PC TOOLS FOR PROJECT MANAGEMENT:
Programs and the State-of-the-Practice

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Cooperative Agreement NCC 9-16
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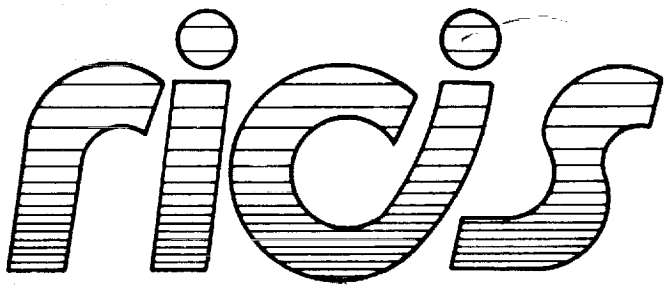
Human Resources Office



Research Institute for Computing and Information Systems
University of Houston - Clear Lake

T·E·C·H·N·I·C·A·L R·E·P·O·R·T

The RICIS Concept

The University of Houston-Clear Lake established the Research Institute for Computing and Information systems in 1986 to encourage NASA Johnson Space Center and local industry to actively support research in the computing and information sciences. As part of this endeavor, UH-Clear Lake proposed a partnership with JSC to jointly define and manage an integrated program of research in advanced data processing technology needed for JSC's main missions, including administrative, engineering and science responsibilities. JSC agreed and entered into a three-year cooperative agreement with UH-Clear Lake beginning in May, 1986, to jointly plan and execute such research through RICIS. Additionally, under Cooperative Agreement NCC 9-16, computing and educational facilities are shared by the two institutions to conduct the research.

The mission of RICIS is to conduct, coordinate and disseminate research on computing and information systems among researchers, sponsors and users from UH-Clear Lake, NASA/JSC, and other research organizations. Within UH-Clear Lake, the mission is being implemented through interdisciplinary involvement of faculty and students from each of the four schools: Business, Education, Human Sciences and Humanities, and Natural and Applied Sciences.

Other research organizations are involved via the "gateway" concept. UH-Clear Lake establishes relationships with other universities and research organizations, having common research interests, to provide additional sources of expertise to conduct needed research.

A major role of RICIS is to find the best match of sponsors, researchers and research objectives to advance knowledge in the computing and information sciences. Working jointly with NASA/JSC, RICIS advises on research needs, recommends principals for conducting the research, provides technical and administrative support to coordinate the research, and integrates technical results into the cooperative goals of UH-Clear Lake and NASA/JSC.

PC TOOLS FOR PROJECT MANAGEMENT:
Programs and the State-of-the-Practice

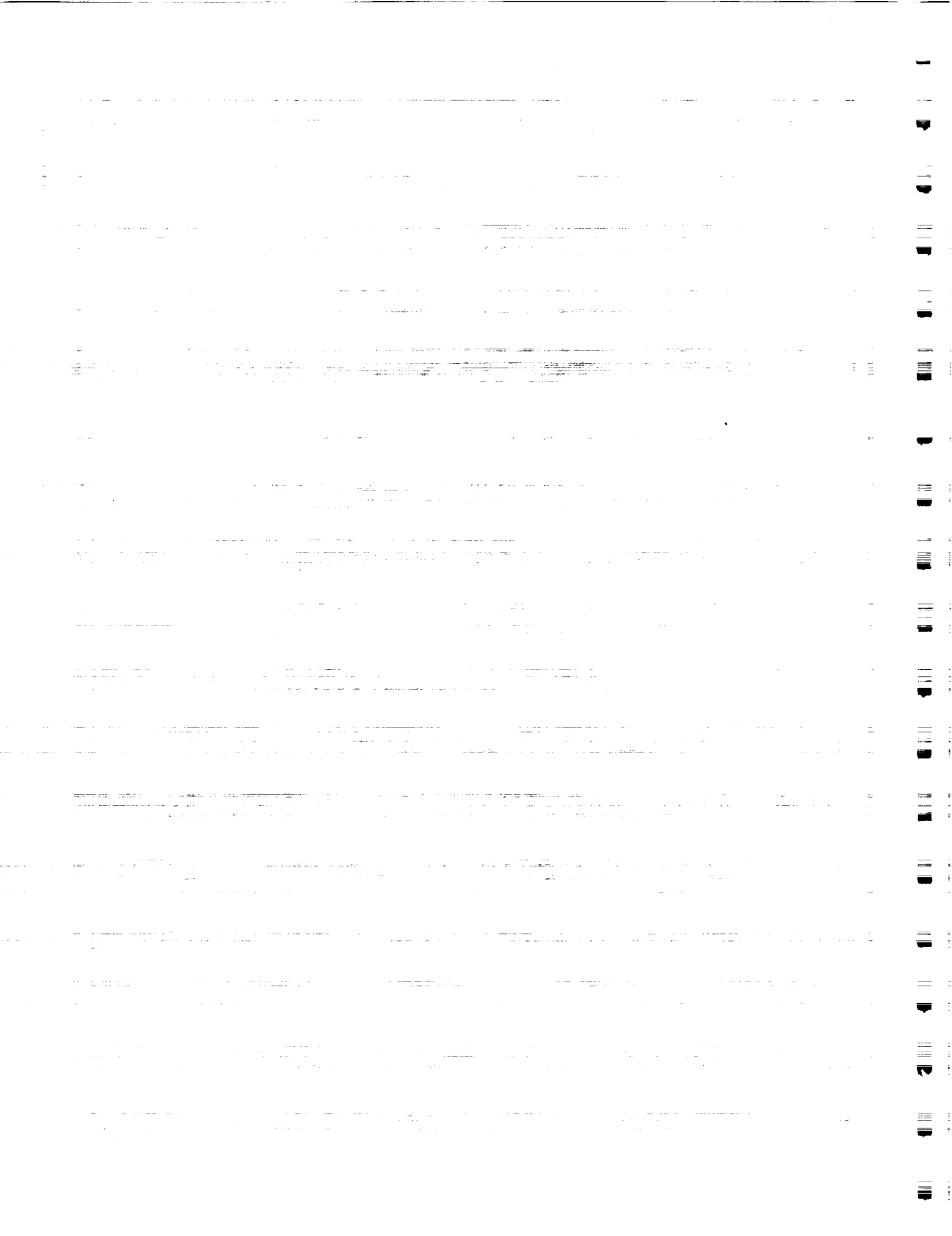
Preface

This research was conducted under the auspices of the Research Institute for Computing and Information Systems by Dr. Peter C. Bishop, Dr. Glenn B. Freedman, Dr. Christopher J. Dede, professors at the University of Houston-Clear Lake and William Lidwell, and David Learned, research assistants at UHCL. Dr. Glenn Freedman, Director of the Software Engineering Professional Education Center at UHCL, served as RICIS research representative.

Funding has been provided by Human Resources Office, NASA/JSC through Cooperative Agreement NCC 9-16 between NASA Johnson Space Center and the University of Houston-Clear Lake. The NASA technical monitor for this activity was Glen Van Zandt, of the Human Resources Development Branch, Human Resources Office, NASA/JSC.

Section I:

Introduction to the Presentation



Purposes of the Presentation

The purpose of the presentation is for each participant to answer the following questions:

1. **How useful are microcomputer tools for NASA project management?**
2. **Which features of the tools are most useful?**
3. **What is the impact of these tools on job performance and individual style?**
4. **What are the prospects for new features in project management tools and related tools?**

Introduction to the Seminar

We ARE:

- √ Examining High, Mid, and Low End PM Tools
- √ Assessing the Pro's and Con's of the tools relative to various tasks
- √ Demonstrating the strengths and weaknesses of the tools through cases and demonstrations

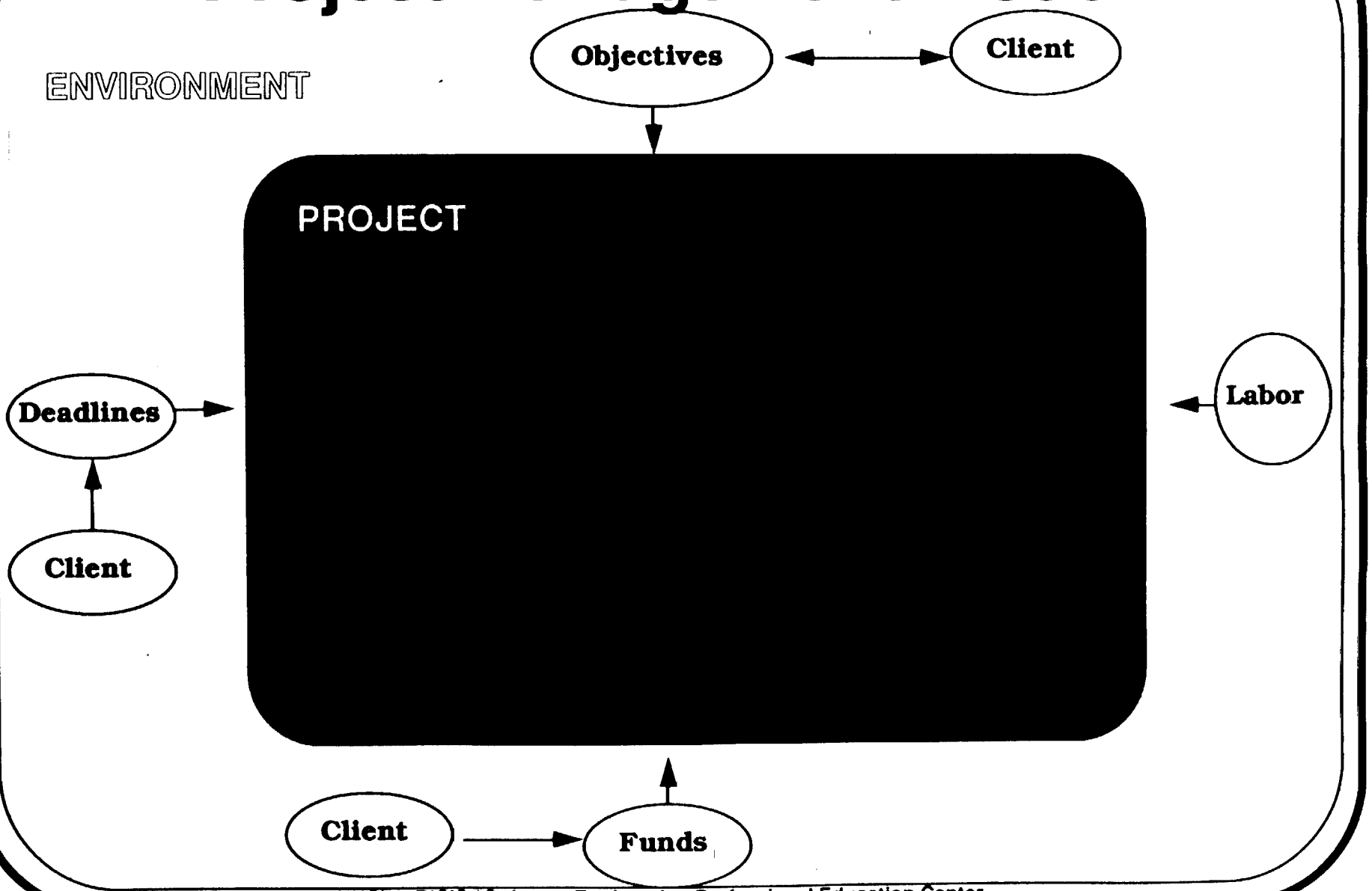
We ARE NOT:

- √ Endorsing any particular tool or technology
- √ Advocating that there is one best way to do every PM task, nor even that PC tools are useful in every case
- √ Providing a skills training program

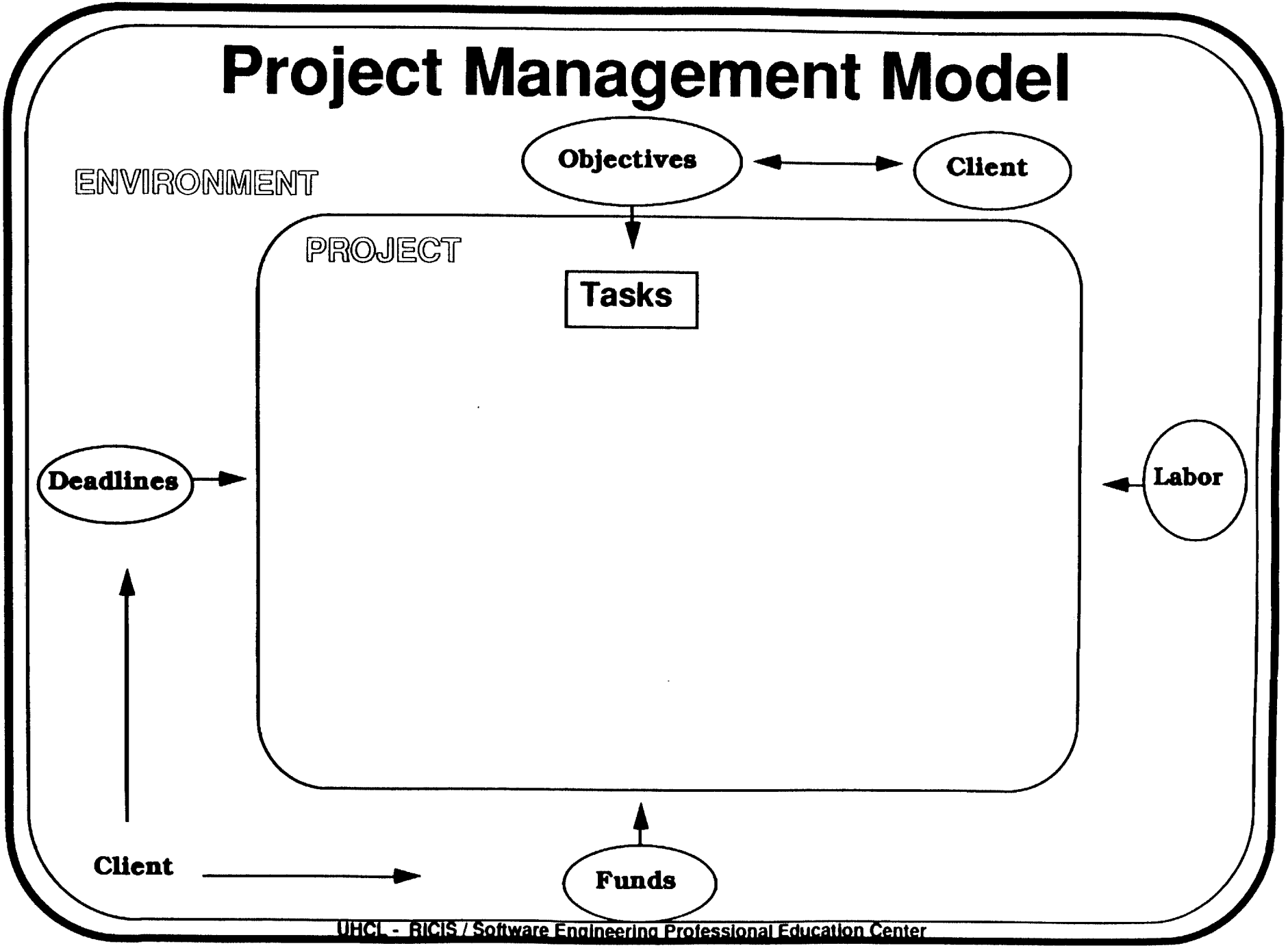
"PC Tools: Caveat Emptor"

Section II:
Project Management Model

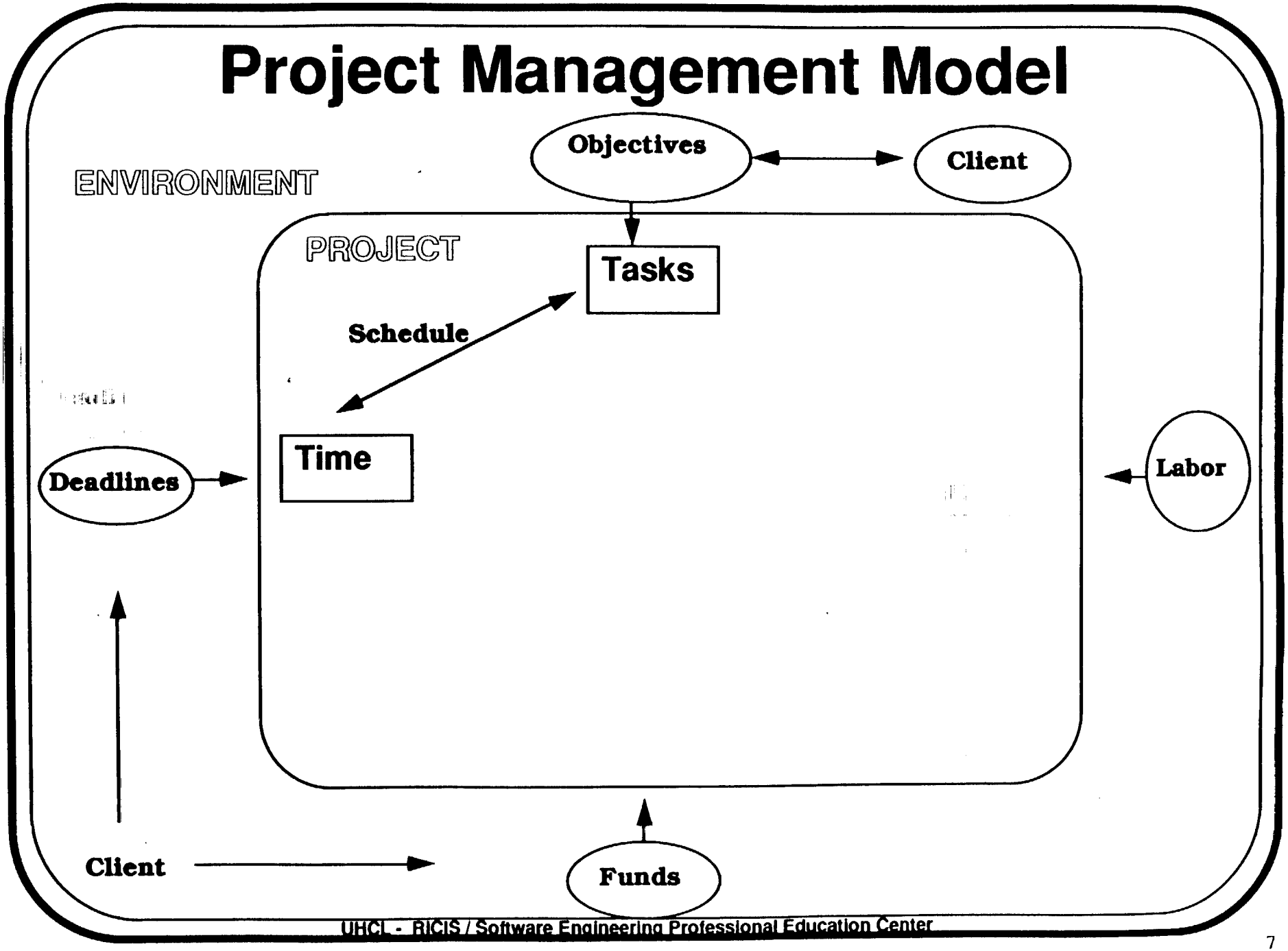
Project Management Model



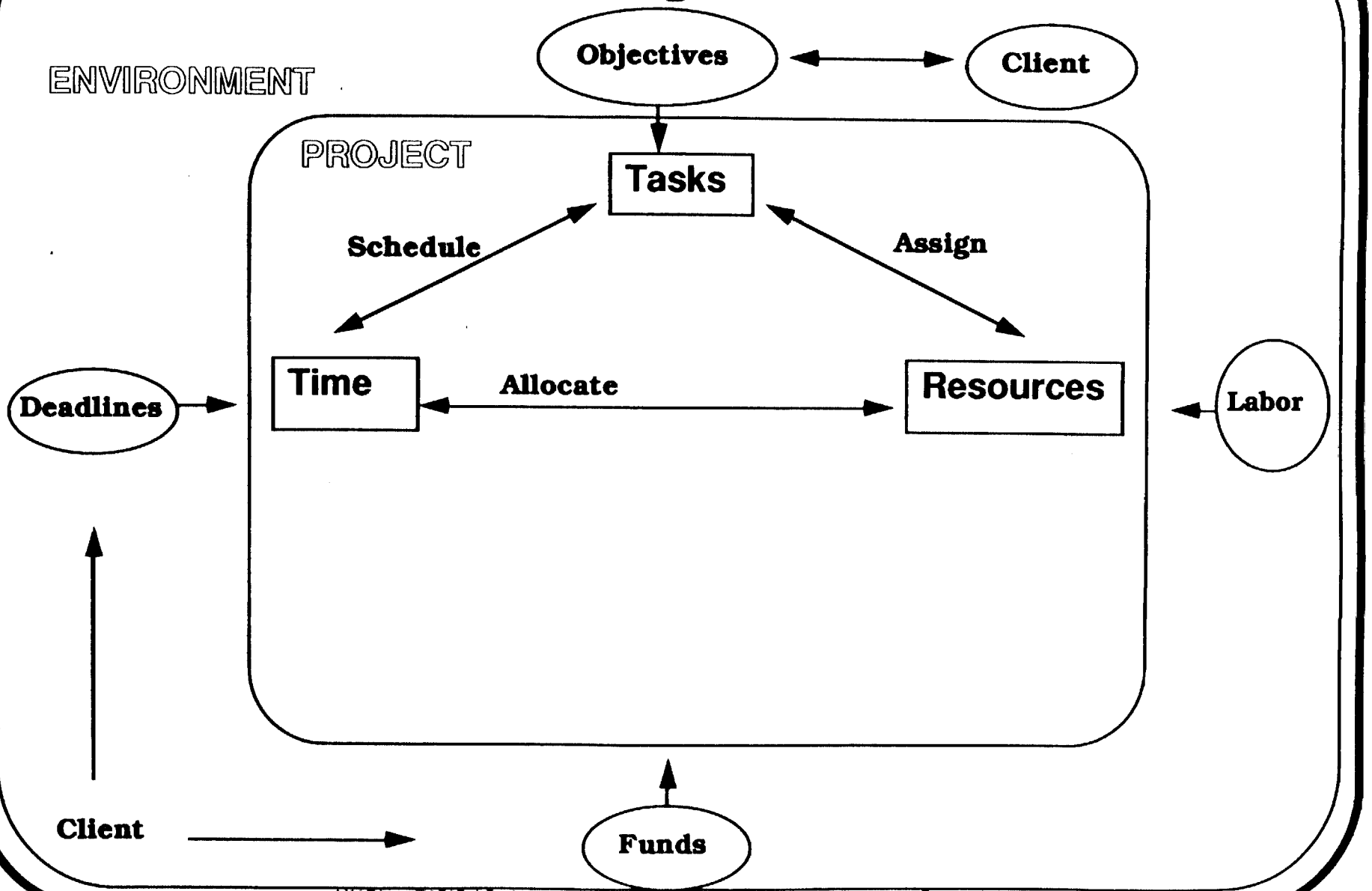
Project Management Model



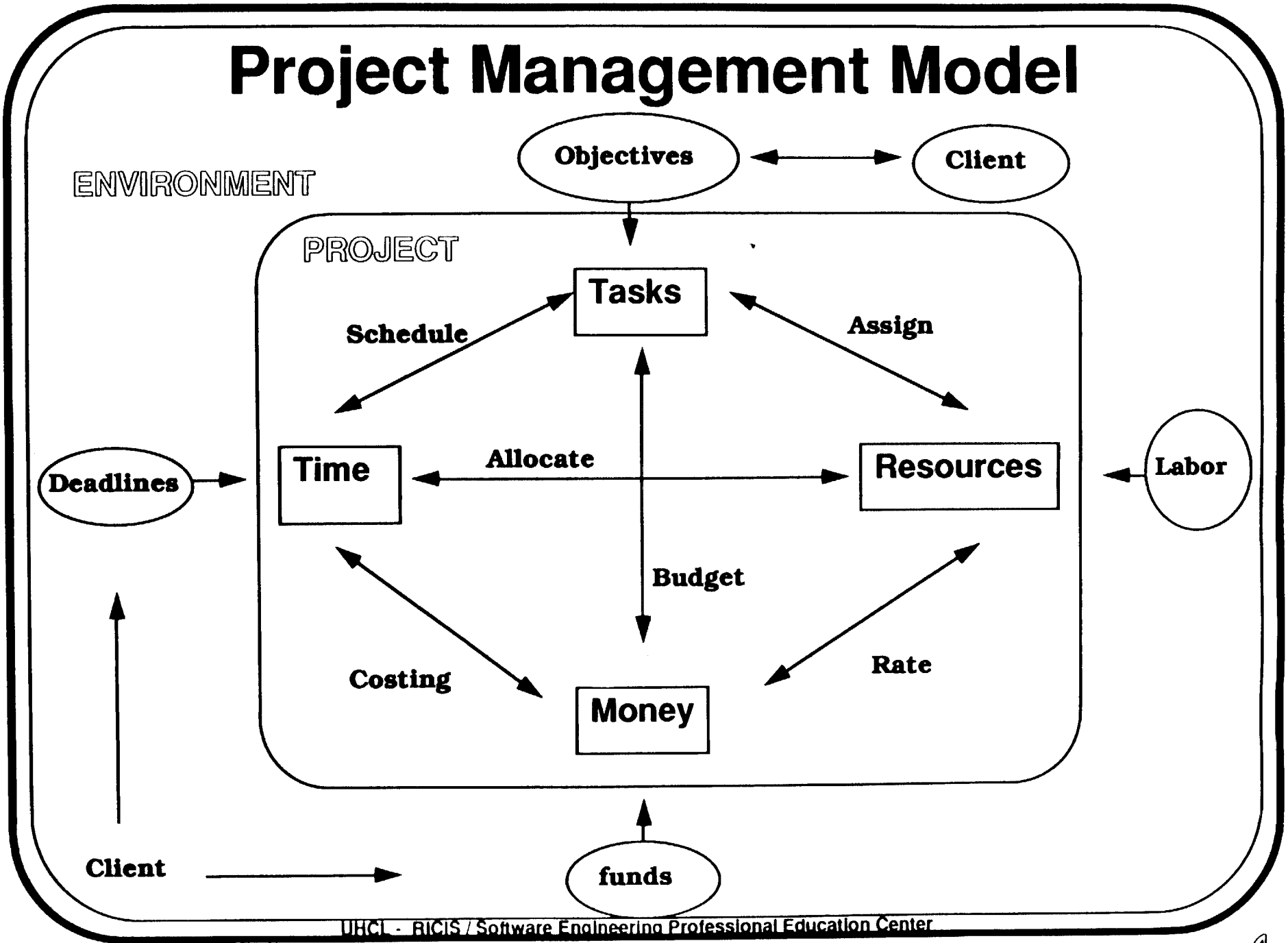
Project Management Model



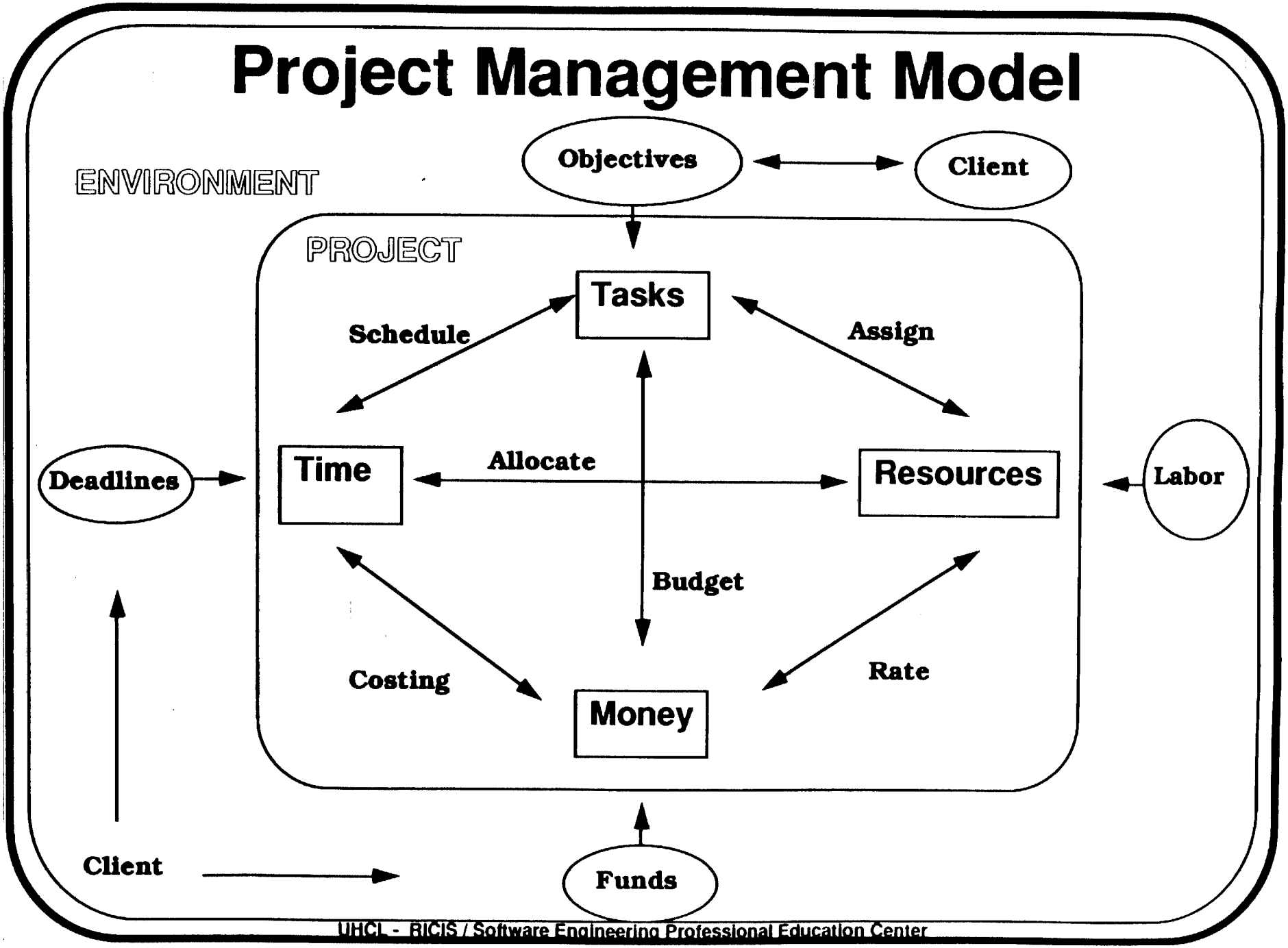
Project Management Model



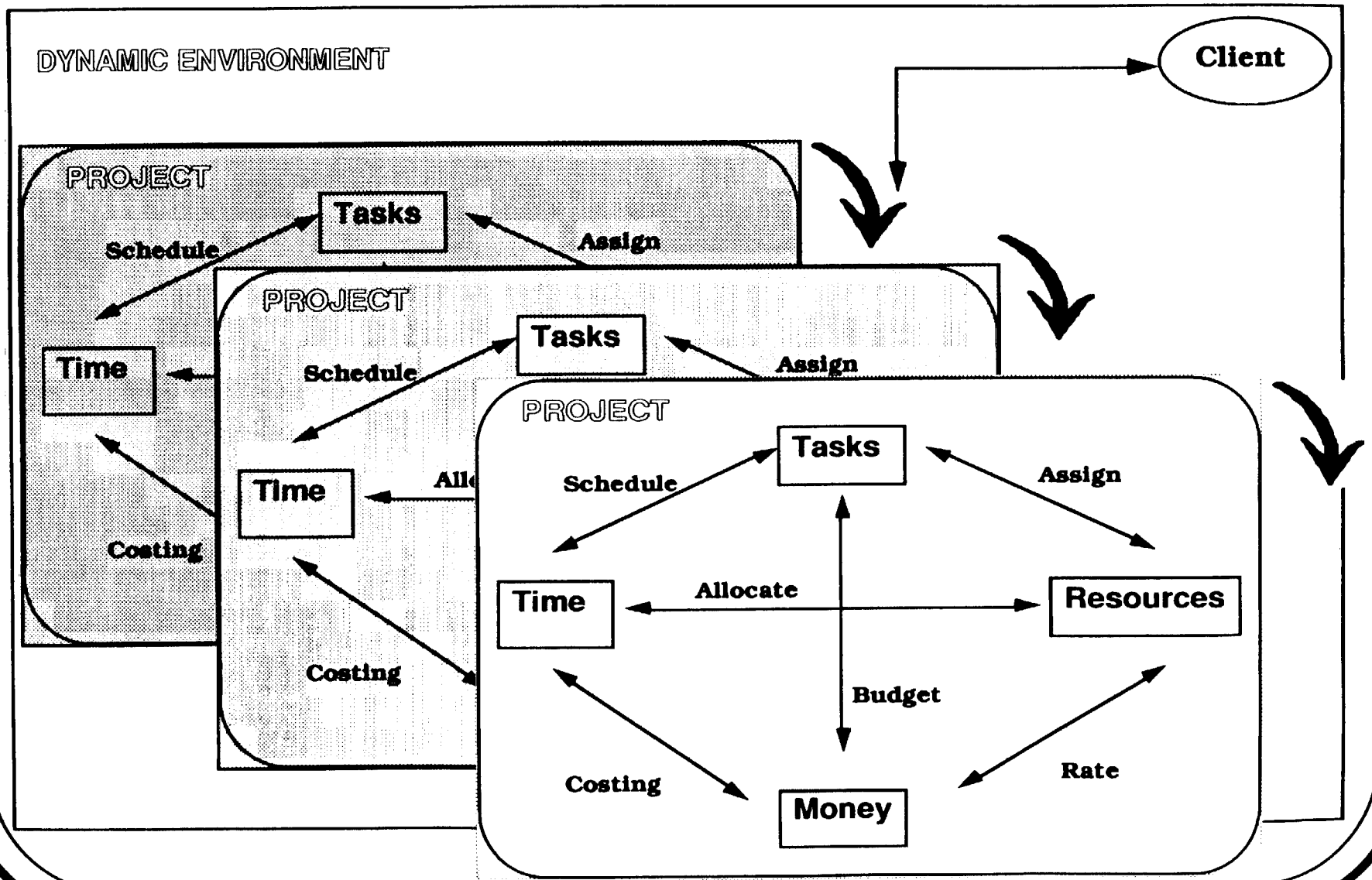
Project Management Model



Project Management Model



Tracking a Project



Glossary of Project Management Terms

Activity: an element of the work entailed on the project; an actual job or task.

Activity-on-arrow: A critical path diagramming technique in which activities and their sequences are represented by arrows with a node at each end. The tail of the arrow represents the beginning of the activity; the head represents the finish.

Activity-on-node: A critical path diagramming technique in which activities are graphically represented by boxes (or nodes). Arrows connecting the nodes show the sequence in which the activities are performed. The arrows are called precedences.

Actual cost of work performed (ACWP): The costs incurred and recorded in accomplishing the work performed within a particular time period.

Allocation: Designation of the number of hours or percent effort a resource is to work on a specific task.

Assignment: The assigning of a resource to work on a specific task.

Bar chart: A graphical representation displaying all activities as horizontal bars extending along project timelines. Also called Gantt charts, bar charts are very basic to project management software because they graphically depict the project schedule, indicating when activities begin and how long they last.

Baseline plan: A schedule and budget against which future project performance can be measured.

Budgeted cost for work performed (BCWP): The budgeted cost of all the work actually accomplished during any given time period.

Budgeted cost for work schedule (BCWS): Another name for the time-phased budget against which performance is measured for the project and for the individual cost account.

CAPM: Computer-aided project management.

Cost Variance: The numerical difference between the budget and the actual cost of the work already performed; similar to schedule variance.

Critical path: The sequence of project activities that determine how much time is necessary to successfully complete a project. Any task on the critical path may not be delayed

without impacting the project's completion time.

Critical Path Method (CPM): a project management principle that leads the user through the scheduling process with the emphasis on time and how each task corresponds with the deadline.

Critical task: A task which has no float time, and any delay results in a delay in the finish of the project.

Deadline: refers to the final date by which a project is scheduled to be completed.

Dependency: The timing relationship between two tasks. For example, one task must end before the other one can begin.

Duration: The amount of time required to complete a task; in most programs, task duration is expressed in terms of hours, days, or weeks.

Earliest start time: The earliest possible time an activity can begin.

Earned-value-based performance measurement: A method of measuring project performance which integrates cost and schedule. Simply, it compares the scheduled amount of work with what actually happened (to determine if the project is on schedule), and the scheduled budget with the actual cost (to determine if the project is over or under budget).

Estimate at completion: A summation of the project's actual cost plus the estimate of costs for the remaining work.

Estimate to complete: A forecast of future project performance based on actual experience to date. The figure is arrived at by estimating the amount of work left to be performed and then estimating the amount of time and other costs needed to finish the job based on experience performing similar work on the project.

Event: The start or finish of one or more activities; it is a single point in time.

Finish-to-finish (FF): A dependency relationship in which the end of the successor is determined by a specified time from the end of the predecessor.

Finish-to-start (FS): A dependency relationship in which the start of the successor is determined by a specified from the end of the predecessor.

Float: The amount of time an activity can be delayed without affecting its completion time. It can also include the amount of time an activity's duration can be lengthened. (Zero float time implies that the activity has no room for delay.)

Free float: Generally, the number of workdays a task can be delayed before delaying another task.

Gantt chart: A graphic representation of task schedules along a timeline. It shows the duration of each task according to dates and status.

Histogram: A graph with vertical bars usually indicating quantities or costs of resources used for specific time elements. For example, a histogram could show volume of concrete used per month in a parking lot construction project.

Latest finish time: The latest event time of the head event.

Leveling: The process of resolving resource conflicts. Leveling "staggers" tasks to bring the workload within the workday limit. The process generally uses priority and float as criteria in deciding which to delay.

Link: A connection between two tasks.

Milestone: A marker or key point that represents the completion of a significant goal. Usually, milestones are visually distinctive in reports and bar charts, so that they are easily seen.

Network: The model used to represent the project's work plan. It consists of activities, precedences and other activity-related information such as resources and costs.

Network analysis: Analysis of the network revealing the project's earliest and latest start and finish dates.

Optimistic duration: The shortest anticipated duration for the completion of a task.

Performance measurement baseline: The time-phased budget plan against which contract performance is measured. It is formed by the budgets assigned to scheduled cost accounts and the applicable indirect budgets.

PERT: (Program evaluation and review technique.) A project management technique for determining how long a project will take to complete based on the statistical analysis of each activity's probable duration: optimistic, pessimistic and most likely.

PERT chart: A visual representation of a project as a series of linked tasks.

Pessimistic duration (Pess): The longest anticipated duration for the completion of a task.

PM: Project management.

Precedence: Precedences represent the sequential relationships between the activities in the project.

Predecessor: The earlier task in a dependency between two tasks.

Project: A task or problem composed of a finite number of activities and events with a definite start and finish.

Rate: The hourly pay rate of the resource.

Resource: A piece of equipment, an employee, a department, a consultant, or any other entity assigned to a task.

Resource histogram: A graph indicating the quantity of resources allocated during the course of the project. By using the graph one can determine when varying amounts of labor and supplies will be necessary for the project's completion.

Resource leveling: The process of resolving resource conflicts by delaying tasks.

Schedule variance: As a project runs its course, it is possible to deviate from the schedule. The numerical difference between the budget of the work actually performed and the budget of the work scheduled to be performed during a specific time period is the schedule variance.

Scheduling: An analysis of the various start and finish dates for critical and non-critical activities in order to produce a time table for the project.

Scheduling constraint: Constraints are dates imposed on the network and any of its activities to simulate the influence of outside events upon the network. For example, assigning a date when the project must be completed is a constraint.

Start-to-start (SS): A dependency relationship in which the start of the successor is determined by a specified time from the start of the predecessor.

Subproject: A project that is also a part of another project.

Successor: The later task in a dependency between two tasks.

Task: An activity or function that is a building block of a project.

Triple constraint: Time, cost and performance.

Work breakdown structure: A hierarchical tree of major project areas which reduces the project into smaller more detailed levels of work.

Section III:

Analysis of NASA Tool Use

Project Management Software at NASA Centers

	SUPPORTED	USED	AVAILABLE
IBM Compatible			
1.....**SuperProject Expert**	2	3	
2.....Microsoft Project	2	1	
3.....**Timeline**	1	4	1
4.....**Viewpoint**	1		1
5...**Primavera Project Planner**	1		1
6.....**Quick Schedule Plus**	1		1
7.....Harvard TPM		3	2
8.....Project Workbench		1	1
9.....**Project Scheduler 4**		1	
10.....SSP's PROMIS			1
Macintosh Compatible			
11.....**MacProject II**	4	2	3
12.....**Micro Planner**	1		1
13.....**FastTrack**		1	2

Comments:
* Data collected by phone interview with "Help" personnel from all 10 NASA centers.
* Software names in **Bold** represent software reviewed for this module.

Sample of the Use of Project Management Software at Johnson Space Center

The following diagram is a summary of phone interviews with Johnson Space Center personnel who acquired project management software as indicated by a list provided by the Product Demonstration Facility at Johnson Space Center.

	IBM Compatible (Super Project Expert)	**Macintosh Compatible** (MacProject II)
Calls initiated	44	33
Individuals contacted	27	26
Actually Used	14	12
Projects currently in progress	11	10
Able to provide sample project	9	10

Frequency Histogram of CAPM Packages by Title Reference
-- PC Compatible --
(Microcomputer Index 1987 - Present)
(Business Software Database 1987 - Present)

Package Name	> 5 10 15 20 <
1.....Timeline	**********
2.....InstaPlan	**********
3.....Viewpoint	**********
4...Primavera Project Planner	**********
5.....Qwiknet Professional	**********
6..... Harvard Total PM II	**********
7.....SuperProject Expert	**********
8.....Microsoft Project	**********
9.....Harvard Project Manager	**********
10.Advanced Project Workbench	**********
11.....Pertmaster Advance	********
12.....Open Plan	*******
13.....Micro Planner	*******
14.....PROMIS	******
15.....SuperProject Plus	******
16.....Artemis	******
17.....Plantrac	****
18...Who/What/When Enterprise	****
19.....Project Scheduler 4	****
20.....SYZYGY	***
21.....Timesheet Professional	**
22.....Pro Path Plus PMS	**
23.....Skyline	**
24....Topdown Project Planner	*
25.....Timepiece	*
26.....PMS-II	*
27.....Project Outlook	*
28.Standard Project Workbench	*
29.....Everybody's Planner	*

COMMENTS: --Revision numbers for software packages were not considered.
--Only "review" references were considered.
--Each asterisk (*) signifies one reference.
--The above software was written for, or is compatible with, the IBM P/C.

Frequency Histogram of CAPM Packages by Title Reference
-- Macintosh --
(Microcomputer Index 1987 - Present)
(Business Software Database 1987 - Present)

```
                                             5    10   15   20
           Package Name               >      |    |    |    |    <

1...............MacProject II          ********
2.................MacSchedule          **
3...............Micro Planner          **
4................Think'n Time          *
5........................More          *
6.....AEC Information Manager          *
7..........FastTrack Schedule          *
8.......Business Plan Toolkit          *
```

COMMENTS: --Revision numbers for software packages were not considered.
--Only "review" references were considered.
--Each asterisk (*) signifies one reference.
--The above software was written for/compatible with the Apple Macintosh.

1989 CAPM Packages
(DataPro Reports - June, 1989)

	Package Name	Version	Number of Users
1	Time Line	(2.0)	100,000
2	Advanced Project Workbench	(3.0)	45,000+
3	Pertmaster	-	15,000
4	Pertmaster Advance	-	15,000
5	Protracs	-	15,000
6	Milestone	-	13,000
7	Advanced Pro-Path 6	-	10,000
8	Primavera Project Planner (P3)	(3.2)	6,700
9	Micro Planner MP 4000	-	5,000
10	Micro Planner MP 2000	-	5,000
11	Quiknet Professional	-	4,200
12	ViewPoint	(3.0)	3,500
13	Qwiknet	-	3,000
14	Plantrac	-	2,800
15	PMS-II	-	2,000+
16	Project Outlook	(2.0)	2,000
17	Project Workbench--Standard System	-	2,000
18	PROMIS	(3.0)	2,000
19	PAC MICRO	-	1,500
20	Critical Path Schedule	-	1,500
21	Finest Hour	(3.0)	1,500
22	Open Plan	-	1,000+
23	Artemis Project Management System	-	900+
24	AMS Time Machine	-	500+
25	Microtrac	-	500+
26	Critical Path Project Management-M2M	-	240
27	Everybody's Planner	-	-
28	Harvard Project Manager	(3.0)	-
29	Micro Planner MP 500	-	-
30	Microsoft Project	-	-
31	Pro-Path Plus	-	-
32	Project Scheduler 4	-	-
33	Skyline	-	-
34	SuperProject Expert/2	-	-
35	SuperProject Expert	(1.1)	-
36	SuperProject Plus	(3.0)	-
37	Time Line	(3.0)	-

--Comments: Dashes represent: Version Column - unchanged
Users Column - unavailable

Tool Selection for IBM Compatibles

High End Tools

- Primavera Project Planner (3.1)
- Viewpoint (3.1)

Mid Range Tools

- Timeline 3.0
- SuperProject Expert 1.1
- Project Scheduler 4 (v. 1.5)

Low End Tools

- Quick Schedule Plus
- Protracs (4.3)

Mid-Range CAPMs Reviewed (PC)

Time Line (3.01)
Symantec Corp.
505 B San Marin Drive
Novato, CA 94945
(800) 441-7234

* **Price:** $595

* **Minimum system requirements:** MS/PC DOS 2.0; 640k RAM; hard disk.

* **Maximum capabilities:** 1,000 tasks per project; 300 resources per project; 24 resources per task.

* **Comments:** Most often reviewed and highest number of users (according to DataPro). Straightforward operation with good functionality. Optional graphics package ($195).

SuperProject Expert (1.10A)
Computer Associates International, Inc.
1240 Mckay Drive
San Jose, CA 95131
(800) 531-5236

* **Price:** $695

* **Minimum system requirements:** MS/PC DOS 2.1; 512k RAM; 2 floppy drives.

* **Maximum capabilities:** 1,560 tasks per project; memory limited number of resources per project; memory limited resources per task.

* **Comments:** Most often used at NASA. Difficult to learn. Excellent functionality for mid-range tool.

Project Scheduler 4 (1.5)
Scitor Corp.
393 Vintage Park Drive
Suite 140
Foster City, CA 94404
(415) 570-7700

* **Price:** $685

* **Minimum system requirements:** MS/PC DOS 2.0; 512k RAM; hard disk; mouse; graphics adapter required.

* **Maximum capabilities:** 1,500 tasks per project; 500 resources per project; unlimited resources per task.

* **Comments:** New package with good reviews. Excellent graphical interface. Lacks some features.

High-End CAPMs Reviewed (PC)

Primavera Project Planner (3.1)
Primavera Systems Inc.
2 Bala Plaza
Bala Cynwyd, PA 19004
(215) 667-8600

* **Price:** $2,500

* **Minimum system requirements:** MS/PC DOS 3.0; 512k RAM (640k RAM recommended); hard disk.

* **Maximum capabilities:** 10000 tasks per project; unlimited resources per project; unlimited resources per task.

* **Comments:** Primavision graphics package is optional ($1,500).

Viewpoint (3.1)
Computer Aided Management Inc.
1318 Redwood Way
Suite 210
Petaluma, CA 94952
(800) 635-5621

* **Price:** $1,995

* **Minimum system requirements:** MS/PC DOS 2.0; 512k RAM.

* **Maximum capabilities:** 32,000 tasks per project; 32,000 resources per project; 32,000 resources per task.

* **Comments:** Viewpoint graphics package is optional ($995).

Low-End CAPMs Reviewed (PC)

Quick Schedule Plus
Channelmark Corporation
2929 Campus Drive
San Mateo, CA 94403
(415) 345-5900

* **Price:** $69.95
* **Minimum system requirements:** MS/PC DOS 2.0; 256k RAM.
* **Maximum capabilities:** 500 tasks per project.
* **Comments:** Basic Gantt-maker; Longitudinal printout capability.

Protracs (4.3)
Applied MicroSystems, Inc.
P.O. Box 832
Roswell, GA 30077
(404) 475-0832

* **Price:** $79.95
* **Minimum system requirements:** MS/PC DOS 2.0; 512k RAM.
* **Maximum capabilities:** 2,000 tasks per project.
* **Comments:** Basic Gantt-maker.

Tool Selection for Macintosh

High End Tools

None

Mid Range Tools

MacProject II (2.2)

MicroPlanner (6.1)

Low End Tools

FastTrack Schedule

Macintosh CAPMs Reviewed

MacProject II (2.2)
Claris Corporation
5201 Patrick Henry Drive
Box 58168
Santa Clara, CA 95052-8168
(408) 987-7000

* **Price:** $499

* **Minimum system requirements:** Macintosh Plus or later.

* **Maximum capabilities:** 500 tasks per project; 800 resources per project; 8 resources per task.

* **Comments:** Higher level Mac tool; Most often reviewed and highest number of users at NASA.

MicroPlanner (6.0)
Micro Planning International
235 Montgomer Street
Suite 840
San Francisco, CA 94104
(415) 788-3324

* **Price:** $595

* **Minimum system requirements:** Macintosh Plus or later.

* **Maximum capabilities:** 500 tasks per project; 26 resources per project; 20 resources per task.

* **Comments:** Higher level Mac tool; "...choice of corporate America." (MACUSER, October 1989)

FastTrack Schedule (1.02)
AEC Management Systems, Inc.
20524 Amethyst Lane
Germantown, MD 20874
(301) 428-3694

* **Price:** $195

* **Minimum system requirements:** Macintosh Plus or later.

* **Maximum capabilities:** 32,000 tasks per project.

* **Comments:** Lower level Mac PM tool; Primarily a Gantt-maker.

Section IV:

Project Management Tools: Feature Analysis

Comparison of Mid-Range PM Tools: IBM vs. Mac

IBM	Mac
More functional	Ease of use; ease of learning
More mathematical	Ease for scheduling
-earned value analysis	Presentation capabilities
-intelligence	-flexible presentations
-modelling	-custom, graphical reports
-resource cost estimation	-word processing/annotation
Larger projects	Small group; small project orientation
-manage complexity	PERT metaphor
WBS metaphor	Mouse driven
Cursor driven	Tool integration
-outline format	

Mid-Range Tool Comparison

IBM Compatible

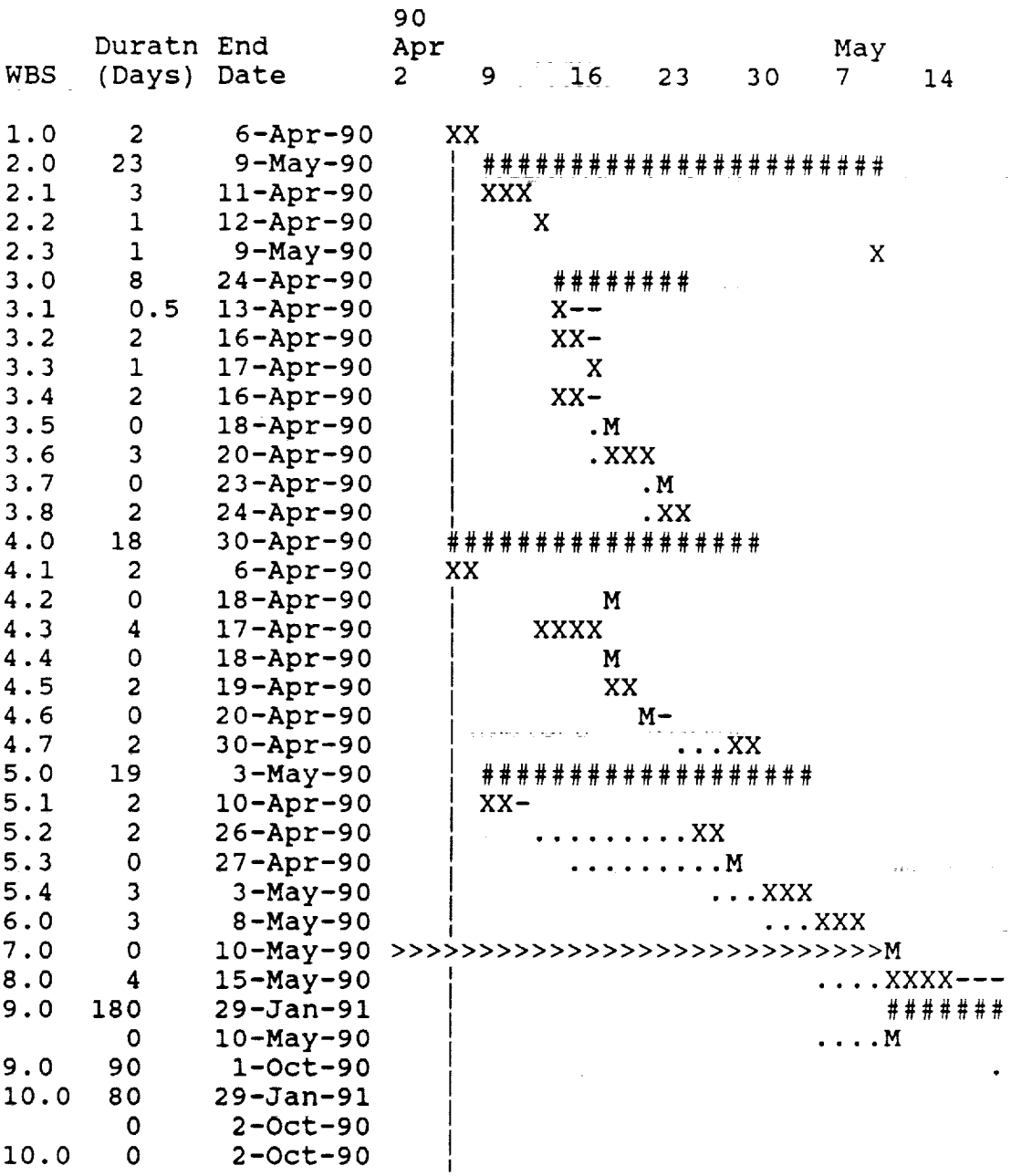
PC Tools for Project Management

Overall Mid-Range Features

	UNIQUE QUALITIES	POTENTIAL PROBLEMS
TIMELINE	Straight-forward	Forms entry
	Insert/copy	Resource info not on outline
	Global roll-up/down	
	Costs assigned to tasks	
	EVA statistics	
SUPER PROJECT EXPERT	Automatic WBS	Poor consistency and documentation
	Resources on outline	Few menus on sub-items
	Subprojects	Few tracking defaults
	Complete Boolean filtering	Little control over screen or reports
PROJECT SCHEDULER 4	Graphical interface	Separate resource tables are often not consistent with project
	Enter tasks and links on PERT	No file maintenance routines
	Multiple active windows	No outline feature

Schedule Name : NASA Project Management Tools
Responsible : P Bishop, UHCL/RICIS
As-of Date : 5-Apr-90 Schedule File : A:\PM\TL3\BASELINE

Task Name	WBS	Duratn (Days)	End Date
Review project obj	1.0	2	6-Apr-90
Establish tasks	2.0	23	9-May-90
List tasks	2.1	3	11-Apr-90
Subordinate tas	2.2	1	12-Apr-90
Develop WBS	2.3	1	9-May-90
Schedule tasks	3.0	8	24-Apr-90
Establish proje	3.1	0.5	13-Apr-90
Assign duration	3.2	2	16-Apr-90
Establish miles	3.3	1	17-Apr-90
Link tasks	3.4	2	16-Apr-90
Calculate sched	3.5	0	18-Apr-90
Move slack/floa	3.6	3	20-Apr-90
Calculate sched	3.7	0	23-Apr-90
Adjust schedule	3.8	2	24-Apr-90
Assign resources	4.0	18	30-Apr-90
List resources	4.1	2	6-Apr-90
Establish resou	4.2	0	18-Apr-90
Allocate resour	4.3	4	17-Apr-90
Calculate sched	4.4	0	18-Apr-90
Adjust oversche	4.5	2	19-Apr-90
Level resources	4.6	0	20-Apr-90
Adjust schedule	4.7	2	30-Apr-90
Measure costs	5.0	19	3-May-90
Assign resource	5.1	2	10-Apr-90
Assign other co	5.2	2	26-Apr-90
Calculate overa	5.3	0	27-Apr-90
Adjust sched &	5.4	3	3-May-90
Review plan	6.0	3	8-May-90
Baseline the plan	7.0	0	10-May-90
Produce planning r	8.0	4	15-May-90
Work	9.0	180	29-Jan-91
Begin work		0	10-May-90
Track progress	9.0	90	1-Oct-90
Produce progres	10.0	80	29-Jan-91
End work		0	2-Oct-90
Deliver	10.0	0	2-Oct-90



XXXXX Detail Task ##### Summary Task M Milestone
xxXXX (Started) ==### (Started) >>> Conflict
XXX-- (Slack) ###-- (Slack) ..XXX Resource delay
Scale: 1 day per character

TIME LINE Gantt Chart Report, Strip 1

OUTLINE

Print Screen Project: BASELINE.PJ

Heading/Task Resource	WBS Code	Dur	Schd Start	Schd Finish
BASELINE.PJ	00.0	173	03-30-90<	09-19-90
Review proj objt	01.0	2	03-30-90	04-02-90
Client		2	03-30-90	04-02-90
Manager		2	03-30-90	04-02-90
Establish tasks	02.0	7	04-03-90	04-11-90
List tasks	02.1	3	04-03-90	04-05-90
Manager		3	04-03-90	04-05-90
Scheduler		3	04-03-90	04-05-90
Subordinat tasks	02.2	1	04-10-90	04-10-90
Scheduler		1	04-10-90	04-10-90
Develop WBS	02.3	1	04-10-90	04-11-90
Schedule tasks	03.0	14	03-30-90	04-18-90
Est proj calndar	03.1	4h	03-30-90	03-30-90
Scheduler		4h	03-30-90	03-30-90
Assign durations	03.2	2	04-06-90	04-09-90
Scheduler		2	04-06-90	04-09-90

GANTT

Print Screen Project: BASELINE.PJ

1 Day Per Symbol ID Heading/Task Resource	April 90 02 09 16 23 30	May 07 14
1 BASELINE.PJ	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
01 Review proj objt	x>...	
001 Client	x>...	
01 Manager	x>...	
02 Establish tasks	.xxxxxxxxx>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	
003 List tasks	.xxx>	
003 Manager	.xxx>	
03 Scheduler	.xxx>	
04 Subordinat tasks	....> >x>>> >>>>> >>>>> >>>>> >>>>> >>>>>	
004 Scheduler	....> >x>>> >>>>> >>>>> >>>>> >>>>> >>>>>	
05 Develop WBS	..... .xx>> >>>>> >>>>> >>>>> >>>>> >>>>>	
06 Schedule tasks	XXXXXXXXXXXXXXXXX.....	
007 Est proj calndar	>>>>> >....	
07 Scheduler	>>>>> >....	
08 Assign durations	....x x>...	
008 Scheduler	....x x>...	

JOB COLUMN REPORT
PROJECT: Project Management

CURRENT DATE: 04/01/9_
AS OF DATE: 02/05/90

WBS CODE	JOB NAME	DURATION	SCHEDULED START	SCHEDULED FINISH
1.0	Review project objectives	16h	04/04/90	04/05/90
2.0	Establish tasks	0d	04/04/90	04/04/90
2.1	List tasks	24h	04/05/90	04/10/90
2.2	Subordinate tasks	8h	04/17/90	04/18/90
2.3	Develop WBS	8h	04/12/90	04/13/90
3.0	Schedule tasks	0d	04/04/90	04/04/90
3.1	Establish project calender	4h	04/04/90	04/04/90
3.2	Assign Duration	16h	04/10/90	04/12/90
3.3	Establish Milestones	8h	04/10/90	04/11/90
3.4	Link Tasks	16h	04/10/90	04/12/90
3.5	Calculate schedule	0d	04/12/90	04/12/90
3.6	Move slack/float	24h	04/13/90	04/17/90
3.7	Calculate schedule	0d	04/17/90	04/17/90
3.8	Adjust schedule	24h	04/19/90	04/24/90
4.0	Assign resources	0d	04/04/90	04/04/90
4.1	List resources	16h	04/11/90	04/13/90
4.2	Establish resource calenders	0d	04/13/90	04/13/90
4.3	Allocate resources to tasks	32h	04/13/90	04/18/90
4.4	Calculate schedule	0d	04/18/90	04/18/90
4.5	Adjust oversched resources	16h	04/18/90	04/20/90
4.6	Level resources	0d	04/20/90	04/20/90
4.7	Adjust schedule & resources	16h	04/24/90	04/26/90
5.0	Measure costs	0d	04/04/90	04/04/90
5.1	Assign resource rates	16h	04/04/90	04/05/90
5.2	Assign other costs	16h	04/11/90	04/13/90
5.3	Calculate overall costs	0d	04/13/90	04/13/90
5.4	Adjust sched & rescr to cost	24h	04/26/90	04/30/90
6.0	Review plan	16h	04/30/90	05/02/90
7.0	Baseline the plan	0d	05/02/90	05/02/90
8.0	Produce planning reports	32h	05/02/90	05/08/90
9.0	Work	0d	04/04/90	04/04/90
9.1	Begin work	0d	05/02/90	05/02/90
9.2	Track progress	80d	05/15/90	09/04/90
9.3	Produce progress reports	640h	05/28/90	09/04/90
9.4	End work	0d	09/04/90	09/04/90
10.0	Deliver	0d	09/04/90	09/04/90

Project Management Software Features (PC)

A Primavera Project Planner

B Viewpoint

C SuperProject Expert

D Project Scheduler 4

E Time Line

F Protracs

G Quick Schedule Plus

	A	B	C	D	E	F	G
*** VERSION & COST**							
1.....Version:	3.2	3.0	1.1	2.0	3.0	4.3	
2.....Cost:	2,500	1,995	695	685	595	79.95	69.95
*** PLANNING CAPABILITIES**							
1..... Tasks/project:	10,000	32,000	3,000	1,500	1,000	2,000	500
2...Resources/project:	UNLIM	32,000	MEMLTD	500	300	N/A	N/A
3.....Resources/task:	10,000	32,000	MEMLTD	UNLIM	24	N/A	N/A

| | A | B | C | D | E | F | G |

	A	B	C	D	E	F	G
4.....Subprojects:	N	Y	Y	Y	Y	N	N
5.....WBS codes:	Y	Y	Y	Y	Y	N	N
6..Activity-on-node Network:	Y	Y	Y	Y	Y	N	N
7....Minimum work unit:	DAY	DAY	HOUR	MIN	MIN	DAY	MIN
8...Multiple Calenders:	Y	Y	N	N	N	N	N
9...Calculates free float:	Y	Y	Y	Y	Y	N	N
10..Selective resource leveling:	Y	Y	Y	Y	Y	N	N
11.Leveling over multiple projects:	Y	Y	Y	Y	Y	N	N

	A	B	C	D	E	F	G

	A	B	C	D	E	F	G
* **EDITING CAPABILITIES**							
1....Interactive Gantt:	Y	Y	Y	Y	Y	Y	Y
2.....Interactive Pert:	Y	Y	Y	Y	Y	N	N
3..Search / sort filtering:	Y	Y	Y	Y	Y	Y	N
4.Split screen / windowing:	N	N	N	Y	N	N	N
* **TRACKING**							
1.Baseline schedule(s):	Y	Y	Y	Y	Y	N	N
2.....Percent complete:	Y	Y	Y	Y	Y	N	N
3....Actual v. planned:	Y	Y	Y	Y	Y	N	N
3a.....Schedule:	Y	Y	Y	Y	Y	N	N
3b.....Cost:	Y	Y	Y	Y	Y	N	N
4.....Manual override:	Y	Y	Y	Y	Y	Y	Y
5...Earned Value Analysis:	Y	Y	Y	Y	Y	N	N

| | A | B | C | D | E | F | G |

	A	B	C	D	E	F	G
*** REPORTING**							
1.....Gantt chart:	Y	Y	Y	Y	Y	Y	Y
2.....PERT Network:	OPT	OPT	Y	Y	Y	N	N
3.....Histograms:	Y	Y	Y	Y	Y	N	N
4.....WBS:	Y	Y	Y	Y	Y	N	N
*** COMPATIBLE FILE FORMATS**							
1.....ASCII:	Y	Y	Y	Y	Y	N	N
2.....Dbase:	Y	Y	Y	Y	Y	N	N
3.....Lotus 1-2-3:	Y	Y	Y	Y	Y	N	N
*** OTHER**							
1.....Macros:	N	N	Y	N	Y	N	N
2.....LAN support:			Y	Y	Y	Y	N
3.....Plotter Support:	OPT	OPT	Y	Y	OPT	N	N
4.Multiproject summary:	Y	Y	Y	Y	Y	N/A	N/A
	A	**B**	**C**	**D**	**E**	**F**	**G**

TIMELINE	SUPER PROJECT EXPERT	PROJECT SCHEDULER 4
NAVIGATION		
keyboard interface	keyboard interface	graphical and keyboard interface (best with mouse and graphics printer)
Lotus-like command line	pull down menu command line	all pull-down and pop-up menus
FKey driven (with Shft, Ctrl)	Shft, Ctrl. Alt + letter driven	...
all sub-items under menu	some sub-items under menu	some sub-items under menu
fill-in parameters backed by menus	no-fill ins	...
DOS like Lotus	file save & retrieve	fewer file maintenance procedures
HELP		
user controlled tutorial	good tutorial video available	automatic tutorial
function key as first help screen	function keys help on individual screens	...
context-sensitive then first letter lookup within index	first screen context-sensitive, then one screen index	first screen context-sensitive, then page-by-page

TIMELINE	SUPER PROJECT EXPERT	PROJECT SCHEDULER 4
SCREEN LAYOUT		
central Gantt screen	many equivalent screens	three central screens with multiple subscreens
item and width control	item control, but not width	window control, but little column control within window
Gantt on screen with data	...	Gantt on screen with data from one task or resource
one column and one form window on same screen	one column window on same screen	multiple column windows on same screen
insert/copy	...	...
DATA ENTRY		
data entry forms (use macro)	data entry forms & columns	data entry forms & columns
data entry updates screens	needs recalc to update screens	needs brief update to update screens
OUTLINE		
global roll-up/out	individual roll-up/out	no outlining

TIMELINE	SUPER PROJECT EXPERT	PROJECT SCHEDULER 4
automatic summaries on same report	automatic summaries on same report	higher level WBS or OBS summaries as separate items
merging projects	subprojects	separate active projects
manual WBS entry	automatic WBS calculation	manual W.. entry
filters and highlights (needs exact match)	highlights (uses range)	WBS and resource filters (needs exact match)
hides unselected tasks	highlights selected tasks	hides unselected tasks
LINKS		
...	...	enter links on PERT
shows links on outline (color) and form	shows links on form	shows links on form
headings included as links	...	no headings
orthogonal PERT	time-scaled PERT	time-scaled PERT
RESOURCES		
...	...	separate resource file
...	resource calendars	resource calendars

TIMELINE	SUPER PROJECT EXPERT	PROJECT SCHEDULER 4
horizontal resource display	vertical resource display	displays only one resource on Gantt
shows allocations on different forms	shows all allocations on same form	shows allocations on different forms
shows up to five resource histograms at a time	shows one resource histogram at a time	shows one resource histogram at a time
COSTS		
variable costs for each resource	fixed and variable costs for each resource	variable costs for each resource
can assign costs to tasks	costs assigned only to resources	costs assigned only to resources
total cost only on display	fixed, variable, and total cost displays	labor, materials, and other resources
TRACKING		
percent complete defaults rest of parameters	most parameters manually entered	percent complete defaults rest of parameters

	TIMELINE	SUPER PROJECT EXPERT	PROJECT SCHEDULER 4
	most cost figures under manual control	actual hours calculated from actual duration... actual duration may differ from planned duration	all cost figures under manual control
	numerous total costs parameters	total, planned, scheduled, and BCWP cost parameters only	planned, completed, and actual cost parameters only
	earned value analysis	...	...
REPORT LAYOUT			
	graphics printer recommended	graphics printer recommended	graphics printer required for Gantt and PERT
	four report types	multiple report types	many report types
	limited data on 3 types	all data available	most data available
	simple totals available	totals and subtotals not always available or consistent	fixed totals and subtotals
	export to ASCII and 123	export to ASCII and 123	export to ASCII

Product Reviews--Summary

--INFOWORLD (Feb 20, 1989) / large projects

Reviewed:
* Pertmaster Advance 2.1 ($1,495)
* Primavera Project Planner 3.1 ($2,500)
* Artemis Project 2.15 ($3,500)
* Project Workbench 3.0 ($1,275)
* Open Plan 3.1 ($4,200)
* Qwiknet Professional 1.3 ($1,995)
* Viewpoint 3.1 ($1,995)

Ratings:
1. Viewpoint 3.1 @ 7.4
2. Primavera Project Planner 3.1 @ 7.3
3. Pertmaster Advance 2.1 @ 6.6

Comments: The Viewpoint has an optional graphics package costing $999. The Primavera Project Planner has an optional graphics package costing $1,500.

--BYTE (Nov 1988) / small, medium, and large projects

Reviewed:
* Viewpoint 3.0 ($1,995)
* SuperProject Expert 1.0 ($695)
* Pertmaster Advance 2.0 ($1,495)
* Time Line 3.0 ($595)
* Timepiece 1.3 ($495)
* Topdown Project Planner 1.01 ($99)
* Instaplan 1.03b ($99)
* Microtrak 1.6 ($595)
* PMS-II 8.1 ($1,295)
* Pro Path Plus 1.0 Lvl 26 ($495)

Ratings:
1. Viewpoint 3.0
2. Pertmaster Advance 2.0

--INFOWORLD (Sept 25, 1989) / small and medium projects

Reviewed:
* Harvard Project Manager 3.01 ($695)
* Instaplan 2.0 ($495)
* Microsoft Project 4.0 ($245)
* Project Scheduler 4, 1.5 ($685)
* SuperProject Expert 1.1 ($695)
* Time Line 3.01 ($595)

Ratings:
1. Project Scheduler 4, 1.5 @ 7.7
2. Time Line 3.01 @ 7.2
3. Instaplan 2.0 @ 7.1

Comments: The average number of maximum tasks per project was approximately 1000 (Hi=SuperProject Expert @ 1560, Lo=Harvard Project Manager @ 280).

--INC. (October 1988) / small and medium projects

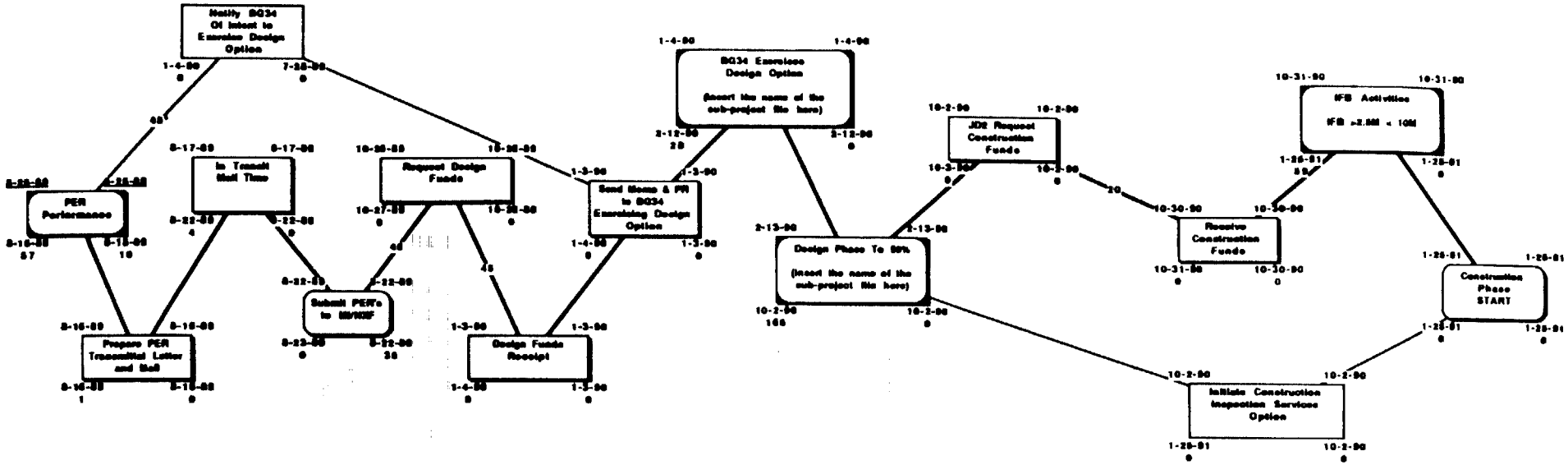
Recommended:
* Time Line ($595)
* Harvard Total Project Manager II ($595)
* Microsoft Project 4.0 ($495)

Comments: "...selected...for those of you [executives] who aren't entirely comfortable with new programs."

Mid-Range Tool Comparison

Macintosh

	MacProject II	MicroPlanner	FastTrack Schedule
General			
Navigation	mouse; keyboard Mac interface	mouse; keyboard Mac interface	mouse; keyboard Mac interface
Help	Hypercard tutorial Manual Sample projects	Manual with tutorial Hypercard introduction Sample projects	Manual with examples Sample project
Screen Layout	PERT with data support Control of sizing and data	PERT with data support Control of sizing and data	Gantt Matrix Control of length and width
Data Entry	Format and enter on PERT No macros Automatic updates	Format and enter on PERT No macros Automatic updates	Enter on matrix; formats No macros Automatic updates
Outline	Outline based on PERT No WBS Linking easy and necessary	Outline based on PERT No WBS Linking easy and necessary	Outline based on time No WBS Linking based on time and outline
Resources	Leveling available; allocations; task and resource costs; cash flow; durations; workloads;	Levelling; costs; negative avail; over/unders; time analysis	Scheduling
Tracking	Subprojects; supertasks; costs	Projects; tasks; costs	Scheduling ; adjustments
Report Layout	Schedule charts; resource timeline tasks; cost entries; cash flow; resource histogram; PERT customized reports; graphics color support	Activities; bar charts; costs; progress; histogram; key events; network; supercritical; top level customized reports; color	Bar charts; graphics; color; annotation on charts
Other Features	Tool integration; ASCII	Tool integration	ASCII; IBM exchange



Logic Diagram For FY91 Project
MCC Power & Control Systems
PER/DESIGN Project Phase

Earliest Start | Actual Start

NASA

Latest Finish | Actual Finish
Duration | % Done

Filename: FY91 MCC PER/Design Phase
Current File Date: 7/12/89
Linked Files: (list sub-project files here)
Print at 72%
Total Tasks in this Diagram .....
plus Total Sub-Project Tasks.....
Total Σ=

Date : 1-APR-90
Time Now : 2-APR-90
Project : ARCHITECTURE
Output : Network Data

MICRO PLANNER

Identification / Type / Description	Duration / Balance		TIME ANALYSIS Early	TIME ANALYSIS Late	ARCHIVES Master	ARCHIVES Interim / RESOURCES>	RESOURCE ANALYSIS Name	FIXED DATES Start	PROGRESS DATES Finish	Resp Quantity	Sortcode Zone / Usage
1		Starts>	16 Feb 90	16 Feb 90	N/A	N/A	16 Feb 90				
Begin		Finish>									
Start of Office Construction Project											
1 → 2	3,1	Starts>	16 Feb 90	16 Feb 90	N/A	N/A	16 Feb 90		16 Feb 90		
Normal 1		Finish>	9 Mar 90	9 Mar 90	N/A	N/A	9 Mar 90		9 Mar 90	Smith-Sub	CAAC
Programming & Schematic Design							ARCHITECT	0,0	3,1	1.00	Per Day
2 →		Starts>	11 Mar 90	11 Mar 90	N/A	N/A	11 Mar 90				
Normal		Finish>									
2 → 3	3,0	Starts>	12 Mar 90	12 Mar 90	N/A	N/A	12 Mar 90		12 Mar 90		
Normal 1		Finish>	30 Mar 90	30 Mar 90	N/A	N/A	30 Mar 90		30 Mar 90	Smith-Sub	CAAC
Design Development & Prepare Furniture Specifications							ARCHITECT	0,0	3,0	1.00	Per Day
3 →		Starts>	1 Apr 90	1 Apr 90	N/A	N/A	1 Apr 90				
Key		Finish>									
TIME NOW											
3 → 4	4,0	Starts>	2 Apr 90	4 Apr 90	N/A	N/A	4 Apr 90				
Normal 1		Finish>	27 Apr 90	1 May 90	N/A	N/A	1 May 90			Architect	CAAC
Prepare Contract Documents (Plans & Specifications)							ARCHITECT	0,0	4,0	1.00	Per Day
3 → 6	4,0	Starts>	2 Apr 90	3 Apr 90	N/A	N/A	3 Apr 90				
Normal 1		Finish>	27 Apr 90	30 Apr 90	N/A	N/A	30 Apr 90				DSE
Prepare Engineering Drawings & Specs							ARCHITECT	0,0	4,0	1.00	Per Day
3 → 7	2,0	Starts>	2 Apr 90	2 Apr 90	N/A	N/A	2 Apr 90				
Normal 1		Finish>	13 Apr 90	13 Apr 90	N/A	N/A	13 Apr 90				CCBF
Order Furniture							ARCHITECT	0,0	2,0	1.00	Per Day
4 →		Starts>	30 Apr 90	1 May 90	N/A	N/A	1 May 90				CAAC
Normal		Finish>									
4 → 11	3,0	Starts>	1 May 90	2 May 90	N/A	N/A	2 May 90				
Normal 1		Finish>	21 May 90	22 May 90	N/A	N/A	22 May 90			Smith-Sub	CCBF
Bid Construction & Approvals							ARCHITECT	0,0	3,0	1.00	Per Day
6 → 4	0,1	Starts>	30 Apr 90	1 May 90	N/A	N/A	1 May 90				
Normal 1		Finish>	30 Apr 90	1 May 90	N/A	N/A	1 May 90				CAAC
Merge with Architectural & Issue							ARCHITECT	0,0	0,1	1.00	Per Day
7 → 8	14,0	Starts>	16 Apr 90	16 Apr 90	N/A	N/A	16 Apr 90				
Normal 1		Finish>	20 Jul 90	20 Jul 90	N/A	N/A	20 Jul 90				
Manufacture & Deliver Furniture											
8 →		Starts>	20 Jul 90	22 Jul 90	N/A	N/A	20 Jul 90				
Key		Finish>									
FURNITURE ON SITE											
8 → 9	0,4	Starts>	23 Jul 90	23 Jul 90	N/A	N/A	23 Jul 90				
Normal 1		Finish>	26 Jul 90	26 Jul 90	N/A	N/A	26 Jul 90				Comm Inst
Install furniture											
9 → 10	2,0	Starts>	27 Jul 90	27 Jul 90	N/A	N/A	27 Jul 90				
Normal 1		Finish>	9 Aug 90	9 Aug 90	N/A	N/A	9 Aug 90				
Move User Group Into New Space											
10 →		Starts>	9 Aug 90	9 Aug 90	N/A	N/A	9 Aug 90				
End		Finish>									
End of Project											

Project Management Software Features (Macintosh)

A MacProject II

B MicroPlanner

C Fastrack Schedule

	A	B	C
* **VERSION & COST**			
1.....Version:	2.1	6.0	1.02
2.....Cost:	495	595	195
* **PLANNING CAPABILITIES**			
1..... Tasks/project:	500	500	32,000
2.....Resources/project:	800	26	N/A
3.....Resources/task:	8	20	N/A

| | A | B | C |

	A	B	C
4.....Subprojects:	Y	N	N/A
5.....WBS codes:	N	N	N/A
6..Activity-on-node Network:	Y	Y	N
7.....Minimum work unit:	MIN	DAY	HOURS
8.....Multiple Calenders:	Y	Y	Y
9..Calculates free float:	Y	Y	N/A
10..Selective resource leveling:	Y	Y	N/A
11..Leveling over multiple projects:	Y	Y	N/A

	A	B	C

	A	B	C
* **EDITING CAPABILITIES**			
1.....Interactive Gantt:	Y	Y	Y
2.....Interactive Pert:	Y	Y	N
3..Search/sort filtering:	Y[1]	Y[1]	N
4.Split screen/windowing:	Y	Y	Y
* **TRACKING**			
1...Baseline schedule(s):	Y	Y	Y
2.....Percent complete:	Y	Y	N
3.....Actual v. planned:	Y	Y	Y
3a.....Schedule:	Y	Y	Y
3b.....Cost:	Y	Y	N
4.....Manual override:	Y	Y	N
5..Earned Value Analysis:	Y	Y	N

	A	B	C

[1] Supports search feature, but no sort or filtering features.

	A	B	C
* **REPORTING**			
1.....Gantt chart:	Y	Y	Y
2.....PERT Network:	Y	Y	N
3.....Histograms:	Y	Y	N
4.....WBS:	N	N	N
* **COMPATIBLE FILE FORMATS**			
1.....ASCII:	Y	Y	Y
2.....Dbase:	N	N	N
3.....Lotus 1-2-3:	N	N	N
* **OTHER**			
1.....Macros:	N	N	N
2.....LAN support:	Y	Y	N
3.....Plotter Support:	Y	OPT	N
4...Multiproject summary:	Y	Y	N/A

| | A | B | C |

Section V:

Barriers to Successful Project Management Using Tools

Barriers to Successful Project Management

- **Complexity**
  (number, degree of interactions among activities)
- **Uncertainty**
  (unknown future state of related activities)
- **Change**
  (in activities and products as learning curve is traversed)
- **Comparison**
  (recognizing differences and patterns among project elements)

Project Scheduling

-- choosing the start time of an activity

-- budgeting that activity

-- responding to changes by either reallocating budget or compromising requirements

-- modifying the plan of an activity and its budget needs based on resource availability

Sources of Complexity & Diversity in Schedules

- same resources can be made available to multiple activities
- same activity can start at different times
- same activity can be carried out with different types of resources
- alternative sets of product requirements can be generated

Computer-Based Project Scheduling

could interactively construct a schedule

- -- generating a set of incremental resources
- -- comparing alternative revisions via cost/benefit estimates
- -- incorporating a negotiation model and functionalities

needed inputs

- -- alternative sets of resources
- -- allowable product requirement modifications (with associated resource impacts, importance estimates, and marginal costs)

Risk Management

reduce or avoid: product delivery delays,
budget overruns
project rework

Sources of Uncertainty

-- because each project is different, historical data often is not accurate for making new estimates

-- expectations about resource availability may be inaccurate

-- project requirements are modified in midstream

--people sometimes make estimates based more on political factors than on realistic appraisals

Computer-Based Risk Management

must find ways to represent, quantify & measure, and consider uncertainty in planning/scheduling

Risk Control

-- reserving extra resources for high risk activities

-- developing contingency plans for product requirements, production deadlines, and internal versus external resources

-- doing probabilistic planning/scheduling

best to use weighted interval estimates of resources and duration <u>during</u> the process rather than after the plan is completed (beyond CPM, PERT, Monte Carlo)

Issues of Change in Quantitative Modeling Systems

Typical Project Management Questions

-- why did yearly budget estimates increase from last month's estimate to this month's?

-- why did the end-date of this project occur much later than expected?

--why did the shuttle payload capacity decrease from scenario-1 to scenario-2 even though the size of the shuttle bay increased?

Explaining Change in Quantitative Modeling Systems

Required System Capabilities

-- isolate the portions of the models that are relevant to understanding a change and determine their interactions

-- assess the significance of changes

-- identify supportive quantitative facts useful for understanding a change

-- describe important qualitative characteristics that identify, classify, and aggregate factors associated with key change variables

-- compose explanatory dialogues that navigate the user through large models

-- present graphical displays to support explanation

Three Different Types of Models With Explanatory Capabilities

Financial Spreadsheets

-- can be large, with complex equations and non-hierarchical relationships

-- has no additional semantics for understanding the meaning of the variables and equations

-- doesn't distinguish significant from insignificant causes of change

Additive Models

-- strict hierarchical groupings aggregate variables

-- multiple alternative groupings; need to analyze which most appropriate in a given situation

Scheduling Models

-- precedence relationships establish interaction of activities

-- hard to determine what caused a change

Comparison in Project Management

Often must contrast results from two different input sets

- -- estimates versus actual values
- -- data on performance over successive time periods
- -- estimates based on different assumptions about organizational events (scenarios)

Typical questions:

- -- Why did Bill Smith's activities cost more than expected in the estimate?
- -- Why is the end-date of the design approval activity later in this week's schedule than last weeks?
- -- Why do John's estimates as to total resources differ from Sue's?
- -- How did changing the duration of the structural design activity affect the shift in the start date of the frame assembly project?

Section VI:

Prospects for Intelligent Project Management Tools

Tools Related to Project Management

- Personal Information Managers
- Single-User Decision Support Applications
- Multi-User Decision Support Applications
- Expert System Tools for Decision Support
- Work Group Schedulers
- Conferencing Databases
- Intelligent PM Tools

Personal Information Managers

- cyclical scheduling
- customizable data forms
- phone dialing
- file viewing
- task tracking
- conflict checking
- global searching
- calculating
- rolodex capabilities
- note management

Examples: Chronologic's "Instant Recall," IBM's "Current"

Single-User Decision Support Tools

Typical Decisions Facilitated via Flexible Templates

- buying products or services
- hiring
- employee evaluation
- vendor selection
- investment or priority setting

Capabilities

- mixture of qualitative and quantitative data
- balloting system for multiple evaluators
- rationale capture
- alternative approaches for decision making
  (e.g. decision matrices, linear programming, Monte Carlo simulation)
- sensitivity analysis
- probability distributions for input or output variables

Examples: Sterling Castles' "BestChoice3", Apian's "Decision Pad"

Group Decision Support Systems (GDSS)

- concurrent recording of thoughts and ideas into shared workspaces
- anonymous comments and suggestions
- tools for support of different phases of decision-making:
  - brainstorming
  - theme analysis and agenda building
  - issue prioritizing
  - policy formulation
  - stakeholder identification

Example: IBM's "Collaborative Management Workshop"

Conflict Management in GDSS

- computer-mediated communication results in greater expression of affective feelings about the situation
- positions people take in writing are maintained more rigidly than verbally expressed positions
- computer-mediated communication deemphasizes personal relationships
- GDSSs equalize member participation
- GDSSs make processes and roles in conflict management clearer
- GDSSs' decision rules can influence the course of a conflict
- GDSSs lead to wider exploration of alternatives

Expert System Tools for Decision Support

Advantages

- forces explicit, exhaustive analysis of the situation, decision criteria, and possible outcomes
- automatically collects needed information from databases and spreadsheets
- applies a sophisticated set of rules to reach a decision in a complicated situation
- captures and replicates scarce human expertise
- trains novices to use decision making protocols

Disadvantages

- heavy front-end investment in expert identification; knowledge engineering; situation, criteria, and outcome analysis; and rule development
- difficult to apply in situations with multiple subjective elements
- requires updating if factors change over time

Examples: First Class Fusion's "First Class Expert System"
Paperback Software's "VP Expert"

Workgroup Schedulers

Capabilities

- facilitate both individual and group scheduling
- provide shared calendars, to-do lists, task managers, and mail functions
- provide notification if a schedule conflict occurs
- supply templates for schedule-oriented communication via e-mail

Disadvantages

- extra effort required to input information necessary for group scheduling
- potential problems of individual privacy and system security
- difficult to shift all users over to a common application

**Examples: Futuresoft's "Right Hand Man,"
Word Perfect's "Word Perfect Office"**

Conferencing Databases

Capabilities

- facilitates complex computer-conferencing discussions
- allows formation of specialized news-nets
- integrates e-mail and conferencing functions
- incorporates full database capabilities (forms, fields, views)
- enables "hot links" among documents
- provides user authentication and access control
- supports multi-media documents, user tailorable applications

Disadvantages

- power intensive
- expensive

Example: Lotus' "Notes"

Uses of Project Management Tools in Preparation of Request-For-Proposals (RFP)

- helps make project requirements explicit, consistent, complete
- aids in determining a reasonable timetable for project completion
- identifies resources (material and human) essential for project
- assists in determining both total budget and reasonable allocations within budget categories
- provides criteria for evaluating competing proposals

Potential Liabilities of Using Project Management Tools

- vital information can be hidden in an electronic morass of detailed data
- conclusions derived from computer analysis may be seen as inappropriately accurate
- decision makers may focus more on the style of the project management information presented than on its actual content
- more of users' cognitive effort may go into mastering the project management tool than into thinking about the underlying project issues
- the user can become an interface between the project management tool and its environment rather than an independent decision maker
- the user may delegate authority for making project management decisions to the tool, but is left with the responsibility for those decisions' consequences
- user skills in reasoning through project management may atrophy as the tool takes over day-to-day operations
- users may not be capable of recognizing subtle errors made by the tool
- the user may be hard pressed to explain why a course of action recommended by the tool was selected over alternative possibilities

Stages of Implementation

1) existing functions are done more efficiently
2) organizational structures and work roles shift
3) new functions and activities emerge
4) the institution's purpose and goals are transformed

Intelligent Decision Support for Project Management

conventional systems don't "understand" what they are doing

-- need an internal model of activities, resources, deliverables, and their interrelationships

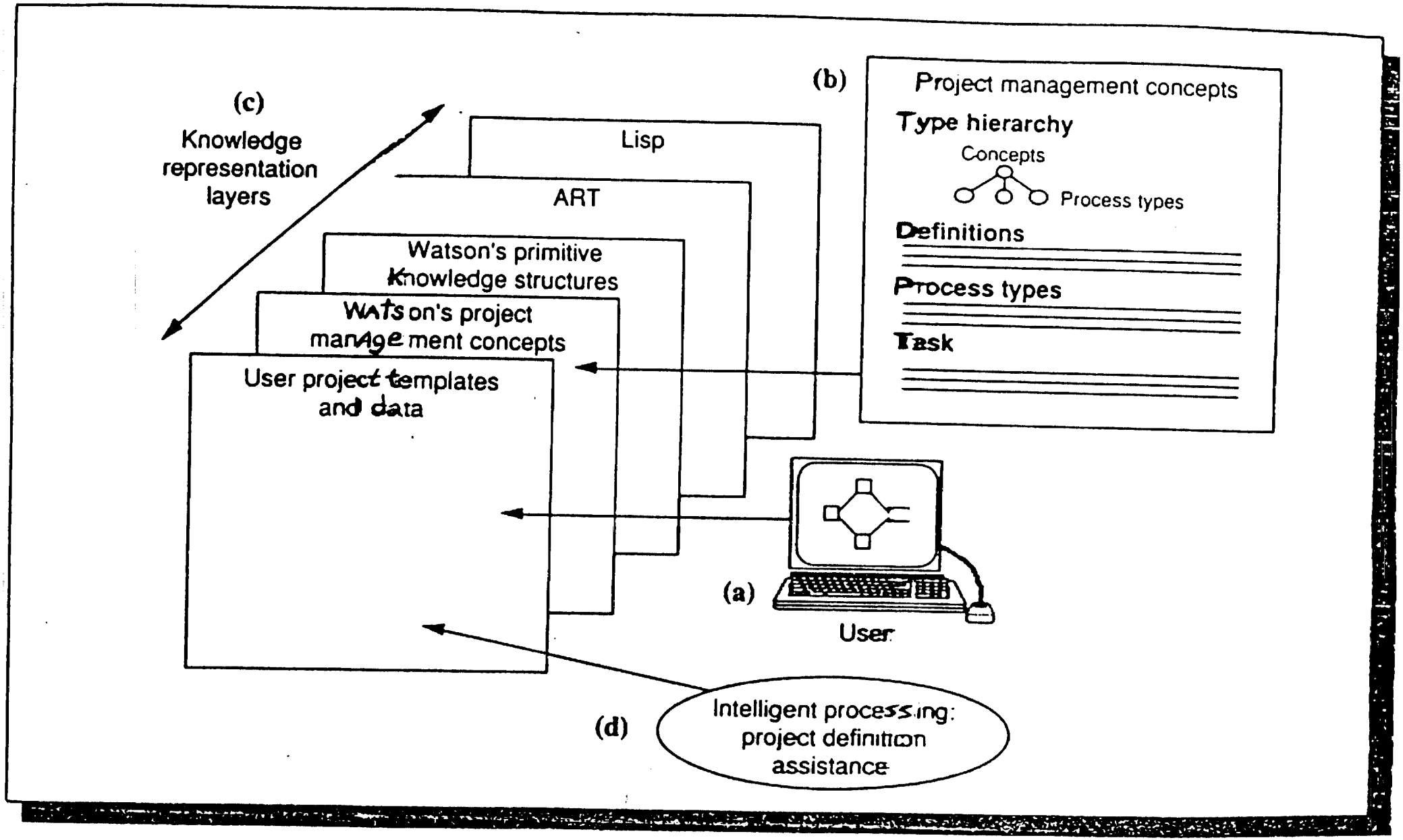
-- require a conceptual model of project management

Capabilities of an Intelligent Project Management System

- configuring templates for defining tasks
- providing sets of attributes and relations for configuring types of templates
- configuring needed entities when a functionality is selected, or indicating functionalities available for a given set of attributes and relations
- customizing to trade-off between system complexity and functionality
- filling in blanks in templates by aggregating lower level definitions
- providing tools for browsing project networks
- defining subnetworks and providing automatic horizontal and vertical consistency checking

Illustrative Dialogue with An Intelligent System

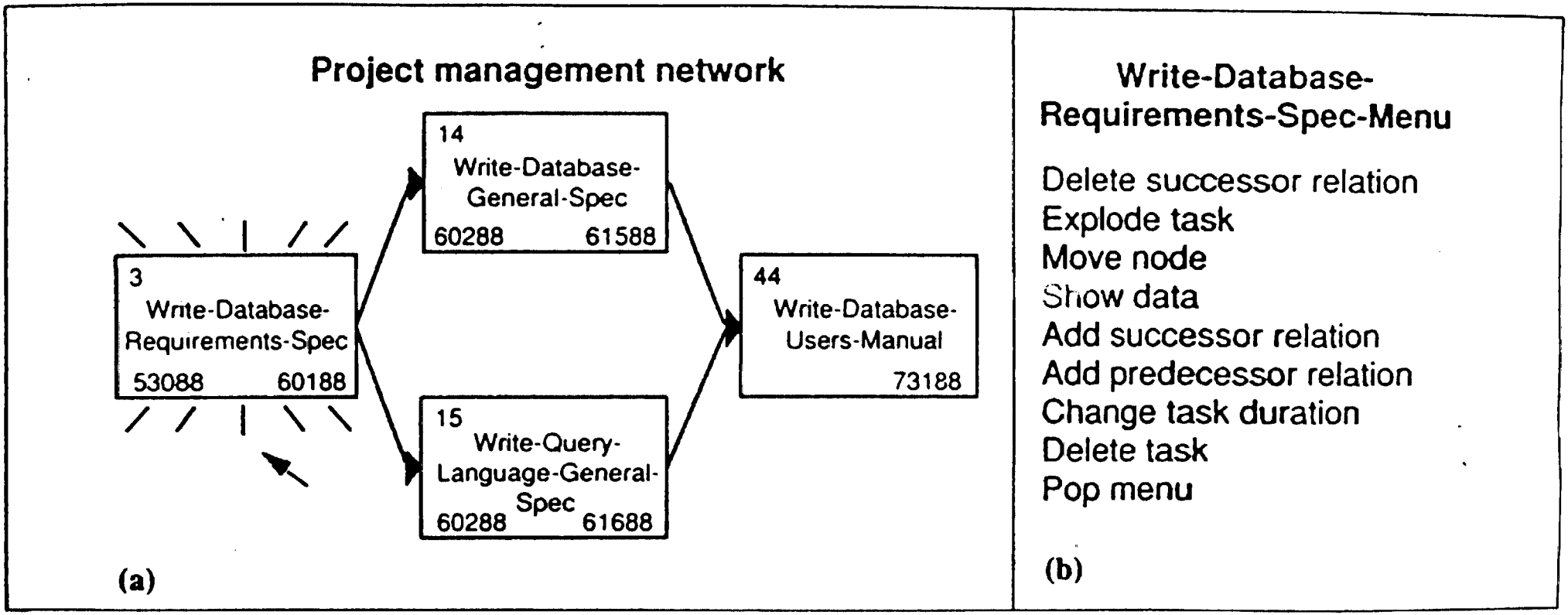
USER:	What tasks have not been started?
SYSTEM:	(1) implement module X (2) write an "instance dumper"
USER:	Do anyone else's tasks depend on getting these done?
SYSTEM:	Yes, without an instance dumper Tom can't finish.
USER:	Who is working on the instance dumper task?
SYSTEM:	Steve
USER:	Request an estimated completion date from Steve.
SYSTEM:	OK.
USER:	What is the instance dumper?
SYSTEM:	It is a part of how the system saves data.



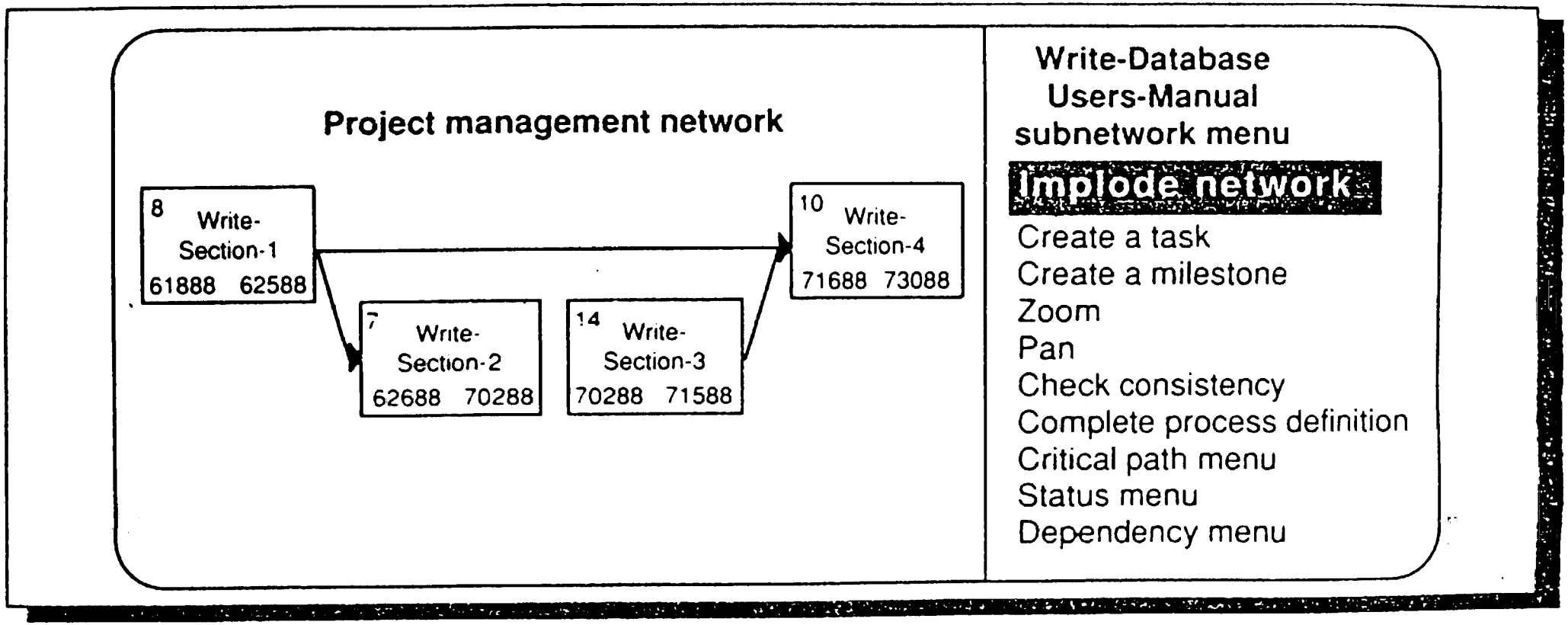
Foundations for an intelligent software project management system: (a) User scenarios; (b) a conceptual model of software project management; (c) Watson's knowledge representation; (d) intelligent assistance in defining project plans.

Attribute	Value
Task name:	Write-Database-Users-Manual
Planned start:	
Planned finish:	73188
Duration:	44
Preceding tasks:	Write-Database-General-Spec, Write-Query-Language-General-Spec
Succeeding tasks:	
Requires input:	
Produces output:	Database-Users-Manual

The user-defined task template and data for the Write-Database-Users-Manual task (template attributes and relations on the left, user-supplied data on the right).



An activity-on-node task network defined using Watson: (a) The top-level network; (b) the context-sensitive, entity-specific menu of operations for the Write-Database-Requirements-Spec task.



The Write-Database-Users-Manual subnetwork

Section VII:

From Project to Program Management:

Cooperative Work Environments

Complex Project Management Situations

Large System Development Programs
(integration of several projects into an overall design)

- large number of activities make acquiring current information impossible
- several departments involved; each with different goals, attitudes, foci
- program requires significant cooperation (changes made by one department impact entire program)
- frequent design changes required due to developmental and technological challenges
- most changes must be approved by multiple managers

Planning for Complex System Development

- plans are not prespecified, but evolve through negotiations
- activities are executed without face-to-face contact
- plans are necessarily incomplete, given the large number of activities
- resource commitments made by diverse organizations may be frequently renegotiated
- various project personnel need different descriptions/views of project information
- to whom negotiated changes are communicated needs to be specified
- the evolution of project definitions and configurations needs to be tracked

Advanced Planning Tools For Complex System Development

- each organizational entity has a mini-project manager with a local knowledge base and associated local functionalities
- all these mini-applications intercommunicate for generating proposals, communicating constraints, proposing constraint relaxations, committing to plans, and querying each other's knowledge

Computer-Supported Collaborative Work (CSCW)

- tools that support group processes embedded in applications software
- early uses in design systems, electronic mail and computer conferencing, project management, group decision support
- speech acts, organizational roles, working relationships

Rationale

- work increasingly is done by teams
- groups often must overcome barriers of distance and time
- information technologies are productive partners
- long-term, complex projects require a shared institutional memory

The design of CSCW will shape the cognitive, affective, and ethical quality of work

Developing Shared Mental Models

- organizing the ideas of a team
- structuring group interaction and decision making
- capturing the rationale for a choice
- coordinating team activities

Collaborative Design

CoLab
(Collaborative Laboratory)

Xerox Palo Alto Research Lab

**Gregg Foster, Daniel Bobrow,
Kenneth Kahn, Stan Lanning,
Mark Stefik, Lucy Suchman,
Deborah Tatar**

Collaborative Processes In Face-To-Face Meetings

- **multi-user interfaces**
- **What You See Is What I See (WYSIWIS)**
- **joint manipulation of physical objects**
- **sequencing group processes, with specialized tools for each phase**

Idea brainstorming, ordering, evaluating
proposal presenting, arguing, evaluating

Collaborating Despite Barriers of Distance and Time

- text sharing
  (electronic mail, computer conferencing)
- project management
  (task assignment, scheduling, logistics)
- collaborative task performance without face-to-face interaction

Organizational Interfaces

Conversational Desktop

Media Lab,
Massachusetts Institute of Technology

Chris Schmandt, Barry Arons,
Charles Simmons

Technology-Mediated Interactive Communication

- determining when a command is directed to the computer
- tailoring actions to the social context
- conducting a dialogue to resolve ambiguous input
- inferring meaning from the conversational situation

Impact Assessment

- forecasting the evolution of a technology and its social context
- identifying chains of interaction between a technology and its environment
- evaluating the implications of a technology's impact on its context
- analyzing policy options for dealing with desirable and undesirable consequences

Illustrative Potential Consequences

- a decrease in middle management
- privacy, security, reliability
- balancing direct and virtual interaction

Barriers to Computer-Based Project Management

- – those who benefit most from a workgroup application are not necessarily those who must do additional work to support the application
- – managers have no intuitive experience in using CSCW applications
- – enhancing ease of information input may be more important than facilitating information display
- – evaluating the costs and benefits of using CSCW tools is very difficult

SUMMARY AND CONCLUSIONS

Project Management: Rules of Thumb Based on Experience of NASA Users

1. Presentation is often more important that calculation.
2. Key points should always be on one page.
3. Weekly intervals are usually the most relevant.
4. The more senior the manager, the less detail and more scope needed; the more junior, the more detail and less scope.
5. Internal NASA rarely uses resources or costs; scheduling only.
6. A major flag is a schedule slip.
7. Another major flag is when the critical path becomes secondary.

PRODUCT REVIEWS

VENDOR PROFILES

MAKERS OF PROJECT-MANAGEMENT SOFTWARE FOR MULTIPLE PROJECTS

AGS Management Systems Inc.
AGS Management Systems specializes in project-management systems development. 880 First Ave., King of Prussia, Pa. 19406 (215) 265-1550/(800) 678-8484/Fax: (215) 265-1230

Ajida Technologies Inc.
Ajida Technologies manufactures IBM PC hardware and software products for industrial, engineering and business applications. 613 Fourth St., Santa Rosa, Calif. 95404 (707) 545-7777/Fax: (707) 575-3210

Bechtel Software Inc.
Bechtel Software produces Oracle-based project-control software. 289 Great Road, Acton, Mass. 01720 (508) 635-0580/Fax: (508) 635-9458

Computer Associates International Inc.
Computer Associates International develops, markets and supports software for a broad range of computers. 1240 McKay Drive, San Jose, Calif. 05131 (408) 432-1727/(800) 531-5236/Fax: (408) 432-0614

Digital Planners Inc.
DPI supplies distributed project-management solutions including database, workstation, graphics and development tools and integration services. 4400 MacArthur Blvd., Suite 800, Newport Beach, Calif. 92660 (714) 476-1020/Fax: (714) 833-7847

Diversified Information Services Inc.
Diversified Information Services provides project-management software and consulting services. 4370 Tujuna Ave., Suite 130, Studio City, Calif. 91604 (818) 506-7265/(800) 333-1979

InstaPlan Corp.
InstaPlan develops, markets and supports project-management products. 655 Redwood Highway, Suite 311, Mill Valley, Calif. 94941 (415) 389-1414/(800) 852-7526/Fax: (415) 389-8046

K&H Professional Management Services Inc.
K&H Professional Management Services specializes in project-management and performance-measurement software and services. 435 Devon Park Drive, Suite 300, Wayne, Pa. 19087 (215) 293-3500/Fax: (215) 293-3523

Micro Planning International
Micro Planning International specializes in project-management software and consulting. 655 Redwood Highway, Suite 311, Mill Valley, Calif. 94941 (415) 788-3324/Fax: (415) 389-8046

Microsoft Corp.
Microsoft develops, markets and supports operating systems, languages and applications programs. 1 Microsoft Way, Redmond, Wash. 98052-6399 (206) 882-8080/Fax: (206) 883-8101

Poc-It Management Services Inc.
A consulting firm, Poc-It Management Services specializes in information services and project management. 429 Santa Monica Blvd., Suite 460, Santa Monica, Calif. 90401 (213) 393-4552/Fax: (213) 451-2888

Power Project Management Inc.
Power Project Management specializes in consulting. 4275 Executive Square, Suite 800, La Jolla, Calif. 92037 (619) 546-2939/Fax: (619) 453-2812

Scitor Corp.
Scitor is involved in aerospace-engineering consulting and project-management software applications. 393 Vintage Park Drive, Suite 140, Foster City, Calif. 94404 (415) 570-7700

Software Publishing Corp.
Software Publishing supplies business-productivity software for IBM and IBM-compatible computers. 1901 Landings Drive, P.O. Box 7210, Mountain View, Calif. 94039-7210 (415) 962-8910

Strategic Software Planning Corp.
Strategic Software Planning develops and markets project-management software systems and provides training, support and consulting services. 1 Athenaeum St., 15th Floor, Cambridge, Mass. 02142 (617) 577-8800/(800) 777-3282/Fax: (617) 225-3241

Symantec Corp.
Symantec develops application and system software products for IBM and Apple computers. 10201 Torre Ave., Cupertino, Calif. 95014 (408) 253-9600/(800) 626-8847 (Calif.)/(800) 441-7234 (outside Calif.)/Fax: (408) 252-4694

William H. Roetzheim & Assoc.
William H. Roetzheim and Assoc. makes project-management, CASE and other software. 3891 American Ave., La Mesa, Calif. 92041 (619) 464-0182 ■

Project-Management Software that Handles Multiple Projects

Company	Product	Operating system	Minimum RAM (optimal)	Resources handled	Project calendar	Management functions	Price
AGS Management Systems Inc. 880 First Ave., King of Prussia, Pa. 19406 (215) 265-1550/(800) 678-8484/Fax: (215) 265-1230	Wings Project Management System	VMS, DOS 3.0 or higher, MVS-TSO, VM-CMS	640K-bytes (640K-bytes recommended)	human, machine, material	hours, days, weeks, months, quarters	separate critical path for each project; late tasks flagged; all resources leveled; may produce reports from more than one file; may calculate project schedule from known end date to unknown start date	$2,500
Allde Technologies Inc. 613 Fourth St., Santa Rosa, Calif. 95404 (707) 545-7777/Fax: (707) 575-3210	Topdown Project Planner version 2.0	DOS 3.0 with Microsoft Windows	512K-bytes (640K-bytes recommended)	time, human, machine, material	hours, days, weeks, months, quarters	separate critical path for each project; late tasks flagged; all resources leveled; can calculate project schedule from known end date to unknown start date; graphics output drivers included	$249
Bechtel Software Inc. 289 Great Road, Acton, Mass. 01720 (508) 635-0580/Fax: (508) 635-9458	Synergy version 4.0	Unix, VMS, DOS 3.3 or higher	2M-bytes and 640K-byte board	time, human, machine, material	hours, days, weeks, months, quarters	separate critical path for each project; late tasks flagged; all resources leveled; may produce reports from more than one file; built on Oracle database	$5,000
Computer Associates International Inc. 1240 McKay Dr., San Jose, Calif. 95131 (408) 432-1727/(800) 531-5236/Fax: (408) 432-0614	Super Project Expert version 1.1	DOS 3.1 or higher, OS/2	383K-bytes (512K-bytes recommended)	time, human, machine, material	hours, days, weeks, months, years	separate critical path for each project; late tasks flagged; all resources leveled; may produce reports from more than one file; may calculate project schedule from known end date to unknown start date	$695 (DOS $795 (OS/2
Digital Planners Inc. 4400 MacArthur Blvd., Suite 800, Newport Beach, Calif. 92660 (714) 476-1020/Fax: (714) 833-7847	ET/Consort version 2.6	MS DOS 2.0 or higher	640K-bytes (640K-bytes recommended)	time, human, machine, material	days	separate critical path for each project; late tasks flagged; all resources leveled; may produce reports from more than one project	$3,500
Diversified Information Services Inc. 4370 Tujunga Ave., Suite 130, Studio City, Calif. 91604 (818) 506-7265/(800) 333-1979	Time Machine version 3.0	MS DOS 2.02 or higher	384K-bytes (640K-bytes recommended)	human, machine, material, financial	hours, days, weeks, months, quarters	separate critical path for each project; late tasks flagged; all resources leveled; may calculate project schedule from known end date to unknown start date	$4,500
InstaPlan Corp., a subsidiary of Micro Planning International 655 Redwood Highway, Suite 311, Mill Valley, Calif. 94941 (415) 389-1414/(800) 852-7526/Fax: (415) 389-8046	InstaPlan 5000 version 2.00	DOS 2.1 or higher	640K-bytes (640K-bytes plus 1M-byte EMS memory recommended)	time, human, machine	hours, days, weeks, months, quarters	separate critical path for each project; late tasks flagged; all resources leveled; may combine information from files; may calculate project schedule from known end date to unknown start date; automatic consolidation of multiple projects	$495
K&H Professional Management Services Inc. 435 Devon Park Drive, Suite 300, Wayne, Pa. 19087 (215) 293-3500/Fax: (215) 293-3523	Prestige Project Management System version 3.5	DOS 3.0 or higher, Unix, VMS, SunOS	485K-bytes (640K-bytes recommended)	time, human, machine, material, space, financial	hours, days, weeks, months, quarters, fiscal periods	separate critical path for each project; late tasks flagged; all resources leveled; may calculate project schedule from known end date to unknown start date	$2,995
Micro Planning International 655 Redwood Highway, Suite 311, Mill Valley, Calif. 94941 (415) 788-3324/Fax: (415) 389-8046	MicroPlanner 2000 version 4.3	DOS 2.1	512K-bytes (640K-bytes recommended)	time, human, machine, material	hours, days, weeks	separate critical path for each project; late tasks flagged; all resources leveled; may produce reports from more than one file	$1,495
Micro Planning International 655 Redwood Highway, Suite 311, Mill Valley, Calif. 94941 (415) 788-3324/Fax: (415) 389-8046	MicroPlanner/-Windows version 6.1	DOS 2.x, Microsoft Windows 2.1	512K-bytes (640K-bytes recommended)	time, human, machine, material	days, weeks	separate critical path for each project; late tasks flagged; all resources leveled; may produce reports from more than one file; may calculate project schedule from known end date to unknown start date; graphics orientation	$595
Microsoft Corp. 1 Microsoft Way, Redmond, Wash. 98052-6399 (206) 882-8080/Fax: (206) 883-8101	Microsoft Project version 4.0	DOS 2.0 or higher	256K-bytes (256K-bytes recommended)	human, machine, material	hours, days, weeks, months, quarters	separate critical path for each project; late tasks flagged; all resources leveled; may calculate project schedule from known end date to unknown start date	$495
Pac-It Management Services Inc. 429 Santa Monica Blvd., Suite 460, Santa Monica, Calif. 90401 (213) 393-4552/Fax: (213) 451-2888	MicroMan II version 1.2	DOS 3.0 or higher	460K-bytes (460K-bytes recommended)	time, human, machine	hours, days, weeks, months	separate critical path for each project; late tasks flagged; all resources leveled; may produce reports from more than one file; record and file locking	$2,895
Power Project Management Inc. 4275 Executive Square, Suite 800, La Jolla, Calif. 92037 (619) 546-2939/Fax: (619) 453-2812	IPMS version 3.1	MS DOS 2.0 or higher, OS/400, SSP	384K-bytes (512K-bytes recommended)	time, human, machine, material	days, weeks	separate critical path for each project; late tasks flagged; all resources leveled; may calculate project schedule from known end date to unknown start date	$3,000
Sohr Corp. 393 Vintage Park Drive, Suite 140, Foster City, Calif. 94404 (415) 570-7700	PS4 version 1.5	DOS 2.0 or higher	512K-bytes (640K-bytes recommended)	human, machine, material, other direct costs	minutes, hours, days, weeks, months	separate critical path for each project; late tasks flagged; all resources leveled; may produce reports from more than one project file; may calculate project schedule from known end date to unknown start date; Gantt chart option	$685
Software Publishing Corp. 1901 Landings Drive, P.O. Box 7210, Mountain View, Calif. 94039-7210 (415) 962-8910	Harvard Project Manager version 3.01	DOS 2.0 or higher	480K-bytes (640K-bytes recommended)	time, human, machine	hours, days, weeks, months, quarters	separate critical path for each project; late tasks flagged; all resources leveled; may calculate project schedule from known end date to unknown start date	$695
Strategic Software Planning Corp. 1 Athenaeum St., 15th Floor, Cambridge, Mass. 02142 (617) 577-8800/(800) 777-3282/Fax: (617) 225-3241	Promis version 3.0	DOS 2.0 or higher	640K-bytes (640K-bytes recommended)	time, human, machine, material, financial	days, weeks, months, quarters	separate critical path for each project; late tasks flagged; all resources leveled; may produce reports from more than one file; may calculate project schedule from known end date to unknown start date	$3,600
Symantec Corp. 10201 Torre Ave., Cupertino, Calif. 95014 (408) 253-9600/(800) 626-8847 (Calif.)/(800) 441-7234 (outside Calif.)/Fax: (408) 252-4694	Time Line version 3.0	DOS 2.x, 3.x	640K-bytes (640K-bytes recommended)	time, human, machine, material, fixed cost	minutes, hours, days, weeks, months	separate critical path for each project; late tasks flagged; all resources leveled; may calculate project schedule from known end date to unknown start date; allows priorities to be set	$595
William H. Roetzheim & Assoc. 3891 American Ave., La Mesa, Calif. 92041 (619) 464-0183	Project Managers' Toolbox version 2.0	MS DOS 3.0 or higher	512K-bytes (2M-bytes recommended)	time, human, machine, material	days, weeks, months, quarters	separate critical path for each project; late tasks flagged; all resources leveled; may produce reports from more than one file; may calculate project schedule from known end date to unknown start date	$492

REPORT CARD

INFO WORLD

High-End Project Management Software

	(InfoWorld weightings)	(Your weightings)	Artemis Project 2.1.5	Open Plan 3.1	Portmaster Advance 2.1	Primavera Proj. Planner 3.1	Project Workbench 3.0	Qwiknet Professional 1.3	Viewpoint 3.1
Price			$3,500	$4,200	$1,495	$2,500	$1,275	$1,995	$1,995
Performance									
Features/flexibility	(125)	( )	Very Good	Good	Satisfactory	Good	Satisfactory	Good	Very Good
Calculation speed	(75)	( )	Good	Good	Very Good	Satisfactory	Excellent	Excellent	Very Good
Output	(75)	( )	Good	Very Good	Good	Very Good	Satisfactory	Satisfactory	Good
Documentation	(150)	( )	Satisfactory	Good	Satisfactory	Very Good	Excellent	Good	Very Good
Ease of learning	(125)	( )	Poor	Good	Very Good	Excellent	Very Good	Good	Very Good
Ease of use	(200)	( )	Satisfactory	Good	Very Good	Very Good	Good	Good	Very Good
Error handling	(75)	( )	Good	Good	Excellent	Good	Very Good	Satisfactory	Very Good
Support									
Support policies	(75)	( )	Good	Good	Good	Very Good	Very Good	Very Good	Excellent
Technical support	(50)	( )	Very Good	Very Good	Satisfactory	Very Good	Very Good	Satisfactory	Satisfactory
Value	(50)	( )	Satisfactory	Good	Very Good	Very Good	Good	Good	Very Good
Final scores			**5.5**	**6.4**	**6.6**	**7.3**	**7.2**	**6.3**	**7.4**
Use your own weightings to calculate your score									

GUIDE TO REPORT CARD SCORES

InfoWorld reviews only finished, production versions of products, never beta test versions.

Products receive ratings ranging from unacceptable to excellent in various categories. Scores are derived by multiplying the weighting (in parentheses) of each criterion by its rating, where:

Excellent = 1.0 — Outstanding in all areas.
Very Good = 0.75 — Meets all essential criteria and offers significant advantages.
Good = 0.625 — Meets essential criteria and includes some special features.
Satisfactory = 0.5 — Meets essential criteria.
Poor = 0.25 — Falls short in essential areas.
Unacceptable or N/A = 0.0 — Fails to meet minimum standards or lacks this feature.

Scores are summed, divided by 100, and rounded down to one decimal place to yield the final score out of a maximum possible score of 10 (plus bonus). Products rated within 0.2 points of one another differ little. Weightings represent average relative importance to *InfoWorld* readers involved in purchasing and using that product category. You can customize the report card to your company's needs by using your own weightings to calculate the final score.

FEATURES

INFO WORLD

High-End Project Management Software

■ Feature
□ No Feature

	Artemis Project 2.1.5	Open Plan 3.1	Portmaster Advance 2.1	Primavera Project Planner 3.1	Project Workbench 3.0	Quiknet Professional 1.3	Viewpoint 3.1
Tasks and Resources							
Tasks/project	64,000	10,000	2,000	10,000	Unlim.	5,000	32,000
Resources/project	255	U/500	Mem/Ltd.	Unlim.	200	Unlim.	32,000
Resources/task	255	U/250	Mem/Ltd.	Unlim.	200	100	32,000
Leveling over multiple projects	■	■	■	■	■	■	■
Selective resource leveling	■	□	□	■	□	■	■
Planning Capabilities							
Activity-on-node netwk.	■	■	■	■	■	■	■
Activity-on-arrow net.	■	■	■	■	□	□	□
Baseline schedule(s)	1	1	Unlim.	Unlim.	1	2	1
WBS codes	■	■	■	■	■	■	■
Resource codes	■	■	■	■	■	■	■
Subprojects	□	□	■	□	■	□	■
Multiple calendars	■	■	■	■	■	■	■
Minimum work unit	Hour	Minute	Minute	Day	Hour	Hour	Day
Calculates total float	■	■	■	■	■	■	■
Calculates free float	□	■	■	■		■	■
Compatible File Formats							
Time Line 3.0	■	■	□	□	■	□	□
ASCII	■	■	■	■	■	■	■
Dbase		■	■	■	■	■	■
Microsoft Project	□	□	□	■	□	■	
1-2-3	■	■	■	■		■	■
Editing Capabilities							
Interactive Gantt	□	□	■	■	■	■	■
Interactive Pert	250 Act.	■	■		■	■	■
Search/sort filtering	■	■	■	■	■	■	■
Split screen or windowing	□	■	■		■	■	□
Reporting							
Gantt chart	■	■	■	■	■	■	■
Pert network	■	■	■	Opt.	■	■	Opt.
Time-scaled logic diag.	□	■	■	■		■	■
Histograms	■	■	■	■	■	■	■
Earned value analysis	■	■	□	■	□	■	■
Other							
Mass update	■	■	□	□	□	□	■
Macros	■	■	□	□	□	□	□
Plotter support	■	■	■	Opt.	■	■	Opt.
Multiproject summary	■	■	■	■	■	■	■

FEATURES

INFO WORLD

Affordable Project Management Software

■ Feature
□ No Feature

	Harvard Project Manager Version 3.01	Instaplan Version 2.0	Microsoft Project Version 4.0	Project Scheduler 4 Version 1.5	Superproject Expert Version 1.10A	Time Line Version 3.01
Tasks & Resources						
Tasks/project	280[1]	Memory Lt'd.	750	1,500	1,560[2]	1,000[3]
Resources/project	120[4]	Memory Lt'd.	255	500	Memory Lt'd.	300[3]
Resources/task	120[4]	Memory Lt'd.	8	Unlt'd.	Memory Lt'd.	24
Individual resource calendars	■	■	■	■	■	□
Leveling over multiple projects	■	■	□	■	■	■ (w/outline)
Selective resource leveling	□	■	□	■	■	■
Time-limited leveling	■	■	■	□	■	□
Resource-limited leveling	■	■	□	■	■	■
Partial resource allocation	■	■	□	■	■	■
Lag time	■	■	■	■	■	■
Task relationships[5]	FS;SS;FF	FS;SS;FF	FS;SS;FF	FS;SS;FF	FS;SS;FF	FS;SS;FF;SF
Activity-on-node network	■	■	■	■	■	■
Activity-on-arrow network	□	□	□	□	□	□
Planning Capabilities						
Outline	■	■	□	□	■	■
Baseline schedule(s)	■	■	■	■	■	■
WBS codes	■	□[6]	■	■	■	■
OBS codes	■	□[6]	□	■	■	■
Subprojects	■	■	■	■	■	■
Project calendar(s)	1	1	1	1	1	1
Minimum work unit	Minute	Hour	Minute	Minute	Hour	Minute
Calculates total float	■	■	■	■	■	■
Calculates free float	□	■	□	■	■	■
Compatible File Formats						
ASCII	■	■	■	■	■	■
DIF	□	□	■	□	□	□
Dbase	■	■	■	■	■	■
Lotus 1-2-3	■	■	■	■	■	■
Other	Time Line 2.0	□	Primavera Multiplan MS Chart	□	CA-Tellepian Supercalc 4	Artemis CA-Tellepian
Editing Capabilities						
Interactive Gantt	■	■	■	■	■	■
Interactive PERT	■	■	■	■	■	■
Search/sort filtering	■	■	■	■	■	■
Split-screen/windowing	■	■	■	■	■	■
Reporting						
Gantt chart	■	■	■	■	■	■
PERT network	■	■ (Opt.)	■	■	■	■
Time-scaled PERT	□[7]	■	□	□	□	Opt.
Histograms	■	■	■	■	■	■
Earned value analysis	■	■	■	■	■	■
Customized reports	■	■	■	■	■	■
Cost tracking	■	■	■	■	■	■
Other						
Macros	□	□	□	□	■	■
Plotter support	■	□	■	■	■	Opt./Time Line Graphics
Dot-matrix support	■	■	■	■	■	■
Laser support	■	■	■	■	■	■
Multi-project summary	■	■	■	■	■	w/outline
Note field	□	Opt.	■	■	■	■
LAN support	□	■	■	■	■	■

[1]Subprojects in Harvard may be nested to achieve greater capacity.
[2]With 640K; Superproject Expert supports 3,000 tasks/project with expanded memory.
[3]In Time Line, depending on schedule complexity and number of layouts, filters, notes, etc., numbers may be exceeded; 1,800 tasks are available with EMS memory.
[4]In Harvard Project Manager, 120 total resources can be used; 2,000 resource assignments can be used per subdirectory. Resources can be shared across projects.
[5]F - Finish; S - Start.
[6]Instaplan uses resources outlining instead of OBS or WBS codes.
[7]Without showing task dependencies (Harvard's Fastrack report).

C-2

BENCHMARKS

INFO WORLD

Affordable Project Management Software

	Harvard Project Manager Version 3.01	InstaPlan* Version 2.0	Microsoft Project Version 4.0	Project Scheduler 4 Version 1.5	Superproject Expert Version 1.1	Time Line Version 3.01
Reschedule lines	4:51	0:09	1:04[1]	0:04	0:31	1:04
Resource leveling	05:29:00	1:17	1:06[1]	14:31	23:35	11:00
Display PERT view	0:01[2]	<0:01	40:23[3]	0:02	0:02[4]	38:13[5]
Display Gantt view	0:05[6]	<0:01	N/A[7]	0:04	0:03	N/A[8]

All times in hours:minutes:seconds unless otherwise noted.
Testing performed with 500 tasks on an 8-MHz IBM AT with 640K of RAM, a 20-megabyte hard disk, an Enhanced Graphics Adapter, 1 megabyte of EMS, and PC-DOS 3.3.
*InstaPlan did not include EMS support. Testing was done with 400 tasks. InstaPlan 5000, a new release supporting EMS, is due to ship soon.
[1]Microsoft Project took approximately 15 minutes to accept a 16-day lag and return program control to the keyboard.
[2]Cannot change to PERT view from task form in Harvard. Switched from subproject default view (Fast Track) to Gantt, then back to PERT.
[3]Can't change from task form in Microsoft Project. Performed change from default view (Gantt).
[4]PERT view is the default in Superproject Expert, so this reflects in the times shown.
[5]Unable to switch from task entry to PERT view in Time Line; changed from default screen (Gantt) to PERT.
[6]Cannot change to PERT from task form in Harvard. We switched from PERT (subproject default) to Gantt and back again, timing the change from Gantt to PERT.
[7]Default view is Gantt in Microsoft Project. Cannot switch views from task entry screen.

FIRST LOOK • By Michael J. Miller

Graphics Come to Project Management With Time Line 4.0

I've noticed lately that graphics and presentation capabilities are becoming part of just about every category of applications software.

Consider that almost all today's major word processing programs can import graphics and drawing files. And this trend seems to be accelerating: Word Perfect Corp. just introduced Draw Perfect, a program designed to allow you to add drawing features to Word Perfect. Draw Perfect is actually a stand-alone program that can import graphics from other programs and create slide shows, but many people will use it in conjunction with Word Perfect.

The same trend is visible in spreadsheets. Lotus 1-2-3, Release 3.0 adds a number of new graphics features, but programs like Quattro Pro and Supercalc go far beyond it, adding many of the capabilities that used to be seen only in stand-alone charting programs. PC Publishing recently announced Impress 2, an add-in for 1-2-3, Releases 2.01 and 2.2 that adds a graphical user interface and many advanced graphics features. For instance, it lets you enhance graphics with titles, frames, colors, and arrows.

To compete, the traditional graphics programs are themselves adding more sophisticated drawing features. For instance, Software Publishing Corp. recently came out with Draw Partner, which adds sophisticated drawing features to Harvard Graphics. And you can expect to see packages like Harvard and Freelance Plus move toward being capable of creating sequences of slides designed for presentations like their "desktop presentation" brethren on the Macintosh. Meanwhile, the high-end drawing packages like Micrographix Designer are adding even more options, such as image scanning and tracing, and more sophisticated output options.

This trend really came home when I looked at Time Line, Version 4.0, the latest upgrade to one of the best project management packages.

The big feature that Symantec is promoting with this version is "project presentations." In other words, the emphasis on graphics has made its way even to project management.

Time Line 4.0 takes many of the features that were previously in the Time Line Graphics add-in, and goes well beyond. Time Line has always given you lots of flexibility in displaying different layouts on the screen. For instance, you normally work in a Gantt chart view, but you can control the amount and kind of information you display at any point. Time Line's Gantt chart view is based on an outline that you can collapse and expand to show detail. You can also use various layouts that display such things as the dates and durations of tasks, task status (whether it is critical or not), conflicts, assigned resources, etc. You can use several predefined layouts or create your own.

From any of these layouts, you can then produce reports or charts. By itself, this gives you lots of flexibility and options in creating sophisticated reports.

In this version, Time Line adds the capability to custom design how these graphs will look. You can select border types and line thickness; add titles, notes or legends; choose your own colors; and enlarge or reduce graphs to a particular size — things that I hadn't seen before in a project management package.

Time Line can output your charts to laser printers, Postscript devices, plotters, and metafiles for 35mm slides or color overheads. It now includes a WYSIWYG preview, so you can make sure the chart looks just the way you want it to.

The result is the capability to create quite sophisticated-looking slides, overheads, and reports. This should let you present higher-quality status reports to management, and you should be able to see more easily how a project is going.

Most of the other changes in Time Line 4.0 are designed to make it easier to use the program.

That's important, because I've always wondered why more people don't use project management systems. After all, many people in business work with and plan projects that involve multiple steps and could presumably benefit from the kind of rigorous analysis made possible by a project management program. The problem has been that the project management software is difficult to learn and harder to keep working with.

One way that Time Line 4.0 tries to make it easier is by giving you many more options for updating the status of the tasks in your projects. Updating these tasks can often be the most time-consuming portion of using project management software. After all, if you're so concerned with the amount of time and resources a project is taking, you don't want to waste your time working with the software instead of managing the project.

A new Assist Update command can automatically update a given task or a set of tasks. Using this, you can indicate that a task has started with only a few keystrokes, rather than having to move to a task form. Even if you do need to edit start dates, duration, etc., this feature lets you enter that information more quickly.

However, I was even more impressed by another feature that lets you edit this information just on your main Gantt chart view, without moving to any forms. You just pick the layout you want to use, and Time Line looks at the different columns of information (such as start dates) as if they were cells in a spreadsheet. You can now edit these cells as if they were in a spreadsheet (even using the standard F2 edit key) rather than having to move to special forms.

Another change is the inclusion of a new macros feature, which lets you automate commonly used features. You can also more easily link projects and schedules together and copy single tasks or a whole family of tasks as a single operation. All this makes it much easier to work with large projects or projects with lots of repetitive elements.

The program has two new options, Quick Plan and Quick Graph, designed to make it faster to create basic plans and graphs. And the new mouse support makes selecting items much easier.

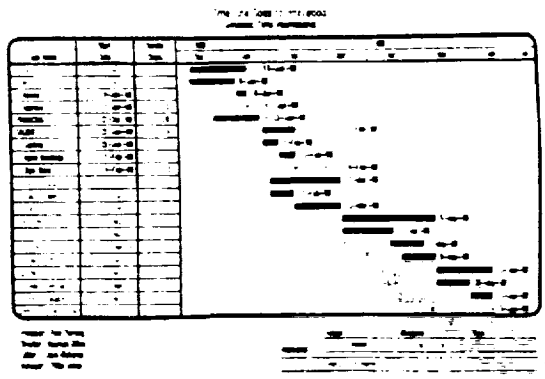
Time Line 4.0 also addresses our major complaint with the previous versions, by being a lot faster at many operations. Symantec claims that recalculating a project is up to three times faster and project leveling is up to 50 times faster. I haven't tested this, but it does seem much faster.

In short, Time Line 4.0 adds lots of features designed to make project management easier. But I'm most impressed by the emphasis on graphics — it takes project management down a new path.

Time Line 4.0 has a $695 suggested list price; Time Line 3.0 users can upgrade for $149. The program requires a PC XT or compatible with at least 640K and a hard disk.

Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014-2132, (408) 253-9600.

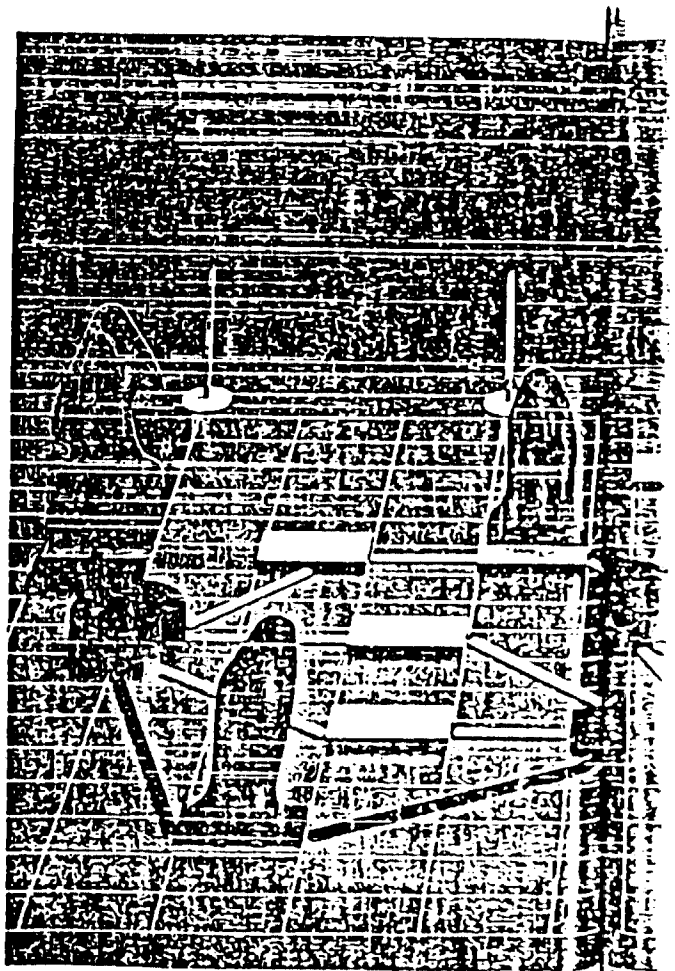
First Look examines new personal computer products before they have been through a formal review. Hear Michael J. Miller discuss other products weekly on the Business Radio Network's "Computing Success," Sundays, 1 to 3 p.m. Pacific time.

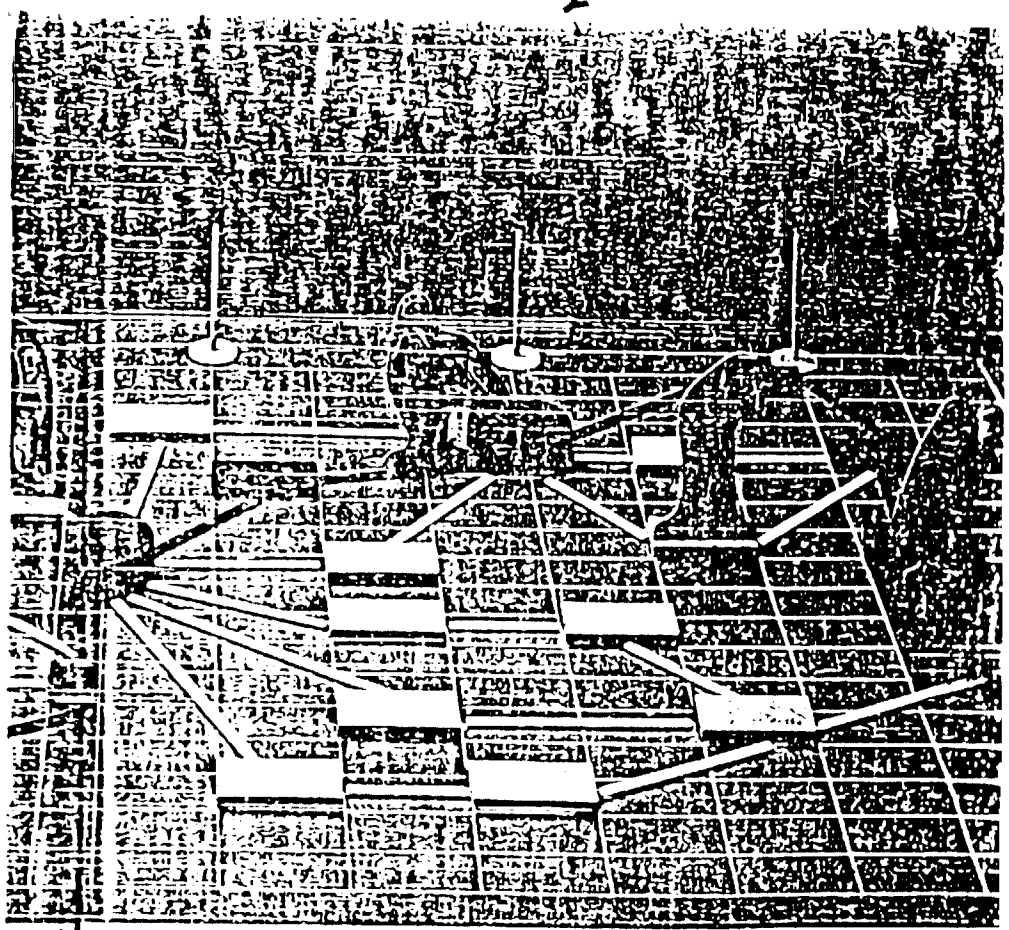


Presentation-quality graphics find their way into project management as one of the new features of Time Line 4.0, which also adds several ease-of-use enhancements.

Critical Paths

When time is critical, good project management can show you the shortest path through a thicket of tasks.





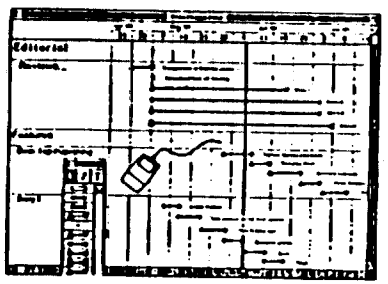
When it comes to serious professional computing, few applications can flex a Mac's muscles like a high-end project management system can. However, project management tools run the gamut from simple data organizers with some basic graphics to massive relational databases that provide detailed management information and produce sophisticated graphic representations of a project's plan and status.

Most project management techniques can be traced back to the U.S. Navy's Polaris missile program. In 1956 the Navy's Special Projects office was given responsibility for coordinating the development of the weapon system. By the end of 1957, it was clear that traditional management techniques were inadequate for the complexity of the task. To solve the problem, a research team that included personnel from Lockheed's Missile and Space Division (the prime contractor for the Polaris missile program) and from the management-consulting firm of Booz, Allen, and Hamilton was formed. The code name for the task force, Project Evaluation and Review Task, later provided the name and acronym, PERT, for the techniques the team developed. PERT strategies depict the relationship of tasks within a project, without regard to priorities.

By Ken Landis

A logical extension of PERT, the critical-path method (CPM), was developed by E. I. du Pont de Nemours & Co. Du Pont, working with computer specialists from Remington Rand, developed a technique that focused on activity-based networks and the relationships among the activities. The phrase "on the critical path," first applied to the construction of a chemical plant in 1958, refers to the shortest "distance" or time to complete a project.

A host of project-planning techniques have since been developed and have found their way into M.B.A. programs across the country. As these techniques have grown more sophisticated, so has the mathematics needed to construct them. That's where your Mac comes in. It doesn't get tired and make mistakes, it can draw the same picture a hundred times until it's exactly the way you want it, and it can do these tasks in a fraction of the time it would take you.



The Reviews phase in this FastTrack Schedule Gantt chart was collapsed to show a summary of the subleval activities. The toolbox offers an extended library of user-definable bar types and milestones.

The Macintosh project-management-software market is divided basically into two categories: simple outliners and schedulers, and project-tracking systems. Outliners and schedulers help organize your resources and produce Gantt charts to show you the structure of a project.

By comparison, full-fledged project-management systems not only plan a project but are also able to dynamically adjust plans based on actual performance and to give status reports. Caring for these systems is a monumental task, even for use in a small project. All scheduling and cost information must be kept current. If the system falls behind the project, its output becomes useless. These tools provide PERT and CPM planning techniques as well as basic management reporting on actual versus forecast figures for time and budget. Even so, the strength of these programs is their ability to construct a project-management plan rather than their ability to manage it. They assist you in establishing your work plan, but they don't tell you how to accomplish it. Project management at a high level is complex and still demands a fair amount of specialized knowledge on your part.

Outliners and Schedulers

Macintosh outliners, such as MORE II from Living Videotext, have been used to track projects as complex as the "Day in the Life" photography series by Collins Publishers, taking the projects from conception to binding. Outliners optimized for scheduling add specialized graphics such as Gantt bars and start/stop symbols to help you visualize the project's stages. Two of the more popular products in this category are FastTrack Schedule and Schedule Maker.

FastTrack Schedule is a classic example of an outliner and scheduler. The program allows you to enter tasks in a multilevel, indented format. Each group of tasks, whether milestones or phases, can be entered in detail and then collapsed for summary viewing. There is no limit to the number of levels you can enter for each activity. Dependent activities are adjusted automatically when you link or change precedent activities on the chart. Up to ten schedules can be open simultaneously, and activities are easily moved from one to the other.

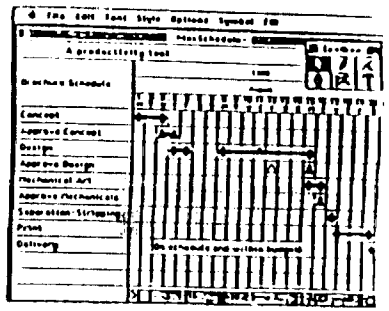
FastTrack Schedule puts color graphics to excellent use on a chart, making screen presentations a visual pleasure and easy to digest. Gantt bars, polygons, triangles, arrows, and other symbols are used to indicate start, stop, and other important dates and are easily integrated into charts. Text and graphics, drawn in directly or imported from other programs in either PICT or ASCII file format, can be added to the Endpoint Toolbox and placed anywhere on a chart. Text display can be in any font or size in your System.

Gantt charts may be scaled to hours, days, weeks, months, quarters, or years or be put into a format of your choice. FastTrack Schedule supports international and U.S. date formats, as well as military and standard time. A page preview feature gives you an overview of your chart on screen. You can flip from page to page and zoom in for closer viewing. FastTrack Schedule is a clean, crisp program that sets the standard for this category.

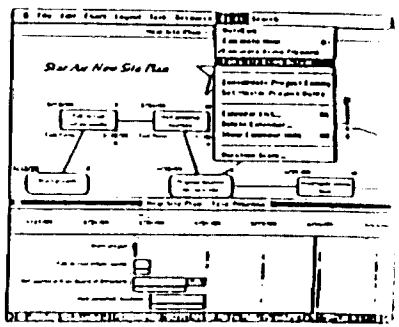
MacSchedule differs from FastTrack Schedule in that it doesn't offer on-screen color or the same shading options, although it conforms well to the Mac interface. Resizing Gantt charts along different time dimensions is easy and helps users see the relationships among tasks from different time perspectives. Unfortunately, MacSchedule doesn't offer a collapse feature for activities or tasks to accompany its time-compaction feature.

MacSchedule divides its Gantt charts into quarterly, monthly, half-monthly, weekly, daily, or free-form segments. The system automatically calculates the number of days that have elapsed and the days to go for each project. To illustrate task starts, stops, and milestones, MacSchedule uses the standard diamond, square, and triangle symbols, which you can replace with your own geometric shapes. All the schedules created in the program follow a simple hierarchical approach — the information is entered and displayed chronologically. All inserts and edits are quick and painless.

The MacSchedule documentation is clear and concise and includes an excellent section on project planning. For average users, learning the pro-



MacSchedule offers a variety of graphic symbols to denote project milestones. This brochure schedule helped plan the project and track its progress.



Users of MacProject II can enter actual dates, costs, and hours and compare them with planned values. The program calculates dates, slack time, critical paths (shown in red), resource utilizations, and cash flows, using both planned and actual information.

Scheduling Employees

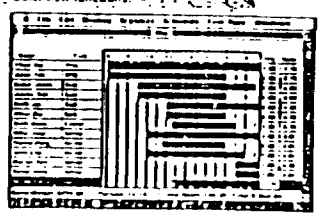
Schedule Maker 2.0 doesn't deal in projects or tasks; it deals in people and resources and is for service organizations that must ensure that the right people and machines are working at the right time.

Schedule Maker uses Gantt-like bars to show the coverage provided by employee schedules. You select workers for a shift by querying the database. Employees can be scheduled for hour, half-hour, or 15-minute increments. The system automatically prevents double-shift scheduling for an employee on a single day, but this logic can be overridden for back-to-back shifts.

Schedule Maker automatically produces a financial summary of your schedule. The amount of time scheduled for each employee, multiplied by the employee's hourly wage, is automatically computed and compared with projected sales or with the amount budgeted for labor costs. Schedule Maker easily handles vacations, sick days, seven-day swing shift schedules, and training time.

All the information stored in the employee database, as well as the schedules and financial reports, can be easily exported to Microsoft Excel, Wolf!, or Works for analysis or for creating presentations.

Upcoming enhancements to Schedule Maker, due out by the time you read this, are focused on making the scheduling and updating process more flexible. The new version will prevent scheduling conflicts, calculate costs as a percentage of sales, mark workers for special days off, and perform a host of other new functions.



Schedule Maker uses a visual display of the scheduled hours. Clicking and dragging the draw bar lets you adjust an employee's hours.

Unadjusted Projects

PERT & Critical Path Techniques is a project-scheduling system that incorporates PERT and CPM scheduling tools, but it doesn't track actual start and completion dates, compare them with the project's schedule, or make necessary adjustments. The program, which is clearly not as flashy as the other packages, is plain and functional — nuts and bolts project scheduler. PERT & Critical Path Techniques provides detailed tabular output from its planning models. The package offers time measurement, project costing, and scheduling. It offers full textbook implementations of PERT and CPM, including calculation of all slack, shadow price, first start, first stop, last start, last stop, and all resource usage variables. The documentation is chock full of references, techniques, and interpretations of PERT and CPM output.

Glossary

Critical Path
A sequence of critical tasks that constitutes the shortest amount of time in which a project can be completed

Dependency
A relationship between two tasks in a project in which work on one cannot begin until the work on the other has been completed

Duration
The amount of working time needed to complete a task

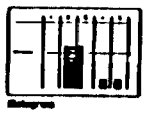
Elapsed Time
The total calendar time, plus nonworking time, between the beginning and the end of work on a task.

Gantt Chart
A time line chart that shows tasks chronologically from left to right, using bars to show start, stop, and total times.

Histogram
A bar chart of the work load assigned to a single resource for the duration of the project.


Critical Path


Gantt


Histogram

Leveling
Adjusting the use of resources in a project so that no resource is overallocated

Milestone
A goal or significant point in a project, such as the start or finish of a phase or set of tasks.

Network
A graphic representation of a critical path. Each task is a box, and the line connecting the tasks represents the working time necessary to complete them

PERT Chart
A graphic depiction of the relationship of tasks within a project. The logical and historical predecessor to a critical path chart, it lays out tasks without regard to priority, slipping, or the overall impact of slipped tasks on a project.

Slack Time
The amount of additional time a task can take to complete without affecting the ending date of the entire project.

gram will probably take only an hour or two. Although MacSchedule is a solid package, in its present form it can't compete with FastTrack Schedule. Enhancements in version 2.0, which is due this fall, include a simple spreadsheet tool for planning, multiple-window support, improved graphics and drawing capability, and an expansion of the tilling capability. The new release should put MacSchedule back into a competitive price/performance position.

Project-Tracking Systems

Project-tracking systems are the powerhouses of the project-management market. The three major contenders in this market segment are MacProject II, Micro Planner and Project Exchange, and Information Manager. Two of these systems, MacProject II and Micro Planner, use the simulations of PERT and CPM methods and include integrated data-management and reporting tools for tracking a project's actual versus predicted performance. Information Manager is a highly specialized database program that can be used alone or with the other two packages.

MacProject II has a highly structured approach. The system is oriented along classic task and milestone lines, in which each milestone is composed of multiple tasks. MacProject II adds a new dimension by providing supertasks — overarching projects linked to the project you're working on.

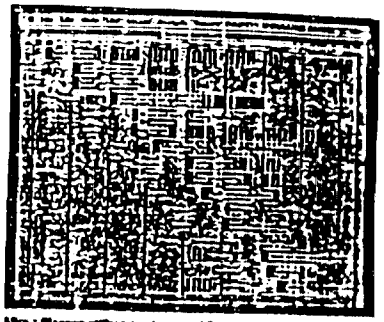
The program's approach is apparent in the entry modules. By providing a rigid structure for data entry, many of the uncertainties and problems that users face with sophisticated programs are removed. Building on the Mac's graphical interface, most data entry uses a library of symbols that a user weaves into a project plan. Even the tabular data-entry sections of the program are stylized to conform to the Mac interface.

MacProject II has broad what-if capabilities as well as the ability to automatically adjust the entire project plan based on actual results. Extensive search facilities help the project manager zero in on a task, milestone, or supertask are included. MacProject II can track multiple variables and estimates for each task — in fact, it can keep tabs on all the data needed for complete PERT and CPM planning.

From this data, MacProject II calculates slack times (the amount of additional time that a task can take before it increases the length of the whole project); the critical path resource duration, or the amount of time that a person or machine will work on a particular task; the work load, which is the amount of work allocated to a resource for a given period; and resource costs.

The results of these calculations can be displayed in any of eight graphic formats:

- The Schedule Chart, a textbook PERT chart
- The Resource Timeline, a Gantt chart.
- The Task Timeline, a Gantt chart that shows tasks.
- The Task Cost Entry Table, which shows the fixed costs and income for each task in the project. This chart is also for entering data.
- The Resource Table, which lists in alphabetical order the names of the people and resources assigned to the project, indicates which parts of the project they are attached to, determines their maximum availability for the project, and displays their cost information.
- The Cash Flow Table, which summarizes the project's costs and income chronologically. The table is compiled from the information entered into the Task Cost Entry Table and the Resource Table and from the dates in the project schedule. The time lines used in the Cash Flow Table are determined by the scaling you used in project planning. The Cash Flow Table is an outstanding tool for managing the outflow of funds during a project.
- The Project Table shows the task and milestone names, planned and actual start and finish dates, task durations, resource assignments, slack time, subprojects or supertasks, and costs and income. This report is the heart of MacProject II. Tasks and milestones that are on the critical path are boldfaced in the table and in red if you have a color monitor. Other colors used in MacProject II's charts highlight milestones and supertasks off the critical path, dependencies between two critical tasks, negative values, and work scheduled above a resource's capacity.
- The Resource Histogram shows the level of work planned for a single resource. This is a critical tool for balancing work loads between resources. The chart graphically shows if resources are under- or overallocated. Using MacProject II's built-in allocation function, resources can be leveled and the project plan can be adjusted automatically. The entire project can be leveled automatically or interactively — you can accept or reject every leveling suggestion the program makes.


Mice's Planner utilizes a color-coded Gantt chart to let users easily determine which tasks are critical to a project's completion date. For example, red signifies critical activities and blue indicates completed ones.

MacProject II works with laser printers and with Hewlett-Packard and Houston Instruments plotters for color output. The documentation intricately explains the function of the program and how it manages projects.

Micro Planner uses a visually oriented data-entry scheme but relies more than MacProject does on pull down menus. Once the project

Affordable Project Management

At press time a new product called Project Blocks was sent to us by PRIORI Systems. This program, a CPM scheduler with a calendar to keep track of plans and appointments, offers a quick and dirty project management system that deviates somewhat from the standard Mac interface. Version 1.1 Requires 512KE or later. $38. Users who want to get their feet wet with an affordable package can write to PRIORI Systems, P.O. Box 40219, St. Paul, MN 55104, (612) 871-7518.

Project Management: Features Chart

	FastTrack Schedule	MacSchedule	Schedule Maker	PERT & Critical Path Techniques	MacProject II	Micro Planner II & Project Exchange	Information Manager
Time Planning			✓				
Gantt	✓	✓		✓	✓	✓	
PERT				✓	✓	✓	
CPM				✓	✓	✓	
Actual vs Forecast Time					✓	✓	✓
Actual Expense Reporting					✓	✓	✓
Project Data Management							✓

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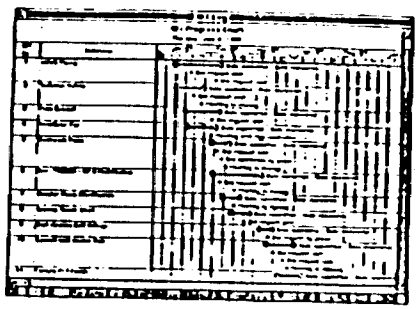
OF POOR QUALITY

information has been entered, you identify the critical path by entering timing information into the program. Once you've supplied the starting date and assigned a duration to each activity, Micro Planner automatically calculates the project's critical path and checks your project for "logic errors" such as activities that are unconnected.

Once the CPM analysis is complete, you can view the task dates in a bar chart or network format. Micro Planner makes excellent use of color in the bar chart to show tasks that are on the critical path. (Unfortunately, the program does not provide support for color plotters.)

The resource-analysis capability of Micro Planner takes your projections of when tasks can start and finish and applies real-world constraints to them, such as the resources that are available. As with MacProject II, Micro Planner's main analytic tool is resource leveling, which automatically delays noncritical activities within their slack, or "float time," period. Resources these tasks would otherwise consume are reallocated to critical-path activities.

If your resource leveling can't finish the project in the minimum time (the critical path), then Micro Planner offers two choices: the time-critical option, which identifies what resources are needed to finish the project in the critical path time; and the resource-critical option, which shows when the project can be expected to finish with the given resources.



MC Information Manager allows users to create their own tracking systems and automatically update status reports that can include either all or only portions of the database information.

Time-critical analysis is histogram-driven, while resource analysis is bar-chart-driven. The system provides exception reporting for variances, as well as the mandatory what if capabilities you expect in a high level project management program.

Micro Planner has the most exhaustive documentation of the big-three Macintosh project managers. The package and documentation are slick and set the standard for this market. Users should note that Micro Planning International sells Micro Planner directly and, more often than not, with significant project-management consulting.

A companion package, Micro Planner Project Exchange, provides the ability to transfer data between DOS and Macintosh versions of Micro Planner. It can also prepare data for and receive it in standard file formats from minicomputers and mainframes.

Not surprisingly, the combination of a high performance package, multiuser capability, sophisticated data-sharing ability, a direct sales force, and in-house consulting and training have apparently made Micro Planner and Project Exchange the packages of choice for Corporate America. Micro Planner's customer list reads like a Who's Who in the Industrial West.

An upcoming product, Micro Planner X-Pert (priced at $1,995), is the next generation of Micro Planner. The program will modify network layouts graphically, provide time units ranging from 15 minutes to a year, provide a report writer for custom reporting, schedule subprojects, be able to break down work tasks, provide a costing feature, and accommodate precedence or activity-on-arrow scheduling techniques. The new package, a response to corporate customers, should firmly establish Micro Planning International as the preeminent provider of project-management systems to the *Fortune* 500.

Information Manager is a structured database program that is specialized for project management. The program has no PERT or CPM implementations. Instead, it provides an organizing and managing structure for all aspects of a project, such as correspondence, reminders, and telephone messages.

The database has a graphical interface similar to index cards. Each index card becomes a record within the database. In addition to standard field types, Information Manager uses custom fields for managing projects. Each special field is actually the header on another record. For example, if you define a notepad field as a special field, it automatically opens a 32K file for text storage when selected. Other fields include start date; stop date; scheduled and remaining times for tasks; and the submittal log field, which tracks project correspondence.

Information Manager lets you set up additional critical dates and reminders on the alarm system. The system notifies you in advance about an impending event and can issue an alarm up to nine times per event. The report generator provides WYSIWYG capability on-screen and full-function formatting.

Information Manager is lightning fast and allows multiple projects to be viewed and managed simultaneously. The program is well designed, but it has a few small flaws. Double-clicking to select a word is not supported nor is multiple scheduling for different people on different sched-

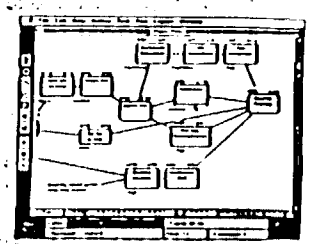
Bold Watch: KeyPlan

Symmetry, the publisher of Acta Advantage is bringing to market a new outliner and scheduling program called KeyPlan. KeyPlan offers both CPM and Gantt analysis of projects. It can calculate float, or slack, time in its CPM mode and can report actual versus budgeted time. The system can't do any resource leveling for CPM, a major drawback when compared with MacProject II, its major competitor. Nonetheless, KeyPlan should give you about 70 percent of the functionality of Acta Advantage, providing the strongest outlining features of any program available.

KeyPlan takes good advantage of the Mac interface by stacking a series of icons in the left border of the screen. Each icon represents a different view of your data. There's a network view, a bar plan (Gantt), lists or tabular views, overhead costs, and the resource list. KeyPlan uses graphics heavily in all its views. You may become disoriented trying to memorize all of the symbols (there can be six or more in an outline or chart), but once you get used to them, they're very helpful.

KeyPlan is very intuitive, and it offers an extremely flexible graphics interface for building Gantt and CPM charts. Controlling KeyPlan's time string, network dependencies, and organization of a chart is easy.

From a beta bird's eye view, KeyPlan should land in the middle of the market between fast-track Schedule and the more-intimidating MacProject II. It's an intuitive program and has the strongest outliner of any project manager to boot. KeyPlan is slated to retail for $450.



KeyPlan lets users plan and manage projects by producing everything from simple outlines to network charts, bar plans, and graphs. The icon palette on the left lets users toggle between different views of the project.

100

ules. Information Manager's biggest competitors are HyperCard-based organizers such as Focal Point II from Mediagenic and Hyper-Action from Multi Solutions. For most medium-sized projects, these systems work well. Information Manager doesn't start to show its real data-management power until it works with a big and complex project.

Future Projects

The Mac project-management marketplace is bound to undergo major structural changes in the next few years. Software publishers such as Symmetry (see "Beta Watch: KeyPlan" sidebar) will continue to integrate their foundation products into a project-management framework. The continued emergence of database engines, such as ACIUS' 4th Dimension, will also stimulate the market.

As developers' tool kits become easier to use and as Macs find their place in business, project-management products will become more pervasive, building on the Mac's power and its ability to show complex relationships graphically.

Ken Landis is a general-management consultant who uses project-management systems daily and helps clients use automation to manage their businesses better.

The Bottom Line

The Mac project-management market is currently divided between entry-level outliners and schedulers and high-end project-tracking systems.

FastTrack Schedule has a commanding lead in the first category. It is the right tool for people who manage projects in which they own all the resources — doing consulting, for instance, or implementing business plans or editorial scheduling.

MacProject II kicks in when multiple resources are used and the completion date is critical. And Micro Planner and Project Exchange show their value in large organizations in which users can justify consulting and training services and in which the environment is a mixed bag of Macs and PCs.

Information Manager can complement any medium-to-large-sized project in which a great deal of correspondence, notes, and project information is the norm.

Report Cards

FastTrack Schedule ★★★★½

Flexible Gantt-based project scheduler that uses a hierarchical outline format. Provides the highest degree of functionality and the best on-screen and printed graphic ability in its class. A perfectly suited project-management system for the Mac. Version 1.02. Requires Mac Plus or later. $195. AEC Management Systems, Inc., 20524 Amethyst Lane, Germantown, MD 20874; (301) 428-3694.

Information Manager ★★★★

A dedicated database for managing project information. Designed to be used with MacProject II or Micro Planner. Helps to manage the data needed to make decisions and track status, and a useful alarm feature reminds users of critical dates. Version 1.22. Requires Mac Plus or later. $195. AEC Management Systems, 20524 Amethyst Lane, Germantown, MD 20874; (301) 428-3694.

MacProject II ★★★★

A PERT and CPM project-management system with time and expense reporting. Can be used alone to manage projects and produce management reporting. Offers crisp documentation with an easy-to-follow design. Version 2.0. Requires Mac Plus or later. $499. Claris Corp., 5201 Patrick Henry Drive, Box 58168, Santa Clara, CA 95052-8168; (408) 987-7000.

MacSchedule ★★½

A simple Gantt-based project-management and outliner system. Offers advanced project time scaling but is not for advanced Gantt users. Limited color, graphic, and printing capabilities. Version 1.1.1. Requires Mac Plus or later. $195. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301; (818) 991-6540.

Micro Planner Plus and Project Exchange ★★★★½

The choice of Corporate America. Provides full PERT and CPM implementations with advanced resource leveling and management reporting. This is the only product that can leverage a company's IBM PC investments. Output can be used easily for management presentations. Version 6.1F for Micro Planner, 1.08 for Project Exchange. Requires Mac Plus or later. Micro Planner, $595; Project Exchange, $100. Micro Planning International, 235 Montgomery St., Suite 840, San Francisco, CA 94104; (415) 788-3324.

PERT & Critical Path Techniques ★★★½

Technically the most sophisticated project-management system, this program has full Gantt and CPM implementation, including all second-order slack and timing calculations, but does not make good use of the Mac interface. If you're a project-manager aficionado, you might want to consider it. Version 6.0. Any Mac. $152. Woodheart Press, P.O. Box 379, Alburg, VT 05440; (514) 933-4918.

Schedule Maker ★★★★

A dedicated employee- or equipment-scheduling system that uses a simple Gantt-chart format but is not a project-management tool. Automates the process of figuring out who should work when and how much it will cost. Version 2.0. Any Mac. $295. Craig Management, Inc., 16717 Monitor Ave., Baton Rouge, LA 70817; (505) 291-6348.

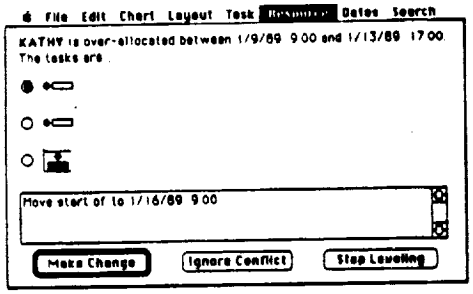
WINDOW SHOPPING

by Lawrence Stevens

MacProject II gets a new look this month. I also review programs that help you back up your hard disk, use MultiFinder even if you only have 1MB of RAM, and get skinny.

MacProject II 2.0

In my review of MacProject II from Claris Corporation (*Macworld*, August 1988), a major criticism was that the product didn't link resources and tasks closely enough. I complained that if you have one resource, say an employee, scheduled to work on two or more conflicting tasks, the program would show the conflict, but would not reschedule the project to relieve it. MacProject II version 2.0 corrects this shortcoming with resource leveling. You can assign a priority percentage—from 0 to 100—for each task. If a resource is scheduled to be used in conflicting tasks, the resource-leveling utility postpones some tasks, beginning with those that have the lowest priority ratings. If you select Interactive Leveling in the Preferences box, the program displays a dialog box with three possible solutions for each conflict. You can choose to reschedule the task (MacProject suggests the best date), decrease the percent of effort by the resource (for example, decide to use an employee only half-time on each task), or substitute a different resource.



MacProject II with Resource Leveling
If the same resources are in demand for several projects, you can resolve the conflict by using the Interactive Level Resources dialog box. The program can suggest three ways to resolve the conflict: Make Change, Ignore Conflict, or Stop Leveling. The icon next to the two top radio buttons means reschedule the task, the third button means decrease the resources effort. As you click each radio button, a different solution appears at the bottom of the screen.

Unfortunately, version 2.0 doesn't correct my second major criticism: it uses a nonstandard schedule chart that can be difficult to read with complicated plans. There are a number of minor enhancements, however, that when added together, do make the chart easier to read. For example, critical path activities, which cannot be delayed without delaying the entire project, used to be displayed in bold. Now they also have a drop shadow, which makes them easier to pick out in the jumble of activity boxes. You can also view multiple charts and save that view so that you can recall the same combination of windows later. In reduced mode, you can now cut, copy, paste, and add dependency activities. MacProject II 2.0 costs $499; you can upgrade from version 1.0 for $65 or from Apple's MacProject for $199. If you purchased version 1.0 after February 1, 1989, contact Claris for upgrade information.

In my original review, I summarized the differences between MacProject II and Micro Planner Plus (the other Mac project planner) as being that MacProject II was easier to learn and use; while Micro Planner Plus had resource-leveling ability and more-readable charts. Now MacProject II has resource leveling, its schedule chart is at least slightly more legible; and it is even easier to use and learn with its spelling checker and HyperCard-based help screens.

MFLauncher II 1.0

If memory limitations keep you from running the applications you want under MultiFinder, MFLauncher II from Impossible Dreams Software ($49.95, bundled with MFDetective 1.0) can help you better organize your RAM. The programs provide charts to show exactly how the Mac is using its memory. The main screen shows how much memory is available. You can use that number to determine if a particular application will fit in memory or decide how much memory to allocate to your applications.

The MFDetective chart is especially helpful when the problem is not a lack of memory but fragmentation. For example, if you open three applications, each of which requires 250K of RAM, one after another (we'll call them A, B, and C) and then you quit applications A and C, you now have 500K of free space. But the free space is discontinuous, or fragmented

(continues)

Micro Planner 6.1e

Project-management software. ***Pros:*** *Uses standard project-management logic; closely ties resources and activities.* ***Cons:*** *Difficult to learn; Mac user interface could be improved.*
Company: *Micro Planning International.*
List price: *$595.* ***Requires:*** *1MB.*

Project-management software helps track large-scale projects such as publishing a magazine, building a house, or bringing a new product to market. It creates charts to help manage and monitor resources, deadlines, and other aspects of the job: it diagrams the activities that need to be accomplished, tracks resources to make sure they are not overutilized, and establishes dates when the various activities, as well as the project as a whole, should start and end.

If you're looking at project-management software for the Mac, you have two choices: MacProject II and Micro Planner. The first is inexpensive and relatively easy to learn. The second is more complex and more powerful, and costs about twice as much.

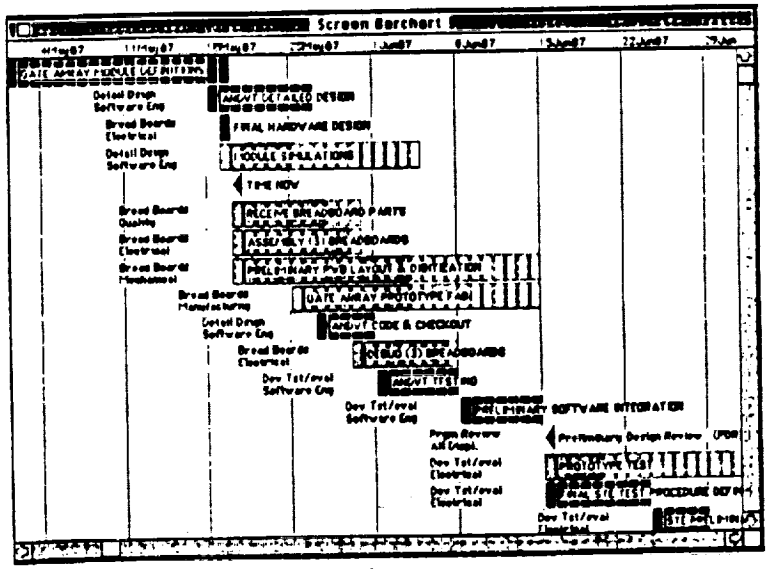
With MacProject II, you enter task names in boxes and join the boxes by drawing MacDraw style lines to represent the sequence of tasks. This becomes the schedule chart. If you have used other Mac applications, the process is familiar, and you'll probably master the program in half a day or less. With Micro Planner, you input the data and the program automatically creates the chart. This process is less intuitive, and if you're unfamiliar with project-management concepts, it will take a few days before you're comfortable with it.

Complex Charts Made Easy

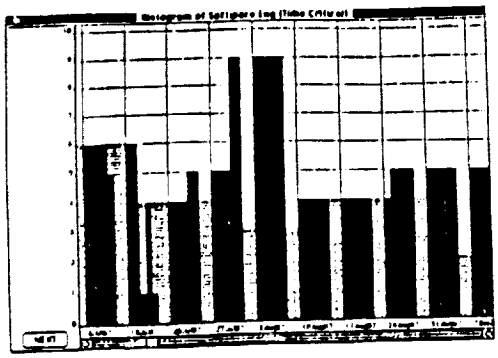
Micro Planner has the advantage of producing more legible charts partly because it uses standard project-management symbols to represent the relationship between activities. MacProject II, by contrast, has only one major logical convention: leftmost activities must be completed before activities displayed to their right can begin. In straightforward sequential projects, that convention is adequate. Micro Planner's more advanced logical conventions allow you to represent complex relationships that are not available with simple boxes and lines. For example, the three activities required to install a sewer pipe might be to dig a trench, lay the pipe, and close the trench. But it would be a waste of time to begin each task only after the preceding one is completed, because after the trench digger has been working only a day or two, the pipe laying can begin, and so on. Micro Planner has symbols to represent lag- and lead-time activities that can be combined in complex ways to create these staggered structures.

Micro Planner also simplifies diagrams using *hammock* activities. These span, and therefore summarize, complex series of events for more concise reporting. For example, suppose there are ten steps to installing sheet rock, including cutting the sheet rock, nailing the sheet rock, sanding it, and so on. You can specify a hammock event called "Start Sheet Rock" at the beginning of the process, and at the end of the process another hammock event called

(continues)



Logic Diagrams *Micro Planner automatically draws the project "road map" (called* logic diagram *or* network diagrams*), calculates and displays deadlines and resource needs. It also shows schedule bottlenecks.*



Resource Analysis
The histograms graphically depict project demands for all resources, showing where demand for resources is greater than the supply (the red bars indicate demands that exceed supply) so that users can determine the best use of specific resources given time and budget constraints.

"Finish Sheet Rock." The program automatically adds up the duration of the events within the hammock activity. You can access reports that include just hammock activities, and you can also use hammock activities in allocating resources.

Another advantage of Micro Planner is that it lets you consider resources such as employees, machinery, and supplies when determining the start and finish dates of activities. For each task you can specify two types of resources. Normal resources—for example, bulldozers or people—are available each day. Pool resources—such as plywood sheets—are consumed. Each normal resource can have its own calendar. You can specify that a bulldozer is only available for this project on Monday through Wednesday, or that a painter can only work in the office on weekends when no one else is there. The program also keeps a running total of pool resources, taking into account how much will be used at each activity and when new resources are expected to arrive.

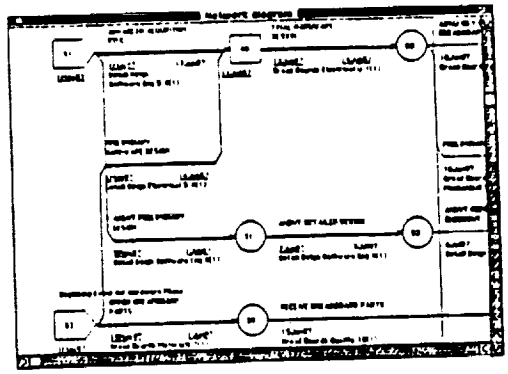
Once you input the resources, the time each activity is expected to take, and the sequence of activities, Micro Planner can do either a Forward Pass, which specifies the earliest day the project can be completed given a specific start date, or a Backward Pass, which gives the latest day the project must be started if it is to be completed by a given deadline.

The program can generate a number of reports and diagrams. The Network Diagram is a graphical representation of all the activities; the Bar Chart shows activities along a time scale; the Activity Listing shows all activities, along with their stop and start dates; and the Progress Report compares the actual performance with projected performance.

Micro Planner is MultiFinder compatible and can be used on an AppleShare network. It also allows transparent file transfer with its IBM PC version.

Steep Learning Curve

Because project management is a complicated discipline, it is natural that a program like Micro Planner is not easy to learn. It could be made easier by providing a more familiar user interface. For example, when you input data, you can only scroll over a limited part of the document using the scroll bar. Then you have to click at the side of the screen to move the data and get more room to scroll. Also, some boxes do not have Close or Cancel buttons.



Critical Path Method (CPM)
Micro Planner's color-coded CPM lets you determine which tasks must be completed immediately if a given deadline is to be met (red), which ones have been completed (blue), and which ones can be delayed without affecting the deadline (extra days are indicated by boxes outlined in green).

And to enter data from an options list, you cannot just double-click, you must select the data and press enter.

Steep as it is, the learning curve on Micro Planner doesn't look so bad when compared with the majority of project managers running on PCs, DEC minis, and IBM mainframes. And Micro Planner can compete with any other system in terms of versatility and power.—*Lawrence Stevens*

See *Where to Buy* for contact information.

ORGANIZATIONAL TOOLS

KeyPlan

Managers uncomfortable with complex project-management programs should love this hybrid outliner/planner.

When we looked at a beta version of KeyPlan last October, we called it an intuitive project-management program with a strong outliner. KeyPlan is now shipping, and it lives up to expectations. This is a good combination outliner and project planner that's ideal for managers or planners who don't need or want the complexity of more-powerful programs such as MacProject II.

WHAT IT IS According to KeyPlan's documentation, the outliner "acts like most other outlining programs," and that's about all that need be said about the outliner. It looks, feels, acts, and works like any standard outlining program.

The project planner is a little different, though. Driven by the outliner's three levels — task, milestone, and subplan — KeyPlan can create network diagrams, Gantt charts, and project lists. KeyPlan's network diagrams show order of precedence, but no summary statistics such as start date or slack times are displayed on the chart. These statistics are reserved for a window at the bottom of the screen called the Task Info window. The window can be "rotated," to show the layers of detail supporting the summary statistics, or kept at a nominal size to show only summary information.

KeyPlan calculates a project's critical path. The critical path is graphically identified by a double-thickness line (or by a red one on color systems).

Editing a network diagram makes good use of the Mac interface. With that interface, tasks are easily created, dependencies established, and schedules accommodated. KeyPlan is smart enough to catch dependency conflicts as you change tasks, and it warns you when such conflicts occur. Conflicts can then be adjusted or overridden.

To size a network diagram, KeyPlan uses a unique graphic system that depicts the size and orientation of charts. In essence, you view the charts from above, superimposed on a size grid. This approach ensures that you won't print charts that are too big, and it lets you reorient your work so you can see it in full-screen views.

You enter and manipulate overhead costs by using a distinct view, or window, that resembles the List, or tabular-data, view. The Overheads and Resource views are used to enter the details of any ongoing costs that are not specific to a single project. The Resource view can also be used for recording details of costs and income anticipated as a result of a project. Lists can be sorted and printed for selective reporting.

Sitting in the background, like a watchful eye, is the base calendar. The base calendar is the time system from which all the project timings are generated. A nicely designed dialog box lets you customize for days and time. KeyPlan can plan time in increments of minutes, hours, days, and weeks.

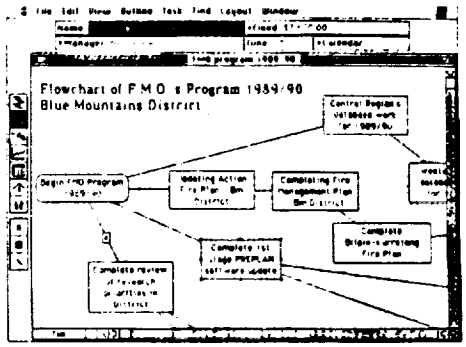
Calculations can run every time a change is made or can be driven manually. During calculation, report-date conflicts can automatically be brought to the surface, the calculation suspended, and the pertinent information displayed to help you resolve the conflict.

To run a master plan, KeyPlan uses a subplan scheme in which individual projects, or subplans, are all rolled together into a single large plan. The linking and reporting using subplans works quite well. You can use the Select command to query KeyPlan interactively, displaying only those elements of a plan that you want to review, such as tasks with no float time.

Plan (network), Bar (Gantt), and Graph views can be annotated with text, frames, or lines to highlight information or make a point. Graphics can also be imported via the Clipboard. As you would expect from a Symmetry product, KeyPlan can import and export Acta files. KeyPlan also offers standard file export to spreadsheets and databases.

KeyPlan's printing subsystem is also pretty smart. Recognizing that components of large plans have to be joined together when printed, the designers incorporated a system that leaves an adequate margin around each page so that multiple pages can be taped together easily. The printing system also allows you to position the network-diagram graphics anywhere you want on multiple sheets of paper. KeyPlan supports color and PostScript fonts.

KeyPlan is a snazzy system. The on-screen presentations are crisp, the on-line help is helpful, and the documentation is good. The program is a great tool for project managers who want to use a project planner as an adjunct rather than as the single point of information, planning, and job tracking.



KeyPlan is an outliner-driven project-management package. It's a good choice for managers and planners who want to work quickly. The lines in this network diagram indicate dependencies between the tasks. KeyPlan is smart enough to catch conflicts and warns you so you can make the necessary adjustments.

THE BOTTOM LINE KeyPlan is flexible and fast and should be a hit with project managers and executives who want to use their Mac to help them think. With its outlining metaphor, KeyPlan doesn't require the esoteric knowledge of project management that some bigger programs, such as Micro Planner, demand. But for serious project management, users will gravitate toward higher-end packages that offer accounting, variance reporting, and stronger information management.

— Ken Landis

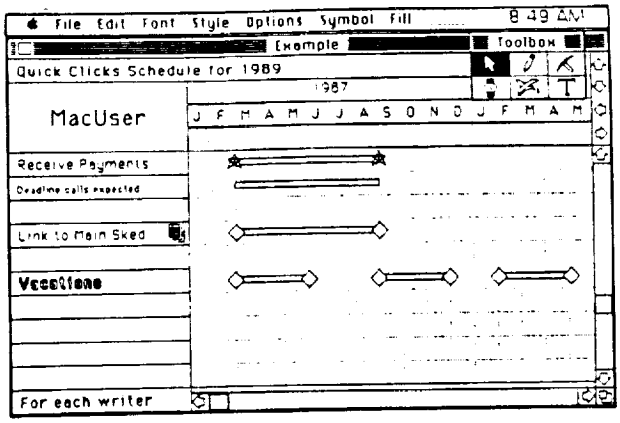
Get Info

KeyPlan ¢¢¢¢
List Price: $395.
Published by: Symmetry Software, 225 E. First St., Mesa, AZ 85203; (602) 844-2199.
Version: 1.0.
Requires: System 6.0.2 or later.
Application Size: 685K.
Compatibility: Mac Plus or later.

Quick Clicks

ORGANIZATIONAL TOOLS

MacSchedule



All work in MacSchedule is done in this basic screen, which can be larger than the display. Tasks can be shown in a wide variety of ways and need not be continuous. The graphics tools at the upper right allow you to create nearly presentation-quality schedules.

Although MacSchedule looks simple, it has substantial intelligence built into it, making the creation and maintenance of schedules nearly painless. MacSchedule's main limitation is that it can produce only Gantt charts, but that's not too big a problem, since they are an industry standard and most people can understand them intuitively.

MacSchedule is graphics oriented and always uses the same basic form, which is then filled in, added to, and modified as necessary to produce the schedule you want. When you update, the same tools you used to create the schedule are there to help you change it.

Projects and jobs are planned visually. Tasks or subtasks are listed in the leftmost column, and you then use the tools provided to indicate when the tasks are to occur.

Schedules can be divided yearly, quarterly, monthly, biweekly, weekly, or daily. You can also omit the time notation to create free-form schedules.

MacSchedule doesn't limit your plans to your screen size. Quick-acting horizontal and vertical scroll bars are provided. If you have a screen larger than the standard Mac Plus or SE display, you can enlarge the working window to use the full area available. If you then open the schedule on a Mac with a smaller screen, the window will automatically resize itself to fit.

The header lines normally show dates. The four control arrows in the upper-right corner (next to the Toolbox) shift the time scales to whatever is appropriate for your schedule. You can also paste a graphic into the area above the task titles. Just keep in mind that whatever you paste will be scaled down to fit into that rather small rectangle.

The actual task lines are created using the Toolbox (in the upper-right corner of each document) and the Options, Symbol, and Fill menus. The Options menu lets you control what your schedule actually shows. You also use this menu to date-stamp tasks, add headers, narrow the columns (to fit more on a given page), and extend the time line to multiple pages. The Symbol menu lets you select from a set of predefined starting and ending symbols. The bottom item on the menu allows you to create custom symbols using a FatBits-like editor. The Fill menu gives you a choice of either a gray or black fill pattern. There is no color support in this version.

Once you have a schedule, you can copy, cut, paste, insert, or delete lines as needed. If your lines are numbered, MacSchedule will renumber them as necessary to account for additions or deletions.

Task bars can be very simple or quite complex with many overlaid milestones. The ability to combine overlay symbols with a variety of fills makes for great versatility.

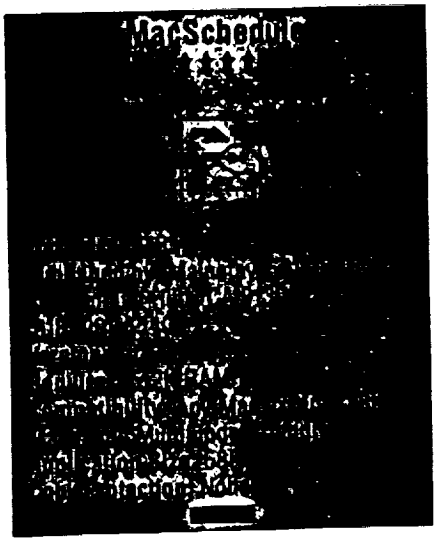
Text and titles can be added anywhere you want them. However, each text string is limited to a maximum of 30 characters, so it's hard to add long notes without going into another program. Text that is placed over the grid (assuming you've left the grid turned on) can be hard to read, so MacSchedule thoughtfully provides a Clean option to block out the grid lines behind text.

The Font and Style menus offer normal fonts and a limited range of styles (plain, bold, italic, underline, outline, and shadow) and sizes (9 to 18 points). You can also align any text string to the left or right of its field, or you can center it in the field.

Schedules can be linked to other schedules — particularly useful when a schedule has more information than can be conveniently shown on a single page. MacSchedule lets you structure the information using a series of top-down, hierarchical links that the program itself creates under your guidance. Linked files are accessed by either clicking a task title (to move down to a subordinate schedule) or clicking the close box (to link up a level). You can print whole sets of schedules using the Print Nest or Print All commands. Links can be edited if necessary.

The somewhat restricted format is both the program's strongest and weakest point. In its favor, this format makes for a program that is simple to learn and use and very powerful. On the negative side, the restrictions may make the program unsuitable for your job. MacSchedule may not be perfect, but it should be considered by anyone who has to plan and coordinate jobs and projects.

— Jake Paden



Project Management

AEC Information Manager
Project management
Macintosh with 1 MB of RAM.
$695 retail
AEC Management Systems, Inc.; 20524 Amethyst Ln.; Germantown, MD 20874; 301-428-3694 or 800-346-9413

CoCoPro
Estimates resources for software development projects
Macintosh Plus or larger.
$495 retail
Iconix Software Engineering, Inc.; 2800 28th St., Ste. 320; Santa Monica, CA 90405; 213-458-0092

Cost/Schedule Workshop (CSW)
Tools to manage a contract's cost and schedule
Macintosh SE; two disk drives; System 5.0.

The Cost/Schedule Workshop (CSW) is a collection of tools designed specifically to meet the needs of managing a contract's cost and schedule. Each tool performs independently with the capability to copy and paste information with other tools.

CSW FEAC produces a schedule critical Estimate at Completion for all data levels within a project based on performance measurement data and key schedule dates. CSW PMDA produces analysis reports and charts based on performance measurement data values for each WBS (Work Breakdown Schedule) element within a project. RAM produces project management matrices, dictionaries, indexes and contract budget baseline information based on project data for each WBS, OBS (Organization Breakdown Schedule) and cost account element within a contract. CAP allows technical managers/planners to describe the data elements for the work scope, schedule and budget by cost element at the work package level of the project. It allows for planing

Project Management

the cost account, computing the earned value, tracking the cost account progress and reporting the status.
$295 retail; FEAC (Forecasted Estimate At Completion)
$595 retail; PMDA (Performance Measurement Data Analysis)
$595 retail; RAM (Responsibility Assignment Matrix)
$595 retail; CAP (Cost Account Plan)
Leckie Associates, Inc.; PO Box 160; Merrimack, NH 03054; 603-424-7014

The DTP Advisor
Graphic arts advisor and project management system
Macintosh Plus or larger; two 800K floppy disk drives or hard disk drive.
$79.95 suggested retail
Broderbund Software; 17 Paul Dr.; San Rafael, CA 94903; 415-492-3500, 800-521-6263 or 415-492-3200 (dealers)

■ **Endeavour Planner**
Project planner based on the gantt chart
512K or larger Macintosh.

Endeavour Planner is a project planning and tracking application that has a simple, interactive, fully graphical interface. Users work directly with a gantt chart. Changing the position or duration of items on the chart automatically and visibly readjusts the scheduling of items. Users also have the option of locking tasks and deadlines on the gantt charts so they cannot be automatically moved, but must be specifically changed by a user.

Dependencies between tasks, milestones and task duration can all be set and modified. Users can also track actual project time vs. planned project time. Each project has a calendar that can be used to specify holidays, partial work days and working hours for any day of the week. Any changes to the calendar are incorporated into the project. Time scales can be updated to display intervals from 15 minutes to four weeks.
$149.95 retail
Soft Stream International, Inc.; 19 White Chapel Dr.; Mt. Laurel, NJ 08054; 609-866-1187

Estimator Plus
Estimating and job costing program
512K or larger Macintosh; second disk drive or hard disk drive; printer; Omnis 3 Plus.
$495 retail; total software solution
Microserve, Inc.; 4412 Spicewood Springs Rd., F-1000; Austin, TX 78759; 512-343-0180

FastTrack Schedule V1.02
Creates and updates presentation schedules
Macintosh Plus or larger.
$195 retail
AEC Management Systems, Inc.; 20524 Amethyst Ln.; Germantown, MD 20874; 301-428-3694 or 800-346-9413

Front Desk Multiuser Version 6.10
Appointment scheduling and resource management
512KE or larger Macintosh.
$99 per user node retail
Layered, Inc.; 529 Main St.; Boston, MA 02129; 617-242-7700

■ **Great Gantt!**
Gantt charting tool
Macintosh Plus or larger; hard disk drive recommended.

Great Gantt! is a Gantt charting tool that features an automatic MacProject reader. In just moments, users can go from the most basic chart to presentation-quality Gantt outputs for MacProject data. Or, users can build Gantt charts from scratch, using Great Gantt!'s powerful editing tools.

Great Gantt! goes beyond the basics to provide flexibility, customization and creativity in Gantt charts. Users can create their own symbols to show critical path, progress, milestones, interfaces and start and end dates, or use Great Gantt's own rich set of symbols. Users can move the status line to do what if scenarios, and charts can be sized.
$195 retail
Varcon Systems, Inc.; 10509 San Diego Mission Rd., Ste. K; San Diego, CA 92108; 619-563-6700

MacProject II V2.0
Project manager/planner
512KE or larger Macintosh.
$499 retail
Claris Corp.; 5201 Patrick Henry Dr.; PO Box 58168; Santa Clara, CA 95052; 408-727-8227 (customer relations), 800-544-8554 (U.S. upgrades) or 800-334-3535 (U.S. dealers)

MacSchedule 2.0
Visual schedule design and presentation
512K or larger Macintosh.
$245 retail
Mainstay; 5311-B Derry Ave.; Agoura Hills, CA 91301; 818-991-6540

Manage That!
Project management
Macintosh Plus or larger; 1 MB of RAM; hard disk drive; ImageWriter or LaserWriter.
$595 retail; includes 4th Dimension Runtime
Varcon Systems, Inc.; 10509 San Diego Mission Rd., Ste. K; San Diego, CA 92108; 619-563-6700

MBA>Projects
Project and case management system
Macintosh Plus or larger; 4th Dimension.
$189 retail; unlimited users
Generation Four, Inc.; 3232 San Mateo NE, #199; Albuquerque, NM 87110; 505-294-3210

Micro Planner
Project and resource management
512KE or larger Macintosh; external disk drive or hard disk drive; ImageWriter or LaserWriter.
$595 retail
Micro Planning International; 235 Montgomery St., Ste. 840; San Francisco, CA 94104; 415-788-3324

Micro Planner X-Pert
Project and resource management
Macintosh SE or larger; 2 MB of RAM; hard disk drive.
$1,995 retail
Micro Planning International; 235 Montgomery St., Ste. 840; San Francisco, CA 94104; 415-788-3324

Project Exchange
Merge, clone, edit; import/export projects and subprojects
512K or larger Macintosh; external disk drive or hard disk drive; ImageWriter or LaserWriter.
$100 retail
Micro Planning International; 235 Montgomery St., Ste. 840; San Francisco, CA 94104; 415-788-3324

Project Planner (PERT & CPM)
Project planning, critical paths and gantt charts, optimum assignments, job-shop scheduling
512K or larger Macintosh.
$145 retail
Lionheart Press, Inc.; PO Box 379; Alburg, VT 05440; 514-933-4918

Project Tracker
Project management
Macintosh Plus or larger; hard disk drive; System 5.0 or later.
$495 retail; single user
First Logistics, Inc.; 43-08 53rd St.; Woodside, NY 11377; 718-397-5927

ToDoList V2.0
Project activity and resource coordination tool
Macintosh Plus or larger; Omnis 5 or Runtime.
$199 retail; program (Omnis source code available)
$299 retail; with Omnis 5 Runtime
O.Sage Consultants, Inc.; 2100 Tannehill, Ste. 1005; Houston, TX 77008; 713-682-3201

Spreadsheets

101 Macros For Excel
Collection of 101 shortcuts, utilities and keystroke savers for Excel
Any Macintosh; Microsoft Excel.
$69.95 retail
Individual Software, Inc.; 125 Shoreway Rd., Ste.

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Time Line 4.0

The Friendliest Project Manager?

Time Line claimed market leadership largely because its character-based screens proved the friendliest among project management rivals. Now Symantec steps into the land of graphical user interfaces with text-based windows and mouse support. The upgrade also includes a *Harvard Graphics*–style slide maker, a PostScript printer driver, and support for 43-line EGA and 50-line VGA monitors.

The spreadsheet-style (rather than formlike) interface lets you change something as small as a number or letter with a mouse click. You also can revert to the old function key editing method.

Time Line 4.0 comes ready to work across LANs, provided you buy a "bump disk" to make the single-user version LAN-ready. The macro capability previously supplied by third-party vendors is now bundled as an optional feature. *Time Line 4.0* also provides access to expanded and extended memory.

Features like the new Work Breakdown Structure manager make *Time Line 4.0* more applicable to government contract work. Beginners will appreciate simple utilities that work with a library of preformatted layouts, filters, and color palettes.

The price of *Time Line 4.0* has risen from $595 to $695; updates are $199 for 3.0 users, but only $149 if you also own a copy of *Time Line Graphics*. *Time Line 4.0* requires 640K, DOS 3.0 or a later version, and a hard disk. Symantec Corporation, 10201 Torre Ave., Cupertino, CA 95014-2132; 800/441-7234, 800/626-8847 California. —*Mark S. Burgess*

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SOFTWA

Microsoft Project Update's Long Gestation Pays Off

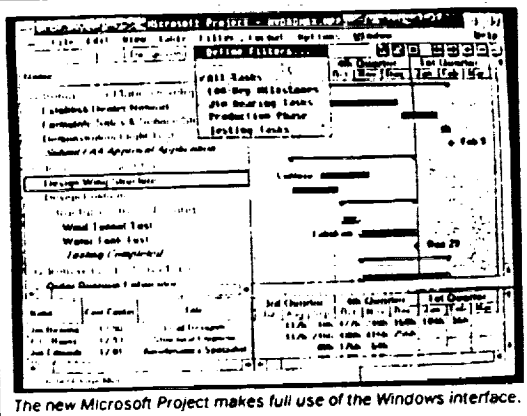
BY ROXANNA LI NAKAMURA

Users welcomed Microsoft Corp.'s release last week of Project for Windows, the first update to its DOS project manager in more than two years.

Project for Windows, Version 1.0 is new code that took some three years to develop, Microsoft officials said. The wait was worth it, because the product offers more flexibility, customization, and intuitive use than the character-based Project 4.0 and other project management software, the officials said.

"This product could do for project management what spreadsheets did for financial management," said beta tester Steve Garfein, president of RPM Systems Corp., a project management training firm based in Newport Beach, California. "With this kind of ease of use, we may see a fivefold increase in the people who are likely to use project management software." Garfein also praised Project's on-line tutorial and context-sensitive help.

"We believe Project is a very flexible and powerful package that we're going to be able to use short- and long-term," said Daniel Emmory, senior activity planning coordinator at Olivetti's Advanced Technology Center, in Cupertino, California. "We found there was also a tremendous depth in resource management — without having to spend $4,000 or $5,000."



The new Microsoft Project makes full use of the Windows interface.

The new Project shares the graphical interface used in Excel and Word for Windows, so common functions work the same in all three packages, said Vijay Vashee, Microsoft group product manager. Users can transfer data among the Windows packages — to have Excel do a pie chart of Project data, for example — by copying through the clipboard.

Project has nine basic views, but users need not switch into special modes to enter or change data, said Jim Dunnigan, Microsoft product manager. The interface lets users enter and edit in a Gantt chart, a PERT network diagram, or a spreadsheetlike row-and-column format, for example, and make changes graphically. For example, the sequence of activities can be changed in the PERT view by clicking and dragging on the activity boxes. Users can customize menus, interactive filters, data fields, and reports, and have the option of selecting various shadings, and font types and sizes.

Although Project 1.0 for Windows was not designed for network use, it is "network aware" and has a file locking feature, Dunnigan said.

Project comes with a runtime version of Windows 2.11, but will support future versions of the environment, Microsoft officials said. The program costs $695 for single copies and is available for $595 in a corporate License Pak. Project users can upgrade for $99 until June 30, and $195 thereafter.

Microsoft Corp., 1 Microsoft Way, Redmond, WA 98052, (206) 882-8080.

Project Management References (Software Related)

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--"Comparison of Three Project Management Packages" by Data Processing Systems Division, NASA. October 1987.

--"Top Project Managers" by <NC>. COMPUTER DECISIONS (pp. 12-13), March 9, 1987.

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--"Computer Tools for Project Management" by Peter Bishop. Draft copy, August 16, 1989.

--"Final Report: Space Station Program Office Scheduling and Tracking System" by Everette S. Gardner, Jr. and Dennis Adams. December 20, 1988.

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--Harrison, F.L. Advanced Project Management (2nd ed.), Gower Publishing Co. Limited, England (1986).

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