PROJECT MANAGEMENT

Report produced for the EC funded project

INNOREGIO: dissemination of innovation and knowledge management techniques

by **Dr Yannis Bakouros**
Ass. Prof, University of Thessaly
Dr Vassilis Kelessidis
Thessaloniki Technology Park

JANUARY 2000

Contents

1 Description
1.1 What is the technique
1.2 Objectives of the technique
1.3 Description /Structure of methodology/ Alternative solutions
1.4 Expected results/benefits
1.5 Characteristics of firms/ organisations/ service providers

2 Application
2.1 Firms /Organisations where the technique has been applied
2.2 Types of firms/ organisations concerned
2.3 Implementation cost
2.4 Time frame for implementation
2.5 Conditions for implementation
2.6 European Organisations supporting the implementation

3 Implementation Procedure
3.1 Steps/ Phases
3.2 Partial techniques and tools per step
3.3 Related software

4 Bibliographic References

Annexes
Annex 1: European Professional Project Management Organisations
Annex 2 : Glossary of Project Management terms

1 DESCRIPTION

1.1 What is the technique

Project management emerged because of the growing demand for complex, sophisticated, customized goods and services and the exponential expansion of human knowledge. The former depends on the integration of product design with production / distribution and the latter allows a number of academic disciplines to contribute to the development of goods and services.

Project Management is a set of principles, methods and techniques for effective planning of objective-oriented work, thereby establishing a sound basis for effective scheduling, controlling and re-planning in the management of programs and projects.

In other words, it provides an organization with powerful tools that improve the organization's ability to plan, organize, implement and control its activities and the ways it uses its people and resources.

A project is a non-repetitive one-of-a-kind activity normally with discrete time, financial and technical performance goals. Normally a complex effort, usually less than 3 years in duration and it is made up of interrelated tasks performed by various organizations.

The project management tools and principles provide the means for

- project breakdown into tasks and sub-tasks
- finding interdependencies between the tasks
- allocating resources, human and material and smoothing resources
- estimation for total project duration and budget
- monitoring more efficiently project progress

Project management ideas are equally applicable to small as well as very large projects (with small and large number of tasks). However, the formal tools used are more appropriate for rather large projects.

1.2 Objectives of the technique

The basic purpose for initiating a project is to accomplish some goals. The reason for organizing the task as a project is to focus the responsibility and authority for the attainment of the goals on an individual (project manager) or a small group (project team).

Project Management is a means by which to fit the many complex pieces of the project puzzle together, both human and technical, by use of:

- Schedules
- Budgets, including resource allocation
- Scope (product) definition

Project Management fulfills two purposes:

- Technical: Documentation techniques to communicate
  - The 'plan'
  - Status which compares 'planned' versus 'actual' performance

- Human: Managerial skills to be a better 'manager' of people as well as the project

1.3 Description / Structure of methodology / Alternative solutions

The methodology for setting up projects and applying Project Management principles follows the following guidelines:

1. Define the Objective
To minimize the risk of getting off the right track, management must clarify the objective of the project well in advance by
a) defining management's intent in undertaking the project
b) outlining the scope of the project, that is, identifying the departments, companies, functions and staff involved and their approximate degree of their involvement
c) describing the end results of the project and its permanent effects, if any, on the company or division.

2. Establish a Project Organization
This includes
a) appointment of an experienced manager to run the project full time
b) organization of the project management function in terms of responsibilities
c) assignment of a limited number of staff to the project team
d) maintenance of balance of power between functional heads of departments and the project manager

3. Install Project Controls
Special project controls over time, cost and quality are very different compared to routine reports. These include:

a) Time Control: normally applied with network scheduling (Critical Path Method) which provides the best time control for the project. Other techniques such as Program evaluation and Review Technique (PERT) allows the use of multiple time estimates for each activity.

b) Cost Control: Project control techniques, though not formalized to the same degree as time controls, can be followed if these steps are followed:
   - break the comprehensive cost summary into work packages
   - devise commitment reports for technical decision makers
   - act on early, approximate data
   - concentrate talent on major problems and opportunities

c. Quality Control: It comprises three elements:
   - Defining performance criteria
   - Expressing the project objective in terms of quality standards
   - Monitoring progress towards these standards

Project Management activities include:

a) Work Breakdown Structure (WBS)
   Decomposes project into various levels of detailed tasks

b) Dependency Analysis

Orders the project tasks established by WBS, determining those, which must be done in sequential order, and those, which can go on simultaneously

c) Network Development
Portrays 'ordered' tasks graphically using a 'network' diagram

d) Resource Commitment / Allocation
Commits the appropriate individual who has the proper skills and expertise to the tasks requiring those skills. Allocates those resources over time to determine the 'build up' and the 'phase out' of the resources over the life of the project

e) Time Estimates
Estimates based on one of several techniques ranging from the forecast method to the quantitative method, the constraint method, or the unit of work method. No matter which method is used, two categories of time are considered:
- Effort: Energy exerted
- Calendar: Elapsed duration

f) Budgeting
Allocates the project development costs spread over the duration of the project

g) Status Reporting
Takes the baselines developed above (schedules, resource loading and budgets) and turns them into a work-in-progress reports which track the plan against the actual.

With respect to organization, project management calls for the appointment of one man, the project manager, who has the responsibility for the detailed planning, coordination and ultimate outcome of the project. He is usually appointed from the middle management ranks of the company or organization and is supplied with a team, often numbering 3 - 10 persons depending on the budget and duration of a project.

It is common that company staff itself implements project management principles once it adopts project management philosophy. However, it often happens that small (and sometimes large organizations) subcontract project management to more experienced companies or individuals who practice project management.

ALTERNATIVES
In essence there are no alternatives to Project Management techniques. An organization would decide to formalize and implement project management to accomplish various tasks, or it may continue to work at random. Work done individually will be based on specific tasks assigned to the individual and the outcome of the work would be joined by other pieces of work by other individual.

1.4 Expected results / benefits

As mentioned above, project management is a powerful technique and it can be used to small as well as very large projects. Project management technique is very popular in several business activities, such as constructions, manufacturing, servicing, etc. because of multiple and useful benefits that can be achieved from its application.

Implementation of project management technique can have significant results such as:

- Cost reduction
- Time reduction
- Recourses allocation
- Increased quality

These factors are the most important concerning the competitiveness and the profitability of any organization.

Using project management technique we can divide one large project in many isolated tasks (projects) and sub-tasks, so cost and time resources are more controllable, as well as quality.
Other benefits include:

- Failures reduction
- Reduction of inappropriate tasks
- Close examination of the sub-tasks
- Scheduling
- Integration
- Communication

1.5 Characteristics of firms / organizations / service providers

There are hundreds of organizations, institutes and consultant companies worldwide specialized in project management research and implementation.

The successful implementation of any kind of project depends primarily on the ability and the experience of the consultant company that it has the responsibility.

Consultant companies have great experience in large construction projects. They employ expert staff specialized in project initiation, planning, scheduling, cost ant time control in any business activity. References to these organizations and consultants can be found in the Annex.

2 APPLICATION

2.1 Firms / Organizations where technique has been applied

The project management technique is widespread in several firms and organizations. Such kind of firms where the technique has been applied can be listed below:

- Construction (buildings, bridges, motorways, etc)
- Industry
- Defence
- Maritime, shipyards
- Software development
- Maintenance of large industrial plants
- Critical Surgery operations
- Films production
- Elections

2.2 Types of firms / organizations concerned

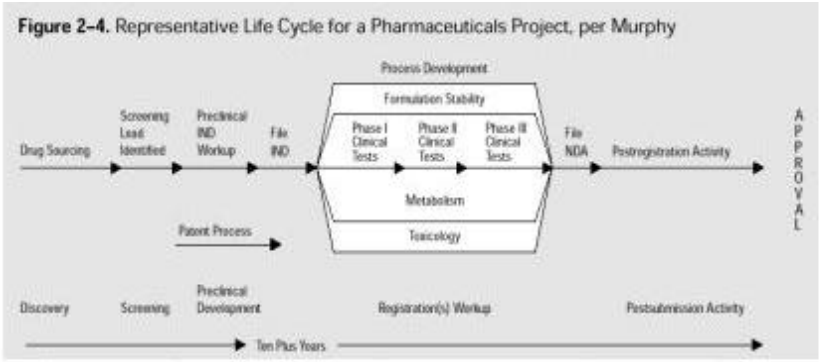
Application areas of project management technique usually defined in terms of:

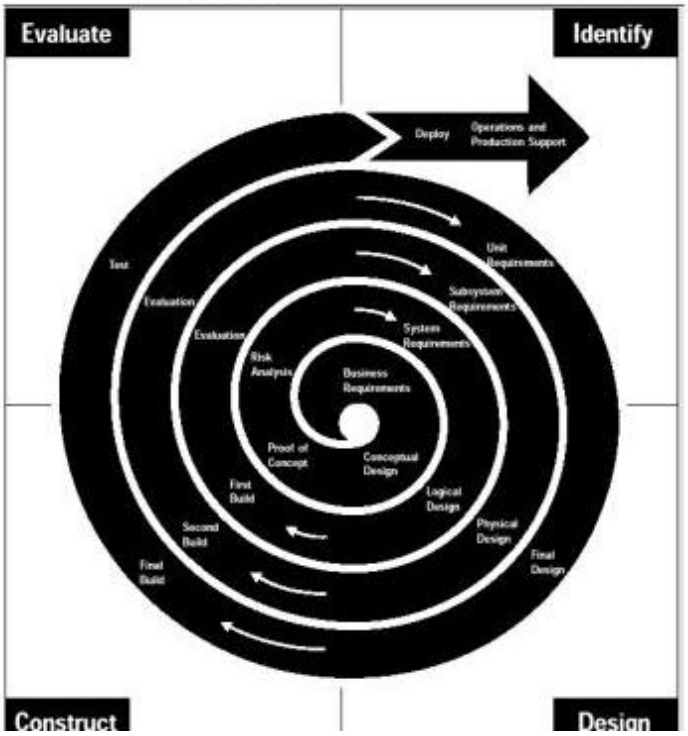
- Industry groups, such as automotive, chemicals, or financial services.
- Technical elements, such as software development, pharmaceuticals, or construction engineering.
- Management elements, such as government contracting or new product development.

Examples of projects include:

- Developing a new product or service.
- Effecting a change in structure, staffing, or style of an organization
- Designing a new transportation vehicle
- Developing or acquiring a new or modified information system
- Constructing a building or facility
- Running a campaign for political office
- Implementing a new business procedure or process.

Below are illustrated two examples of project management application and implementation: [27,28].





2.3 Implementation cost

The implementation cost of any project can be estimated considering 2 significant factors:

1. *Implementation time (schedule)*
2. *Recourse allocation and infrastructure needed.*

Projects may involve a single unit of one organization or may cross-organizational boundaries as in joint ventures and partnering. They may involve a single person or thousands and also may require less than 100 hours to complete or over 10,000,000. Considering the above it is clearly obvious that implementation cost can differ from project to project.

When initiating a project it is necessary to have *body knowledge* about project cost management. Project cost management includes the *processes* required to ensure that the project is completed within the approved budget.

These *processes* are:

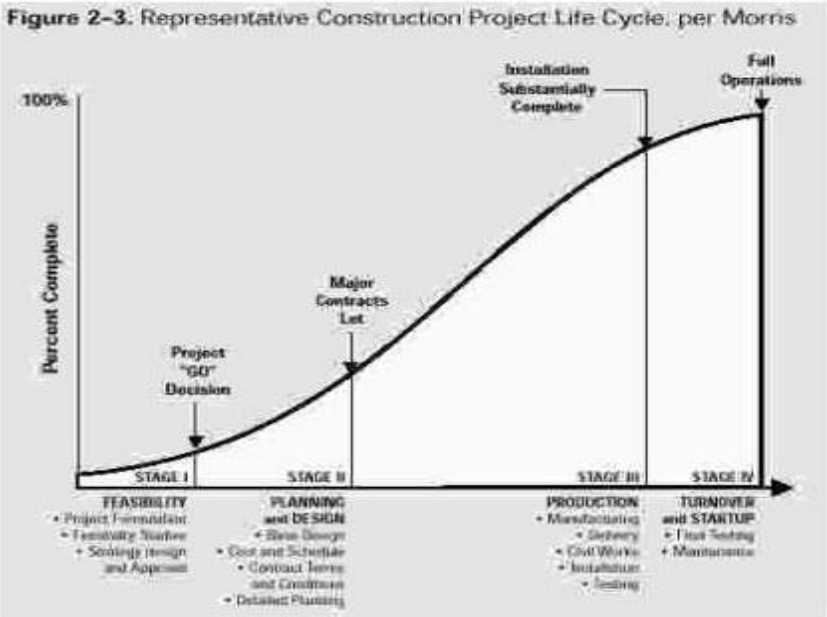
1. **Recourse Planning** - determining what recourses (people, equipment, materials) and what quantities of each should be used to perform project activities.
2. **Cost Estimating** - developing an approximation (estimate) of the costs of the recourses needed to complete project activities.
3. **Cost Budgeting** - allocating the overall cost estimate to individual work items.
4. **Cost Control** - controlling changes to project budget.

A detailed description about these processes is given below:

	Recourse Planning	**Cost Estimating**	**Cost Budgeting**	**Cost Control**
Information needed	• Work breakdown structure • Historical information • Scope statement • Recourse pool description • Organizational policies	• Work breakdown structure • Recourse requirements • Recourse rates • Activity duration estimates • Historical information • Chart of accounts	• Cost estimates • Work breakdown structure • Project schedule	• Cost baseline • Performance reports • Change requests • Cost management plan
Tools and Techniques needed	• Expert judgement • Alternatives identification	• Analogous estimating • Parametric modeling • Bottom-up estimating • Computerized tools	• Cost estimating tools and techniques	• Cost change control system • Performance measurement • Additional planning • Computerize d tools
Results - Profits	• Recourse requirement	• Cost estimates • Supporting detail • Cost management plan	• Cost baseline	• Revised cost estimates • Budget updates • Corrective action • Estimate at completion • Lessons learned

2.4 Time frame for implementation

As mentioned in section 2.3 a project may require less than 100 or more over to 10,000,000 hours.
An example of a representative construction project, implementation time is illustrated below: [29]



Time framework implementation include the follow processes:

1. **Activity Definition** - identifying the specific activities that must be performed to produce the various project deliverables.
2. **Activity Sequencing** - identifying and documenting interactivity dependencies.
3. **Activity Duration Estimating** - estimating the number of work periods which will be needed to complete individual activities.
4. **Schedule Development** - analyzing activity sequences, activity durations, and recourse requirements to create the project schedule.
5. **Schedule Control** - controlling changes to the project schedule.

	Activity Definition	Activity Sequencing	Activity Duration Estimating	Schedule Development	Schedule Control
Information needed	• Work breakdown structure • Scope	• Activity list • Product description	• Activity list • Constraints • Assumptions • Recourse	• Project network diagram • Activity	• Project schedule • Performance reports

	statement • Historical information • Constraints • Assumptions	• Mandatory dependencies • Discretionary dependencies • External dependencies • Constraints • Assumptions	requirements • Recourse capabilities • Historical information	duration estimates • Recourse requirements • Recourse pool description • Calendars • Constraints • Assumptions • Leads and Lags	• Change requests • Schedule management plan
Tools and Techniques needed	• Decomposition • Templates	• Precedence diagramming method (PDM) • Arrow diagramming method (ADM) • Conditional diagramming methods • Network templates	• Expert judgement • Analogous estimating • Simulation	• Mathematical analysis • Duration compression • Simulation • Recourse leveling heuristics • Project management software	• Schedule change control system • Performance measurement • Additional planning • Project management software
Results - Profits	• Activity list • Supporting detail • Work breakdown structure updates	• Project network diagram • Activity list updates	• Activity duration estimates • Basis of estimates • Activity list updates	• Project schedule • Supporting detail • Schedule management plan • Recourse requirement updates	• Schedule updates • Corrective action • Lessons learned

2.5 Conditions for implementation

In order to implement project management technique in any organization, the companies have, first, to adopt the project management philosophy and understand its tremendous benefits and profits that can be obtained.
The main conditions can be focused in:

- Sufficient cost allocation (cash flow)
- Sufficient infrastructure (existing or new required)
- Project manager appointment
- Staff acquisition and team development

2.6 European Organizations supporting implementation

(See annex)

3 IMPLEMENTATION PROCEDURE

3.1 Steps / Phases

The steps followed for project management are essentially the steps for successful project initiation, development and completion. We would then normally see the following phases, valid for small as well as large projects:

1	PROJECT **INITIATION** ▪ Concept definition, which includes identification and selection of opportunities and identification of objectives ▪ Feasibility study and justification
2	PROJECT **PLANNING** ▪ Scope definition ▪ Goal definition, includes time, money, resources and product targets ▪ Project requirements - definition of deliverables ▪ Project objectives - definition of major work efforts, quantifiable ▪ Work break down structure ▪ Analysis & break down of project into smaller pieces of work ▪ Development of checklist of everything that needs to be done ▪ Team building ▪ Selection of project manager ▪ Selection of team members, ▪ Use resource matrix to match skills task requirements
3	PROJECT **SCHEDULING** ▪ Determining sequence of work ▪ Building network / interdependence ▪ Analysis of interdependence, estimation of total duration (CPM, PERT) and determination of Critical Path ▪ Establish milestones ▪ Graph on time chart (Gantt chart) ▪ Determining human resource loading ▪ Establishing milestones / reporting periods
4	PROJECT **COSTING** ▪ Estimate costs, capital / operating ▪ Develop cost spreadsheets
5	PROJECT **CONTROL** ▪ Done periodically (at milestones) ▪ Time control, status, deviations from plan, replanning, new estimates ▪ Cost control, Expenditure, deviations from plan, new estimates ▪ Quality control, performance versus performance criteria / project requirements
6	PROJECT **TERMINATION / EVALUATION** ▪ Post project activity ▪ Statistics from monitoring progress ▪ Client feedback ▪ Profitability or not of the project ▪ Post implementation report

3.2 Partial techniques and tools per step

1. PROJECT **INITIATION**

Partial Techniques & Tools:

- Opportunity Analysis
- Project Selection Methods
- Creativity Assessment
- Expert Judgment

2. PROJECT **PLANNING** & **SCHEDULING**

Partial Techniques & Tools:

- Scope Planning
  - Product analysis
  - Benefit / cost analysis
  - Alternatives identification
  - Expert Judgment
- Scope Definition
  - Work breakdown structure
  - Decomposition
- Activity Definition
  - Decomposition
  - Templates
- Activity Sequencing
  - Precedence diagramming method (PDM)
  - Arrow diagramming method (ADM)
  - Conditional diagramming methods
  - Network templates
- Activity Duration Estimating
  - Expert judgment
  - Analogous estimating
  - Simulation
- Recourse Planning
  - Expert Judgment
  - Alternatives identification
- Cost Estimating
  - Analogous estimating
  - Parametric modeling
  - Bottom-up estimating
  - Computerized tools
- Schedule Development
  - Mathematical analysis
  - Duration compression
  - Simulation
  - Recourse leveling heuristics
  - Project management software
- Cost Budgeting
  - Cost estimating tools and techniques
- Project Plan Development
  - Project planning methodology
  - Stakeholder skills and knowledge

- Project management information system (PMIS)

- Quality Planning
  - Benefit / cost analysis
  - Benchmarking
  - Flowcharting
  - Design of experiments
- Communication Planning
  - Stakeholder analysis
- Organizational Planning
  - Templates
  - Human recourses practices
  - Organizational theory
  - Stakeholder analysis
- Staff Acquisition
  - Negotiations
  - Pre-assignment
  - Procurement
- Procurement Planning
  - Make - or - buy analysis
  - Expert judgment
  - Contract type selection
- Solicitation Planning
  - Standard forms
  - Expert judgment
- Risk Identification
  - Checklists
  - Flowcharting
  - Interviewing
- Risk Quantification
  - Expected momentary value
  - Statistical sums
  - Simulation
  - Decision trees
  - Expert judgment
- Risk Response Development
  - Procurement
  - Contingency planning
  - Alternative strategies
  - Insurance

3. PROJECT **CONTROL**

Partial Techniques & Tools:

- Performance reporting
  - Performance reviews
  - Variance analysis
  - Trend analysis
  - Earned value analysis
  - Information distribution tools and techniques

- Overall change control
  - Change control system
  - Configuration management
  - Performance measurement
  - Additional planning
  - Project management information system
- Scope change control
  - Scope change control system
  - Performance measurement
  - Additional planning
- Schedule control
  - Schedule change control system
  - Performance measurement
  - Additional planning
  - Project management software
- Cost control
  - Cost change control system
  - Performance measurement
  - Additional planning
  - Computerized tools
- Quality control
  - Inspection
  - Control charts
  - Pareto diagrams
  - Statistical sampling
  - Flowcharting
  - Trend analysis
- Risk response control
  - Workarounds
  - Additional risk response development

4. PROJECT **TERMINATION / EVALUATION**

Partial Techniques & Tools:

- Contract close-out
  - Procurement audits
- Administrative closure
  - Performance reporting tools and techniques

3.3 Related software

Project management software that will run on PC or network is available at many different levels of sophistication and at prices ranging from $25 to $10,000 or more. The capabilities of the more expensive packages vary widely. Most of the more sophisticated packages not only cost more, but also require a substantial learning investment. It's best to decide what kind of user will use the software before buying. The following three categories of project managers divide the world up pretty well:

1. **The Multi-project Environment**

A high-end user organization is defined not just by the raw size of their projects, but also by their need to manage multiple projects simultaneously. These organizations want to schedule and track a pool of people working on multiple projects. This category of user also generally wants to create detailed project budgets and have the software come pretty close to mimicking the company's cost accounting system.

Software for these multi-project users runs from $2,000-$10,000 or more and requires a big investment in time to master all the features. There are dozens of products in this range including: Primavera Project Planner, Artemis Views, Open Plan, Cobra, Enterprise PM, Micro Planner, X-Pert.

2. **Mid-range Project Managers**

These users manage large projects with up to about 2,000 tasks. They may have a couple of projects going at the same time, but the emphasis is not on multiple projects. They spend $200-$500 and want software that gives them the full range of project management tools on their PC. These software packages offer a tremendous range of planning, scheduling and tracking tools and produce a mind-numbing array of reports.
Packages in this price/capability range include the big seller Microsoft Project® (available in Mac and Windows versions), Micro-Planner Manager and Primavera's Suretrak.

3. **Pretty Pictures**

For the project manager who wants to automate the process of laying out plans, prepare occasional status reports and produce some simple Gantt and PERT charts, the low end is just fine. Without investing the time to master the more sophisticated tools, there are plenty of packages that will automate the basics for you. For under $100 there are products like: Milestone Simplicity, Project Vision, Quick Gantt.

Some web sites of PM software vendors are listed below:

Microsoft Project®
www.microsoft.com
Microsoft Project 98 is a powerful project management tool to efficiently plan, manage, and communicate project information. It is designed for anyone who oversees a team, plans a budget, juggles schedules, or has deadlines to meet. Microsoft Project costs approximately 500 Euros and is a very comprehensive and user friendly package. It is running on Windows and it is highly recommended.

Primavera Software
www.primavera.com
Primavera is a more expensive software and it provides a framework for running large projects.
TeamPlay software includes a Web collaboration and feedback tool that lets managers delegate assignments and keep track of project status. IT employees can view project information such as documentation, and send feedback to managers on time estimations as well as project problems and solutions. The software keeps a skills-assessment database. The Project Website lets managers post project details, including reports and documents, to an intranet. TeamPlay includes best practices methodologies and the ability to customize them. Managers also can write their own methodologies.
Project managers are able to perform risk and impact analysis. They can assign a probability to problem occurrences and then simulate the schedule, resource, and cost impact of those problems.
The software works with Microsoft and Oracle relational databases.

Artemis Management Systems
www.artemispm.com
Artemis Views 4 is the first enterprise business solution to bring project planning, cost control, resource tracking, and project analysis to the heart of your organization. With Views, organizations can develop and grow, while maintaining flexibility and control over their projects. It enables general managers to effectively implement their strategies and achieve their goals of real improvements in business performance through understanding, managing and forecasting the interaction between project and operational work. Views 4 consists of:
ProjectView - to manage and schedule multiple projects at detailed, consolidated and multiple project group levels
TrackView - to report and measure progress, effort expended, and actual costs
CostView - for sophisticated project, contract and program performance management and cost control
GlobalView - fully graphical executive project data analysis and reporting application

Planview PM Software offers a "downloadable" demo of their product
www.planview.com

Trakker software for integrating PM and accounting controls
www.dttrakker.com

Risk Analysis Software
www.agoron.com/~sphygmic/riskmast.htm

Open Plan
www.welcom.com

4 BIBLIOGRAPHIC REFERENCES

(1) Project Management, Meredith J.R. and Mantel S.J.Jr. (1995), J. Wiley & Sons
(2) Management, Batrol K.M. and Matin, D.C. (1992), McGraw-Hill
(3) Management, Concepts and Applications, Megginson L.C. (1991), Harper Collins Publishers Inc.
(4) Goal Directed Project Management by Kristoffer V. Grude, Tor Hague, Terry Gibbons (Editor), E.S. Anderson - 2nd Edition - Paperback - 196 pages, Published 1997
(5) Microsoft Project for Dummies by Martin Doucette - Book & Disk Edition - Paperback - 384 pages - Published 1997
(6) Prince: A Practical Handbook (Computer weekly Professional Series) by Colin Bentley, Ken Bradley - 2nd Edition - Paperback - 350 pages -
(7) Published 1997
(8) Project Management Methodology: A Practical Guide for the Next Millennium by Ralph L. Kliem, Irwin S. Ludin, Ken L. Robertson - Hardcover -Published 1997
(9) Creating an Environment for Successful Projects: The Quest to Manage Project Management (The Jossey-Bass Business & Management Series by Robert J. Graham, Randall L. Englund - Hardcover - 272 pages - Published Aug. 1997
(10) Project Management (ASTD Trainer's Sourcebook) by L. McLain - Paperback - Published 1997
(11) Project Management: A Systems Approach to Planning, Scheduling and Controlling by Harold Kerzner - 6th Edition - 1152 pages - Published Aug. 1997

(12) Project Management for the General Manager by Harry M. Stuart, Richard Punzo - Hardcover - Published Sept. 1997
(13) Sharpen Your Team's Skills in Project Management by Jean Harris - NR Edition - Paperback - Published 1997
(14) Managing Performance Improvement Projects: Preparing, Planning, and Implementing by Jim Fuller - Hardcover - 240 pages - Published 1997
(15) Planning, Performing, and Controlling Projects: Principles and Applications by Robert B. Angus, Norman A. Gundersen - Hardcover - 320 pages - Published 1997
(16) Managing Projects Well: What They Don't Teach You in Project Management School by Stephen A. Bender - Paperback - 300 pages - Published 1997
(17) Outsourcing Manual by Robert White - Hardcover - Published 1997
(18) Principles of Project Management: Collected Handbooks from the Project Management Institute by John R. Adams (Introduction) - NR Edition - Published 1997
(19) Project Management - Engineering, Technology, And Implementation by Avraham Shtub, Jonathan F. Bard, and Shlomo Globerson 634 pages, hardcover, disk included, 1994 Engineering & Management Press
(20) Implementing Concurrent Project Management by Quentin C. Turtle
(21) 222 pages, hardcover, 1994 Engineering & Management Press
(22) The Technical Manager's Handbook A Survival Guide by Melvin Silverman 505 pages, softcover, Engineering & Management Press, 1996
(23) Managing Smaller Projects, Mike Watson, Project Manager Today Publications, 168 pages, 1998
(24) Project Management by Dennis Lock, Paperback - 522 pages 6th edition, John Wiley & Sons, 1996
(25) Project Management for Managers, Mihaly Gorog, Nigel J. Smith, Project Management Institute, 175p, 1999
(26) Project Management Software Survey, Project Management Institute, 600p, 1998
(27) The AMA Handbook of Project Management, Paul C. Dinsmore, Publisher: Amacom Books, A Division of AMA, 489p, 1993
(28) The Benefits of Project Management, C. William Ibbs, Young-Hoon Kwak, Publisher: Project Management Institute, 80p, 1997
(29) Murphy, Patrice L. 1989. Pharmaceutical Project Management: Is It Different? *Project Management Journal* (September)
(30) Muench, Dean.1994. The Sybase Development Framework. Oakland, Calif.: Sybase Inc.
(31) Morris, Peter W.G. 1981. Managing Project Interfaces: Key Points for Project Success. In Cleland and King, *Project Management Handbook*, Second Edition. Englewood Cliffs, N.J.: Prentice Hall

URLs

Some web sites of interest for Project Management are listed below:

(1) http://www.projectmanagement.com/main.htm
(2) http://www.pmforum.org/warindex.htm
(3) http://www.pmibookstore.org/
(4) http://www.pmforum.org/prof/dirorg.htm
(5) http://www.pmi.org/links/links.htm
(6) http://www.apmgroup.co.uk
(7) http://www.miprojects.co.nz
(8) http://www.synapse.net
(9) http://www.projectnet.co.uk/gloss.htm
(10) http://netman.cit.buffalo.edu/FAQs/proj-plan.glossary.html

ANNEXES

ANNEX 1: EUROPEAN PROFESSIONAL PROJECT MANAGEMENT ORGANISATIONS

A

AUSTRIA

Project Management Austria Web Site

Mission Statement
of the
Projekt Management Austria

- We are the Austrian Project Management Association at the University of Economics and Business Administration, Vienna. The members of our association come from the business sector, public administration sector and universities.
- We represent a systemic-constructivistic Project Management approach. Objects of our work are project management, process management, program management, the management of project oriented companies and crisis management.
- We communicate state of the art of management know-how in presentations, seminars, programs and events.
- We are a platform for the exchange of information and the further education of our members. We cooperate with international companies on specific PM subjects and in the field of marketing.
- We ensure innovation in Project Management by cooperating with the Project Management Department and the Roland Gareis Consulting within the pmg r u p p e.
- We are the Austrian representative of IPMA - International Project Management Association.
- We help qualified Project Managers to prepare for a PMA certification

CZECH REPUBLIK

INTERNET Czech Republic
P. O. Box 630
11121 Praha
Czech Republic
Phone: +42 -79 36 766
Fax: +42 - 79 34 743

D

The Danish Project Management Association. Though in Danish you will still be able to get an impression of this PM association's program and activities on the homepage at www.projektforeningen.dk.

F

FINLAND

Projektitoimintayhdistysrys

PMA Finland
Tekniikantic 12
02150 Espoo
Finland

Phone: +358 0-43 54 23 36
Fax: +358 0-50 23 384
E-Mail Address:

FRANCE

Association Francophone de Management de Projet (AFITEP)

AFITEP is the French association for project management based in Paris. AFITEP publishes La Cible ... Le Journal du management de projet. For information contact

AFITEP

3, rue Francoise 75001 Paris
Tel: (1)42.36.36.37
Fax: (1) 42.36.36.35
Web Site: Association Francophone de Management de Projet

G

GERMANY

GPM is a member of the International Project Management Association and is the leading professional German project management organization. The GPM mission is to promote and develop German project management interdisciplinary skills and resources. GPM is governed by a Board of Directors and runs its own certification programme administered by a separate and impartial organization called PM-ZERT.
GPM publishes Projektmanagement-Zeitschrift, GPM-aktuell and PM-Telegram which covers scientific, practical, internal organization and latest information on seminars and other national events

GREECE

Hellenic Project Management Association

4 Kassou Str.
11364 Athens
Greece

Phone: +30 - 1 86 29 660
Fax: +30 - 1 86 17 681
or send an e-mail to M773@eurokom.ie

H

HUNGARY

FOVÁLLALKOZÓK MAGYARORSZÁGI SZÖVETSÉGE
Project Management Association Hungary
IPMA-Member
1133 Budapest, Pannónia u. 59-61.

tel.(361)3501030 - fax.(361)3501013
E-mail betonut@mail.matav.hu

I

ICELAND

The Project Management Association of Iceland (VSF)

Postholf 8773
128 Reykjavik
E-mail: vsf@skima.is
Web site: http://www.skima.is/vsf/

IRELAND

The Institute of Project Management of Ireland

The Institute of Project Management of Ireland was founded in 1989 to help individuals and organisations in both the public and private sectors to develop a knowledge of and high-quality capability in Project Management and to provide a focal point and mechanism for the development and promotion of Project Management in Ireland on a professional basis. The Institute is the only Irish organisation devoted solely to these and is recognised as "Ireland's premier Project Management Authority". ....
The Institute has close links with the world's leading project management bodies, for example , in Europe, The International Project Management Association based in Zurich (IPMA) and in the United States of America, The Project Management Institute (PMI).
ObjectivesThe Institute of Project Management of Ireland has the following principal objectives.

- To establish and maintain an organisation to advance the theory and practice of Project Management in Ireland.
- To establish, maintain and heighten public awareness in general, and business awareness in particular, of Project Management as a critical, clearly defined and recognisable business knowledge and skills set, with relevance to all types of organisations, in both the public and private sectors, at all levels of the organisation.
- To work with educational institutions to provide for the training and career development needs of Project Management and to promote academic and industrial research in Project Management.
- To define standards for entry level qualification for competency in Project Management and to establish and administer a certification process that has Irish and International recognition and acceptance.

The Institute of Project Management of Ireland's web site is http://www.projectmanagement.ie The email contact is instpmgm@iol.ie

ITALY

ANIMP Associazione Nazionale di Impiantistica Industriale

Corso Venezia 18
20121 Milano
Italy
Phone: +39 - 2 76 008 755
Fax: +39 - 2 78 43 74

N

THE NETHERLANDS

Project Management Instituut Nederland

The Dutch PM Association (Project Management Instituut Nederland) was founded in November 1979 and had a first assembly in February, 1980. Starting with members, who were professional "procesplanners" and pioneers in the application of project management. In 15 years the PMI-Nederland has grown to an association of almost 600 members, spread out over the universities, government, county staffs and city councils, software houses, and such International companies as Philips, Shell, Akzo a.s.o. , advisers and " engineerburos".

Each year PMI-Nederland has a National Congress. The main activities are organising diner-lectures , workshops on testing software, research on training institutes, research on new methods of working, maintaining and renewing a Dutch BOK, organizing a yearly market on planning software.

Project Management Instituut Nederland
Buitenplaats 135
8212 AE Lelystad
The Netherlands
Phone: 31 (0) 320 222464
Fax: 31 (0) 320 280434
or send an email message to : PMI - Nederland

NORWAY

Norwegian Association of Project Management
PB 2312 Solli
0201 Oslo
Norway
Phone: +47 - 22 94 75 00
Fax: +47 - 22 94 75 02
E-Mail Address: Norwegian Project Management PS 2000

R

RUSSIA

SOVNET Soviet Project Management Association
Venadsky Prospect 29, room 1303
117943 Moscow
Russia
Phone: +7 - 095 133 2611
Fax: +7 - 095 138 3048
E-Mail Address:

S

SLOVAKIA

Spolocnost Pre Projektove Riadenie (SPPR) is the Project Management Association of Slovakia, established in 1994 due to the splitting of Czechoslovakia into independent Czech and Slovak Republics. Its roots go back to the 1960s, when members began

participating in International Project Management Association (IPMA) activities. SPPR is a member of IPMA and also works with the Project Management Institute (PMI).
The goal of the Association is to provide a forum for exchanging knowledge and experience in project management; support consulting companies and universities; organise courses, seminars and conferences; identify challenges; and cooperate with similar organizations around the world.
Address:
Spolocnost Pre Projektove Riadenie
P.O. Box 211, Postal 1
917 01 Trnava
Slovakia
Phone: +421 805 559-1806
Fax: +421 805 599 1818
E-mail: sppr@excite.com
Web Site: http://www.sppr.sk

SWITZERLAND

International Project Management Association

The International Project Management Association is a federation of independent national project management associations world-wide. IPMA is a non-profit, Swiss registered organization, with a Secretarial office based in the United Kingdom. Its function is to be the prime promoter of project management internationally, through its membership network of national project management associations around the world. Additionally it has many individual members, people and companies, as well as co-operative agreements with related organizations world-wide, to give it a truly world-wide influence.
IPMA Web information includes a background to IPMA activities and organization, a list of member National Associations and IPMA Officers, list of conferences and publications.
International Project Management Association
P.O. Box 30, Monmouth NP5 4YZ, United Kingdom
Tel: +44 1594 531007; Fax: +44 1594 531008
Email: ipma@btinternet.com

Swiss Society for Project Management (SPM)

SPM is the national association representing Switzerland in the International Project Management Association(IPMA). The Swiss certification of project managers is done by VZPM, an accredited body founded by SPM and the Swiss Association for Organisation (SGO). SwissPM is an initiative of SPM. In western Switzerland the French speaking partner organization is SMP. Visit the SPM Web at <http:// www.spm.ch>.

SWEDEN

The Swedish Project Management Society

The Swedish Project Management Society has worked for 25 years to develop project management in Swedish companies and organizations. The Society is a meeting-place for exchange of experience and ideas between people that work in or with projects. A Newsletter **ProjektForum**, 4 issues per year, is available in Swedish. Project Management Seminars, sponsored by the Society, are held on a regular basis.
Membership in theInternational Project Management Association and in NORDNET makes the Swedish Project Management Association members of an internatial project management network. In this network there is a certification program for project managers - a quality record of project management experiences and skills.
The Objectives for the Society are to continuously develop and adapt the **Project Work Model** in the following ways:

- act as contact point for exchange of experiences in project management and leadership
- work for development of and implementation of good project management practice
- work for effective use of tools and methods
- work for a common well defined project management knowledge base
- work for high quality in project management training
- keep close contacts with international project management development
- deploy the Project Work Model

For more information on the Swedish Project Management Society contact:

- Svenskt Projektforum
- Norr Mälarstrand 20
- 112 20 Stockholm
- Sweden
- Telephone: +46 8 653 56 35
- Fax: +46 8 651 51 98
- E-mail: info@projforum.se
- Internet: http://www.projforum.se

T

TURKEY

Project Management Association

Gulvenlik Caddesi Guven Sokak 28/1 Y.Ayrnci
06540 Ankara
Turkey

Phone: 312-468-0901
Fax: 312-426-7013
E-Mail Address: dengiz@venus.aselsan.com.tr

U

UKRAINE

UKRNET Ukrainian Project Management Association

31 Povitroflotskiy prosp.
Kiev 252037
Ukraine

Phone: + 7 044 272 94 00
Fax: + 7 044 245 48 57
E-Mail Address: Consult and PRIME.Kiev.UA

UNITED KINGDOM

Association for Project Management

The Association for Project Management is the United Kingdom based organization dedicated to advancing the science of Project Management and the professional development of Project Managers and Project Management Specialists. It was formed in 1972 to advance the discipline of Project Management and to promote the professional development of Project Managers in all business areas.
The Association for Project Management (APM) exists to help its members and to advance and promote the profession of Project Management its skills and practice. It is

the only United Kingdom based organization dedicated to advancing the science of Project Management and the professional development of Project Managers and Project Management specialists. The Association is committed to an energetic programme of activities to help Project Managers and others involved in Project Management, to progress their professional careers. It is affiliated with the International Project Management Association (IPMA) based in Zurich, Switzerland.
Secretariat:
Mrs Doreen Bevan - 105 West Wycombe Road, High Wycombe HP12 3AE Tel: +44(0) 1494 440090 Fax: +44(O)1494 528937
E-mail - secretariat@apm-uk.demon.co.uk
Web Site: Association for Project Management

More information about Professional Project Management Organizations, ***worldwide*** can be found in http://www.pmi.org/links/links.htm

ANNEX 2: Glossary of Project Management Cost

Activity
An activity is an individual task needed for the completion of a project. It is the smallest discrete block of time and resources typically handled by PM software. It is a single task which needs to be done in a project. Multiple activities are related to each other by identifying their immediate predecessors. Solitary activities, which have no predecessors or successors, are allowed. Most PM software packages are precedence-based systems which analyze schedules based on the activity relationships that are specified. Activities can also be called work packages, tasks, or deliverables.

Activity Duration
Activity duration specifies the length of time (hours, days, weeks, months) that it takes to complete an activity. This information is optional in the data entry of an activity. Work flow (predecessor relationships) can be defined before durations are assigned. Activities with zero durations are considered milestones (milestone value of 1 to 94) or hammocks (milestone value of 95 to 99).

Actual Dates
Actual dates are entered as the project progresses. These are the dates that activities really started and finished as opposed to planned or projected dates.

Baseline Schedule
The baseline schedule is a fixed project schedule. It is the standard by which project performance is measured. The current schedule is copied into the baseline schedule which remains frozen until it is reset. Resetting the baseline is done when the scope of the project has been changed significantly. At that point, the original or current baseline becomes invalid and should not be compared with the current schedule.

Calendars
A project calendar lists time intervals in which activities or resources can or cannot be scheduled. A project usually has one default calendar for the normal work week (Monday through Friday), but may have other calendars as well. Each calendar can be customized with its own holidays and extra work days. Resources and activities can be attached to any of the calendars that are defined.

Control
Control is the process of comparing actual performance with planned performance, analyzing the differences, and taking the appropriate corrective action.

Critical Activity
A critical activity has zero or negative float. This activity has no allowance for work slippage. It must be finished on time or the whole project will fall behind schedule. (Non-critical activities have float or slack time and are not in the critical path. Super-critical activities have negative float.)

Calculate Schedule
The Critical Path Method (Calculate Schedule) is a modeling process that defines all the project's critical activities which must be completed on time. The Calc tool bar button on the Gantt and PERT (found in most GUI-based PM software) windows calculates the start and finish dates of activities in the project in two passes. The first pass calculates

early start and finish dates from the earliest start date forward. The second pass calculates the late start and finish activities from the latest finish date backwards. The difference between the pairs of start and finish dates for each task is the float or slack time for the task (see FLOAT). Slack is the amount of time a task can be delayed without delaying the project completion date. A great advantage of this method is the fine-tuning that can be done to accelerate the project. Shorten various critical path activities, then check the schedule to see how it is affected by the changes. By experimenting in this manner, the optimal project schedule can be determined.

Critical Path
There may be several paths within one project. The critical path is the path (sequence) of activities which represent the longest total time required to complete the project. A delay in any activity in the critical path causes a delay in the completion of the project. There may be more than one critical path depending on durations and work flow logic.

Duration
Duration is the length of time needed to complete an activity. The time length can be determined by user input or resource usage. Activities with no duration are called Milestones which act as markers (see MILESTONES). Estimating durations for future activities is very difficult. It is recommended that the largest duration possible be used to account for possible delays.

Early Finish
The Early Finish date is defined as the earliest calculated date on which an activity can end. It is based on the activity's Early Start which depends on the finish of predecessor activities and the activity's duration. (See EARLY START) Most PM software calculates early dates with a forward pass from the beginning of the project to the end. This is done by selecting ANALYZE & PROCESS REPORTS from the Report pull-down menu.

Early Start
The Early Start date is defined as the earliest calculated date on which an activity can begin. It is dependent on when all predecessor activities finish. Most PM software calculates early dates with a forward pass from the beginning of the project to the end.

Elapsed Time
Elapsed time is the total number of calendar days (excluding non-work days such as weekends or holidays) that is needed to complete an activity. It gives a "real world view" of how long an activity is scheduled to take for completion.

Finish Float
Finish float is the amount of excess time an activity has at its finish before a successor activity must start. This is the difference between the start date of the predecessor and the finish date of the current activity, using the early or late schedule. (Early and Late dates are not mixed.) This may be referred to as slack time. All floats are calculated when a project has its schedule computed.

Finishing Activity
A finishing activity is the last activity that must be completed before a project can be considered finished. This activity is not a predecessor to any other activity -- it has no successors. Many PM software packages allow for multiple finish activities.

Finish-To-Finish Lag
The finish-to-finish lag is the minimum amount of time that must pass between the finish of one activity and the finish of its successor(s). If the predecessor's finish is delayed, the successor activity may have to be slowed or halted to allow the specified time period to pass. All lags are calculated when a project has its schedule computed. Finish-to Finish lags are often used with Start-to-Start lags.

Finish-To-Start Lag
The finish-to-start lag is the minimum amount of time that must pass between the finish of one activity and the start of its successor(s). The default finish-to-start lag is zero. If the predecessor's finish is delayed, the successor activity's start will have to be delayed. All lags are calculated when a project has its schedule computed. In most cases, Finish-to-Start lags are not used with other lag types.

Float
Float is the amount of time that an activity can slip past its duration without delaying the rest of the project. The calculation depends on the float type. See START FLOAT, FINISH FLOAT, POSITIVE FLOAT, and NEGATIVE FLOAT. All float is calculated when a project has its schedule computed.

Forced Analysis
Most PM software can force schedule analysis where a project is re-analyzed even if no new data has been entered. The feature is used for an analysis on the project by itself after it has been analyzed with other projects in multi-project processing (or vice versa). A leveled schedule may also be removed by forcing schedule analysis.

Free Float
Free float is the excess time available before the start of the following activity, assuming that both activities start on their early start date. Free float is calculated in the following way: FREE FLOAT = EARLIEST START OF FOLLOWING ACTIVITY - EARLIEST START OF PRESENT ACTIVITY - DURATION OF PRESENT ACTIVITY On the activity's calendar, free float is the length of time from the end of the activity to the earliest Early Start date from among all of its successors. If the activity has no successors, the project finish date is used. Since free float is meaningless for hammocks, it is set to zero. For the common case where all lags are finish-to-start lags of zero, the free float represents the number of work days that an activity can be delayed before it affects any other activity in the project.
Example: The current activity has an Early Start of March 1st and a duration of 3 days. The succeeding activity has an Early Start of March 7th. Assuming everyday is a work day, then: FREE FLOAT = March 7 - March 1 - 3 days = 6 days - 3 days = 3 days Free float can be thought of as the amount of time an activity can expand without affecting the following activity. If the current activity takes longer to complete than its projected duration and free float combined, the following activity will be unable to begin by its earliest start date.

Gantt (Bar) Chart
A Gantt chart is a graphic display of activity durations. It is also referred to as a bar chart. Activities are listed with other tabular information on the left side with time intervals over the bars. Activity durations are shown in the form of horizontal bars.

Hammocks
A hammock groups activities, milestones, or other hammocks together for reporting. A hammock's milestone number ranges from 95 to 99. This allows for five levels of

summation. For example, two hammocks at the 95 level can be combined in a 96 level hammock. Any number of hammocks are allowed within the five levels for a project. Most PM software calculates the duration of a hammock from the early and late dates of the activities to which it is linked.

Histogram
A histogram is a graphic display of resource usage over a period of time. It allows the detection of overused or underused resources. The resource usage is displayed in colored vertical bars.
The ideal level for a resource on the screen is indicated by a another color (typically red). The vertical height is produced by the value specified in the maximum usage field of the Resource Label window. (The printed histogram uses a horizontal line to display the maximum usage set in the Resource Label window.) If the resource bar extends beyond the red area for any given day, resources need to be leveled (or spread out) for proper allocation. The resource histograms should be checked after resources are assigned to the project activities.

Lag
Lag is the time delay between the start or finish of an activity and the start or finish of its successor(s). See FINISH-TO-FINISH LAG, FINISH-TO-START LAG, and START-TO-START LAG.

Late Finish
Late Finish dates are defined as the latest dates by which an activity can finish to avoid causing delays in the project. Many PM software packages calculate late dates with a backward pass from the end of the project to the beginning. This is done by selecting ANALYZE & PROCESS REPORTS from the Report pull-down menu.

Late Start
Late Start dates are defined as the latest dates by which an activity can start to avoid causing delays in the project. Many PM software packages calculate late dates with a backward pass from the end of the project to the beginning.

Micro-Scheduling
Micro-scheduling is the scheduling of activities with duration less than one day (in hours or fractional days).

Milestones
A milestone is an activity with zero duration (usually marking the end of a period).

Multi-Project Analysis
Multi-project analysis is used to analyze the impact and interaction of activities and resources whose progress affects the progress of a group of projects or for projects with shared resources or both. Multi-project analysis can also be used for composite reporting on projects having no dependencies or resources in common.

Negative Float
Negative float indicates activities must start before their predecessors finish in order to meet a Target Finish date. All float is calculated when a project has its schedule computed. Negative float occurs when the difference between the late dates and the early dates (start or finish) of an activity are negative. In this situation, the late dates are earlier than the early dates. This can happen when constraints (Activity Target dates or a Project Target Finish date) are added to a project.

Network Analysis
Network analysis is the process of identifying early and late start and finish dates for project activities. This is done with a forward and backward pass through the project. Many PM software tools will check for loops in the network and issue an error message if one is found. The error message will identify the loop and all activities within it.

Network Diagram
A network diagram is a graphic representation of activity sequence and relationships. Activity boxes are connected together with one-way arrows to indicate precedence. The first activity is placed on the left side of the diagram with the last activity on the right side. Activity boxes are usually placed at different levels (not in a single row) to accommodate activities that are done simultaneously.

Parallel Activities
Parallel activities are two or more activities than can be done at the same time. This allows a project to be completed faster than if the activities were arranged serially in a straight line.

Path
A path is a series of connected activities. Refer to CRITICAL PATH METHOD for information on critical and non-critical paths.

Positive Float
Positive float is defined as the amount of time that an activity's start can be delayed without affecting the project completion date. An activity with positive float is not on the critical path and is called a non-critical activity. Most software packages calculate float time during schedule analysis. The difference between early and late dates (start or finish) determines the amount of float.
Float time is shown at the end or the beginning of non-critical activities when a bar chart reflects both early and late schedules. Float is shown on many of the tabular reports.

Precedence Notation
Precedence notation is a means of describing project workflow. It is sometimes called activity-on-node notation. Each activity is assigned a unique identifier. Workflow direction is indicated by showing each of the activity's predecessors and their lag relationships. Graphically, precedence networks are represented by using descriptive boxes and connecting arrows to denote the flow of work.

Predecessor
An activity that must be completed (or be partially completed) before a specified activity can begin is called a predecessor. The combination of all predecessors and successors (see SUCCESSOR) relationships among the project activities forms a network. This network can be analyzed to determine the critical path and other project scheduling implications.

Program Evaluation and Review Technique (PERT)
PERT is a project management technique for determining how much time a project needs before it is completed. Each activity is assigned a best, worst, and most probable completion time estimate. These estimates are used to determine the average completion time. The average times are used to figure the critical path and the standard deviation of completion times for the entire project.

Project
A project is a one-time effort to accomplish an explicit objective by a specific time. Each project is unique although similar projects may exist. Like the individual activity, the project has a distinguishable start and finish and a time frame for completion. Each activity in the project will be monitored and controlled to determine its impact on other activities and projects. The project is the largest discrete block of time and resources handled by most PM software.

Rescheduling
Rescheduling is a feature of most PM software that recalculates the start and finish dates of all uncompleted activities based upon progress as of a specified date.

Resource
A resource is anything that is assigned to an activity or needed to complete an activity. This may include equipment, people, buildings, etc.

Resource Based Duration
Resource based duration provides the option to determine activity duration, remaining duration, and percent complete through resource usage. The resource requiring the greatest time to complete the specified amount of work on the activity will determine its duration. You may change the duration mode for an activity at any time. This feature may not be used without values in the Resource Usage fields.

Resource Leveling
Resource leveling provides the capability to adjust project schedules in order to minimize the peaks in daily resource usages. This is usually done when resources are over-allocated. Activities are moved within their available float to produce a new schedule.
Resources and projects may have leveling priorities. Some activities may not have any rescheduling flexibility due to lack of float. Either resource-constrained or schedule-constrained leveling may be selected.

Scheduling
Scheduling is the process of determining when project activities will take place depending on defined durations and precedent activities. Schedule constraints specify when an activity should start or end based on duration, predecessors, external predecessor relationships, resource availability, or target dates.

Sequence
Sequence is the order in which activities will occur with respect to one another. This establishes the priority and dependencies between activities. Successor and predecessor relationships are developed in a network format. This allows those involved in the project to visualize the work flow.

Slippage
Slippage is the amount of slack or float time used up by the current activity due to a delayed start. If an activity without float is delayed, the entire project will slip.

Start Float
Start float is the amount of excess time an activity has between its Early Start and Late Start dates.

Start-To-Start Lag
Start-to-start lag is the minimum amount of time that must pass between the start of one activity and the start of its successor(s).

Starting Activity
A starting activity has no predecessors. It does not have to wait for any other activity to start. Many PM software packages permit multiple start activities if needed.

Sub-Critical Activity
A sub-critical activity has a float threshold value assigned to it by the project manager. When the activity reaches its float threshold, it is identified as being critical. Since this type of criticality is artificial, it normally does not impact the project's end date.

Subproject
A subproject is a distinct group of activities that comprise their own project which in turn is a part of a larger project. Subprojects are summarized into a single activity to hide the detail.

Successor
A successor is an activity whose start or finish depends on the start or finish of a predecessor activity. Refer to PREDECESSOR for related information.

Super-Critical Activity
An activity that is behind schedule is considered to be super-critical. It has been delayed to a point where its float to calculated to be a negative value. The negative float is representative of the number of units an activity is behind schedule.

Target Finish -- Activity
Target Finish is the user's imposed finish date for an activity. A Target Finish date is used if there are pre-defined commitment dates. Most PM software will not schedule a Late Finish date later than the Target Finish date. Your favorite PM software may alert you to negative float which occurs when a Late Finish date is later than a Target Finish date. This is caused by the duration of predecessors which makes it impossible to meet the Target Finish date. The negative float can be eliminated by reducing the duration of predecessors or extending the Target Finish date.

Target Finish -- Project
A user's Target Finish date can be imposed on a project as a whole. A Target Finish date is used if there is a pre-defined completion date. Most PM software will not schedule any Late Finish date later than the Target Finish date. See TARGET FINISH ACTIVITY on how to deal with negative float.

Target Start -- Activity
Target Start is an imposed starting date on an activity. Most PM software will not schedule an Early Start date earlier than the Target Start date.

Total Float
Total float is the excess time available for an activity to be expanded or delayed without affecting the rest of the project -- assuming it begins at its earliest time. It is calculated using the following formula: TOTAL FLOAT = LATEST FINISH - EARLIEST START - DURATION

Work Breakdown Structure (WBS)
The WBS is a tool for defining the hierarchical breakdown of responsibilities and work in a project. It is developed by identifying the highest level of work in the project. These major categories are broken down into smaller components.
The subdivision continues until the lowest required level of detail is established. These end units of the WBS become the activities in a project. Once implemented, the WBS facilitates summary reporting at a variety of levels.

Work Flow
Work flow is the relationship of the activities in a project from start to finish. Work flow takes into consideration all types of activity relationships.

Work Load
Work load is the amount of work units assigned to a resource over a period of time.

Work Units
Work units is the measurement of resources. For example, people as a resource can be measured by the number of hours they work.

Zero Float
Zero float is a condition where there is no excess time between activities. An activity with zero float is considered a critical activity. If the duration of any critical activity is increased (the activity slips), the project finish date will slip.