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MBA THESIS IN PROJECT MANAGEMENT

TITLE: PROJECT MONITORING AND CONTROL PROCESS FOR EFFECTIVE PROJECT MANAGEMENT

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CONTENTS

'Deliver Quality, below Budget, in Time and ... with a Smile' (Chryssis Petoussis, Cybarco Ltd)

1. INTRODUCTION

Project Management is a scientific-engineering discipline first developed by the defence and space industry and the USA Department of Defence in the '40s.

In the following years it has progressively found wide applications worldwide in the construction industry and more recently in areas like IT projects, industrial and engineering projects. Its hard core objectives have always been ensuring that a project will be developed according to schedule and finish on time, the required technical performance will be delivered, it will remain within its scope and will cost as most as budgeted.

Progressively Project Management has been enriched with areas like Procurement Management, Risk Management, Human Resources and Organisation Management as well as Communication Management all of which are means or constraints important to meet aforementioned goals. 'Modern' PM is a means of enterprise management since so many activities in the life of a company have the characteristics of a Project. According to the Japanese P2M approach, for instance, Project Management should have diverse kind of added value to the company and should even lead to product and/or process innovation.

PM therefore encompasses various managerial processes like Organisation, Budgeting, Planning, Risk, Quality, Change Control, Documentation etc.

The particular professional interest of the author in management consultancy projects and their management led to the selection of this subject. More particularly these projects last from 6 to 18 months are relatively mature in their deliverables-objectives and methodology but because of their relatively tight budget should be as well managed as major multi million projects.

Control, Monitoring & Review (CMR) is a task found in every project and appearing in one way or another in <u>all</u> literature sources we have reviewed. They belong to first generation or hard core PM.

The Control – Monitoring & Review is seen by many bibliographical sources as integral part of each separate managerial areas of PM. Other sources devote a separate section or discipline of PM to this area with a more consistent and holistic result.

The current thesis will mainly concentrate on those areas, which are important for Monitoring and Control of the various elements of managing a Project. It will aim at devising a comprehensive but practical system, which will allow the effective and efficient application of this task.

The actual validation of the outcome in real situation for Projects undertaken by ENNOUS LTD Business Development Company is another objective.

The thesis includes:

- a *theoretical* part where an overview of what is the current bibliographical approach will be presented in a critical way;
- a *practical* - or application - part where procedures, monitoring forms and report templates will be designed so they can form a standalone CMR tool suitable for PM of management consultant type projects
- a *validation* part where this tool will be put in effect and assessed for its effectiveness

The thesis has taken place from February to October of 2004 under the supervision of Prof Constantinos Zografos of AUEB, Athens.

2. THESIS OUTLINE

The present thesis is a theoretical and practical approach to the process of 'monitoring, controlling and - subsequent - reviewing' of a project in the general context of Project Management.

The work is based primarily on the acknowledged Bodies of Knowledge as developed by certain national and international PM associations like the APM, the IPMA etc as well as other texts identified in the available literature attempting to standardise the approach versus the various PM process which are related to scope, time, cost, resource, risk etc and their interdependencies.

The thesis includes a theoretical as well as a practical part.

A) The theoretical part deals with the overview, presentation and critical comparison of the 'monitoring, controlling and reviewing' process as seen by the aforementioned texts in the **literature**. It also includes the development of a **methodology**, which will be followed by a study of available procedures, forms and other documents capable of putting into effect the theoretical approach in a real PM situation.

B) The practical part is the application of this 'monitoring, controlling and reviewing' methodology and the development of a set of tools (procedures, forms, reporting templates) capable of meeting the Control, Monitoring & Review needs of a small to medium management consultant type of project. The specific ten-year-long experience of the author and the company he represents both in

- Executing such kind of small management consulting projects and therefore understanding their needs and managerial problems as well as in
- Setting up procedural tools to describe or control enterprise activities;

has been useful during this part.

C) The next phase will be the implementation in case studies i.e. in real management consultant projects taking place in Greece by a local management consultants firm, ENNOUS Ltd. This phase C is indeed a validation of phase of A and B and provides valuable feedback to improve the design.

As regards the type of project we are targeting at here is a list of their attributes, criteria taken into account in our present work.

1. Type of projects: Design, Development, Implementation and Certification of Quality or Environmental Management Systems. The certification is carried out according to ISO standards or other specifications (ISO 9001, ISO 14001, OHSAS 18001, EMAS, IFS etc)
2. Cost to the customer: Ranging from 8,000 to 50,000 Euro
3. Time: Six to 18 months, with a typical value of one year.
4. Quality: Defined in the project proposal and contractual documents. Usually assessed via verification and validation activities of the customer. The certification taking place by an independent, accredited Certification Organisation (ELOT, LLOYD'S, TUV etc) acts as the final validation of the delivered technical performance of the project outcome.
5. Team: Ranging from 1 to 4 consultants with designing, developing documentation, auditing, reporting and training responsibilities.
6. Communication: Meeting with customer, reporting following audits
7. Constraints: Because these projects require the cooperation of the customer in the design phase and the commitment of the customer for implementing the newly introduced Quality Management practices there is a risk of slow assimilation and uncertainty as regards the schedule.

3. THESIS OBJECTIVES

The following objectives on the development and deliverables of this thesis were set:

- Thorough **study** of the current literature concerning 'monitoring, controlling and subsequent reviewing' in PM to acquire a robust understanding of how this issue is being approached
- Critical **review** and **assessment** of the available theoretical views, techniques and methodologies proposed with the aim of understanding the problems, enriching our knowledge, selecting ideas which would be used in our methodology, assessing the usefulness of different approaches e.g. IPMA, Japanese PMA, APM (UK), Department of Energy (USA) as concern the application for small to medium management consultancy projects
- **Development** of a set of rules or methodologies which could be useful and easily convertible to practical procedures
- **Design** of a practical tool for CMR of consultancy projects
- **Application** of the theoretical conclusions in real life situations and subsequent validation of these conclusions

The following general objectives are:

- To present an extensive critical literature review on the subject of Control Monitoring & Review in PM discipline
- To offer an effective methodology and a practical set of guidelines, templates and forms that, following some easy adaptation, could be used for efficient and effective Control, Monitoring & Review of a project
- The use of the results in the day-to-day managing of this kind of projects which is a need identified already by the company

4. THESIS EXPECTED FINAL OUTCOME

The most concrete final outcome of the thesis will be a set of validated documents applicable for managing a small to medium management consulting project. These documents will be used as is but also allow adaptation to comply with particularities of certain projects.

They form a methodology and a guideline as to how 'monitoring, controlling and reviewing' should be achieved.

At a secondary level this thesis could be the first step in a series of future procedures covering a much broader aspect of PM i.e. all related processes. It is our ambition to contribute or even trigger more applied research on PM and Quality Systems Management, on developing PM certification in Greece, on Value Engineering and System Engineering and Earned Value Analysis and PM and Innovation.

5. THESIS RESEARCH APPROACH AND METHODOLOGY

The research approach and methodology we are adopting can be described as follows:

- Assessment of PM 'monitoring, controlling and reviewing' process approach available in the Internet literature using predefined criteria.

The criteria for which type of literature to critically review where:

- Generic Standards on PM by Institute or Organisations
- Allowing an international view of the issues
- Containing practical approaches which would be useful to the thesis
- Not older that 1998

6. Canadian Government Cost/Schedule Performance Management Standard (C/SPMS)
7. CCTA Projects in a Controlled Environment (PRINCE)
8. P2M: A Guidebook of Project and Program Management for Enterprise Innovation, Nov 2001, rev1 Aug 2002, PMCC, Japan.
9. Department of Energy USA, Program and Project Management Manual

The author Morris, Peter W.G. in his article "Updating the Project Management Bodies of Knowledge" *Project Management Journal* 43(3) (September 2001) refers to the various Bodies of Knowledge available today.
In fact these are collections or curricula of competences for PM professionals accreditation or of concepts necessary for a broad understanding of PM. They appeared in mid '80s. These documents provide guidelines and standards to best practices as accepted by national or international professional associations and form the basis of their certification systems. They comprise what a project management practitioner ought to be knowledgeable in.

Table 1

Document	**PM Professional Association**	**Origin**	**Structure**	**Availability**
Guide to the PM Body of Knowledge, 2000 (PMBOK)	PMI (Project Management Institute)	N America	47 elements Hierarchical Structure: • scope, • time, • quality, • resources, • risk, • procurement, • communications.	Partly downloaded-previous version fully available
Body of Knowledge, 1996	APM (Association for Project Management	U.K.	Broader in scope than PMI 44 elements.	
IPMA ICB Competence Baseline 1999 v.2 and BOK	IPMA (International Project Management Association)	International (comprising of 28 national associations)	'Sunflower' – no hierarchy. 28 core elements 14 additional elements Additional to PMI: • technology, • environment, • regulatory issues	Competence Base line downloaded

CRMP BoK And APM BoK ed. 2000	Research BoK MIST adopted by APM	U.K.	55 Knowledge areas	Partly available
ISO 10006	International Organisation for Standardisation	International	11 elements	Acquired
P2M Program Management for Enterprise Innovation, 2002	PMCC PM professionals Certification Centre Engineering Advancement Association ENAA	Japan	Different from PMI and APM BoK	Partly downloaded
PRINCE2	CCTA (former UK Government Standard)	UK	24 chapters (Components, Processes, Techniques) Thorough but complicated	Only outline is accessible
Competency Standards for Project Management	AIPM	Australia		Had not access to it
Standard		South Africa		Had not access to it

In constructing these BoK the basic question being asked was, 'what factors have to be managed if a project is to be delivered successfully?' as Morris puts it.

Let us see the example of the hierarchical structure of the **PMI BoK**: PMI has 47 elements divided into three levels.

Project Management PMI PMBoK Structure

Project Integration Management
- Project Plan Development
- Project Plan Execution
- Overall Change Control

Project Cost Management
- Resource Management
- Cost Estimating
- Cost Budgeting
- Cost Control

Project Communications

Management
•Communications Planning
•Information Distribution
•Performance Reporting
•Administrative Closure

Project Scope Management
•Initiation
•Scope Planning
•Scope Definition
•Scope Verification
•Scope Change Control

Project Quality
Management
•Quality Management
•Quality Assurance
•Quality Control

Project Risk Management
•Risk Identification
•Risk Quantification
•Risk Response Development
•Risk Response Control

Project Time Management
•Activity Definition
•Activity Sequencing
•Activity Duration Estimating
•Schedule Development
•Schedule Control

Project Human Resource
Management
•Organizational Planning
•Staff Acquisition
•Team Development

Project Procurement
Management
•Procurement Planning
•Solicitation Planning
•Solicitation
•Source Selection
•Contract Administration
•Contract Close-out

The structure of the older version of **APM Body of Knowledge** was organised into four "key
competencies": project management, organisation and people, processes and procedures,
and general management. APM has 44 at two levels. The APM set is very much broader than PMI's. (Fifteen of APM's elements represent all 44 of PMI's.)

Project Management

—Systems Management
—Programme Management
—Project Strategy
—Project Management
—Project Environment
—Project Appraisal
—Project Success / Failure Criteria
—Integration
—Systems & Procedures
—Post Project Appraisal
—Close Out
—Project Life Cycle

Organisation & People
—Organisation Design
—Control & Co-ordination
—Communication
—Leadership
—Delegation
—Team Building
—Conflict Management
—Negotiation
—Management Development

Techniques & Procedures
—Work Definition
—Planning
—Scheduling
—Estimating
—Cost Control
—Performance Measurement
—Risk Management
—Value Management
—Change Control
—Mobilisation

General Management
—Operational/Technical Management
—Marketing & Sales
—Finance
—Information Technology
—Law
—Procurement
—Quality
—Safety
—Industrial Relations

Prince2 has a basic structure of Introduction, Components, Processes, and Techniques. It is structured in 24 Chapters.

The Japanese **P2M** has 4 Parts with a total of 27 Chapters.

The criteria for the assessment of the critically reviewed literature where:

- How is Control, Monitoring and Review dealt with
- What kind of projects is the document mostly interested in, in terms of type, budget, reporting requirements, deliverables and length
- In what areas of PM is CMR mostly important

- Selection of those features and characteristics that best suit and are applicable to small and medium projects and would be of optimum practical use
- Development of flow charts to map the required process
- Development of a process model further elaborating the chosen practice
- Conversion of the findings of the design into a set of instructions/procedures/forms and verification of the result
- Application of this methodological Tool (Tool Kit) in two distinctly different projects always in the category of small and medium management consultancy projects
- Review of practicality and usefulness of the 'monitoring, controlling and reviewing' process as developed by the thesis; validation of result
- Improvement of these elements and finalisation of the proposed process description

6. LITERATURE OVERVIEW

We have started our research by attempting to understand the various disciplines within PM and how most particularly Control, Monitoring & Review stood in the various 'models' available in the literature.

The most important texts – or 'generic standards for aspects of PM', as Dr Lynn Crawford of the Global Working Group, Jan 2000 puts it - we came across or had a chance to go through are listed below. Some of them have been thoroughly and critically reviewed.

1. ISO 10006:1997 Quality Management – Guidelines to quality in PM (International Organization for Standardization)

2. Association for Project Management - Project Management Body of Knowledge (APM BoK)

3. Project Management Institute Guide to the Project Management Body of Knowledge (GPMBOK), PMI 1996

4. Software Engineering Institute Capability Maturity Model (SEI CMM)

5. US Department of Defence Earned Value Management System (EVMS)

7. MONITORING AND CONTROL

Why is Monitoring Control & Review so important?

A classic story to illustrate this is the tale of the Apollo 11 space journey. During the entire journey to the moon, it has been said that Apollo 11 was only ever on track for 2% of the time.
Does this mean that they were lost most of the time? Obviously not. The computer guidance systems were always in total *control*, making constant *adjustments* to ensure that Apollo 11 remained on course. So too in PM, you may not always be on track, BUT you should have enough information in front of you to make constant adjustments, enabling you to maintain control and keep on course!

Control is the PM function, which aims for the reduction of the variance between goals and actual results by monitoring this variance.
Control is the part of PM focused on assessing or measuring the degree to which a set of characteristics fulfils requirements.
With no planning or requirements set, 'controls' are meaningless. The cycle of Plan-Do-Check-Action is valid here once more.

From the **definition** of Project Management by the British Institute of Project Management (The overall planning, *control* and co-ordination of a project from inception to completion aimed at meeting the client's requirements and ensuring completion on time, within cost and the required quality standards) it is evident that the concept of *control* is rather key in the PM discipline.

Peter Drucker in his classical textbook 'MANAGEMENT: Tasks, responsibilities and practices' differentiates the concept of *controls* and *control*.

Controls are measurements and information; are analytical and deal with facts.

Control is the direction and expectations. Other terms and expressions found in the literature referring to *control* are:
- Management Control
- Overall Control
- Monitoring and data collecting to maintain control etc

Does one use *controls* to exercise *control* of a Project? This is arguable since the complexity of a Project may require a lot of integration and certain important steps from the information the *controls* give us to the effective corrective actions taken to bring back a project under *control*. The involvement of people and interacting

processes make this 'controls → control' relation not a straightforward one but one governed by complex inter-relations.

It is useful to present some key word definitions:

Monitoring according to PMBOK - 2000: The capture, analysis and reporting of project performance usually as compared to plan.

Control according to PMBOK - 2000: The process of comparing actual performance to planned performance, analysing variances, evaluating possible alternatives and taking appropriate corrective action as needed.

Project Controlling according to IPMA Competence Base Line - 1999: The process of establishing Project objectives and plans, measuring actual Project performance, comparing results against planned, taking the necessary action to correct the situation in time.

The following information demonstrates, however, that this important PM element is not always seen as requiring a special focus.

A market survey conducted in the UK looked on what practitioners and academics believe project management professionals ought to be knowledgeable in. The top subjects, where 100% agreement was reached, was Leadership, Legal Awareness, Procurement. However, only 78% agreed that Monitoring & Control should be included, indeed quite a low figure in our opinion.

7.1 Monitoring & Control in the BoKs: an Overview

The APM BoK – old version – devotes three sub-elements to the controlling activities e.g. Cost control, Change Control (Techniques and Procedures); Control & Coordination (Organisational & People)

The IPMA Competence Baseline contains one Core Element dedicated to Project Controlling. (No 20). The meaning of controlling is the wider role of setting plan and targets, measuring and comparing with required as well as taking actions to correct situation in time. It applies for all activities concerning time, cost and work. It is considered as one of the original management functions. It includes reporting, what-if studies, trends forecasts and plan revisions. In Quality, Change Management, Financing and Accounting.

A research by UMIST in the UK on the APM BoK introduced a new practical concept in their own CRMP BoK . The 36 topics are grouped into seven broad sections.

- The first section deals with a number of **General** and introductory items.

- The remaining six sections deal with topics to do with managing:
- the project's **Strategic** framework, including its basic objectives;
- *the **Control** issues that should be employed;*
- the definition of the project's **Technical** characteristics;
- the **Commercial** features of its proposed implementation;
- the **Organisation** structure that should fit the above;
- issues to do with managing the **People** that will work on the project.

We note that *control* although appearing as a cross disciplinary factor in BoKs with this development it becomes a discipline in itself. APM 2000 BoK subdivides *Control* into 7 elements.

10.0 Work Content & Scope Management
11.0 Time Scheduling/ Phasing
12.0 Resource Management
13.0 Budgeting & Cost Management
14.0 Change Control
15.0 Earned Value Management or Performance Management (as adopted by APM v. 2000)
16.0 Information Management

www.UMIST.ac.co/CRMP

The Japanese **P2M** Guidebook has a lot of references on Project Control but its structure does not include Control & Monitoring as a separate issue.

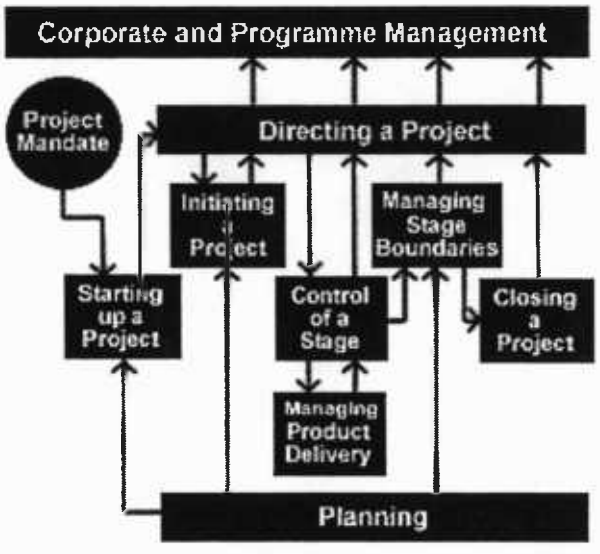
Within the basic concept of PDCA cycle (Deming) i.e. Plan ☐ Do ☐ Check ☐ Act or Plan ☐ Execute ☐ *Monitor-Control*☐ Feedback-Correct the phase of *Monitor & Control* is omnipotent and ever present. PM should set standards for how to most efficiently accomplish given unique tasks. First generation or hard core PM is rich in planning and control processes as it is of out most importance that we control the implementation of the PM plans.

PRINCE 2. According to its authors, designers and developer, PRINCE 2, the latest version of the method, is designed to incorporate the requirements of existing users and to enhance the method towards a generic, best practice approach for the management of all types of projects. This method approaches Project Management as comprising of the following elements:

- Components
- Processes, and,
- Techniques

Within the 'Components' section, Chapter 6 is devoted to 'Controls' and Chapter 11 to Change Control. In other words *Controls* and *Change Control* are two out of totally eight Components that PRINCE recognises within the Project Management

discipline. Meanwhile, within 'Processes', Chapter 16 refers to 'Controlling a Stage'. Finally, in the 'Techniques' Chapter 22 is devoted to Change Control Techniques.



PRINCE 2 Process Model

ISO 10006. This International Standard is an attempt on behalf of ISO to provide guidance on quality system elements and to achieve quality in project management. It is structured on ten groups of – interrelated - processes:

- Strategic process
- Interdependencies
- Time related
- Scope related
- Cost related
- Resource related
- Personnel related
- Communication related
- Risk related, and,
- Purchasing related

The interest of this ISO 10006 standard for the thesis is:

1. the fact it deals a lot with control matters as Quality is a typical measurement and assessment discipline
2. that it is clearly process oriented (a common approach with PRINCE2)
3. that it is closely linked to the widely acceptable ISO 9001 quality management standard

Real world Projects have complexity, volume and uncertainty. The aim is to manage this complexity by developing a Monitoring and Control methodology, which should combine optimum analysis with minimum documentation, use a functional easy-to-use software package and be effective and efficient.

8. What is required by Control, Monitoring and Review (CMR) in Project Management

We are introducing and adopting from this point on the terminology 'Control, monitoring and review (CMR)' as very precisely and satisfactorily depicting this integral function or process in Project Management.

The aim is to keep the Project under Control by *monitoring* certain key parameters and measuring/*controlling* them; the *review* is possible thanks to those inputs. It is important to acknowledge that monitoring – control is not the objective of the process. Our aim is to regularly *review* the situation based on objective data provided by a robust monitoring and control mechanism and take decisions which will correct or prevent negative trends or rectify identified malfunctions and deviations from the targets (on cost, time, resources etc)

We shall keep in mind that the 3 basic elements of PM are **Time**, **Cost** and **Quality**.

Therefore Project Management can be approached as a series of interrelated processes, which should be independently managed still in an integral way in order to respect and balance the demands of the time, cost and quality of the Project.

Each process transforms inputs into outputs via managerial, technical or scientific mechanisms. The process utilises human and hardware resources and is subject to certain restrictions or regulations, which may be applicable. Finally, the process, once put into effect and concluded, should be also measured for its effectiveness and should be subject to improvement e.g. via the PDCA cycle (see paragraph 3).

The CMR process should be used across many PM activities.

- its inputs are the measuring of certain parameters
- its main process is the comparison of the achieved figures against targets and the thorough review of any deviations or trends, the seriousness and possible effects for the project
- its resources are competent professionals and the use of suitable hardware and software
- its restrictions are the Project Objectives or Milestones, Procedures – Instructions – Forms
- its outcome is the result of the review i.e. a series of plans, re-scheduling, re-estimations of cost, time, resource availability etc, which should be decided

and should be the input of the Corrective or Preventive Activities Process implemented soon after but probably by other parts of the organisation
- the CMR process effectiveness should be monitored according to an index agreed.

The CMR process is due to take effect at agreed time intervals and can refer to a specific project step or apply to the whole project.

It is important to note that if we fail to approach the CMR activity as a time-sensitive process broadly described above then we risk to gather data with no specific reason or fail to use the right resources or attempt to put things right without enough solid evidence.

9. Critical Literature Review

9.1 ISO 10006:2003 - Quality management systems– Guidelines for quality management in projects

This International Standard has been initially issued in 1997 and was meant to be a guideline for the implementation of ISO 9001 in Project Management. Its main approach is the recognition of a series of processes that need to be under control for the user to achieve quality in project management. The result is a managerial model presented in the form of an ISO standard including the totality of activities required to manage a project according to the authors.

ISO 10006:1997 is structured on the following ten groups of interrelated processes.

- Strategic process
- Interdependencies
- Time related
- Scope related
- Cost related
- Resource related
- Personnel related
- Communication related
- Risk related, and,
- Purchasing related

Six years later, ISO 10006:2003, the current, second edition, does not abandon this approach. On the contrary it elaborates it even further by offering a useful categorisation, which we intend to discuss further. Processes and phases are seen as

2 different aspects of a project. ISO 10006:2003 is structured on a number of Chapters the critical ones being: 'Management Responsibility', 'Resource Management', 'Product Realisation' and 'Measurement, analysis and improvement'.

It is worth mentioning that ISO 10006:2003 refers to 'Control Monitoring and Review' both as parts of Product Realisation processes (e.g. Schedule Control as a sub-process of time-related process) as well as a separate, stand alone process under the 'Measurement Analysis and Improvement' section.

Management Responsibility (ISO 10006 Ch 5)

a. Strategic Process

Under this category ISO includes the following principles:

- Customer Focus
- Leadership
- Involvement of people
- Process approach
- System approach to management
- Continual improvement
- Factual approach to decision making
- Mutually beneficial supplier relationships

The above disciplines are identical to the eight quality management principles introduced by ISO 9001:2000 and the planning, direction setting process should adhere to those.

b. Management reviews and progress evaluations

An interesting part for the subject of this Thesis as it deals extensively with the various tasks performed to a assess adequacy of the plan, the compliance of the work, the level of synchronisation, the identification of activities that would adversely affect achievement of objectives etc. How planning of progress evaluations, who should perform them and how they can be of use are also described. However, this approach resembles more to the system audits established in quality systems rather than the tasks of monitoring and control.

Resource Management (ISO 10006 Ch 6)

c. Resource-related processes

These processes aim to plan and control equipment, facilities, finance, information, materials, personnel, services etc. Resource control should be based on data

collection, forecasts, reviews all of which should be well timed. The objective is to identify deviations from the resource plans and analyse the reasons, record but most importantly initiate action. Those actions should take side effects into consideration. (Implication on other processes, objectives). Planning revisions should be authorised. Main emphasis is on shortages or excess in resources.

d. Personnel-related processes

People are a special category of resources and ISO 10006 devotes an important part to it while monitoring and control is not an issue.

Product Realisation (ISO 10006 Ch 7)

The attempt of ISO 10006:2003 to improve the alignment with ISO 9001:2000 lead to a terminology not explicitly found in other PM documents. Seven groups of processes are presented here. It is worth mentioning here that 'Project processes are necessary for managing the project as well as for realising the project's product'.

e. Interdependency-related processes

Those involve 'Initiation and PM plan development', 'Interaction Management', 'Change Management' and 'Process & Project Closure'.
Plan development should include provision for ways/time of measuring and assessing the product characteristics, of measuring the progress and performance indicators; these assessments should 'facilitate preventive and corrective actions' and 'confirm that the project objectives remain valid...'
While controls are not explicitly mentioned under Interaction Management the usually high risk encountered at interfaces oblige the carrying out of progress evaluations focusing on interdependencies (planned) and interaction (not planned).
Change management does not encompass control and measurement.
A complete review of project performance should be undertaken at the Process and project closure. Records and inputs from interested parties should include measurable feedback.

f. Scope-related processes

For the International Standard these processes have to do with: concept development, scope development and control, definition of activities or breakdown structure and control of activities. This last part interests us more but, sadly, the ISO remains unspecific. It is mentioned that activities and their interactions should be 'carried out and controlled according to the PM plan' and that activities should be reviewed to identify deficiencies and for progress evaluations/ revised plan. Only attention to 'new technologies (sic)' is drawn.

g. Time-related processes

Schedule control is an integral part of these processes. The ISO 10006:2003 devotes par 7.4.5 to this subject. However we interpret the content of this paragraph as rather referring to schedule *review*. Progress analysis should identify trends, and uncertainties for the remaining project. Significant deviations should be acted upon. Root causes of favourable or unfavourable variances should be identified etc. Implication of schedule changes on budget, resources, objectives etc should be taken into account. Finally *schedule control* must involve customer and/or other interested parties at information or decision level.

h. Cost-related processes

Similarly, *cost control* is seen as a key subject within the cost estimation-budgeting-cost control cycle. The standard here, refers to 'cost control system' and 'procedures' as well as methods like the 'earned value analysis' (for trends analysis). Emphasis is given to the need of change decisions based on facts and implications for other processes/objectives. Last, regular project cost reviews are advised.

i. Communication-related processes

These are: 'communication planning', /information management' and 'communication control'. The planning as well as the implementation deals with type of information, media, frequency etc of communication and particularly with agreements, reports and meetings. The control function is limited to assessing if communication management meets the needs of the project.

j. Risk-related processes

Risk is seen here as 'uncertainty' i.e. having either negative or positive effect on project products or processes.

These processes are: 'risk identification', 'risk assessment', 'risk treatment' and finally 'risk control'. This final process is the result of keeping the risks under control by identifying, assessing and acting upon.

k. Purchasing-related processes

It refers to all agreements with suppliers or subcontractors. These processes are: 'purchasing planning and control', 'documentation of purchasing requirements', 'supplier evaluation', 'subcontracting' and 'contract control'. We shall concentrate on the last item. A system should be in place to monitor all contract conditions and make sure they are always met; this should be specifically done prior to contract

closure. This should be integrated into the overall management of the project. Supplier performance should be monitored and communicated back to the supplier.

Measurement, analysis and improvement (ISO 10006 Ch 8)

I. Improvement-related processes

So that the organisation learns and improves two processes are necessary, according to ISO 10006:2003. 'Measurement and Analysis' and 'Continual Improvement'. A general guidance is thus provided for the management to work upon, which recapitulates from previous points (product realisation processes etc) but now puts forward the requirement of *measurement of performance*. This measurement can be achieved via auditing, individual activity evaluations, resource used evaluation, product evaluation, supplier performance evaluation, customer satisfaction evaluation.
Continual improvement both by the originating organisation and by the project organisation is a matter of information management system.

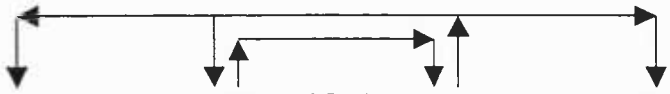
As a general conclusion this ISO 10006:2003 document seems to cover all the areas where controls should be implemented within a project and a fair description is given. It fails, however to provide either a structured way of how these monitoring and control activities should be done or a consistent approach for an organisation which requires to impose some CMR rules within a project. More to that the standard has in mind rather large projects and it is obvious that smaller ones would have difficulties in implementing its guidelines. The usefulness is enhanced for those organisations which already use quality management systems and which can expand the scope of their system to projects.

9.2 PMBOK-2000 Project Management Institute Body of Knowledge 2000

The PMBOK edition 2000 (latest) Guide is issued by the Project Management Institute (PMI), a Pennsylvania, USA based professional association. It is approved by the American National Standards Institute as ANSI/PMI 99-001-2000. It contains the theory and practice of PM as generally accepted. A preview (experts) of the 2000 edition is available in the Internet while the 1996 edition is available in full.

It is structured around:
- Nine Project Management Knowledge Areas, which include,
- Thirty nine (39) PM Processes categorised and organized into:
- Five (5) Process Groups

Table 2



KNOWLEDGE AREA / PROCESS GROUPS	Initiating	Planning	Executing	Controlling	Closing
Project Integration Management	Initiation	Project Plan Development	Project Plan Execution	**Integrated Change Control**	
Project Scope Management		Scope Planning Scope Definition		**Scope Verification** **Scope Change Control**	
Project Time Management		Activity Definition Activity Sequencing Activity Duration Estimation Schedule Development		**Schedule Control**	
Project Cost Management		Resource Planning Cost Estimating Budget Planning		**Cost Control**	
Project Quality Management		Quality Planning	Quality Assurance	**Quality Control**	
Project Human Resources Management		Organisational Planning Staff Acquisition	Team Development		
Project Communications Management		Communications Planning	Information Distribution	**Performance Reporting**	Administrative Closure
Project Risk Management		Risk Management Planning Risk Identification Qualitative Risk Analysis Quantitative Risk Analysis Risk Response Planning		**Risk Monitoring & Control**	
Project Procurement Management		Procurement Planning Solicitation Planning	Solicitation Source selection Contract Administration		Contract Closure

The whole document describes PM in terms of its component processes. Therefore each Knowledge Area is defined and described as a series of processes, having different roles in the development of a project. These Knowledge Areas are as follows:

- Project Scope Management, which ensures that the project includes all the work required and only the work required.
- Project Time Management to ensure timely completion of the project.
- Project Cost Management to ensure that the project is completed within the approved budget.
- Project Quality Management to ensure that the project will satisfy the needs for which it was undertaken.
- Project HR Management to make the effective usage of the people involved.

- Project Communication Management to ensure timely and appropriate generation, collection, dissemination, storage and ultimate disposition of project information.
- Project Risk Management for identifying, analysing and responding to project risks.

Control Processes of PMBOK

Out of the 39 processes we note that eight (8) have been classified under the *Control* group and are of interest to our current thesis. In Table 2 those processes are connected with the Knowledge Areas they form part of.

The controlling processes are defined as those, which 'ensure that process objectives are met by monitoring and measuring progress regularly to identify variances from plan so that corrective action may be taken where necessary'. Depending on how important these variances are, the Planning of the project is adjusted by going through the planning processes. Preventive action is also foreseen if trends are visible. (See chapter 3 on Demming Cycle PDCA).

The objectives of the controlling processes are the following:

- The coordination of change throughout the project: Integrated Change Control Process.
- The formalization of acceptance of the Project Scope: Scope Verification Process
- The control of changes to project scope: Scope Change Control Process
- The control of changes to project schedule: Schedule Control Process
- The control of changes to project budget: Budget Control Process
- The monitoring specific project results (different to every project) to determine if they comply with the quality standards set and to identify ways to eliminate causes of unsatisfactory performance. : Quality Control Process
- Collecting and disseminating information i.e. reporting, progress measurement and forecasting: Performance Reporting
- Keeping track of known/identified risks, monitoring residual risk and identifying new ones, ensuring the execution of plans and evaluating the effectiveness of reducing the risks: Monitoring and Control of Risks.

It is interesting to notice two points a) that Controlling Process are seen to be 'alive' throughout the entire duration of a project while they are intensified when the execution processes are at their highest (intermediate phases) and, b) that processes, in general, are approached as requiring input, having tools and techniques and producing a result (or outcome). Control & Monitoring tools and techniques interest this thesis.

Process Interaction

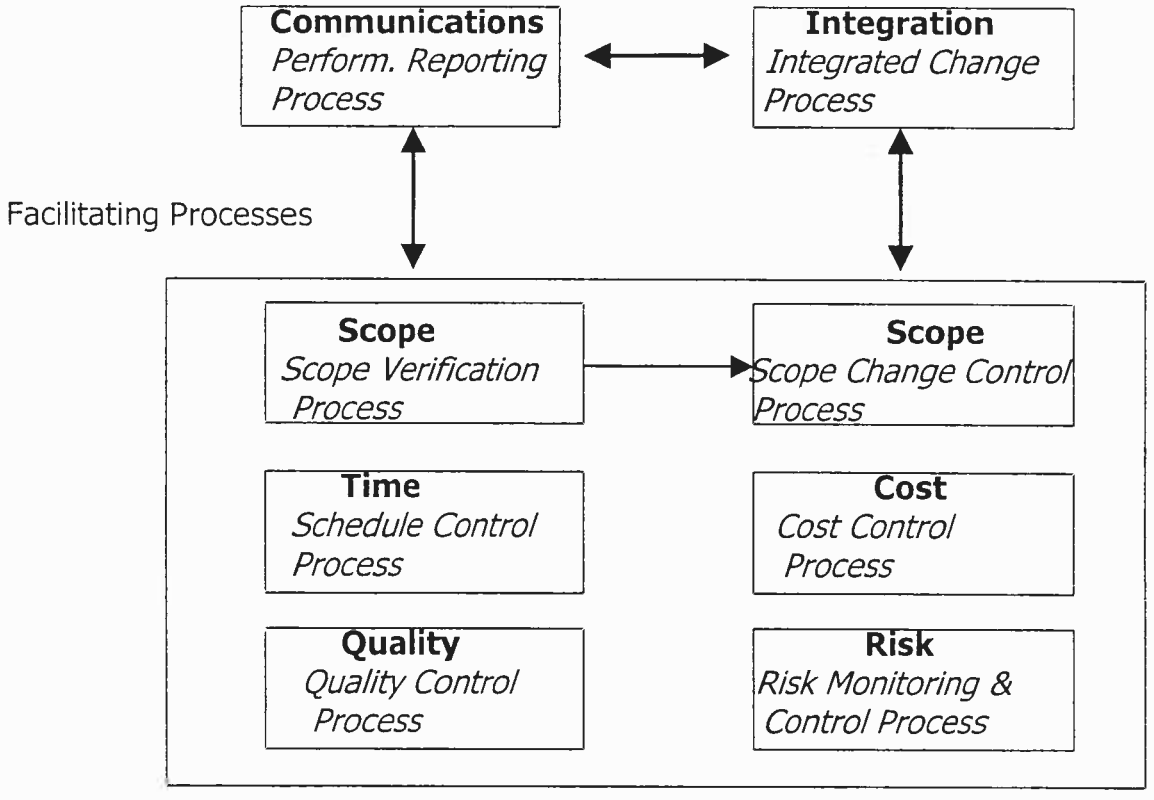
Is there no interconnection between the 8 controlling processes? The PMBOK stresses the interlinkage of these processes and emphasises the importance of integral change control. These processes are indeed linked via the results or

outcomes they produce which can be input to another process – control or other kind.
As is demonstrated on top of Table 2 *controlling* processes interact with planning, executing, and closing processes.

The development noticed from the previous edition (1996 to 2000) is that: a) *Overall Change Control* is now referred to as *Integrated Change Control*, b) one process has change status; the *Scope Verification process* from executing has become a controlling, and, c) the *Risk Response Control* has given its place to *Risk Monitoring and Control* in the controlling procedures.

The following Figure 1 shows the interlinkage between *controlling processes*.

Fig 1. How Controlling process interlink according to PMBOK (arrows show flow of information)



The above Figure 2 from the PMBOK 2000 shows that there is an alleged interaction between Performance Reporting and Integrated Change Process, while both these 'core' controlling processes interact with the entire rest of the group. On the other hand Scope Verification and Scope Change Control interact, while all the other

'facilitating' controlling processes are, according to the PMBOK 2000, independently operating, obviously expected to provide input of information to the core processes. All the 'facilitating' processes give and take from the two top ones (core).
Finally it is demonstrated that all the controlling process have input from the executing process and provide their out put to the planning, executing and closing processes. (see also Table 2)

Example of Control Process layout: **Scope Change Control**

Inputs	Tools & Techniques	Outputs
Work breakdown structure	Scope change control system	Scope changes
Performance Reports	Performance measurement	Corrective Actions
Change Requests	Additional Planning	Lessons learnt
Scope management plan		

Example of Control Process layout: **Schedule Control**

Inputs	Tools & Techniques	Outputs
Project Schedule	Schedule change control system	Schedule updates
Performance Reports	Performance measurement	Corrective Actions
Change Requests	Additional Planning	Lessons learnt
Schedule management plan	Project Management S/W	

Example of Control Process layout: **Cost Control**

Inputs	Tools & Techniques	Outputs
Cost baseline	Cost change control system	Revised cost estimates
Performance Reports	Performance measurement	Budget updates
Change Requests	Additional Planning	Corrective Actions
Cost management plan	Computerised tools	Estimates at completion
		Lessons learnt

The similarity demonstrates a consistent approach. We notice that PMBOK use repeatedly some input, tools or output types, which we shall present briefly.

Performance Reports: The outcome of Performance reporting process. It includes current status, progress and forecasting providing information on schedule, scope, cost and quality.
Change Requests: Requests for changes (of scope, schedule etc) generated following review processes, or external event (e.g. regulation), coming from an error or omission. It could be a value-adding change.
Schedule management plan: How changes to the schedule will be managed (maybe detailed or not, formal or informal). A document describing how this should be done and how changes will be incorporated. A subsidiary element of the overall project plan.
XXX change control system: Set of procedures which define the steps by which official project documents may be changed. Approval or rejection of change requests is commonly the responsibility of CCB (change control board). A change control system will include procedures to handle changes approved without prior review as for example emergencies. Also, various changes must be categorised.
Corrective actions: Anything done bringing any deviation back to order and expected performance back to the plan.
Lessons learned: For an organization to be a learning organization and invest in improvement, the causes of variances and the reasoning behind the corrective action chosen should be documented so that they become part of the historical database of both the project and the organization.

Example of Control Process layout: **Quality Control**

Inputs	Tools & Techniques	Outputs
Work results	Inspections	Quality improvement
Operational Definitions	Control Charts	Acceptance decisions
Check Lists	Pareto Diagram	Rework
Quality management plan	Statistical sampling	Completed checklists
	Flow charting	Process adjustments
	Trend analysis	

PMBOK Particularities Noticed
The inclusion of Scope Verification into the controlling processes in the 2000 version of PMBOK is a substantial issue worth considering. More to that we notice that neither the Project Human Resources Management nor the Project Procurement Management areas include processes marked as 'controlling'. However, we believe some kind of monitoring & control exists in both these knowledge areas although they might be concealed or not quite as important in the typical project.

9.3 U.S. Department of Defence (DoD) Extension to the PMBOK

Project Management was deployed for the first time in the world in the military systems and space development fields, by the US DoD in the 1940s.
In June 2003 the DoD published an extension to the PMBOK. In order to include the requirements of the DoD this document elaborates on the needs connected to defence projects or acquisitions. Earned Value methodology and other very specific areas are covered.
Five 'defence acquisition knowledge areas' have been added to the PMBOM. These are:
Project Systems Engineering Management
Project Software Acquisition Management
Project Logistics Management
Project Test and Evaluation Management
Project Manufacturing Management
This reference is regarded not to be of value to this thesis.

9.4 International Project Management Association Competence Baseline – IPMA ICB

This source is an April 2001 summary available in the Internet of the version 2 of the original text.

The contribution to the wide approach on the *Monitoring and Control* theme in PM consists of two areas. One is Performance Measurement and the other is Project Controlling.

Performance Measurement is the concept used to represent physical progress achieved in relation to cost and schedule performance. Earned Value analysis is a useful way of calculating and assessing the project progress. The indicators used are Actual Cost of work performed, Budgeted Cost for work performed as well as Budgeted Cost for work scheduled. Schedule variance and Cost variance are two factors calculated using these indicators.

IPMA regard *Project Controlling* (Chapter 20) as an integral process within a project. From this point of view the approach is of high interest to this thesis.

A number of techniques are proposed; also IPMA refers to it as 'one of the original PM functions'. This is a radically different approach to APMBOK. IPMA enlarge the scope of Controlling for all activities of cost, time and work by including in it the

planning and *decision taking* elements closely linked with the *inspection* element of control. A handy list of *tasks* controlling consists of is presented in this document. These are:

1. Establishing an effective Reporting System
2. Monitoring of Performance on specific dates (time-now analysis)
3. Analysing of targets, plan and actual deviations
4. Work authorisation
5. Running trend forecasts
6. Planning alternatives – running simulations (what-if analysis)
7. Developing and applying control actions
8. Adjusting and modifying objectives (plan revision) (cf Review)

The targets are time, cost , quality, resources, risk, EH&S of the Project while the higher the frequency of reporting dates and the earlier appropriate control measures (cf Corrective or Preventive Actions) are put into actions the more effective they are.

Clearly according to IPMA Performance Measurement and Configuration and Change Management are parts of the *Control* function. Indeed this document devotes one chapter (no 37) to Management of Change.

9.5 P2M GUIDEBOOK: A GUIDE FOR PROJECT AND PROGRAM MANAGEMENT FOR ENTERPRISE INNOVATION – JAPAN

The **P2M** Guidebook has been issued by Project Management Professionals Certification Center of Japan. A 99 page brochure (summary) is available in the Internet. The method has been developed by the Engineering Advancement Association for Innovative Project Management Development Committee. It attempts to set aside the delivery-focused traditional PM models and allows:
the integration of 'project business strategy' elements and
the utilisation of knowledge created through projects
'projectized' management of operations.

Key theme in P2M is
Value creation for enterprises and
Consistent chain from the MISSION to STRATEGIES to embody the mission, a PROGRAM to implement the strategies, to PROJECTS constituting the program.

The PM segments P2M recognises are the following:
Project Strategy Management
Project Finance Management
Project Systems Management
Project Organisation Management
Project Objectives Management
Project Resources Management
Project Risk Management
Project Information Management
Project Relationships Management
Project Value Management
Project Communication Management

According to P2M, first generation PM 'sets standards on how to most efficiently accomplish given unique tasks, meeting a given or set cycle time'. So the focus was on Quality-Time Cost plus, later, Scope Management. Because of its project implementation focus it was basically developed round defining scope via WBS i.e. decide and allocate resource to be utilized as well as adhere to the Plan-Do-Check-Feedback/Execute cycle. Basic planning and control processes are the hard PM processes.
Modern Project Management includes 'soft processes' like communications and organization and enriches the 'hard processes' with procurement, risk etc thus expanding its applicability and using the Faster-Better-Cheaper concept!

P2M claims a third generation PM! It opens up to broad visions and value consciousness, rich insights that enables one to grasp the totality, deciphering complex issues and developing missions for breakthroughs, in one word leading to innovation. It is a cradle to grave of projects approach.

P2M also highlights the importance of Program Management. Guiding the mission and strategy formulation and managing the interrelated component projects of larger Programs is considered to be poorly done if traditional PM is followed. The explicit

P2M *Tower* presents Project and Program Management structure and frame elements.

As we can see that P2M structure does not include Control & Monitoring as a separate issue. It has however a lot of references on Project Monitoring & Control.

Within the basic concept of PDCA cycle (Deming) i.e. Plan → Do → Check → Act or Plan → Execute → *Monitor-Control*→ Feedback-Correct the phase of *Monitor & Control* is present.
However in the chapter dedicated to Project Management Cycle an important differentiation to the common view is noted. The cycle according to P2M is:

Designing – Planning- - Implementing – Coordinating – Delivering. We note here that the *Control and Monitoring* phase has been substituted. The 'coordination' element aims at solutions through consultation with interested parties and not just by 'reduction of the differences between goals and results'. Without being abolished the control element is now combined with interference between goals, situational changes, obstacles to collaboration, accidental factors etc.

Finally, out of the PM segments P2M is structured upon the Project Objectives Management approach is seen as the most valuable and appropriate for the current thesis.

Project Objectives Management summary:

Practice Guidelines for Project Objectives Management are:
- Clarify Project Objectives Indicators
- Work out project management plans fit for the project in terms of pertinence and complexity
- Secure project visibility and accountability
- Gain client satisfaction
- Optimize objectives and set priorities

Fig 2. Project Objectives Management

OBJECTIVES	WORK PROCESSES	RESULTS
Conduct Life Cycle Analysis	Project Life Cycle Plan	Successful completion of the project
Visualize project objectives	Scope Management	
Define project scope	Cost Management	Client satisfaction
Establish Most Efficient Time Schedule	Time Management	
Establish baseline for measuring progress		Achievement of Objectives
Establish quality policy	Quality Management	
Forecast values at completion	Earned Value Management	Effective use of resources
Guide optimum work implementation		
Design and maintain	Reporting and Change	Contribution to enterprise

effective communication systems Control Changes Feedback know-how acquired in visible formats	Management Delivery Management	value Creation of new future projects from project success

Project Objectives Management – Constraints & environnemental Changes:

- Scope Changes
- Constraints on resources
- Implicit requirements
- Harmonisation between stakeholders interests

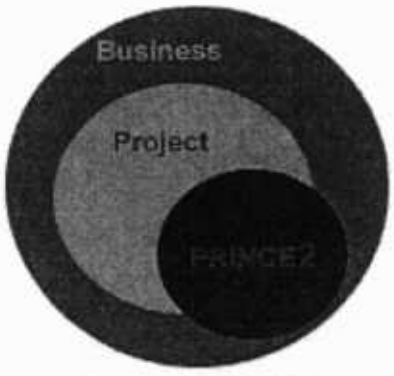
Project Objectives Management – Knowledge & Information base:

- Library of completion reports
- Library of lessons learned & know how
- WBS
- Productivity data base (standard value per unit task or activity)
- Technical data

9.6 PRINCE2

PRINCE was first developed by the **Central Computer and Telecommunications Agency (CCTA)** now part of the **Office of Government Commerce (OGC)** in 1989 as a UK Government standard for IT project management.
Since its introduction, PRINCE has become widely used in both the public and private sectors and is now the UK's de facto standard for project management. Although PRINCE was originally developed for the needs of IT projects, the method has also been used on many non-IT projects. The latest version of the method, PRINCE2, is designed to incorporate the requirements of existing users and to enhance the method towards a generic, best practice approach for the management of all types of projects.
The design and development work was undertaken by a consortium of project management specialists, under contract to OGC, and over 150 public and private sector organisations were involved in a Review Panel.

PRINCE is a process-based approach. The method describes how a project is divided into manageable stages enabling efficient control of resources and regular progress monitoring throughout the project. The various roles and responsibilities for managing a project are described and are adaptable. This allows to suit the size and complexity of the project, and the skills of the organisation. Project planning using PRINCE2 is product-based which means the project plans are focused on delivering results and are not simply about planning when the various activities on the project will be done. This concept is presented with the following diagram.



Scope of PRINCE 2

Fig.2 Prince 2

According to PRINCE2 it provides the following benefits: no4 presents a particular interest for this thesis.

1. A controlled and organised start, middle and end;
2. Regular reviews of progress against plan and against the Business Case;
3. Flexible decision points;
4. *Automatic management control of any deviations from the plan;*
5. The involvement of management and stakeholders at the right time and place during the project;
6. Good communication channels between the project, project management, and the rest of the organisation.

The structure of PRINCE2 is the following:

Introduction
Chapter 1: Introduction
Chapter 2: An introduction to PRINCE

Components
Chapter 3: Introduction to the PRINCE Components
Chapter 4: Organisation
Chapter 5: Plans
Chapter 6: Controls
Chapter 7: Stages
Chapter 8: Management of Risk
Chapter 9: Quality in a project environment
Chapter 10: Configuration Management
Chapter 11: Change control

Processes
Chapter 12: Introduction to Processes
Chapter 13: Starting Up a Project (SU)
Chapter 14: Initiating a Project (IP)
Chapter 15: Directing a Project (DP)
Chapter 16: Controlling a Stage (CS)
Chapter 17: Managing Product Delivery (MP)
Chapter 18: Managing Stage Boundaries (SB)
Chapter 19: Closing a Project (CP)
Chapter 20: Planning (PL)

Techniques
Chapter 21: Product-based planning
Chapter 22: Change Control approach
Chapter 23: Quality Review technique
Chapter 24: Project filing techniques

Chapters 6 and 11 of 'components', chapter 16 of 'processes' and 22 of 'techniques' refer to *control monitoring and review* issues.

9.7 DEPARTMENT OF ENERGY (USA) – PROGRAM AND PROJECT MANAGEMENT PRACTICES MANUAL

This extensive document is provided to contractors of the DoE projects for them to follow as a contract requirement, dated 10/01/2000. Their PM system is expected and required to comply with this manual.

In the Project Execution Plan (PEP) section of the document, the Project Controls System Description is outlined. The contents should include work planning, scheduling s/w, cost control, funds control, project status meetings and reporting as well as the change control process.
The following items are addressed:
- Contingencies and reserves
- PM philosophy towards project control goals and objectives
- Integration of the systems
- Documentation
- Level of control
- Change control procedures
- Reporting and review plan specifying frequency, content and format of periodic reports & reviews

The document includes a section devoted to Project *Control*. EVMS Earned Value Management Systems are proposed as the most appropriate to measure performance.

Earned Value reflects the integration of cost, schedule, and technical work into one common view to establish a project plan. It uses progress against previously defined work plans to forecast such important concerns as:
- estimated completion costs,
- finish dates, and
- the effectiveness of corrective action plans.

Earned Value is the measurement of what you physically got for what you actually spent, or the value of work accomplished. "Earned Value" is a term that is often referred to as Budgeted Cost of Work Performed. Simply put, it is a program management technique that uses "work in progress" to indicate what will happen to work in the future. Other performance measurement indicators include:
Level-of-Effort (LOE), Milestone Reports, Technical Progress Indicators.

'Assessment, Reviews and Lessons Learned' are addressed in a different dedicate section of the DoE manual; they should be implemented for each phase. They reflect a continual improvement mindset of the company undertaking the execution of the Project. According to DoE all reviews and assessments should be based on a tailored

approach considering project-specific attributes, review/decision objectives, and project size. These reviews and assessments form a valuable body of knowledge for future projects and therefore should form the documented foundation for the 'lessons learned' report as proposed by DoE.

9.8 PM FOR SUCCESS IN TEACHING AND LEARNING PROJECTS, UNIVERSITY OF NEW ENGLAND, AUSTRALIA

This document differs substantially from the previous ones as it is created for non-PM professionals; hence it is considerably more simple in its content and approach while respecting the basic PM elements frequently referring to PMI BOK and using the standard terminology e.g WBS, Critical Path Method, PERT chart etc. We have appreciated this point of view, and the interesting material for our study.

The authors break down the project to 4 phases.

Define --- Plan --- Conduct/Control --- Review

We quote some of its successful parts.
'Apply the project management tools to the practical planning of the project to enable the project to proceed from its initiation to its completion. Establish long and short-term goals. Allocate tasks. Establish control mechanisms and a monitoring process (that is, quality assurance) for the project to check the efficiency (that is, how the project is proceeding?) and the effectiveness (is the project achieving?) and establish whether there is a gap between where the project is and where it should be. If there is a gap, establish methods to get the project back on track.
The monitoring process will track the project. Develop a process to redefine goals as a result of unexpected problems such as finance, people etc.'

Somehow the objectives of this author seem to be very close to ours.

'Real-world projects are plagued with complexity, volume and uncertainty. We therefore need to develop a project management methodology, which will help us manage this complexity. The methodology selected must combine the best of analytical techniques and include proper documentation, particularly, for very large projects. The project management methodology must be a streamlined and effective process and should recommend a functional yet easy-to-use software package.'

This manual contains practical and useful tips on *Monitoring* on *Control* and *Review*, however the review is limited to the end of the Project Review and does not include reviews conducted following regular reporting phases.

10. THE PROPOSED METHODOLOGY FOR PROJECT CONTROL, MONITORING AND REVIEW (CMR)

10.1 OBJECTIVES

The main objective of the proposed methodology is the development of a lean and practical process in the form of a **guide** that could be followed so that a medium to small management consultant project is effectively and efficiently 'controlled, monitored and reviewed'.

The methodology is based on the Internationally proven theory and practice. The achievements and approaches of other authors or practitioners have been taken into consideration, as it was our aim to build on existing and internationally acknowledged processes and procedures.

The methodology developed contains, according to our study, all essential and enough provisions, and should lead to activities undertaken by the Project Manager or his/her assistant regularly in the course of the project. The effort spent should typically be 3 hrs every month so for a 12 month project a 36 hour time should be allocated (4 man/days). This should represent roughly 5-10% of the work effort devoted. Therefore the methodology proposed should limit itself so that it is not necessary to exceed this time allocation on PM control-monitoring-review activities. It would not be competitive for any company either offering the management consultancy service (supplier) or receiving it (customer), to allow more time in such a specialised PM – CMR activity. It should be noted that more time would be required so that other PM activities take place like e.g. planning, closing the project, record keeping.

The ultimate success factor of the methodology proposed is the repeated usefulness of such a practice, i.e. the effective and efficient CMR of these kind of projects.

10.2 PROJECT SCOPE, QUALITY, TIME AND COST

Our thorough study of the existing internationally established theory and practice of PM (PMBoK, PRINCE2, ISO 10006 etc, see chapter 9) has proven to us that, for a project of limited budget and resources, the important and essential project elements to control are the following:

- Scope
- Quality
- Time
- Cost

In the present thesis we shall concentrate on the controlling mechanisms for those key elements only. We shall take each of those and present what are the features or/and subjects they consist of.

10.2.1 SCOPE

The scope of a Management Consultant Project can differ enormously. The scope is really presented in the form of the proposal when the technical and financial offer is made. Scope should include:

- Objectives of the Project
- Sections or departments or processes or activities or products of the customer-enterprise
- Description of the deliverables
- Description of the services to be provided

The Scope is an element that must be very precisely defined when the contract documents are signed. Ambiguous scope description could be detrimental for the life of the project. For example if Training is within the scope of the Project it is essential that an analysis of the expected methodology, training topics, etc be agreed.

Any control for deviation from Scope plan is based on good Scope definition.

10.2.2 QUALITY

We must acknowledge the quality element having two sides. One is the quality of the services provided during a Management Consultant project; the other is the quality of the final product/result it is agreed we must deliver.
Let us take one example. A productivity improvement project targets at a 10% improvement. The consultant is late at meetings, writes unacceptable reports, the diagnostic phase lasted twice as planned etc. However, the end-year results based on his recommendations presents 11% improvement! The Quality of the service is poor but the Quality of the deliverable is good.

The aim of every project is to achieve Quality in both those aspects.
In order to do that the expected characteristics of both the service and the interim and/or final outcome must be very precisely defined so that the control of Quality is performed.

In the Quality documents therefore, we should clearly depict the methodology, the service provided and the features of the final product, deliverable or objective

10.2.3 TIME

The Schedule i.e. duration of the project and its breakdown into WBS or phases, the achievements of milestones etc is an important feature of the project. One may argue that it is another feature of the project Quality. However, because of the time sensitivity of most of the projects, PM reserves special control activities to Time.
We shall propose the use of commercial software like MSProject which, provided the input is wise and consistent enough, can be a brilliant tool for PM- schedule CMR activities.

10.2.4 COST

The cost element of PM is of prime importance in all kind of projects, especially in those where there is a risk of exceeding budget due to unpredictable elements.
Cost is important to the customer who would like to see the progress of the Project using earned value analysis (Cost Variance and Cost Performance Index) but also to the supplier (consulting company) who cares about its cost and profit.

10.3 JUSTIFICATION FOR RESERVING A 'LOW PROFILE' TO SOME PROJECT MANAGEMENT AREAS

10.3.1 COMMUNICATION

The area of communication management is not approached separately but is again included in Quality. We see 'Communication' as interwoven with Control Process while the tools of Meetings and Reporting are used in this Control Process to produce Report outcome. This will then become an input to the Review Process.

10.3.2 RISK

Risk is an important element taken into consideration in our Methodology but not occupying a separate place. In fact the reason we are exercising control (or applying a preventive measure) over elements is because we recognise a potential risk. For example, the monthly cost control and trends analysis is done because we have identified that there maybe a risk of exceeding the budget. The quality control of interim deliverables is performed because the risk of delivering a non-conforming service or product and dissatisfying the customer is real.

10.3.3 CHANGE MANAGEMENT

This important PM area is not considered to be key for small to medium management consultant projects. Therefore a separate Change Management control method is not developed here but the possible changes are included in the Review agenda when the Scope status is discussed.

10.3.4 PROCUREMENT MANAGEMENT

The type and size of projects we are focusing at don't have requirements for purchasing materials and services important for the project with the exception of some rare subcontracting.

10.3.5 HUMAN RESOURCE AND ORGANISATION MANAGEMENT

Again, the small size of the team (2-5) of these relatively small duration projects obliges us to exempt this management area or, to be precise to incorporate it into the Quality issue.

10.4 PLANNING STAGE

Since Control is essentially the comparison of the actual situation with that intended, every time, in terms of Cost, Quality etc, there can be no *Control*, hence no Review, without the development of specific and precise Planning.

We could also argue that Planning and Control should mirror each other.

The project plan (or Baseline Plan) serves as the basis for the project's monitoring, controlling, and reporting – reviewing activities. By following the plan and gathering relevant data for the status meetings and reports, information will be available to accurately identify issues and problems, minimize project risks, and monitor, control, and report progress.

Planning is a process commencing together with the start of the project and its completeness and robustness helps the control of the project.

We shall therefore, briefly present the planning prerequisites expected to be in place before any CMR activities can take place. Usually contracts signed between the parties involved in the Project serve the purpose of this level of planning but the project manager should develop this planning even further to include all these tasks if a full further control of the project is our objective. Some planning items, for instance, do not concern or may not be of interest to the customer but only to the project manager (e.g. travelling cost, if the service paid includes all other expenses, or, internal communication)

The particular tasks that should be carried out during Planning stage and analytical objectives sought are presented from 1 to 15 here below:

10.4.1 For SCOPE:

1. Agreement of scope i.e. objectives, deliverables, services to be provided

10.4.2 For QUALITY:

2. Agreement on deliverable per project task
3. Description and level of services provided during the project
4. Methodology with specific and measurable parameters
5. List of possible standards or regulations applicable in the project
6. Description and features of the final product, deliverable or objective
7. Description and frequency of progress or project team meetings, reports frequency and format
8. Description of responsibilities and lines of authority of project team members
9. Development (or adaptation) of procedures to cater for various important areas of activities that need to be 'Quality Assured'. (Communications – Meetings - Reports, Records Control, Document Control, CMR etc)

10.4.3 For TIME:

10. Breakdown of the project into separate phases or tasks (WBS) with estimated (or required) duration
11. Agreement on milestones
12. Definition of Critical Path

10.4.4 For COST:

13. Work assigned for every task
14. Resources assigned for every task
15. Fixed or other variable costs budgeted (travelling, subcontractors etc)

The 15 *Planning* bullets described above will become the *15 Control Points* that we need to spend time upon, assess performance by and take decisions by.

PLANNING Process Table

	OBJECTIVES	CONSTRAINTS & RISKS	TOOLS	OUTPUTS
S	Remove ambiguity Focus the resources	Early to know exactly	Existing Know-how Tender document	Clear Project Description
Q	Agree details of Scope		Existing Know-how Tender document	Quality Document containing Deliverables, Methodology
T	Schedule plan	Inability to meet requirements	MS Project	Gantt Chart,...
C	Cost plan	Underestimation of work required	MS Project	Budget ,...
				Planning Document

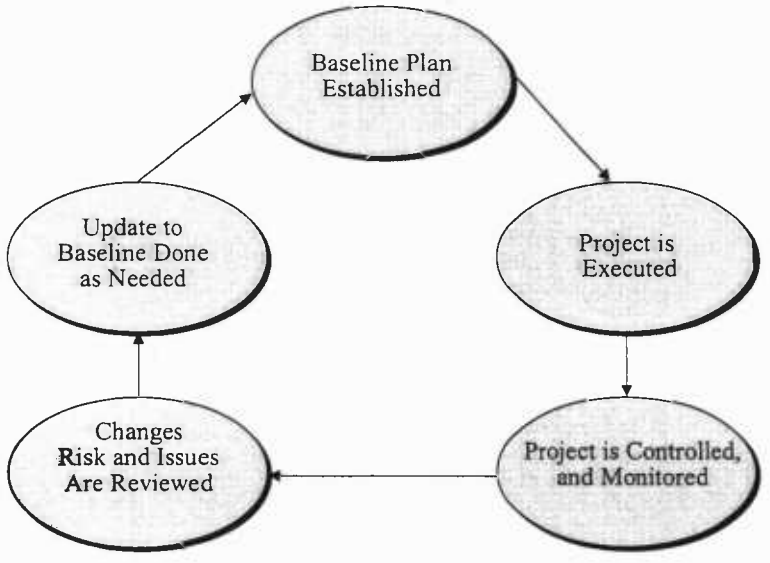


Fig. 3 Process

10.5 PROJECT CONTROL PROCESSES OF THE EXECUTION STAGE

Once a project has been planned and the project starts, then it needs to be directed. This involves processes that need to be in place to ensure that the project progresses according to plan. During data collecting, monitoring, and reviewing, the project team collects data to assess the current state of the project in terms of SCOPE, QUALITY, TIME & COST. These activities always include:

- Review the completed activities
- Identify milestones reached

- Identify problems or issues
- Update project schedule and progress information
- Update budget and variances.

Project controls which may be needed include:

- Addressing issues
- Reviewing changes and making recommendations
- Preparing corrective action plans
- Rescheduling
- Reallocating resources

10.6 MONITORING OR CONTROL ?

Let us consider the definitions of the PMBOK-2000 for Monitoring and for Control.

Monitoring : 'The capture, analysis and reporting of project performance usually as compared to plan'. Tracking is also used in conjunction with monitoring especially in the MS Project terminology.

Control: The process of comparing actual performance to planned performance, analysing variances, evaluating possible alternatives and taking appropriate corrective action as needed.

The two activities seem to be almost synonymous. However there is an element of continuous activity in the *Monitoring* like an automatic continuous recording and printing of temperature of a refrigerator which you can look at occasionally and may even have an alarm to let you know when temperature is out of boundaries! On the other hand *Control* sounds like a 'batch' process you perform at known intervals or at phase conclusion points.

The tasks included in *Control* may vary depending on the element (S,Q,T,C) under assessment, but generally include the following:

- Collection of current information and facts; checking completeness and accuracy of data
- Analysis of current information e.g. using MS Project for schedule and cost
- Comparison of actuals with planned or baseline
- Conclusion on Project performance or deviations
- Conclusions on trends (- , 0, +)
- Reporting: Some references categorise the *reporting* with Control and this we shall keep in this study. It is the most important output of the C & M process and input to Review.
- Root cause analysis leading to why things went wrong
- Decision on timely corrective actions (in case of deviations) or preventive action (in case of adverse actions) based on pre-decided alarm limits and action limits

In fact we may say that CMR is indeed a continuous process, which can't easily be broken down into its components.

We shall adopt that view and tabulate the activities as follows:

Monitoring & Review Process Table

	OBJECTIVES	**CONSTRAINTS & RISKS**	**TOOLS**	**OUTPUTS**
S	To make sure we are not doing more or less To justify work over scope	Contract is binding	Contract Review procedure	Scope redefinition?
Q	To prevent non - conforming service and customer complaints	Fail to deliver	Document Reviews, Audits	C & P Actions proposals
T	To control schedule	Underschedule	MS Projects	C & P Actions proposals
C	To control cost		MS Projects	C & P Actions proposals
				Report Documents

Why Data collecting and Monitoring?

These functions of data collecting and monitoring (or tracking) are indispensable to the effective and efficient control of the project. In this methodology, data collecting or capturing is used as a synonym to fact-finding processes, and together with the analysis of these facts, monitoring is effected. All these components are needed for the management of the project.

Control processes are established not to determine only what has happened, but rather to predict and manage what may happen in the future.

Information generated during the data collecting and monitoring processes forms the basis for reaching a judgment about the project status and whether corrective action is required. It also allows the project team to answer these specific questions:

General

- Where is the project on schedule, cost, technical performance, objectives, and goals?
- What is the status of activities that were to be completed?
- How does this status impact future project activities?
- What is going right on the project?
- What is going wrong?
- What opportunities are emerging?
- Are the project stakeholders comfortable with the results of the project?

Organization

- Is the project team an effective and suitable organization?
- Does the project manager have adequate control and authority?
- Have key roles been defined in the project?
- Are the project team personnel innovative and creative by suggesting project management improvements?
- Does the project team get together on a regular basis to see how things are progressing?
- Does the project have an efficient method for handling issues?
- Does the project team seek the advice of stakeholders on matters of mutual concern?

10.7 REVIEW

The review process (or 'management review' as it is frequently referred to since it is a process involving higher management and leading to managerial decisions) receives as an input all the outputs of the complex Monitoring & Control Process.

The review is the convergence phase whereas the conclusions concerning the Project should now be put into Action.

What kind of output is expected?
- Rescheduling. Repositioning of milestones.
- Change or reallocation of resources.
- Renegotiation of project parameters with customer.

The review is the point whereby management decisions will be taken with or without the customer in order to bring the project back on track.

11. PROCEDURES AND TEMPLATES (GUIDE)

In this Chapter we shall present the Guide consisting of:
- Procedures, and
- Templates

The **procedures**, which need to be applied for project CMR according to our methodology, explain in some detail the steps to be followed, the responsibilities

and the use of the **templates** or standard forms. All these templates proposed are included in the Appendix A.

It is important to realise that there is not always a one-to-one correspondence of each item to control in a procedure with one particular Form or one file. For example the WBS as well as the project cost per phase are both controlled by the same MS Project electronic file (via a different report) although they belong to Time and Cost Control Procedures respectively.

When using the electronic form of these procedures the Hyperlinks take you directly to the necessary templates in Microsoft Word, Excel or MS Project type of files.

In this way, any user managing a project can build up the Control – Monitoring and Review background of his/her project, which can be practically controlled through this guide.

The Procedures, which are presented here, are the following:

- SCOPE CONTROL PROCEDURE with the objective to enable a good clarification, understanding and agreement of the project scope and deliverables as well as the services to be provided. The procedure will include the risk evaluation and the control of these issues all along the project.
- QUALITY ASSURANCE AND CONTROL PROCEDURE with the objectives of providing detailed product and project description, methodology, monitoring & quality control for each stage; it includes the project organisation and team responsibilities; it includes the necessary consideration of all external requirement like standards and regulations; it includes the planning and control of communications as well as the development of any other specific instructions needed in the project.
- TIME & COST CONTROL PROCEDURE with the objective to develop the schedule, to breakdown the project into phases and tasks and identify milestones and monitor the Critical Path; also with the objective to assign the necessary work to each task, assign resources, budget for work and other costs; to control the project progress via these issues.
- REPORTING PROCEDURE to clarify the reporting requirements of the project
- REVIEW PROCEDURE to design the planning and function of the Review process including meeting preparation, conduct, minute taking and results.

11.1 SCOPE CONTROL PROCEDURE

11.1.1 Project Description, Definition and Scope

F1 SCOPE & DEFINITION

Development of the project description is an essential and defining process in project initiation. What the project is to accomplish must be described in simple terms at the beginning of the project. The statement should describe who the project is for, what must be done, and why it must be done. This statement is the foundation for defining the scope of the project.

To arrive at this statement, the project manager or team should perform an abbreviated analysis of the assigned project. The project description statement will: describe the general approach to development; describe the basic characteristics of the required product or service; identify the beneficiary; and, identify the purpose served by the product or service delivered.

DEFINITION
- Reference
- Name
- Purpose
- Background
- Scope
- Constraints
- Deliverables

ORGANISATION
- Sponsor
- Manager
- Resources
- Responsibilities

SCHEDULE
- Start Date
- End date
- Work Estimate
- Location
- Project Approach
- Final / Interim Products

BUSINESS

- Justification
- Risks
- Preventive Measures
- Costs

Definition and Project Purpose

The purpose of the project is to solve a business problem. In this section of the project description, the business case is summarized at a high level. The business rational for the project is explained.

Project Business Objectives

This section defines the specific business objectives of the project and relates the objectives to key business initiatives or critical business issues defined by the customer. The document communicates these objectives to ensure that all stakeholders understand the business issues the project addresses. During the planning phase, these objectives serve as a foundation for development of measures of success.

Project Scope

The project scope & definition documents the project's scope. Project Scope is defined as, the sum of the products and services provided by a project. In other words, the scope establishes the boundaries of a project. The project scope addresses who, what, where, when, and why of a project. During the Project Planning stage the PM addresses detailed analysis and further refinement of the project scope. The project scope developed here should reflect as much information as possible to clarify what is included in the project and, of equal importance, what is not included in the project. While the project scope may be further refined in the detailed planning process or even during project execution, the scope approved in the project charter is the approved limit for the project.
Any subsequent changes made to the project scope in other phases of the project life cycle are managed through a formal change process in Progress reviews.

Project Sponsor and Manager

The project Scope and Definition document defines the authority and even mechanisms to resolve potential problems. Three areas are addressed:

1. The level of management issuing the project Scope and Definition document is identified. A level of management that can allocate organizational resources to the project and have control over the project elements issues the project Scope and Definition document.

2. The project Scope and Definition document appoints the project manager and grants him the authority to plan, execute, and control the project.

3. The project Scope and Definition document establishes a relationship between the project manager and senior management or SPONSOR to ensure support mechanisms exist to resolve issues outside the authority of the project manager.

The project Scope and Definition document is a contract between senior management and the project manager; both have duties and obligations to the project. The project Scope and Definition document has a signature section, which the appropriate parties sign to acknowledge agreement and approval of the project as chartered.

Project Organization

This section provide a text and, maybe, a graphic description of the project team. It should depict the type of organization used for the project team, the lines of authority, and definition of the responsibilities of project stakeholders, including those not under the authority of the project manager. For example, this section might identify functional managers and their roles in implementing and supporting the project.

Review

Reviews are planned dates when project progress is measured. Senior management uses these reviews to approve the completion of a phase, a document, or a milestone and as go/no-go decision points to proceed with the project. The reviews ensure the products and services delivered meet project objectives. See further below REVIEW PROCEDURE.

Resources & Responsibilities

The full scope of resources required to execute a project is usually unknown when the project Scope and Definition document is developed. However, the project Scope and Definition document does need to indicate what resources the management plans to make available to the project. This includes people, facilities, equipment, and funding.

11.2 Risk Management

11.2.1 Risk Management Process

F2 RISK

The procedure that the team will use to manage project risks is defined in the planning stage, documented in the project plan (See Forms1.xls file), and then executed throughout the life of the project. Risk management deals with the following risk phases:

- Risk identification
- Risk analysis, quantification and prioritization
- Contingency or Risk mitigation planning or Preventive Action Planning
- Risk response or Corrective Action Planning

The Risk Management Plan documents the procedures used to manage risk throughout the project. In addition to documenting the results of the risk identification and analysis phases, it must cover who is responsible for managing various areas of risk, how risks will be tracked throughout the life cycle, how contingency plans will be implemented, and how project resources will be allocated to handle risk.

Project risks are identified and carefully managed throughout the life of the project. It is particularly important in the planning stage to document risks and identify Preventive measures that have been applied to the risks.

There are various areas that can affect a project, including:

- Lack of top management commitment to the project
- The technology – methodology used on the project
- Failure to gain user commitment
- The environment in which the project is executed
- Lack of adequate user involvement
- Relationships between team members
- How well the project fits the culture of the enterprise
- How great a change will result from the project.
- Changing scope/objectives
- Conflict between user departments
- Failure to manage end user expectations
- Lack of required knowledge/skills in the project personnel

Of the identified risks, some will be considered not important. These later may not become problems, as expected, or may indeed become problems.

The other category of problems, unidentified problems, have a higher likelihood of being overlooked. Of these, some will become problems and others will not.

There are three paths that result in problems:

1. Those risks that are identified as important and you do nothing about them
2. Those risks that are identified as unimportant and later change into a high risk
3. Those you do not identify and later become problems.

Risks in 1. should never become a problem because the project managers would build them into the schedules. Risks in 2., although probably not built into the schedule, should be recorded and remembered and periodically revisited by project managers to determine if they are now turning into problems. Unidentified risks (3.) require constant monitoring by project managers to identify and resolve.

Identify Risks

Risk identification consists of determining risks that are likely to affect the project and documenting the characteristics of those risks. Don't try to identify all possible risks that might affect the project, but focus on those **likely to affect the project's success**.

A risk is any factor that may potentially interfere with successful completion of the project. Risk management recognizes that a problem might occur. When a problem develops, the risk of it happening is 100%. By recognizing *potential* problems, the project manager can attempt to avoid a problem through proper actions.

Analysis of Risks

The risk analysis should determined the levels of risk (Low, Moderate, High) to the project for these categories:

Category	Level (Low, Moderate, High)
External Dependencies	
Organizational	
Planning	
Business Related	
Methodological or Technical	
Overall Project	

The specific - major - risks which may cause the project to fail to meet it's objective must be tabulated.

Responsibility for Risk Identification

All members of the project team can identify risk, but the project manager has overall responsibility. The project manager is responsible for data collecting risks and for developing contingency plans. Sometimes a risk identification "brainstorming" session can help in the initial identification process. Such meetings help team members understand various perspectives and can help the team members better understand the "big picture."

Risk identification begins in the early planning phase of the project. A Risk Management Worksheet (F2 - Risk) is started during the planning phase. Then, as scheduling, budgeting, and resource planning occur, the worksheet is updated to reflect further risks identified in the planning stage.

At project start-up, the F2- Risk is reviewed again, and any new risks are added to it. As the project progresses, members of the team identify new risk areas that are added to the Risk Management Worksheet. Also during the project, risks identified earlier may be removed.

Risks should be documented and rated at F2-Risk so that contingency measures can be taken to mitigate their effects. Risks to both the internal and external aspects of the project should be tracked.

Internal risks are those items the project team can directly control at the Planning or Methodology development phase (e.g., staffing, budgeting).

External risks are those events that happen outside the direct influence of the project team (e.g., legislative action).

When does Risk Identification Occur?

Risk identification is a recurring event; it is not performed once and then set aside. During the planning stage, risks and mitigation measures are identified and documented. During the resource allocation, scheduling, and budgeting phases, associated reserve planning is also documented.

Risk identification, management, and resolution continue throughout the life of the project. New risks are developed as the project matures and external and internal situations change. Old risks may go away or decrease in likelihood.

When probability of a risk increases, or when a risk becomes a reality and the project manager must deal with a real problem, replanning occurs. At this point, the project manager and project team develop strategies that assess the impact of the problem. This re-planning may result in budget, schedule, or resource changes for completion of the project.

The Review stage always includes an F2-Risk document review.

Preventive Action Planning or Contingency Planning

Contingency plans or Counter Measures are developed as a result of a risk being identified. These plans are pre-defined action plans that can be implemented if identified risks actually occur. If a problem actually occurs, the contingency plan must be implemented and reserves must be allocated.

Small to medium projects will not require sophisticated PAP. Top five risks associated with a project will be studied and actively tracked.
There are some situations where nothing can realistically be done to prevent or deal with a risk. In this case, the project must be managed in such a way that the probability of the event occurring is minimized. If the event does occur, the project manager must replan the project and include the effect of the problem.

Example of PAP regarding an internal factor is presented. 'Planning' risks are about scheduling resources. Sound resource planning makes allowances for dealing with risks in one or more of the following ways:

- The most recommended technique for risk allowance is to add an additional WBS task for risk management/risk reduction, and financial reserves can be set aside to deal with potentially delayed schedules.
- Add time to those tasks where resources are known to be a problem. There is no rule of thumb for this effect; it depends on the degree of risk and the overall impact that resource problems can have on the project.
- Add a percentage time multiplier to the schedule for specific individuals, particularly if new technology is being used or if the person providing the estimate is extremely optimistic. Remember that technical staff typically underestimates the time required to do any particular task.
- Where skill shortage is identified, add time and resources for training. By recognizing resource shortfalls and providing the necessary training, a project manager mitigates some level of risk.

How to perform and record Risk Management with F2-Risk

The *Risk Factor* is the description of anticipated risk.

The *Value* is the standard objective measure for each risk. The Project Team should set these standards at the Risk Identification session. A YES or NO answer to each known risk may have different weight dependency on the Risk.

Score is the actual score the Team will give to each risk.

Problem column answers the question: What will be the consequence if the Risk Factor goes wrong or appears.

Preventive Action or Counter measures should be developed in order to prevent the occurrence or eliminate the effect of a risk.

The Excel file calculates the total Risk Level.

11.3 QUALITY ASSURANCE & CONTROL PROCEDURE

11.3.1 Quality Planning, Control and Review

Detailed Description of Methodology and Deliverables

Description of Services, List of Standards etc

Objective

To confirm that the interim and final product/service is as required,
identify Corrective or Preventive Actions to solve non-conformances

in a way that it:

- ensures that products/services meet defined standards,
- ensures that products/services meet business requirements as contractually agreed,
- ensures that there is no ambiguity,
- continually improves the quality control procedure,
- involves customer business and technical staff,

so that

- the related project activities can be 'signed off' as completed at every phase and the project can progress.

Overview

The Quality process includes activities at the Planning Stage and Execution Stage of the Project as well as in the Review.

In the Planning Stage a ***Quality Plan*** is developed which includes detailed methodology, deliverables and description of services and constraints.
During each project phase Quality Control takes place by the Quality Assurance Manager; this leads to ***Phase Quality Reviews***, which happen at the monthly Progress Meetings.

ISO9001 definition of quality; "The totality of features and characteristics of a product or service, which bear on its ability to satisfy a given need".

Work on a product/service can only be considered complete when the product/services has been assessed against *acceptance criteria* that have been previously established for the product/service. It is important that those criteria are established in advance (at Planning Stage via the Quality Plan), since it is difficult to produce a product if you do not know what it is you are trying to produce.

When quality control is correctly applied, it can make a project team more effective, since it prevents situations where work has been carried out based on a product that is not acceptable.

We must establish the degree of Quality Control to be applied to each product during the planning work for a Project phase. This step is used when a product/service is thought to be complete, and the product is either confirmed as complete, or corrected until it is confirmed as complete

The underlying quality principle applied in this methodology is that a quality product is achieved by using a quality process, and quality control is a final, but necessary step in that quality process.

F3 QUALITY PLAN

The *quality plan* identifies and describes the totality of plans, responsibilities, procedures and activities that the project team defines, plans for, and executes for quality.

A quality model should be maintained by each organization, and this model should describe the detailed quality procedures that are used for projects.
This QA model defines a quality assurance process that is consistent with ISO (International Standards Organization) 9000 standards.

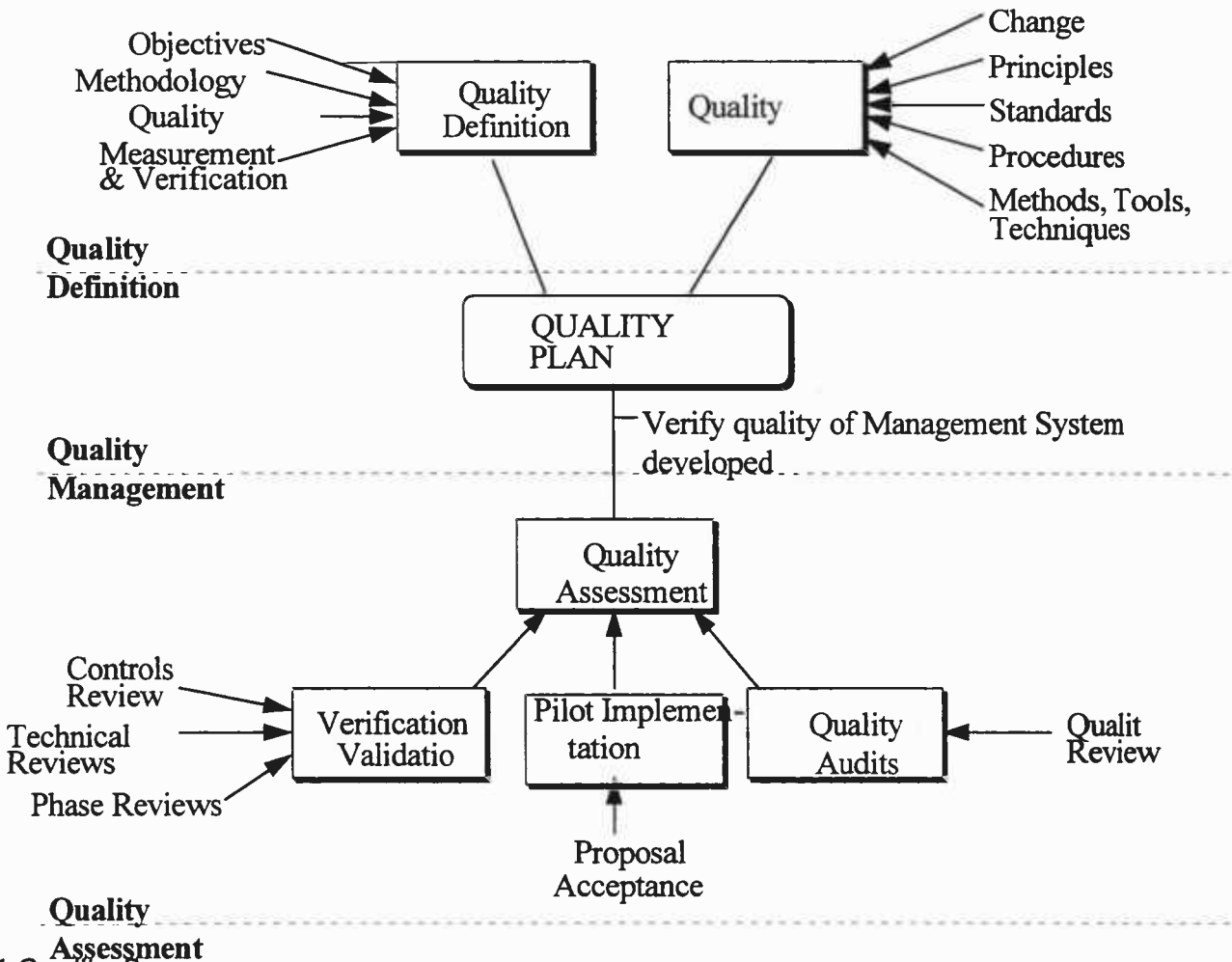


Fig. 4 Quality Process

Creating the Quality Plan

The organization's quality model should be based on standards and procedures that enable the quality manager to ensure quality throughout the life of the project by:

- enforcing quality standards and procedures through formal reviews, audits, and inspections
- data collecting and reviewing non-conformances at each phase of the project.

Sometimes projects will not require a "unique" quality plan, but can be completed under the standard process. For large, lengthy or complex projects requiring a unique Quality Plan, it defines, tracks, and measures the project's *quality objectives* via customer's quality expectations as expressed in the agreement.

It is important to include directly or in an Appendix the Project *Methodology* and *Deliverables* very accurately so that Quality *Control* can actually perform the assessment required per project phase.

The Quality Plan describes how the project implements its *quality control and audit process* and defines the processes that will be taken to prevent non-conformances. It is important for management to consider the quality goals early in the project and ensure that quality activities are integrated into the overall project management plan. The quality plan identifies the person who is *responsible* for the quality assurance activities, identifies the scheduled quality activities, and identifies the resources required to conduct the activities. Quality activities are included in the project schedule as milestones and quality audits that require budgeting and staffing.

Successful quality processes always strive to see quality through the eyes of the customer. The customer is the ultimate judge of the quality of the product they receive. They will typically judge a project by whether or not their requirements are met. To ensure delivery of a quality product, each phase of the project should ensure that requirements are addressed.

It is important to include a process that validates that the currently defined requirements will be satisfactory to the customer. It is counterproductive to develop a system that meets a documented requirement if you and the user know that the requirement has changed. The change management process helps to control the number of such changes, but quality processes must be in place in order to make changes when they are necessary.

Responsibility for Quality

Though the Project Manager has overall responsibility for the quality of the final product, every project member needs to accept the responsibility for providing a quality product or service. Through ownership of the organization's quality policy, the individual team members become the most effective way to implement quality into products efficiently and completely. A quality policy cannot rely on "adding" quality at the end of a process; it must be built into the work of each individual on the team. It is far more cost effective to have team members add quality into their day-to-day jobs than to have a quality controller find a problem after a process has been completed. This is the principle of prevention vs. correction.

Independence of the Quality Assurance Manager (QAM)

While it is important that each team member be responsible for the quality execution of tasks, a dedicated quality manager is typically included in the project team. (In large projects a team is necessary). The QAM assures that the quality plan is executed as planned. The QAM reports functionally to the Project Manager, but must also have a reporting chain outside the project to facilitate problem escalation. Problem escalation is the process of moving a problem to a higher management level if sufficient attention is not given by the project manager. The independent reporting chain provides a check and balance on the project.

Quality Tools (CAP, Checklist)

Corrective and Preventive Action Plan is a plan that lists identified non-conformance, rates them, defines actions to be taken and responsibility as well as dates (target and actuals) of identification, implementation and closure of non-conformance. The effectiveness of the actions taken to eliminate the quality problem or non-conformance of the project should also be recorded.

Quality checklists are often developed as part of the quality procedure definitions.

Example of a Checklist for control of Project Scope.

Does the Scope Statement clearly indicate what is included and excluded in the project?	☐
Have the pertinent processes, entities, systems, customers, and other objects that will not be in the project been identified? If not, some stakeholders may assume those items will be in scope.	☐

Is the Scope written in clear, business-oriented language?	☐
Is the Scope consistent with the Project Objectives and Deliverables?	☐

Example of a Checklist for control of Project Organisation and Responsibilities.

Has a project sponsor who meets the following criteria been clearly identified in this section:	
The sponsor has authority to make necessary decisions or the support to obtain necessary decisions efficiently and effectively.	☐
The sponsor has support of the affected business area(s).	☐
The sponsor has the ability to obtain/assign required project resources.	☐
The sponsor has the necessary time available to dedicate to this project.	☐
Have these additional key roles been assigned and identified in this section:	
Project Manager?	☐
Business Area/Customer Representative(s)?	☐
Team members (e.g. consultants, technical experts, trainers)?	☐
Do all parties listed understand and agree with the defined roles and responsibilities?	☐
Are the responsibilities listed for each role clear and concise (not more than 5-10 words per role)?	☐
Have names and contact information been listed for each person serving each role?	☐

PHASE QUALITY CONTROL & REVIEWS

Introduction

Quality Controls & Reviews are assessment with various activities. These activities include:

- Deliverables Checking and Control
- Review of Manuals and Procedures
- Audits of Project Records
- **Audits** of Compliance to Procedures & Working Instructions

- Reporting, categorising and analysing the findings and proposing Corrective Actions
- Internal Project Team Quality Review Meetings
- Meetings with customer to Review the Quality status of the Project

In a Management Consultant project quality control is on the use of methodology by the consultants and requirements of deliverables prior to despatch to the customer.

Scheduling the Quality Reviews for the current stage.

The WBS identifies the resources fulfilling the "review" responsibilities. The schedule will determine when the Quality Reviews need to take place.
Alternatively, Quality Reviews can be explicitly defined as separate milestone tasks, without successors.

It is recommended that Quality Reviews be scheduled at the beginning of the stage to occur regularly when a work package has finished. This will ensure that controllers/reviewers are aware well in advance when they are to participate, and it will reduce scheduling conflicts. It will also motivate the project team to create small products at regular intervals. Quality Reviews can always be postponed if the products are not ready for review.

A special kind of Review is the Audits performed near the end of certain Management consultant Projects requiring interviews with personnel in departments where procedural and other technical type of changes (should) have occurred. Auditing is an assessment of the validation-implementation phase of a Management Consultant Project and it could be regarded as the QC and review part of the Implementation Phase.

Internal Quality Review Meetings

At the end of each project phase and prior to a Project Progress Meeting the consultant Project Team should meet to review quality status of the finishing stage.
This meeting should be at least attended by the PM, the QAM or the person who has executed the quality controls and the key consulting/technical personnel of the phase.
As a minimum the Corrective/Preventive Actions instigated should be reviewed and decisions taken.

11.3.2 Communication

F4 COMMUNICATION PLAN

F5 COMMUNICATION TEMPLATE

Communication Procedure

Objective

The objective of Communication Procedure is to standardise the methods and responsibilities of Communication within the Project between companies and individuals,
...so that flow of information is smooth, people cooperate and understand each other and the Project is monitored and controlled in the best way.

Overview

Communication is a major component of a successful project. Two leading causes of project failure are insufficient involvement of stakeholders and infrequent communication with sponsors.

Communication is really what can be considered as formal like, typically:

- Meetings
- Training
- Reporting
- Procedure distribution
- Announcements

Off course there may be dozens of other informal but equally important communication events during the Project.
The best way to approach communication is to develop a clearly planned approach. Without effective communication, Key Stakeholders could miss out on vital information and may not understand why change is needed.

Communication Planning

The methodology identifies several important points to consider in Communication planning. They are:

- keep communication as simple as possible;
- identify every external and internal stakeholder;
- provide timely information;
- use credible communicators;
- try to speak to people in person;
- listen to people;
- thoroughly plan presentations/meetings; and
- have a clear strategy for seeking and acting on feedback.

It is therefore imperative that any Project Communication process that is developed defines:

- Target Audience - think about each stakeholder group and the target audience within them.
- Key Messages – what are the three or four key points you want stakeholders to understand and act upon?
- Communication Mechanisms/tools – which method/tool would be most appropriate for them?
- Priorities – who will be responsible for implementing each action and when?

Types of communication to be considered can be categorised under **Verbal**, **Electronic** and **Written** or a combination of those (e.g. workshop)

Verbal	Electronic	Written

• presentations/briefing sessions
• networking facilitation
• staff meetings
• seminars/workshops
• stakeholder consultation
• events
• launches
	• personal email to identified stakeholders
	• possible list server
	• internet/intranet including:
	  ○ Online Fora
	  ○ Newsletter
	  ○ Web sharing of ongoing project planning by internal and external stakeholders
	• Fax etc
		• Reports
		• Letters

It is recognised that not every staff member of an organisation may have email/internet access; every company/organisation has different communication mechanisms and cultures; and individuals exposed to the same method of communication will respond differently.

Communication Control

In our Guide the Communication process is managed and controlled using 2 complementary templates.

The F5 Communication template allows the PM to plan ahead the What, How, When, From whom and to Whom to communicate in the Project. It is advised that these issues are defined first.
The F4 Communication Plan is a much more detailed tool. It should contain the details of all key players in the Project and their information requirements.
Also a meeting schedule is included. All meetings with their details are planned in F4.

11.3.3 Organisation & Team Responsibilities

F7 ORGANISATION PLAN

Objective

The objective of this procedure is to describe the planning and control of the Project Organisation the assignment of the responsibilities of the team members and the way these are controlled,
...so that the human resources involved in the Project contribute in an optimal way to the success of the project objectives.

Overview

The procedure includes planning of resources, definition of number and skills required, definition of organisation chart and lines of authority.

Overview of Resource Planning

Every organization has a limited number of resources to perform tasks. A project manager's primary role is to find a way to successfully execute a project within these resource constraints. Resource planning is comprised of

- establishing a team that possesses the skills required to perform the work, as well as
- scheduling the non-labour resources (equipment, travelling, and processes) that enable the staff to complete the project.

Determining the Size of the Team

The optimal size of a project team is driven by two principal factors. One is the total number of tasks to be performed, and the other is the effort needed to perform the tasks.

In developing the schedule and assigning the resources, the project manager determines the optimal mix of staff to activities. Doubling resources does not necessarily double productivity. For example, 365 engineers could not complete in a day a project estimated at one person per year! At some point, people begin to get in each other's way. The significance of the project duration, as well as each major activity's duration, needs to be clearly understood and documented as part of the scheduling process.

Adding more people to an activity creates the need for additional communication and may also increase the need for equipment or offices. Large teams require a significant amount of coordination and teamwork. Sometimes a smaller team can accomplish much more than a larger one in a shorter period of time. The optimal selection also depends on the personalities of the team members and the communication and organizational skills of the project manager.

Adequate and timely personnel planning contains cost overruns. Having personnel on-board when they are not essential is extremely costly.
In this methodology we stress that it is important for the project manager to understand the size of the required team needed to perform the work on a week by week basis. For this reason, significant effort needs to be made in the planning phase to identify the resources required to complete each task.

Determining Required Skills

Finding available staff with the skills required to perform a task is critical to project success. For example, some assumptions about the skills of the person performing the task are made by the project manager. The skills of the people performing the work are directly related to the time it takes to perform a task.

It is helpful in the planning process to develop a list of skills required. This skills list may then be used to determine the type of personnel required for the task.

Even in small to medium management consultant type of projects the project manager pragmatically assesses the skills of the available people on the project, but skill level is not a yes/no factor. People have varying degrees of skill, and the manager needs to determine the level of schedule adjustment that should be made based upon the staff skill level.

Where staff with the necessary skills are largely unavailable for assignment on the project, the project manager and project sponsor has the option to outsource the necessary talent or contract services to perform the work.

Define Resource Profiles

A staffing plan is developed for each project. For small to medium projects, this may be simply stated as the assignment of three people full time to the project throughout its six-month duration. For more significant projects, the staffing plan identifies when and how staff is brought onto and taken off the project team.
The following chart and the graph on the following page are useful in the Project Plan for staffing large projects.

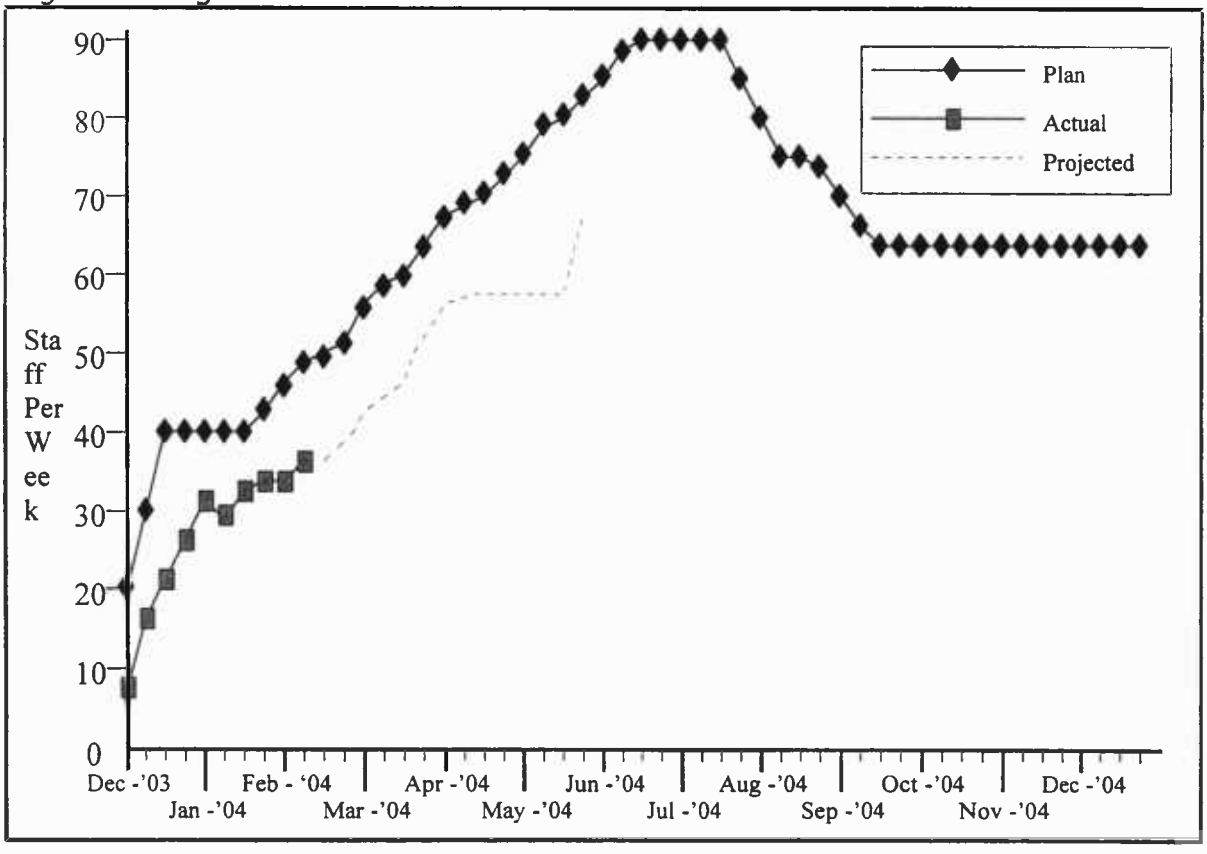
Staffing Plan and Actual

POSITION	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Manager	1	1	1	1	1	1	1	1	1	1	1	1
Sr. Consulting Eng.	1	1	1	1	1	1	1	1	1	1	1	1
Q A Mng & Auditor	1	1	1	1	1	0.5	0.5	0.5	0.5	0.5	1	1
Consultant			2	2	3	3	3	3	3	3	3	2
Trainer			0.5	1	1	1	1	1	1	1	1	1
Technical Expert	0.5	1	1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Admin Support	0.25	0.5	0.5	1	1	0.25	0.25	0.25	0.25	0.25	1	0.5
TOTAL												
PLANNED	3.75	4.5	7	8	8.5	7.25	7.25	7.25	7.25	7.25	8.5	7

POSITION	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Manager	1	1	1									
Sr. Consulting Eng.	1	1	1									
Q A Mng & Auditor	1	1	1									
Consultant			2									
Trainer			1									
Technical Expert	0.5	1	1									
Admin Support	0.25	0.25	0.5									
TOTAL												
ACTUAL	3.75	4.25	7.5	0	0	0	0	0	0	0	0	0

Example Staffing Plan

Fig. 5 Staffing



The previous chart and graph illustrates the planned number of people required by week for a project team. Both also depict how actuals might be applied in the performance of the project. The monitoring of actuals and assessing them vs. planned is a control activity.

The graphic representation of the staffing plan helps to point out peaks and valleys in staffing that can present serious project management problems. The project manager realistically determines how a relatively consistent staffing level can be maintained. Particular attention is paid to releasing resources when they are no longer needed on the project. It is unrealistic to assume that the project can go from a 5-person to 10-person level of effort in a month and then return to a 5-person effort in another month. Resource levelling is supported by many project-scheduling tools, but requires the special attention of the project manager in both the planning and the execution phases of the project. In this Guide we are using MS Project for this function.

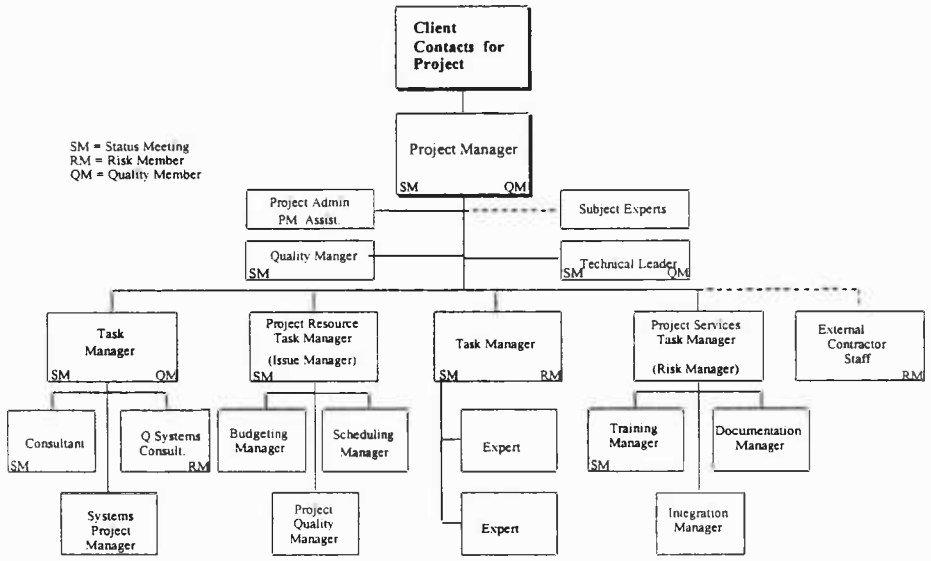
Forming the Team

Project organization is used to coordinate the activity of the team and to define the roles and responsibilities of team members. Project organization is needed for every project, and a project manager must always be identified.

Confusion and lack of productivity are the result of poor project organization. This is where many projects run into trouble. A good organization facilitates communication and clearly defines roles and responsibilities.

There are numerous ways to organize a small to medium project, which interests this work. A sample organization chart for a large project is shown below, with the types of functions that are often assigned to a project.

Fig 6. **Sample Organizational Chart for a large project**



The larger the project, the more critical the organizational structure becomes. In a small project, a single team member may be responsible for several functions, whereas in a large project the functions might require full-time resourcing. A very large project, for instance, often requires a deputy project manager. A small project might have the senior technical staff member serving as a training manager. Definition of the project organization is a critical part of the planning process.

Project complexity also is a major factor when organizing a project. For example, a project that includes a large number of beneficiaries or user departments typically includes a coordination manager deputising for the PM. This allows for a concentration of resources on a high-risk area. Unless a project is extremely small, it is useful to organize the project into functional teams. The project manager is responsible for defining and selecting the team leaders. Team leaders can off-load some of the work of the project manager and take responsibility for completion of tasks.

Support Functions

While the project manager, in theory, is responsible for all of the management aspects of a project, rarely can all of these tasks be performed by one person. In

fact, some should not be performed by the project manager due to the time consuming nature of the function. These necessary support tasks can be divided into administrative and technical support functions and are shown in the following figure.

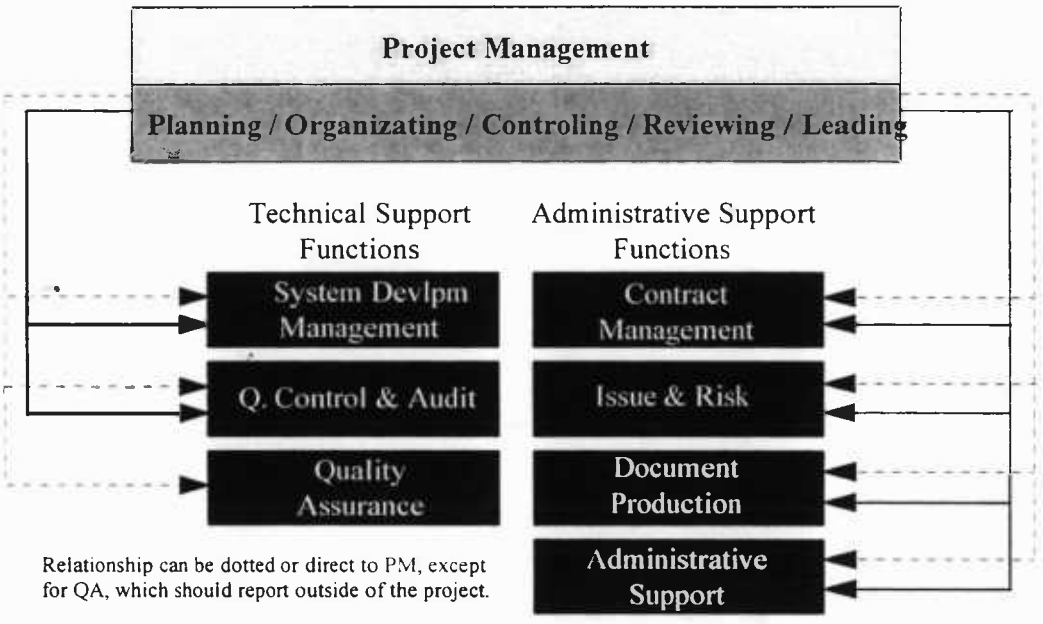
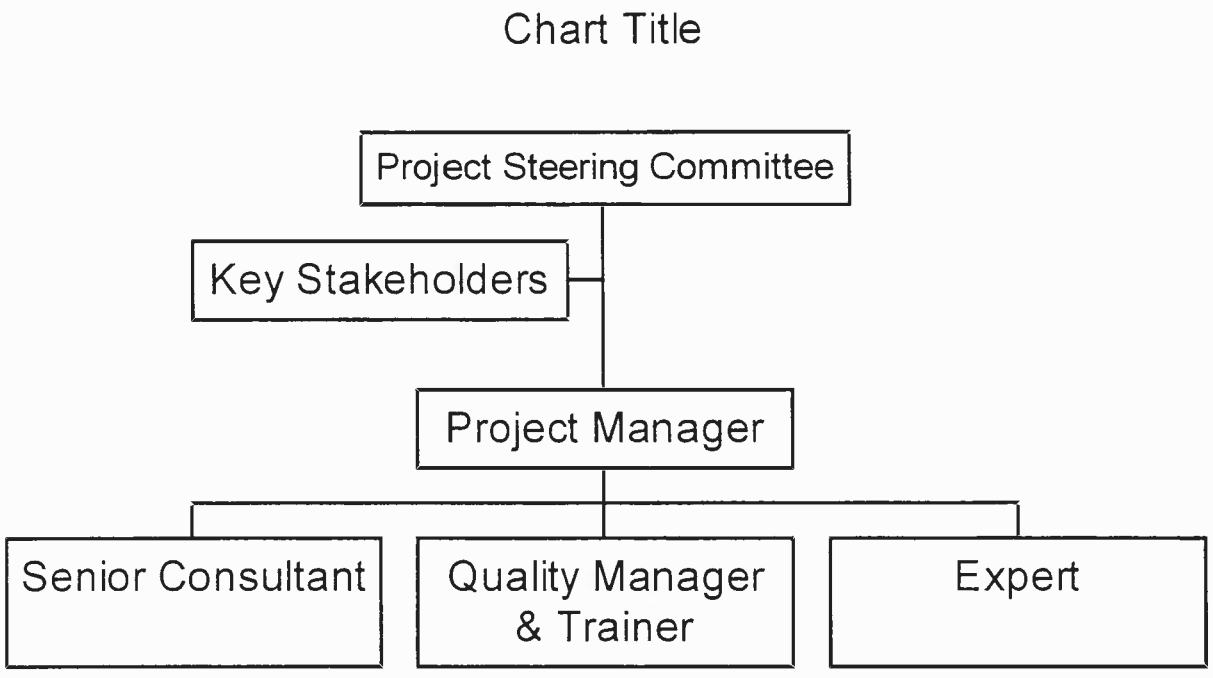


Fig. 7 **Project Management Support Functions**

The administrative functions are fairly obvious and can be further expanded to include scheduling and budgeting in very large projects. Within the technical support functions, system development management ensures that the management consultant services re developed are controlled; quality assurance monitors and controls the quality of the product being developed; and QC verifies compliance of the service being developed to the stated requirements.

It is the project manager's responsibility to organize the project support groups and to document their planned activities.

Fig. 8 Small Project Organization



The role of the Project Manager

The project manager is responsible for management of all aspects of the project. From an overall perspective, the project manager ensures the project is on time, within budget, and delivers a product or service at an acceptable level of quality. A project manager's daily management responsibilities typically include some or all of the following:

- Providing direction, leadership, and support to project team members
- Using, developing, and improving the project management methodology
- Providing team(s) with advice and input on tasks throughout the project, including reports, documentation, creation of plans & schedules, and organizing meetings
- Resolving conflicts affecting the project's resources, schedules, etc.
- Influencing customers and team members to accept decisions that will lead to the success of the project
- Delegating responsibility to team members

Selection criteria for a project manager should be based on the following skills and experience:

- Experience managing projects
- Knowledge of project management methodology and tools (e.g. MS Project)

- Demonstrated interpersonal and team leadership skills
- Knowledge of basic business and management skills
- Experience within the project's technical field both as regards the Service provided e.g. Business Process Re-engineering, Environmental System Development, Quality & Safety Certification etc as well as regards the sector where the service is provided e.g. Banking, Construction, Hotel, Chemical Industry etc
- Respect and recognition among peers

Project managers of small projects also should have training in the project management methodology. They should also have an interest in and reasonable knowledge of the product or services that the project will deliver. Small projects generally involve fewer people, have limited cost, and are limited in scope. Ideally, managers of small projects should have gained some initial experience by working as a project team member under a good senior project manager.

Reporting

Refer to Reporting Section for a discussion on how the project information recorded by team members and the PM will be used during the Execution Phase of the project.

11.4 TIME AND COST CONTROL PROCEDURE

Objective

To effectively monitor and control progress on the project, by planning and controlling the time and cost elements

...so that the project

- collects actual work and cost performance information,
- collects latest estimates to completion,
- compares actual performance with plan,
- determines the causes of the deviation,
- promotes re-planning, re-scheduling
- identifies non-conforming situations,

- involves all parts of the Project Organization,

so that

- the project work can be carried out as scheduled i.e. meet its time and budget objectives

Overview

The Time & Cost Control Procedure is about breaking down a complex Project into manageable activities, developing them in the time available or scheduling, recording planned durations and work effort needed and budgeting for each task. It is also about how monitoring & control is implemented on these two major project parameters, Time and Cost during the execution of the project. Monitoring, data collecting and controlling feed their result to the Review procedure.

The procedure includes the following sub-sections:

- Scheduling (Type, plan)
- WBS analysis
- Task Duration
- Milestones
- Priorities and Interdependencies of Tasks
- Critical Path
- Financial Measurement
- Time & Cost Progress Control

Project Scheduling

F8 SCHEDULE

WBS

In a project we call Work Breakdown Structure or WBS the decomposition of a project into a set of defined sub-tasks.
In other words it is the division of tasks that organize, define, and graphically display the product to be produced, as well as the work to be accomplished to achieve the specified product.

Ideally the WBS is decomposed into discrete tasks or work packages to be accomplished during the project. A project WBS normally is decomposed to at least three levels or tiers of tasks. Projects are decomposed to a level that represents a distinct package of work. Distinct work packages are characterized by the following:

- A discrete product or service is identified
- Responsibility for the element can be assigned to one person or functional group
- Scope is clear
- Cost is reasonably estimated
- The element is manageable

If these prerequisites are not followed we risk creating project phases with confused deliverables and responsibilities as well as work priorities.

Overview of Project Scheduling

Following the definition of project activities, the activities are associated with time to create a project schedule. The project schedule provides a graphical representation of predicted tasks, milestones, dependencies, resource requirements, task duration, and deadlines. The project's master schedule interrelates all tasks on a common time scale. The project schedule should be detailed enough to show each WBS task to be performed, the name of the persons responsible for completing the task, the start and end date of each task, and the expected duration of the task.

Like the development of each of the project plan components, developing a schedule is an iterative process. Milestones may suggest additional tasks, tasks may require additional resources, and task completion may be measured by additional milestones. For large, complex projects, detailed sub-schedules may be required to show an adequate level of detail.
During the life of the project, actual progress is frequently compared with the original schedule. This allows for evaluation of development activities. The accuracy of the planning process can also be assessed.

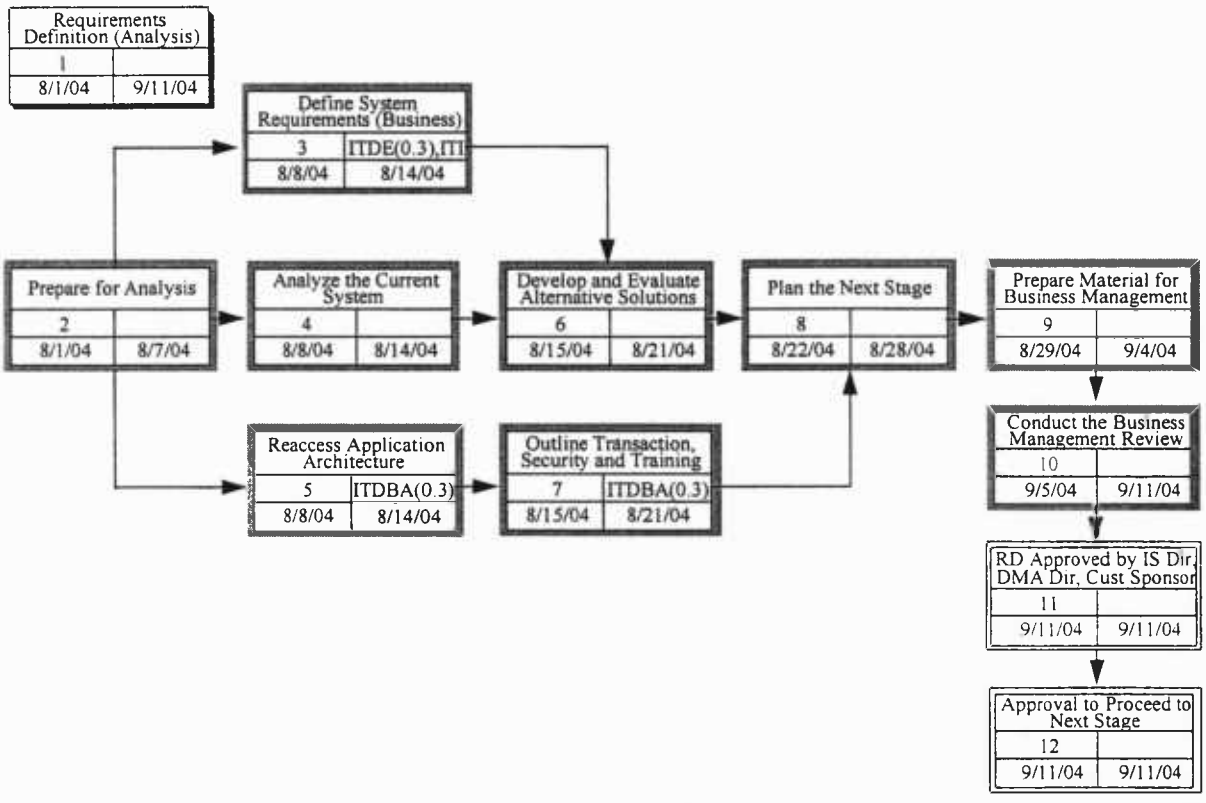
Basic efforts associated with developing a project schedule include the following:

- Define the type of schedule
- Define precise and measurable milestones
- Define all tasks and sub-task
- Estimate task duration
- Define priorities
- Define the critical path
- Document task relationships
- Document assumptions
- Identify risks
- Review results

Define the Type of Schedule

The type of schedule associated with a project relates to the complexity of the implementation. (See F8 SCHEDULE). For large, complex projects with a multitude of interrelated tasks, a PERT chart may be used. PERT charts depict interdependencies and associations and allow planning to include these relationships. A key feature of the PERT method is the ability both to determine and to show the critical path of the project (see later sections for a discussion of critical path). A sample PERT chart is shown below.

Fig. 9 **Sample PERT Chart**



For small projects, a GANTT chart (or bar graph) is adequate. These schedules are two-dimensional representations that show the tasks and the timeframe for completion. Since task interrelationships are not easily shown on a GANTT chart, it is considered a weak planning tool for very complex information technology projects. However, the GANTT chart is very common for reporting status and for defining the schedule. A sample indicative GANTT of a Quality System Project follows. In this work MS Project is used for these charts.

ID	Task Name	Duration	Work
1	**Plan Quality System**	**68 d**	**78 d**
2	Determine Current Situation	9 d	9 d
3	Review Quality Req's	20 d	5 d
4	ReviewCurrent System Documnts	11 d	11 d
5	Create General Overview of Future System Structure	8 d	8 d
6	Conduct Review Meetings with Admin and Manag	20 d	30 d
7	**Install QMSin Organis**	**75 d**	**101.5 d**
8	List Critical Procedures	1 d	1 d
9	Agree with key OrgnManagrs	1 d	1 d
10	Write Procdrs	22 d	22 d
11	Receive and Anal. Comments	2 d	0.5 d
12	Train Mid Managrs	1 d	1 d
13	Setup and Verify Quality Interfaces	1 d	4 d
14	Setup Team for Intern. Audits for Process Complnc	3 d	12 d
15	Train Users on Basic Q. Records	1 d	4 d
16	Train Users on Basic Instruct/Forms & Procedures	1 d	2 d

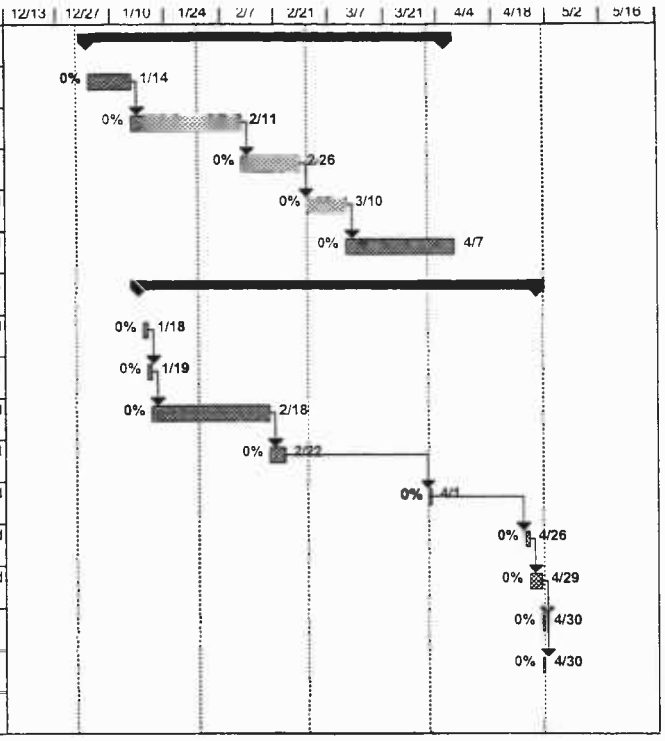


Fig. 10 Sample Gantt chart

Define Precise and Measurable Milestones

Milestones often denote key events. These events typically have no duration. For example, deliverables often are represented as milestones, while the effort to produce the deliverable is referred to as a task. (See F8 SCHEDULE)

While milestones are unique to each project, some example project milestones are shown below:

- Requirements Approval
- Phase Review Approval
- Final Documentation Distribution
- Start of Audit
- Design Complete
- System Acceptance by Client
- Implementation Training Complete
- Certification of a Quality System

Milestones can occur at the end of each work package in the WBS and serve as a measurable item upon which to base success of a task.

For contracted work, milestones are often used as a point in the project where interim payments might be made. If this approach is used, mutual agreement is necessary on the content of each milestone and the cost associated with that milestone.

Estimate Task Duration

Estimating task duration is one of the most challenging aspects of project planning. It is also a key to later cost estimation. This is a refined process that occurs throughout the planning process, as it is directly affected by results of the staffing and costing activities. (See F8 SCHEDULE)

With defined task durations, the team knows what to expect and what is expected of them. Task duration is rarely overestimated, but is frequently underestimated.
The estimation process is complex because activity duration is affected by numerous variables that must be dealt with concurrently in the planning phase. Some of these variables include staff availability, the skill level of the person assigned to the task, unexpected events, efficiency of work time, and mistakes and misunderstandings during the development of the project plan.

When estimating the duration of a task, reality is a major factor. The knowledgeable scheduler takes into account:

- Absenteeism,
- meetings,
- discussions,
- travelling and
- interaction among the staff.

No one is 100% *productive* every hour of the workday. If a scheduled task assumes 100% productivity, the schedule rapidly falls apart. A successful PM builds these types of factors into the duration estimate.

There are several techniques that support task duration estimation. The most common technique is based on the historical experience of a similar scope of work performed by the estimator/PM.

Define Priorities

Clearly defining the task priorities helps to resolve any scheduling and/or resource conflicts. Understanding the priorities and relationships of the tasks assists in resolving difficult scheduling conflicts.

Define the Critical Path

The critical path is the *longest* path through a project. It determines the earliest possible completion of the work. The critical path is carefully managed because if critical path tasks slip, the entire project is delayed! In order to manage the project, the project manager determines the critical path and remains aware of its importance throughout the implementation of the plan. The current methodology makes use of MS Project, which automatically calculates the Critical Path. (See F8 SCHEDULE)

Document Task Relationship

After the WBS has been created (F8 SCHEDULE) the tasks of each major section should be ordered into their logical sequence. Then, if tasks are dependent on each other, the task dependencies should be indicated. That is, if one task must be completed before another, then the first is a predecessor to the second, and the second task is a successor to the first. This relationship would be a Finish-to-Start relationship, i.e., the first task must finish before the second task can begin.

Other task relationships include:

- Start-to-Finish: this task must start before the previous one can finish
- Start-to-Start: this task must start at the same time as the other task
- Finish-to-Finish: this task must finish at the same time as the other task.

Document Assumptions

Documentation of the assumptions made in developing the project schedule is critical to the later success of the project. Without clear documentation of these assumptions, later changes to the schedule are very difficult and risky.

If, for example, a schedule was shortened because it was assumed that a highly skilled person would be performing the work, that assumption should be documented. Then, if a less skilled person is actually assigned to perform the task, the project manager can recognize the risk and make necessary changes and decisions. Without documentation of the assumption, the schedule could be later placed in serious risk without the project manager realizing it.

Review the Results

The development of a schedule requires input from more than one person. No one possesses all the knowledge or understanding of all the factors that affect schedules in every aspect of a project. Schedule review also prompts buy-in to the schedule and motivates the team and client personnel.

The work descriptions and the schedule should be reviewed by the people named to do the work.

Determine if there is a common understanding of what has to be done. Get their independent estimates as to how long it will take to do the job. Where there are significant differences between the current schedule and new estimates, review and revise the schedule estimates.

Scheduling Tools

There are numerous tools that support the development of project schedules. Many of these tools prepare either a GANTT or PERT chart. MS Project is a standard, reliable and relatively easy to use tool recommended in this Guide.

Financial Measurements

F9 COST

F10 MS PROJECT3

So far we have concentrated in the time parameter of scheduling.

However, due to the fact that the cost of Management Consultant type projects heavily depends on work effort, once this is established, by phase, cost is also calculated. (MS Project, Task Usage View, Summary Table also Gantt chart View, Baseline Table)

This financial data, however, should not be used in isolation. Variance and earned value calculations are recommended to supplement the project manager's information.

The following steps provide additional financial metrics that can further assist in determining if the project is really on schedule on cost and time.

MS Project calculates automatically some of these 4 parameters, which will be used. For the others F9 Cost (Excel file) will be used:

Cost Variance (Data collecting GANTT view, cost table) – Earned Value Report(F10 MS Project3>View>Reports)
Schedule Variance - Earned Value Report
Cost Performance Index – F9 cost
Schedule Performance Index – F9 Cost

Here below we present the explanation of these metrics (as well as some that are not recommended for use in small projects):

- **Budgeted Cost for Work Scheduled (BCWS),** the budgeted cost for work scheduled to be accomplished, plus the planned effort or apportioned effort scheduled to be accomplished in a given period and the level of effort budgeted to be performed. In other words, BCWS represents the plan that is to be followed. BCWS, as well as BCWP and ACWP can be calculated for any time period. However, cumulative totals balance out previous time period fluctuations.
- **Budgeted Cost of Work Performed (BCWP),** the budgeted amount of cost for completed work, plus budgeted for level of effort or apportioned effort activity completed within a given period of time. This is sometimes referred to as "earned value" and is a measure of work accomplished during a given period. Think always of BCWP as what you got for the effort expended. Tasks may be classified either as discrete or level of effort. If discrete, no credit is given for completing a task until it is done. If a task is level of effort, BCWP = BCWS.
- **Actual Cost for Work Performed (ACWP),** the amount of cost actually expended in completing the work accomplished within a time period, plus the apportioned cost for level of effort activities.
- Calculate the **Cost Variance (CV)** by subtracting ACWP from the BCWP. A negative cost variance means that the project is spending more than it should.
  CV = BCWP - ACWP
- Calculate the **Schedule Variance (SV)** by subtracting BCWS from BCWP. A negative schedule variance means the project is behind schedule.
  SV = BCWP - BCWS
- Calculate the **Cost Performance Index (CPI)** by dividing BCWP by ACWP. The CPI is the cost efficiency factor representing the efficiency of work performed. The remaining budget of the project divided by the cumulative CPI is one approach to calculate the revised EAC total.

$$\mathbf{CPI} = \frac{\mathbf{BCWP}}{\mathbf{ACWP}}$$

- Calculate the **Schedule Performance Index (SPI)** by dividing BCWP by BCWS. The SPI represents the schedule efficiency of work performed.

$$\mathbf{SPI} = \frac{\mathbf{BCWP}}{\mathbf{BCWS}}$$

- Calculate the **Critical Ratio** by multiplying the CPI by the SPI. If the Critical Ratio is between .9 and 1.2, the task or group of task begin analyzed is probably OK.

Critical Ratio = SPI X SPI or $\frac{BCWP}{ACWP} \times \frac{BCWP}{BCWS}$

- Calculate the **Percent of Work Complete** by dividing the Cumulative BCWP by the Budget at Completion.

$$\% \text{ Complete} = \frac{BCWP}{\text{Budget at Completion}}$$

- Calculate the **Percent Spent** by dividing the cumulative ACWP by the Budget at completion.

$$\% \text{ Spent} = \frac{ACWP}{\text{Budget at Completion}}$$

These variances could then be plotted graphically and over time to show how the project team is doing.

Time and Cost Progress Control Procedure Description

Overview

It is very unusual for any undertaking to go exactly to plan. Projects are no exception. By the nature of a project, more information is being uncovered all the time which can affect the progress of the project.

It is important to monitor the degree to which the plan is being followed, and to take appropriate action if the project is deviating significantly from the plan.

The progress control procedures that are defined during the Project Planning stage form the basis of the progress control during project Execution stages. These procedures cover day-to-day progress data collecting amongst the team, up to Steering Committee reporting and Review.

Checkpoints are held throughout the project at weekly intervals and provide the mechanism for monitoring and controlling the day-to-day work on the project. Performance information is captured and plans are updated prior to the Project Status meeting (internal team) and Project Progress meeting (with customer). This enables the meetings to concentrate on determining what to do next.

Defining the control procedures includes the setting of acceptable (tolerance) levels for project performance (see Acceptance criteria of F3 Quality Plan.)

When the stage tolerance is exceeded, the Project Manager should carry out a Corrective Action, to regain control of the project.

Capture Performance

The following tasks need to be accomplished:
Create the timesheets and distribute to the project team members at the beginning of the checkpoint cycle. This is done at the beginning of the project and the team members fill it in daily, and hand it to the PM monthly.

Collect from each team member the following:

- actual start date for tasks started this month,
- actual finish date for tasks finished this month,
- actual work (effort) in hours per task this month,
- latest estimated work in hours to complete the task,

Capture any non-staff costs incurred this period.

Software Guidelines to Update Schedule

Update the schedule by task by resource in F10 MS Project for the following:

- actual start date for tasks started this month,
- actual finish date for tasks finished this month,
- actual work (effort) in hours per task this month,
- latest estimated work in hours to complete the task.

Manually compare the rescheduled completion dates with the latest estimated elapsed time to complete. In order to make the scheduler recalculate an end date compatible with the estimated elapsed time to complete it may be necessary to revise the resource unit value or resource calendar; e.g. A resource is assigned 50% to a task and the estimated work to complete is 3 days. The scheduler will recalculate the end date to be 6 working days hence. However, the resource has stated that the elapsed time to complete is 10 days because of a training class. In this example, update the resource calendar to remove the 4 days of the class from the calculation.

Software Guidelines to Update Costs

We are using F10 MS Project3.

From the Tracking Gantt view, table Work we are first updating actual work for the period.

Then we update the Tracking Gantt Cost view worksheet with:

- actual fixed costs incurred this period,

Staff costs will be automatically updated from the scheduler, since they are calculated from actual work.

Software Guidelines to Re-plan Stage Schedule

Review the F10 MS Project3, Data collecting Gantt view, Cost Template and identify any deviation from the baseline. Establish why the deviation has occurred. Refer back to the Project planning (scope and definition) to help determine the appropriate corrective action and adjust the schedule accordingly. Actions include:

- do nothing,
- accept a date slippage, within the project tolerance levels,
- adjust staff availablity,
- reassign staff,
- assign additional resources,
- coach and motivate the staff to work more effectively,
- resolve scheduling conflicts,
- expedite fuller client participation
- reduce the number of tasks,
- substitute tasks.

Determine if the stage has exceeded the progress, cost and quality tolerance levels agreed with the Project Steering Committee at planning stage. If the stage is out of tolerance then take up a Corrective Action to regain control of the project.

Review status of open issues (F6 Issue Log) and determine any further action required on these issues. Review the status of any outstanding quality reviews.

Conduct Team Status Review

Conduct a Status Meeting with the Project Team.

It is beneficial to conduct the Status Meeting according to a formal standard agenda.

Items for discussion are:

- achievements this period,
- planned activities that are incompleted or overdue,
- activities for the next period,
- new issues identified this period,
- issues closed this period,
- summary of results of quality reviews,
- summary of schedule and cost status,
- suggested revisions to the plan,

The Status Meeting is an opportunity to exchange information between all members of the Project Team.

Create Status Report

The F11 Status Report provides a record of current achievements and immediate expectations of the project. It provides an accurate history of the project, effectively communicates to all interested parties the current status of the project, and integrates progress data collecting, change control and issue management.

Create the monthly (for large projects weekly) Status Report. List:

- accomplishments this period,

- items not completed this period,
- proposed activities for the next period,
- reference new issues identified this period from the Project Issues Log,
- reference any issues resolved this period from the Project Issues Log,
- identify any predicted slippage to the stage schedule, along with cause and corrective action,
- identify any predicted cost overrun, along with cause and corrective action.

Distribute to the Project Team members directly responsible for the Project Manager.

Retain an electronic and paper copy of the F11 Status Report.

Following to the Status or Team Meeting make any adjustments to the schedule and Stage Cost Summary worksheet – see F9 Cost per Stage.

Create Progress Report

Create the F4 Progress Report at the end of the month.

Summarize the accomplishments for the month, schedule status, upcoming tasks for the month, and any major issues.

Distribute to the Project Team and Project Steering Committee.

(For Status and Progress Reports see REPORT PROCEDURE section)

DATA COLLECTING AND MONITORING INSTRUCTIONS

The following is a more detailed presentation of the Time & Cost Control procedure focusing on:

- *how to collect facts and data*
- *how to re-plan work schedules*
- *how to perform monitoring*
- *the plan as the baseline*
- *scope of monitoring*
- *what should be collected*

Project Manager responsibility

Project managers should

- ☐ identify risks, potential project problems, as early as possible
- ☐ identify when goals may not be met
- ☐ identify when constraints may be violated
- ☐ ensure that contingency plans occur before unrecoverable problems occur
- ☐ provide and receive project status for the phases and total project.

Introduction to Project Data collecting and Monitoring

Once a project has advanced to the phase of execution, the consistent reporting on the true status of the project is essential. During Execution, the project team's and, specifically, the project manager's focus now shifts from discovery to data collecting and reviewing what was said would be done. This information is generally provided in the Status Report package, which would include at least the following information:

- F11 Status Reports
- Updates to the schedule -- plan versus actual, generally in the form of Gantt or PERT chart
- Financial Analysis, including the comparison of actual costs versus planned costs and variance measurements, i.e. financial metrics
- addressing plan variations.

See the section on Reporting for more detail of information.

Monitoring against planning

To begin the data collecting process, the project plan serves as the starting point. The recommendations contained in these documents (F1, F2, F3, F4, F7) serve as the minimum set of planned elements that are to be tracked and monitored over the lifetime of the project. This list should be tailored for each specific project.

It should be noted that part of the planning was to acknowledge which elements were to be monitored and how often they were to be controlled. Thus, the data collecting process to provide a practical, workable method to evaluate where a project stands at a given point in time with regard to the initial baseline plan follows the planning process.

The concept of a perfect plan is an illusion. Plans are living documents that change as the environment of the project changes. In the new world of information technology, success is dependent on strategies, project resources, and people. Focus should be on monitoring and directing these dynamic elements.

The key elements that are needed for data collecting and analysis include:

- Scope of Work including project objectives
- Project Specifications
- Success factors – Milestones - Deliverables
- Work Breakdown Structure (WBS) -- activity list and activity network
- Work packages
- Budgets and Estimates, along with the assumptions on which they were based
- Master and supporting schedules
- Financial and funding plans
- Quality Management Plans
- Organisation plan
- Cost plan.

Even very large projects can be controlled well if adequate time is spent planning, data collecting and monitoring.

How and what is to be Tracked?

A key management issue in every project is to develop processes that provide critical information without becoming a burden and taking on a life of their own. Many think this is only an issue in large projects, but small projects share equally in the problem because they typically lack the necessary resources to do many of the management functions.

Just as in the planning process, the project manager walks a fine line to achieve the correct level of detail. As a general rule of thumb, most data for control should be by-products of execution of the project. The level of detail about the project should decrease as the information is moved up through the project organization.

"How and what is to be tracked" is a very important question and one not to be taken lightly. The project manager should focus on putting in place the most critical parts of data collecting and monitoring, and then add additional items to track as necessary, based on the complexity of the project.

Data collecting and monitoring means focusing on the following kinds of issues:

- Status – current activities and planned activities.
- Comparing the planned schedule to the actual progress and determining the current position. This analysis may be done at the top levels of the Work Breakdown Schedule for reporting, but may also be done at the actual task level for determining work activities. Key items are:
  - ⇒ Tasks planned and actual start/finish dates.
  - ⇒ Project actual start/finish dates.
  - ⇒ Impact on overall schedule.
- Comparing the planned budget with the actual expenditure. The data collecting and monitoring processes should generate:

- ⇒ Actual expenditures to date.
- ⇒ Estimate to Complete (ETC).
- ⇒ Estimate at Completion (EAC).
- ⇒ Adjusted baseline after replanning.

- Technical performance and quality indicators from each developmental stage of the project.

When Should Data collecting is done: The Project Data Collecting Matrix

The frequency of the various data collecting and monitoring activities will vary with the specific element and the amount of detail needed and should complement the various reviewing processes of the project.

The frequency of data collecting activities is noted on the Project Data Collecting Matrix. A sample matrix for a project is provided below.

Please not that all templates used in this Guide are tabulated and hyperlinked in the Project Data Collecting Matrix.

It is obvious that according to required Review FREQUENCY, the data collection frequency is adjusted.

PROJECT MANAGEMENT TEMPLATES				DATA COLLECTING MATRIX					
FORM NUMBER	TITLE	FILE	INITIATED AT PHASE	OPTIONAL	CONTROLLING AREA	PROCEDURE	REVIEW FREQUENCY	REVIEW AUTHORITY	OPTIONAL REVIEW
F1	SCOPE & DEFINITION	doc	PLANNING	NO	SCOPE	CHANGE	MONTHLY	STEERING COMMITTEE	YES
F2	RISK	xls	PLANNING	NO	SCOPE	RISK	MONTHLY	PM	YES
F3	QUALITY PLAN	doc	PLANNING	YES	QUALITY	QUALITY	MONTHLY	QAM	YES
F4	COMMUNICATION PLAN	xls	PLANNING	NO	QUALITY	COMMUNICATION	MONTHLY	PM	YES
F5	COMMUNICATION TEMPLATE	doc	PLANNING	NO	QUALITY	COMMUNICATION	MONTHLY	PM	YES
F6	ISSUE LOG	doc	EXECUTION	NO	ALL		ON GOING	PM	NO
F7	ORGANISATION PLAN		PLANNING	NO	TIME & COST	TIME & COST	MONTHLY	PM	YES
F8	SCHEDULE	doc	PLANNING	NO	TIME & COST		weekly update	PM	NO
F9	COST	xls	PLANNING	NO	TIME & COST	TIME & COST	weekly update	PM	NO
F10	MS Project3	mpp	PLANNING	NO	TIME & COST	TIME & COST	weekly update	PM	NO
F11	STATUS REPORT	doc	EXECUTION	YES	ALL		MONTHLY	PROJ TEAM	NO
F12	MEETING AGENDA	doc	REVIEW	NO	REVIEW	REVIEW	EACH MEETING	PM	NO
F13	MEETING MINUTES	doc	REVIEW	NO	REVIEW	REVIEW	EACH MEETING	PM	NO
F14	PROGRESS REPORT	doc	REVIEW	NO	ALL	REVIEW	AD HOC	STEERING COMMITTEE	NO

Activity and Schedule Data collecting

A large part of the data collecting and monitoring process is knowing the project's status.
This is done by tracking/monitoring F10 MS Project3 in conjunction with F1, F2, F3, and F4.

The only way to determine this is to:

- Review what activities were planned
- Determine that the work has been done to complete these activities
- Analyze whether the level of work is consistent with the level of effort that had been planned
- Compare this to the planned start and finish dates
- Determine if adjustments are needed for this activity
- Analyze if any required adjustments impact other tasks.

There are numerous ways to collect, analyze, and present this information. Two methods are presented here: Activity Data collecting Table and Updated Project Schedule. (For large, complex projects that have an involved activity network, additional levels of analysis and mathematical models would be needed.) These tools should be used first to generate the project schedule during planning and should then continue to be used to track the schedule.

As can be seen in the Activity Data collecting Table shown later in this section, a number of key data collecting and monitoring activities are reflected. Included in the activity data collecting table are:

- **WBS number.** This should be the activity's WBS number that was assigned during plan development or the number assigned at replanning.
- **Activity Description.** This is a brief narrative on the activity.

- **Dependency.** This would apply if the project reflects activity dependency, meaning one task cannot start and/or finish without the completion of another task.
- **Owner.** This should be the person who is responsible for updating the status on the task. It may or may not be the actual task manager.
- **Planned Schedule.** This information was generated as part of Project Planning. It would represent what was originally thought to be the number of days an activity would take, as determined by the date that the master activity list was generated. The second element of the activity in a bigger project schedule would show when the task would start and end, based on the duration.
- **Duration.** For the purposes of scheduling, duration should be in days, not hours. Hours are more of a financial element since they reflect the level of commitment and not the time. In other words, the purpose of the information in this table is not to show the number of people and hours being spent on a task (effort), but the actual time it will take.
- **Actual Schedule.** This information is completed as the activities are completed. Note that some of the 2.0 activities have no information filled in. This is because these tasks have not yet been completed. The current example shows that the design team is on Task 2.2.1.
- **Target schedule.** This the planned schedule, plus the actual, with adjustments based on new project knowledge. In this example, the design of the project was to take 90 days. The current tasks have taken 15 days more than had been anticipated. During the planning phase, the project manager allowed a few days "float" in the design as a reserve for schedule risk.

During the process of establishing the project target, the project team now reviews the outstanding tasks and determines:

- Can the 15-day schedule slippage be made up in the other tasks? If so, where?
- Can the other tasks still be completed in the length of time planned? If so, where are additional adjustments required? In this example, one of the two activities could be completed in less time, and one activity would require more.

To complete the projection for tasks that have not been started:

- Try to preserve "float" wherever possible.
- Ensure that logical discrepancies do not occur by attempting to override dependencies.
- Work up to the task level from the details. If an automated planning tool is being used on the project and a critical path has been established, the system will prevent the user from overriding the dependencies in the schedule.

Activity Data collecting Table

WBS	Activity Description	Depend	Owner	Planned Schedule			Actual Schedule			Target Schedule		
				Start	Finish	Dur.	Start	Finish	Dur.	Start	Finish	Dur.
2.0	QUALITY SYSTEM DESIGN	1.0	PA/VK	4/1/04	7/1/04	91	4/1/04	7/1/04	91	4/1/04	7/5/04	95
2.1	Prepare Preliminary Design		PA	4/1/04	5/1/04	30	4/1/04	5/15/04	45	4/1/04	5/15/04	45
2.1.1	Develop System Architecture		PA	4/1	4/10	10	4/1	4/10	10	4/1	4/10	10
2.1.2	Prepare Data Flow Diagrams		PA	4/10	4/20	10	4/10	4/20	10	4/10	4/20	10
2.1.3	Prepare Procedures		PA	4/20	5/1	10	4/20	5/15	25	4/20	5/15	25
2.2	Prepare Audit	2.1	VK	5/5	6/1/04	26	5/15			5/15	6/5/04	21

2.2.1	Prepare Audit Checklist		VK	5/5	5/25	20	5/15	5/31	15	5/15	5/31	15
2.2.2	Prepare Audit Plan		VK	5/25	6/1	6	5/31			5/31	6/6	7
2.3	Document Training Material	2.2	VK	6/1	6/28/04	28				6/6	7/2	27
2.3.1	Develop Training Package		VK	6/1	6/28	28				6/6	7/2	27
2.4	Design Review	2.3	CT	6/30/04	7/1/04	2				7/3/04	7/5/04	2
Comments: *All activities that are not meeting planned dates need to define: reason, approach to bring into conformance, and impact.*												

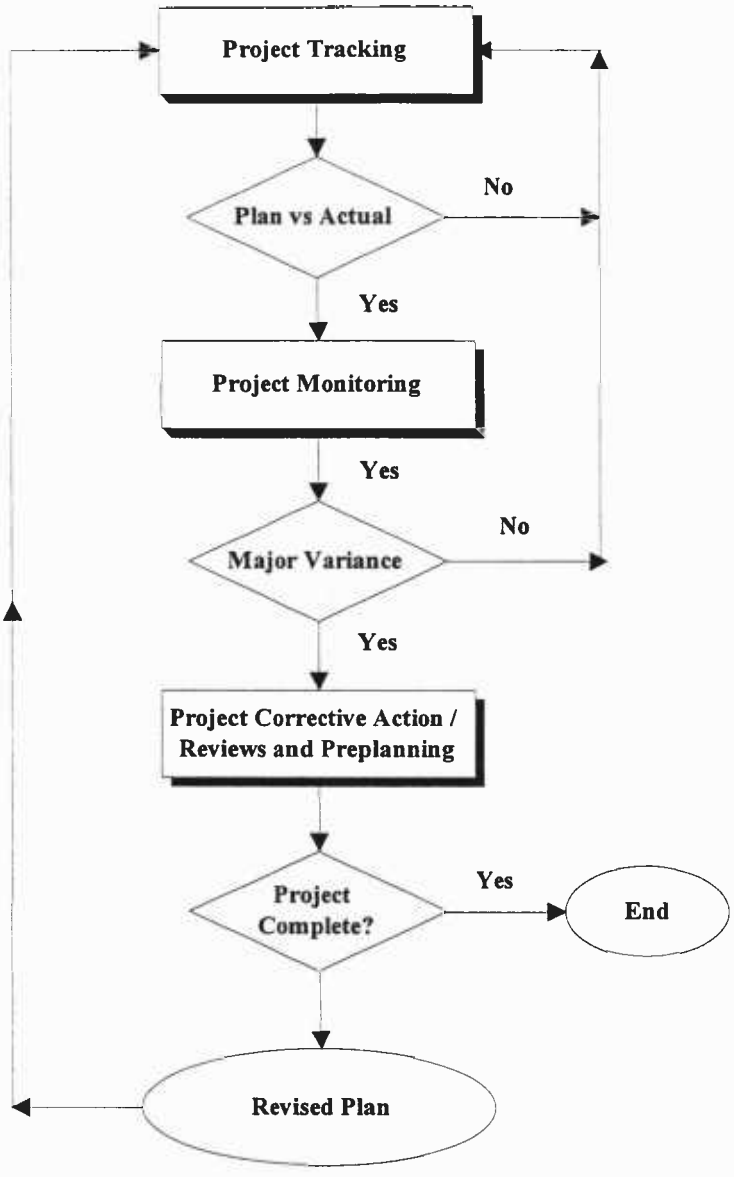
Once the Activity Data collecting Table is completed, the project manager can prepare a graphical presentation of this information. If an automated tool is being used, this graphic will be automatically generated. In most cases, the project manager has a choice in the graphical representation. At a minimum, it should be shown as a Gantt chart. F10 MS Project automatically produces the chart.

The objective of data collecting and monitoring is to preserve the original schedule (baseline) for comparison. In the above sample, the actual schedule is reflected for all those tasks completed. For tasks still open and ones that have not been completed, the new target schedule is reflected.

Monitoring Process

As is graphically presented below, the project monitoring process is an interactive part of data collecting and is firmly tied to project planning. Project monitoring takes the outputs of data collecting and uses them to determine planned versus actual.

Fig. 11 Project Controlling by Tracking (data collecting) and Monitoring



Planned Versus Actual Costs

As repeated before the basic consideration underlying all the elements of monitoring and control is "planned versus actual." When the project manager completes this comparison, he/she then evaluates whether the existing plan can continue to be used, whether the activities can get back on plan, or whether the project (in whole or in part) has deviated significantly from the plan.

Cases where actual progress and projected progress differ significantly suggest the need for replanning, which would include updated project budgets.

Cost Determination

Budgets for each task should be simple and directly related to a specific WBS task. Comparing performance to plan can be difficult when the work cannot be quantified.

The way to measure progress is through estimation and completion of tangible products or milestones. First, tasks during the planning cycle should be broken down into activities to permit progress to be monitored fairly frequently. Second, tangible deliverables should be used as signposts to show progress. Budget updates are obtained from the people responsible for managing the work efforts.

Cost of performing a task is directly related to the labour assigned to the task, the duration of the task, and the cost of any non-labour items required by the task.

To develop updated costs and account for actuals, the project manager needs to review:

- Labour costs.
- Non-labour costs.
- Other expenditures.

Estimating how much more time the task requires takes still remains the single most difficult part of deriving updated cost estimates.

In calculating the cost of labour, costs must be burdened appropriately. Burdened cost typically refers to the overhead and general expenses that are beyond strict salary associated with an employee.

Non-labour charges include such items as material costs, reproduction, travel, cost of capital (if leasing equipment), computer center charges, and equipment costs.

Update the Cost Model

Actual labour and non-labour cost information is compared to the numbers used to develop the plan. Spreadsheets like F9 COST work well for projects of small to medium scope. For large systems, a project management tool like MS Project is typically preferred for cost estimation.

Within the system, costs are assigned and estimates updated at the lowest level WBS work package task. These costs are then combined to determine a sub-task cost,

and in turn, are combined to determine the overall task cost, which can be summed to find the total project cost.

Review the Cost Estimates

Updates to budget are best developed by more than one person. Rarely does a single individual have the knowledge and understanding of all the factors affecting every aspect of a project.

Project managers have a choice in how they track (and report) project financial data. The basic financial data collecting method is to prepare an Estimate at Completion (EAC) Summary Report. See F10 MS Project , Earned Value Report.

Each project creates an EAC in the planning phase to identify the costs associated with each of the project's high level WBS elements, thereby developing an overall budget for the project.

Another financial data collecting method is to maintain financial metrics. Projects that prepare monthly reports for a customer would be more likely to have a need to maintain financial metrics.

Finally, many projects can obtain useful financial status by generating a planned vs. actual spending profile graphic. This method is particularly useful for presentations to upper management because of its visual impact. The spending profile, as shown on the following page, can show in a glance what is happening with the project's costs. Creating these profiles is one of the many data collecting options available to project managers.

Estimate at Completion (EAC) Summary Report

Although applicable to all projects, an EAC periodically determines the expected total cost of the project at project completion. Projects, particularly large projects, suffer cost overruns due to inadequate estimating procedures and overlooked items.

The EAC provides:

- An historical baseline of the budget.
- A disciplined process for obtaining inputs.
- A means of allocating and data collecting budgets to manageable sizes.

- A library of metrics that can be updated with actuals throughout the life of the project for use on similar projects.

The EAC is an assessment of the total effort required to complete each contract task. It estimates the amount of effort required to complete each WBS element and adds that estimate to the costs incurred to date to derive the anticipated cost of each WBS element at project completion. A possible process for budget updates is detailed below:

- Estimate hours and other direct costs for each WBS element.
- Calculate the estimated remaining cost by entering the remaining effort/activity needed into a task cost spreadsheet.
- Add costs incurred to date.
- Sum the task leader estimates and the costs to date to derive an EAC for each WBS element.
- Sum the EACs for each WBS element to derive an EAC for the overall project.
- Determine the actual amount of funds available to the project.
- Compare the EAC to total funds available to the project.
- If the total available funds are less than the estimated total cost, then:
  - ⇒ Re-cost the project, and
  - ⇒ Eliminate unneeded or excessive requirements until the remaining estimated cost is within the bounds of the remaining funds, or
  - ⇒ Advise executive management that current estimated scope of work for the project is greater than initially estimated.

At a minimum, a full EAC should be done at each major milestone and for all major contractual changes.

The financial information included in an EAC provides most of the budgetary numbers needed. What varies is the method by which the estimates to complete and at completion are done. Three variations on EAC are shown below:

EAC = Actuals to date plus the remaining project budget modified by the performance factor, often the cost performance index developed as part of an Earned Value method of estimating.

EAC = Actuals to date plus a new estimate for all remaining work. This approach is most often used when past performance shows that the original estimating assumptions were fundamentally flawed, or they were no longer relevant due to changes within the project environment.

EAC = Actual to date plus the remaining budget. This approach is most often used when current variances are seen as atypical and the project management team's expectations are that similar variances will not occur in the future.
Beware of the Trap to Report More Progress than has been achieved.

11.5 REPORTING PROCEDURE

Objective

To create a formal system to record and communicate Project information internally and to the customer/sponsor,

...so that each one involved has the right information at the right time to optimally contribute to the Project and

...so that Control of the Scope, Quality, Time and Cost is better achieved.

Overview

The Reporting Procedure is closely related to Communication Procedure. However the format and tasks to be carried out are specifically presented here.

Reports during the project are the following:

1. Project Status Report F11 STATUS REPORT

This brief but comprehensive Status Report serves as a rapid mirror of the Project situation; it is a useful tool and could be accompanied by Appendices like:

- Updated Issue log
- Corrective Action Plan
- Any other relevant document

The Status Report should be used mainly internally and when interim meetings with customer take place. Its frequency is monthly but on special occasions it can be more frequent (weekly, ad hoc)

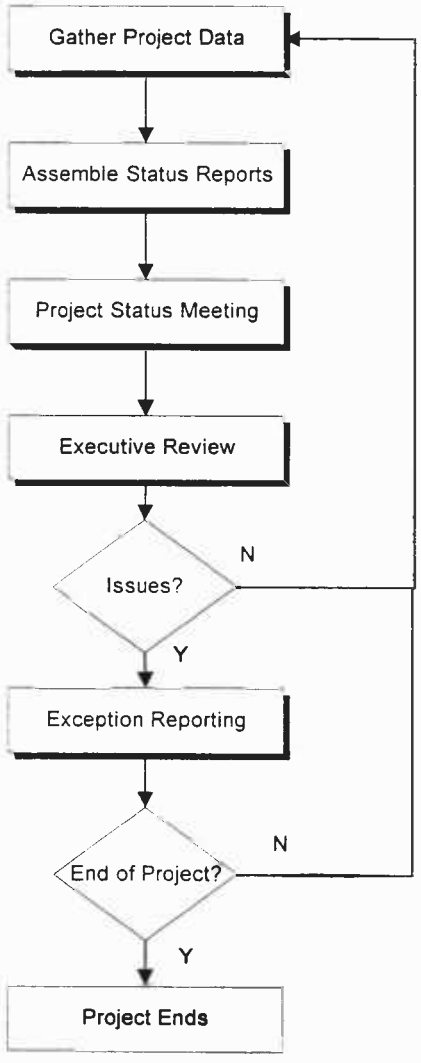
2. Project Progress Report F14 PROGRESS REPORT

It is a more formal and full report focusing on progress and a covering wider reporting perspective.
It is for use towards the customer at the Monthly Progress Meetings or Steering Committee Meetings.

Reporting for the Steering Committee

Progress reports are produced by key project team members and collated by the PM. These team members should know what areas of execution they are responsible for. Progress reporting is an integral part of the project management processes. It is the means by which the stakeholders stay informed about the progress and key activities required to successfully complete the project. The purpose of the progress report, like the progress meetings, is to develop a standard format for the formal exchange of information on the progress of the project. The progress reporting process can be graphically represented as:

Fig. 12 Project Data collecting and Reporting Process



The progress report package should be prepared by the project team detailing activities, accomplishments, milestones, identified issues, and problems. Some level of recovery plans should be prepared for activities that are not on schedule and abatement plans prepared for anticipated problems.

Other information to be considered for inclusion in a progress report package includes:

- Status Report form which include significant accomplishments for the period and scheduled activities
- Updated GANTT charts
- Preventive plans for activities not on schedule defined by the project team as being late, (e.g. slippage in the critical path activities)
- Updated Risk Management Worksheet F2 Risk
- Resolution to assigned action items and issues
- Updated Estimated Cost at Completion
- Updated Staffing Plan with actuals
- Financial Metrics

11.6 REVIEW PROCEDURE

Objective

The objective is to define the method to convert Control Process outcome to re-planning of the project

.... by make use of findings, measurement, analysis and results of monitoring, data collecting and controlling
by involving the team members in formal meetings
by the commitment of executive management and client representatives.

so that the project is always *under control.*

Overview

Review Process includes Meetings (Agendas, Plans and Execution), the defined role of Steering Committee (who conduct the Executive or Management Review) and C & P Actions leading to Updates (re-planning) of the Project. Project meetings are the following:

- Project Status or Project Team meetings
- Project Steering Committee meetings

Project Status or Project Team Meeting Agenda

This is prepared and distributed by the PM at least 2 days prior to the meeting.

F12 MEETING AGENDA

Process for Meeting

It is expected that each person will be prepared to update their status report from the previous reporting period and to discuss key issues and topics. Key areas are: costs, schedules, current and next period activities, issues, and possible change elements, and other topics that require discussion.

Ground Rules for Status Meetings

Since a large percentage of project time is spent in meetings of one form or another, a set of rules should be applied to each meeting type. These rules follow standard meeting management principles:

- Start and end on time
- Come prepared
- Bring handouts; information should not just be in the attendee's head.
- Summarize information; do not read it.
- A list of action items and the status reports should be the by-products from the meeting. The action items and discussion topics should be written up and disseminated. If a project action item, change issue, or new risk element is mentioned, then the support person responsible for distributing the status meeting information should ensure that the responsible project team member is informed.

Hints for
Effective Meeting Minutes

1. Take concise and appropriate notes to ensure an accurate record of the meeting
2. Prepare minutes so they reflect the true and accurate account of the meeting
3. Format minutes to include Actions
4. Make sure Actions are signed off by nominated participants
5. Give everyone a copy of the minutes .... At the meeting

Since a project manager is responsible for reporting on the project's status to other levels of the organization, written materials are needed to complete the necessary reports.

If an activity is not on the schedule, then the status meeting member should address:

- Why task completion is late or early
- What other areas are/might become impacted
- What actions need to be taken, if any.

Project Steering Committee

The Function of the Project Steering Committee is to take responsibility for the business issues associated with the project. The Steering Committee is responsible for approving budgetary strategy, defining and realising benefits, and monitoring risks, quality and timeliness.

Executive Review based on Progress Report (see F14 Progress Report)

A standard requirement of all projects is to provide reports to the Steering Committee, the project team and executive management. At a minimum, the frequency of the reports should correspond with the meetings that are scheduled.

The information shared in the report should be in a consistent format throughout the project. A general rule of thumb is that the detail should be kept to what can be explained during a Steering Committee Meeting. If more details are needed to clarify issues, then these should be provided as supplementary data or presented in a MS Power Point form during the meeting.

Role of the Project Steering Committee

The Role of the Project Steering Committee is to:

- assess the Progress of the Project;
- take on responsibility for the project's feasibility, business plan and achievement of outcomes;
- ensure the project's scope aligns with the requirements of the stakeholder groups;
- provide those directly involved in the project with guidance on project business issues;
- ensure effort and expenditure are appropriate to stakeholder expectations;
- address any issue that has major implications for the project;
- keep the project scope under control as emergent issues force changes to be considered;
- reconcile differences in opinion and approach, and resolve disputes arising from them;
- report on project progress to those responsible at a high level

Role of individual Steering Committee members

The Role of the individual members of the Project Steering Committee includes:

- having the authority to take decisions about the Project;
- understand the strategic implications and outcomes of initiatives being pursued through project outputs;
- appreciate the significance of the project for some or all major stakeholders and perhaps represent their interests;
- be genuinely interested in the initiative and the outcomes being pursued in the project;
- be an advocate for the project's outcomes;
- have a broad understanding of project management issues and the approach being adopted; and
- be committed to, and actively involved in pursuing the project's outcomes.

In practice, this means they:

- ensure the requirements of stakeholders are met by the project's outputs;
- help balance conflicting priorities and resources;
- provide guidance to the Project Team and users of the project's outputs;
- consider ideas and issues raised;
- review the progress of the project; and

Membership

The Project Steering Committee shall be comprised of senior members of the client organisation, the Project Manager and project team members, special representatives, consultants, advisors (if required) and observers. It is chaired by the most senior member.

Agenda Items

F12 Meeting Agenda

The Project Manager must forward Project Steering Committee agenda at least 5 working days prior to the next scheduled meeting together with the F14 Progress Report of the period.

The Chair has the right to refuse to list an item on the formal agenda, but members may raise an item under 'Other Business' if necessary and as time permits.

Minutes & Meeting Papers

F12 Minutes of Meeting

The format of the Project Steering Committee minutes shall be as F12 Meeting Minutes . The minutes of each Project Steering Committee meeting will be prepared by the Project Manager.

Full copies of the minutes, including attachments, shall be provided to all Project Steering Committee members no later than 2 working days following each meeting.

The minutes of each Project Steering Committee meeting will be followed-up and maintained by the Project Manager.

Frequency of Meetings

The Project Steering Committee shall meet at an agreed frequency. The frequency of Management Review meetings is a function of:

- the experience and expertise of the Project Manager,
- the size and complexity of the project,
- the requirement for senior management direction and support,
- the length of the stage,
- the overall project risk,
- the overall project cost,
- the magnitude of the loss resulting from project failure.

As a minimum the Project Steering Committee will meet at the end of each stage, including Project Initiation, to review the achievements of the concluded stage and authorize proceeding to the next.

Executive Meeting (optional)

A monthly or at least a quarterly executive meeting with executives who are not on the Steering Committee should be held to facilitate open communications.

Link to Issue and Quality Management

As key components of the project control process, the reviewing cycle and structure are closely linked to the other control processes. The direct link to data collecting and monitoring has already been discussed. However, there is also a link to the project's issue management and quality processes.

The formal review process is the main channel for the exchange and recording of project communications. For this reason, it is important to realize that during the planning of each type of review meeting, some element of quality or issue management will be included.

Non Conformance Detection- Corrective and Preventive Action

Objective

To take corrective and/or preventive action when a project is off course, by analysing and identifying the root cause of non-conformances,

in a way that

- minimizes impact to the project,
- gains agreement from all parts of the Project Organization,

so that

- the project can still be successfully completed.

Overview

In the planning of the project we define the project tolerances with respect to:

- cost,
- schedule,

- quality.

During the lifetime of a project it is possible that:

- a stage tolerance set by the Project Steering Committee is or will be exceeded,

- a major technical/methodology deviation is identified and recorded,

- an important dependency from another project is not available.

Their effect is that the current Stage Plan will not be met and so the Stage must be replanned in the light of the new situation. This is done by raising a Non Conformance Report.

This Report shows the effect on the project of NC situations; for this reason the NC plan includes objective information on the situation that has arisen, the options that have been examined and the action that it is proposed to take.

In addition to the information contained in the Stage Plan, a NC Report contains the following:

- an explanation of why a given situation is a NC and the circumstances that led to the situation,

- Classification of the NC to High Risk or Potential Risk

- a prediction of the schedule, cost, schedule, functional, quality and technical impact if no action is taken,

- the recommended action (changes to scope, organization, budget, timescale, etc),

- the consequences of this corrective action on both the Stage Plan and the Project Plan,

Non Conforming Situation

Analyze Cause of Non Conforming Situation

Confirm which component of the project is out of tolerance. Ensure that the control measuring the tolerance is functioning correctly.

Analyze the causes of the Non Conforming Situation. These may include:

- resource utilization and availablity,
- resource productivity and performance,
- external factors,
- under estimating,
- scope creep,
- quality issues requiring the rework of products.

Assess the impact on the project of doing nothing, and continuing with the original plan, with respect to:

- stage and project schedule,
- stage and project cost,
- scope,
- quality of development products,
- interproject dependencies, both business and technical projects.

Create Corrective Action Plan CAP

Consider each aspect of the project, identify appropriate changes and define their probable impact.

Dimension of Scope

- organizational,
- data,
- performance requirements,
- implementation environment,
- services provided,
- deliverables.

Plan

- identify new tasks and products,
- modify original tasks and products,
- remove tasks and products,
- review resourcing,
- review workflow and task dependencies,
- re-estimate.

Organization

- review the effectiveness of the Project Steering Committee, Key Stakeholders, and Project Team.

Schedule

- Recreate the stage and project plans.

Cost

- Recreate the project budget.

Business Case

- Quantify the impact of the proposed changes on each benefit, and the on the time to break even.

Risk

- Conduct a risk analysis.
- Identify new project risks and appropriate countermeasures.

If it is not clear what option should be taken, prepare an analysis of the options for the Project Steering Committee together with an outline Non Conforming Report for each option.

Prepare for an Assessment

Arrange a project assessment meeting of the Project Steering Committee to decide what course of action to take on the project.

Prepare an agenda and any presentation material that will be required to present the Non Conforming Report to the Project Steering Committee in order for them to make a decision.

Conduct Non Conformance/CAP Assessment

Conduct the Project Assessment meeting. The Project Steering Committee should make a decision on how to proceed with the project, that the Project Manager and Project Team can follow.

Follow-up Non Conforming/CAP Assessment

Record the decision made by the Project Steering Committee and takes the appropriate action.

In most cases, this will be a series of additional project activities that are required to address the causes of the Non Conforming Situation.

Periodic Updates

As shown in the Data Collecting Matrix (and Forms List) earlier, other data collecting and monitoring activities may occur on a different frequency than the financial, budget, and status activities. Some of the periodic data collecting processes are listed here.

Updating a Project's Work Packages

Each project identifies a series of work packages for specific work to be accomplished. Work packages are generally created to cover a specified subset of the project's overall requirements and are updated as project requirements change or as additional requirements are developed. It should be noted that work packages are tracked until completion. The project team should update the following areas each time a work package is completed, rescheduled, or changed:

- Work package description
- Person responsible for the work package
- Start date
- End date
- Dependencies
- Updated requirements.

Updating Project Requirements

In the planning phase, each project must identify the requirements that the project intends to satisfy. This process may result in the creation of a matrix that lists consolidated requirements. Like the work package, once identified, project requirements are tracked until completion.

Based on the change control processes, project requirements only change as a result of written notification and thorough review. Hence, project requirements will be updated as part of the change control process.

Updating the Quality Project Plan

A Quality Activities matrix that lists project specific quality-related activities is required for each project. This matrix is initially developed in the project planning phase and is updated as project requirements change or as additional requirements are developed. The project team shall update the Quality Activities milestone schedule, as necessary, by:

- Adding or deleting quality activities
- Providing actual or revised quality activity completion dates as the project progresses.

12. EXAMPLES FROM GUIDE IMPLEMENTATION

In **Appendix A** all Templates of the Data Collection Matrix are presented. Some include instruction guidelines or preset text to facilitate the user.

In **Appendix B** the Templates used in the Project 'Design, Development and Implementation of an Environmental Management System at the Ag Dimitirios Plant of Organisation Omega' are presented. Because this is a current project and commercial issues may be considered of some value to the client the confidentiality of information has been preserved by avoiding to mention names of companies and participants.

13. VALIDATION RESULTS AND CONCLUSIONS

The methodology presented in the Guide of Chapter 11 has been partially implemented by ENNOUS LTD in various small and fully implemented in larger management consultant's projects this year (June – October 2004).

The author of this thesis has taken part in these projects with the role of Project Manager and has personally coordinated the Control Monitoring and Review activities presented.

In Chapter 12 and Appendix B the filled forms and examples of used templates are presented.

The validation assessment was done by 4 senior engineering consultants with 3-12 years of experience in coordinating and managing small-medium management consultant projects.

The validation rating was as follows:

- *Excellent* when the criterion is fully met
- *Fair* when the criterion is adequately met but could be better; or when it is acceptable in most cases
- *Poor* when the criterion is not met or is not satisfactory covered in deployment

There were 5 criteria used to assess the Methodology proposed and the following rating was given:

Criterion	Rating
Is the methodology complete enough to cover for the totality of management issue areas occurring in our projects?	Excellent
Does the methodology provide adequate data, detailed information and know-how for effective use in PM?	Excellent
Is the Guide actually useful for Management Consultant projects?	Excellent-Fair
Does the methodology reasonably and practically apply to small-medium management consultant projects?	Fair-Poor
Would you consider the methodology as an efficient way to Control Monitor and Review small management consultant projects?	Fair

The result of the validation also proves that:

- The guide proposed can be used to manage the CMR process of a project as it is with good results; but small projects benefit less
- Further work should be done to simplify some areas of the methodology

- Considerably more time (about double then proposed) is necessary by a Project Manager to use these templates (from planning to their actual regular update in the Execution phase)
- Some further integration is an opportunity for improvement
- Further guidance of the Earned Value analysis is also needed

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15. DEFINITIONS OF IMPORTANT TERMS

15.1 Important Terms Used in the Methodology

Monitoring according to PMBOK - 2000: The capture, analysis and reporting of project performance usually as compared to plan.

Control according to PMBOK - 2000: The process of comparing actual performance to planned performance, analysing variances, evaluating possible alternatives and taking appropriate corrective action as needed.

Project Controlling according to IPMA Competence Base Line - 1999 : The process of establishing Project objectives and plans, measuring actual Project performance, comparing results against planned, taking the necessary action to correct the situation in time.

Value Engineering Budget at Completion (BAC). The sum of all budgets allocated to a project
excluding contingency.

Budgeted Cost of Work Performed (BCWP). Also known as "Earned Value."
The sum of all budgets for completed work and the completed portions of open work. (What was budgeted for the work that actually took place?)

Budgeted Cost of Work Scheduled (BCWS). Also known as "planned value."
The sum of all budgets for all planned work scheduled to be completed within a given time period. (The cumulative Budgeted Cost of Work Scheduled gives us the performance measure baseline.)

Cost Performance Index (CPI). Represents the relationship between the actual cost expended and the value of the physical work performed. CPI = BCWP / ACWP. Cost Performance Index (CPI) = Earned Value/Actual Cost = BCWP / ACWP

Cost Variance (CV). The difference between Earned Value and the actual costs (ACWP). CV = BCWP - ACWP.

Cost Variance Percent (CV%). The cost variance as a percent of the Earned Value. CV% = (CV / BCWP) x 100.

Scheduled Performance Index (SPI). Represents the relationship between the value of the initial planned schedule and the value of the physical work performed,

or Earned Value. SPI = BCWP / BCWS. Schedule Performance Index (SPI) = Earned Value/Planned Value = BCWP/BCWS

Schedule Variance (SV). The difference between Earned Value and the budget plan (BCWS). SV = BCWP - BCWS. Schedule variance in units of time is the difference between the BCP and BCWS on the time axis.

Schedule Variance Percent (SV%). The schedule variance as a percent of the performance baseline. SV% = (SV / BCWS) x 100.

15.2 Kansas Terms in Alphabetical List

We are reproducing the full list of terms from *Kansas USA, Statewide Information Management Manual, PM Methodology.*

Access	To gain entry into, or to instruct or communicate with, the logical, arithmetical, or memory function resources of a computer, computer system, or computer network.
Acquisition Process	The process of acquiring personnel/goods/services for new or existing work within the general definitions of contracts requiring an offer and acceptance, consideration, lawful subject matter and competent parties.
Acronym	A cryptic name for a project, program or sponsor based on the first letters of the words in a project name.
Action Item Status	A list of action items, including a description, point of contact, and dates of action and resolution.
Active Project	A project that is in progress.
Activity Description	A name that easily identifies an activity or task.
Activity(ies)	A task or series of tasks performed over a defined period of time.
Actual Cost of Work Performed (ACWP)	The direct costs actually incurred and the indirect costs applied in accomplishing the work performed within a given time period.

Actual Finish Date	The calendar date work actually ended on an activity. It must be equal to or after the start date.
Actual Start Date	The calendar date work actually began on an activity. It must be prior to or equal to the finish date.
Agency	Used to define a general state organizational level consisting of the Agency and Departments interchangeably. Reference to Agency (with a capital "A") is used for reference to a specific Agency or to that specific organizational level.
Algorithm	A general term used to refer to a mathematical formula or processing routine that, based on parameters, performs a set calculation(s) or performs a specific set of tasks.
Alternative Analysis	Breaking down a complex scope situation for the purpose of generating and evaluating different solutions and approaches.
Alternatives	Identification of other approaches or solutions and the impact of tradeoffs to attain the objectives.
Analysis	The study and examination of something complex and the separation into its more simple components. Analysis typically includes discovering not only what are the parts of the item being studied, but also how they fit together. An example is the study of schedule variances for cause, impact, corrective action, and results.
Approve	To accept as satisfactory. Approval implies that the item approved has the endorsement of the approving entity. The approval may still require confirmation by somebody else, as in levels of approval. In management use, the important distinction is between approve and authorize. See authorization.
Areas of Responsibility	Used to define the person or organizational entity responsible for specific policy areas, processes, and procedures as identified. The current levels of responsibility are Legislature, customer, organization and user.
Assumptions	A statement that someone has deemed to be possibly true, on which the project's business case has been developed.
Audits	A planned and documented activity performed by qualified personnel to determine by investigation, examination, or evaluation of objective evidence, the adequacy and compliance with established procedures, or the applicable documents, and the effectiveness of a project.
Authorization	The power granted by management to specified individuals allowing them to approve transactions, procedures, or total systems such as the Steering Committee delegating approval of deliverables to certain users or user groups.
Authorized Work	An effort that has been approved by higher authority and may or may not be defined.

Baseline	Management plan and/or scope document fixed at a specific point in time in the project life cycle. Each project is baselined at least once at the beginning. As a project evolves, it may be re-baselined.
Breakdown	Identification of the smallest activities or tasks in a job according to a defined procedure.
Budget	When unqualified, refers to an estimate of funds planned to cover a project or specified period of future time.
Budgeted Cost for Work Performed (BCWP)	The sum of the budgets for completed activities and completed portions of open activities, plus the appropriate portion of the budgets for level of effort and apportioned effort. Also known as "Earned Value".
Budgeted Cost for Work Scheduled (BCWS)	The sums of the budget for all activities, planning activities, etc., scheduled to be accomplished (including in-process activities), plus the amount of level of effort and apportioned effort scheduled to be accomplished within a given task period. Also known as the plan.
Budgeting	Part of the planning function and control mechanism for a project.
Burn Rate	The number which represents the average cost of the project by hour, day or week.
Business Plan	Model used by a manager for planning and scheduling project work.
Calendar	The calendar used in developing a project plan. This calendar identifies project work days and can be altered to define the work week.
Calendar	The calendar used in developing a project plan. This calendar identifies project work days and can be altered to define the work week.
Calendar Unit	The smallest unit of the calendar produced. This unit is generally in hours, days, or weeks; it can also be grouped in shifts.
CCB	Change Control Board is to approve changes at a level established by the Steering Committee. The Board should consist of the Change Manager, key technical and management staff from the project team, representation from executive management, stakeholders, and user communities.

Change	An increase or decrease in any of the project characteristics, usually referring to specifications.
Change Control	The process of controlling, documenting, and storing the changes to control items. This includes proposing the change, evaluating it, approving or rejecting it, scheduling it and data collecting it.
Change in Scope	A change in objectives, specifications, work plan, cost or schedule that results in a material difference from the terms of previously granted approval to proceed.
Change Management Process	A set of tasks or procedures established to ensure that project performance is measured to the baseline and changes are reviewed, approved or rejected, and the baseline updated.
Close-Out Stage	The stage the project enters when all activities are complete and the product finished. It is the last phase of the project management life cycle.
Completed Activity	An activity with an actual finish date and no remaining work to be done.
Computer Network	Any system that provides communication among one or more computer systems and input/output devices including, but not limited to, display terminals and printers connected by telecommunication facilities.
Concept	An imaginative arrangement of a set of ideas.
Concept Phase	A generic term used to define both the first stage in a project management process and in a generic project life cycle. The first of the sequential phases in the generic project life cycle.
Conceptual Design	A process of choosing/documenting the best approach to achieve project objectives.
Conceptual Project Planning	The process of developing broad-scope project documentation from which the technical requirements, estimates, schedules, control procedures, and effective project management will all flow.
Confidential Information	Information maintained by state organizations that is exempt from disclosure under provisions of State or federal laws.

Configuration Management	Processes including procedures and tools to control project deliverable(s) in terms of release and revision. A system of procedures that monitors emerging project scope against the scope baseline. Requires documentation and management approval on any change to the baseline.
Conflict Management	The process the project manager uses to deal with the inevitable disagreements, both technical and personal in nature.
Conflict Resolution	The process of seeking a solution to a problem. Five methods in particular, that have been proven successful are confrontation, compromise, smoothing, forcing, and withdrawal.
Contingencies	Specific provisions for unforeseeable elements of cost and schedule within the defined project.
Contingency Plan	A plan that identifies key assumptions, beyond the project manager's control, and their probability of occurrence. The plan identifies alternative strategies for achieving project success. It is considered part of risk management.
Contingency Planning (Mitigation)	The establishment of management plans to be invoked in the event of specified risk events. Examples include the provision and prudent management of sequences or "work-arounds," emergency responses to reduce, and the evaluation of liabilities in the event of complete project shut down.
Contract	A binding agreement to acquire goods and/or services in support of a project.
Control Item	A project element that is considered a unit for the purpose of configuration management. This includes such items as software modules, versions of software systems, the project design document and the project plans.
Control System	A mechanism that reacts to the current project status in order to ensure accomplishment of project objectives.
Corrective Action Plan	Action necessary to correct variance from the project plan. This directive is the result of the data collecting and review process.
Cost	Expenditures required to accomplish a project activity.
Cost Budgeting	The process of establishing budgets, standards, and a monitoring system by which the investment costs of the project can be measured and managed.
Cost Estimates	The project's economic budget for labor, hours, equipment, risks, etc.
Cost Factors	Components of the economic influences on a project.
Cost Model	A tool prepared for cost estimation of the project.

Cost Performance Index (CPI)	The value earned for every measurable unit of actual cost expended. CPI = BCWP/ACWP
Cost Variance(CV)	The numerical difference between earned value (BCWP) and actual costs (ACWP).
Cost/Schedule Impact Analysis (CSIA)	The process followed to determine the cost and/or schedule impact of a specific change with a project.
Crashing	Implementing an alternative series of tasks to accomplish a specific objective. Often done to get a project back on schedule. Generally, raises the overall cost of the project.
Critical Activity	Any activity on a critical path.
Critical Path	A sequential path of activities in a network schedule that represents the longest duration of a project. Any slippage of the tasks in the critical path increases the duration of the project unless corrective actions are implemented.
CSIA	See: Cost Schedule Impact Analysis
Critical Path Method (CPM)	A scheduling technique that uses precedence diagrams for graphic display of the work plan. The charts are referred to as network diagrams.
Critical Path Network (CPN)	A plan for the execution of a project that consists of activities and their logical relationships to one another.
Critical Success Factors	A description of factors necessary to ensure the success factors of the project's design, development, and implementation. They are based on the user's, stakeholder's and project sponsor's view of the project.
Current Estimate	Forecast of start and finish dates, hours of effort, and cost, which is made at any point in time after the baseline start date has passed.
Data Collection	The gathering and recording of facts, changes, and forecasts for reporting and future planning.
Decomposing (Decomposition)	The process of breaking down activities and the work package to a manageable level, usually to a timeframe of 8 to 80 hours.

Deflection	The act of transferring all or part of a risk to another party, usually by some form of contract.
Deliverable(s)	A report or tangible product of one or more tasks that satisfy one or more objectives of the project.
Design	The creation of final approach for executing the project's work.
Design Control	A system for monitoring project scope, schedule, and cost during the project's design stage.
Detail Schedule	A schedule used to communicate the day-to-day activities to working levels on the project. A schedule must incorporate planned start dates and planned finish dates.
Development Strategy	A description of the project's technical strategy, i.e. architecture, technical approach, etc.
DISC	Division of Information Services and Communications within the Department of Administration.
Discrete Activity	A task that has a deliverable, is measurable, and has a definite start and finish. A low-level task on the Work Breakdown Structure would be an example of a discrete activity.
Display	A pictorial, verbal, written, tabulated, or graphical means of transmitting findings, results, and conclusions.
Earned Value (EV)	This is a mathematical calculation used to estimate what you got for what you spent. Also referred to a budgeted cost of work performed.
Economic Evaluation	The process of establishing the value of a project in relation to other state standards/benchmarks.
Estimate	An evaluation of all the costs of the elements of a project or effort as defined by an agreed-upon scope.
Estimated Cost at Completion (EAC)	The value (expressed in dollars and/or hours) developed to represent a realistic appraisal of the cost of the project once it is completed. It takes into consideration actual cost, plus projected cost, and is an assessment of the total project effort.

Estimated to Complete (ETC) The remaining costs to be incurred to satisfy the complete scope of a project at a specific date. The difference between the cost to date and the forecast final cost.

Ethics In the conduct of their operations, state organizations and their employees will employ information technology in a legal and ethical manner consistent with government statutes, rules and regulations. Information technology will not be used for purposes that are unrelated to the state organization's mission or that violate State or Federal law. Contract provisions, including software licensing agreements, will be strictly enforced.

Event An identifiable single point in time on a project.

Exception Reporting The process of documenting those situations where there are significant deviations from the specifications of a project. The assumption is made that the project will be developed within established boundaries. When the process falls outside of those boundaries, a report is made on why this deviation occurred.

Execution Phase It is used in this Framework to define a general stage of a project after startup and before closeout. It is the phase of work where the development team produces the primary project deliverables.

External Network Any public or private communications network external to the organization. Examples include Bulletin Board Services, subscription services such as CompuServe, America Online, Prodigy, Genie, Logitech, Lexis/Nexis, and Barclay's, public access network such as the Internet World Wide Web Gopher,

etc.

Feasibility The assessment of capability or reasonableness of being completed, including the possibility and probability.

Feasibility Studies The methods and techniques used to examine technical and cost data to determine the economic potential and the practicality of a project.

Feedback Information (data) extracted from a process or situation and used in controlling (directly) or in planning or modifying immediate or future inputs (actions or decisions) into the process or situation.

Firewall Security provided by software and hardware to control access methods to a computer system or network, to guard against unauthorized users introduction of contaminants to the system.

Framework A device used to define the basic structure of materials according to an overall concept of planning and managing. It includes policies, required processes, and their interrelationship.

Functional Requirements What the systems/products are, do, or provide from the user's point of view.

GANTT Chart Graphic representation of a project schedule that shows each job as a bar whose length is proportional to its duration. The bars appear in rows and indicate the job start and end times.

Gap Analysis A detailed analysis of the reasons that actuals differ from plan.

Guideline(s)	Used to define a collection of steps that are recommendations to be followed to meet a stated policy(s).
Impact Statement	A cause and effect report generated at the manager level to show the impact that new projects will have on current schedules and resources as they enter the work stream.
Independent Project Oversight	A process that employs a variety of quality control, inspection, testing measurement, and other observation processes to ensure that planned project objectives are achieved in accordance with an approved plan. Project oversight is usually done by an independent entity (separate from the project team) trained or experienced in a variety of management and technical review methods. Project oversight includes both technical and management oversight.
Independent Validation and Verification (IV&V)	The process of an agency that does not report through the project management reporting chain. It evaluates a product at the end of the development process to determine whether it satisfies specified requirements, and whether the products of a given development phase, satisfy the conditions imposed at the start of that phase.
Initial Risk Identification	The process of identifying risks that might impact a project. The risk identification process is recommended for agencies to evaluate a project.
Initiation	See: Project Initiation
Installation	A description of the project's method of transition to production, i.e. phased cutover, single cutover, etc.

Internet Access	All access from personal computers to the Internet, including e-mail, Web browsers, File Transfer Protocol (FTP) clients and other commonly used internet programs.
Intranet	A network entirely within a department or company, providing communications and access to information, similarly to the Internet, with Web pages, etc., for internal use only.
Issue Management	A process that provides a mechanism to document, research and resolve issues that arise during project planning and execution.
AB	Advisory Board
EC	Executive Council
PP	Project Plan
JAD	Joint Application Development or Joint Application Design
LCC	Legislative Coordinating Council
Leadership	The way in which the project manager influences the project team to behave in a manner that will facilitate project goal achievement.
Level of Effort (LOE)	Work that cannot be effectively associated with a definable end product process result. It is measured in terms of resources actually consumed within a given time period, e.g. project manager time, Steering Committee time.
Life Cycle	The type of methodology to be used in system development, e.g. System Development Methodology, Information Engineering Methodology, or Rapid Application Development Methodology.
Life Cycle Costing	The concept of including all costs within the total project from concept through implementation, startup to dismantling. It is used for making decisions between alternatives and expresses the total cost of a system.
Management Project	The process of evaluating and monitoring the project management processes that exist for a given project and ensuring that the stated process conforms to the project plan.

Oversight

Management Styles Refers to a series of styles that a manager may elect to use to lead and motivate a team. Some specific styles are: authoritarian, combative, conciliatory, disruptive, ethical, facilitating, intimidating, judicial, promotional, and secretive.

Master Schedule A comprehensive list of an approved project, containing schedule and progress statistics.

Method The manner or way in which work is done. When formalized into a prescribed manner of performing specified work, a method becomes a procedure.

Methodology Used to define the processes, policies, and guidelines that are included as part of the framework for project management.

Milestone A significant event in the project (key item or key event).

Mission Statement A concise statement, usually one paragraph, summarizing what the project is about and what it will accomplish.

Mitigation The act of defining strategies in terms of scope, budget, schedule, or quality, in order to reduce uncertainty on the project.

Monitoring The capture, analysis, and reporting of actual performance compared to planned performance.

Network Diagram A schematic display of the sequential and logical relationship of the activities that comprise the project.

Networking The exchange of information or services among individuals, groups, or institutions.

Node One of the defining points of a network; in a network diagram, it is a junction point joined to some or all of the others by dependency lines.

Non-Conformance A deficiency in characteristics, documentation, or procedure that renders the quality of material/service unacceptable or indeterminate.

OJA Office of Judicial Administration

Order of Magnitude	This is an approximate estimate made without detailed data, that is usually produced from cost data. This type of estimate is used during the formative stages of an expenditure program for initial evaluation of the project.
Organizational Politics	The informal process by which personal friendships, loyalties, and enemies are used in an attempt to gain an advantage in influencing project decisions.
Patch	An unscheduled quick fix required to correct a program malfunction.
Path	The continuous, linear series of connected activities through a network.
PERT Chart	This charting technique is typically done to crisply communicate the project's critical path. PERT is an acronym that stands for Program Evaluation and Review Technique. PERT charts can also be used to estimate the range of potential costs and timeframes of any given project.
PIER	Post Implementation Evaluation Report. A report generated during close-out activities.
Plan	An intended future course of action.
Planning Stage	Determines details and approach of the project plan. It is the stage in which the plan is initially created.
Policy	A succinct statement that gives direction to state organizations to support implementation. Policies are high-level, overall statements that do not dedicate specific procedural steps or processes. Directives issued by management for guidance and direction where uniformity of action is essential.
Priority	The imposed sequences desired with respect to the scheduling of activities within previously imposed constraints.
Privacy	The right of individuals and organizations to control the collection, storage, and dissemination of information about themselves.
Procedure	Used to define a collection of steps that the organization is responsible for implementing to ensure that policies and

process requirements are met.

Process	The set of activities by means of which an output is achieved.
Product	General terms used to define the end result of a project delivered to a customer. Sometimes referred to as a deliverable.
Program	An organization-based established business purpose.
Progress Analysis	The evaluation of progress against the approved schedule and the determination of its impact. For cost, this is the development of performance indices.
Progress Report	A report comparing current project status against the baseline.
Project	A temporary process, which has a clearly defined start and end time, a set of tasks and a budget, that is developed to solve a well-defined goal or objectives.
Project Budget	The amount and distribution of money allocated to a project.
Project Categorization	A process state organizations complete to determine general size and complexity of an project at a very initial stage. This is prior to the project initiation process.
Project Change	An approved change to project work content caused by scope of work change or a special circumstance on the project.
Project Close-Out	A process that provides for acceptance of the project by the project sponsor, completion of various project records, final revision and issue of documentation, and the retention of essential project documentation.
Project Database	The automated portion of the project library.
Project Definition	The definition of what is expected to be obtained for the effort expended.
Project Duration	The elapsed time from project start date through to project finish date.
Project Initiation	A process that occurs after state organization has completed the project concept and phase planning and denotes a series of steps to have the project externally approved and started.
Project Library	The collection of automated and manual files and reports used to plan, manage and control a project.
Project Life Cycle	A collection of phases through which any project passes. Note that the number of phases and the breakdown are dependent on the methodology being used. A typical waterfall life cycle has either 4 or 6 phases.

Project Management (PM)	The processes of directing and coordinating human and material resources throughout the life of a project by using management techniques to achieve predetermined objectives of scope, cost, time, quality, and participant satisfaction.
Project Manager	The individual appointed and given responsibility for management of the project.
Project Number	The number given by organizations to identify an approved project.
Project Objectives	A description of the specific functionality that the project intends to accomplish upon implementation.
Project Oversight	A process that employs a variety of quality control, inspection, testing measurement, and other observation processes to ensure that planned project objectives are achieved in accordance with an approved plan. Project oversight is usually done by an independent entity (separate from the project team) trained or experienced in a variety of management and technical review methods. Project oversight includes both technical and management oversight. (Same as Independent Project Oversight).
Project Overview	A summary of the project's Mission, Description, Scope, and Key Objectives.
Project Plan	A management summary document that gives the essentials of a project in terms of its objectives, justification, and how the objectives are to be achieved. It should describe how all the major activities under each project management function are to be accomplished, including that of overall project control. The project plan will evolve through successive stages of the project life cycle.
Project Planning	The identification of the project objectives and the ordered activity necessary to complete the project plan. The identification of resource types and quantities required to carry out each activity or task.
Project Schedule	A graphical representation of predicted tasks, milestones, dependencies, resource requirements, task duration, and deadlines.
Project Summary	Defines the estimated value of the project, the deliverables, the effort's duration, the purpose, goals, acceptance and completion criteria, assumptions, major dependencies/constraints, and status. It is updated monthly.
Project Tasks	The activities that accomplish the project objective.

(Activities)

Quality	A composite of attributes (including performance features and characteristics) of the product, process, or service that is required to satisfy the need for which the project is undertaken.
Quality Assurance	A planned and systematic means for assuring management that defined standards, practices, procedures, and methods are applied to a project.
Quality Management	A collection of quality policies, plans, procedures, specifications, and requirements is attained through quality assurance (Managerial) and quality control (Technical).
Quality Plan	Planned and systematic process for evaluating the satisfaction of the project.
Quality Process Review	The technical process of using data to decide how the actual project results compare with the quality specification.
Relative Priority	The specific prioritization of any individual request in relation to other requests in the same general priority group.
Release	Piece of a product that delivers functionality to the customer, but is not a complete system. Limited scope for installation of software. There may be multiple releases within a version.
Required Process(es)	Used to define a specific course(s) of action that are mandated by organisation, law, or directives.
Required Skills	The ability and knowledge necessary to perform work tasks.
Requirements	Something essential to the existence or occurrence of something else.
Requirements Process	**The disciplined application of proven methods and tools to describe a proposed system's intended behavior and its associated constraints.**
Resource	Something that lies ready for use or that can be drawn upon for aid or to take care of a need.
Resource Loading Profiles	Detailed staffing plan including number of personnel by type over time.
Resource Planning	The identification of components required to complete the project.
Resource Profiles	See: Resource Loading Profiles

Risk	Any factor that potentially can jeopardize the successful completion of a project.
Risk Analysis	Systematically determining the impact of identified risks on the project.
Risk Assessment	Review, examination, and judgment of whether or not the identified risks are acceptable. Initial risk assessment is used as a tool to determine project oversight requirements.
Risk Event	The precise description of what might happen when a risk occurs.
Risk Management	The art and science of identifying, analyzing, and responding to risk factors throughout the life of a project and in the best interests of its objectives.
Risk Mitigation	The act of revising the project's scope, budget, schedule, or quality, in order to reduce uncertainty on the project.
Risk Probability	The likelihood a risk event is likely to occur.
SB5	Senate Bill 5 relates to recent legislation defining CITA and CITO, roles, and mandated the adoption of the project management methodology
Schedule	A display of project time allocation for all tasks in a given project.
Schedule Update	Revision of the schedule to reflect the most current scope, timeframe, deliverables and requirements.
Schedule Variance (SV)	The numerical difference between Earned Value (BCWP) and the Budget Plan (BCWS).
Scheduling Tools	Tools that support the scheduling efforts of a project, such as a GANTT or PERT chart.
Scope of Work	A narrative description of the work to be accomplished, deliverables to be produced or processes to be followed.
SDLC	System Development Life Cycle
Sponsor	Customer representative responsible for sponsoring the project and usually in charge of project funding.
Stakeholders	Individuals or organizational entities whose stake in the project is sufficient for them to attempt to play an influential role affecting the outcome of the project.
Standards	Set of criteria used to accomplish a specific task and describe what the finished product should be.

Standards Template	Set of project planning guideline patterns to select from, based on project size. Contains minimum standard deliverables that MUST be met.
Start-Up	The period after planning during which the project is baselined and resources are committed.
State Organization	Used to define a general state organizational level consisting of the Agency and Departments interchangeably. Reference to Agency (with a capital "A") is used for specific reference to an Agency or that specific organizational level.
Status	The condition of the project at a specified point in time.
Status Report	A report containing specific information on a specific project. In this methodology, this information is documented using Form PM-07.
Status Report Package	A collection of reports produced at pre-defined intervals to provide information on the project.
Steering Committee	The group of senior level people within an organization that provides high-level oversight to a project. The Project Manager reports to the Steering Committee. The Steering Committee assumes overall responsibility for addressing project risks based on the judgment of the members and recommendations of the Project Manager.
Strategy	A framework guiding choices that determine the nature and direction needed to attain an objective.
Support Organization	Any group outside of the project leader's control, that is responsible for tasks on the work breakdown structure.
System	A methodical assembly of actions or things forming a logical and connected scheme or sequence of tasks, calculations, reports or access to data.
System Development Methodology (SDM)	A structured approach to designing and implementing computer applications.
Task	An activity, or series of activities, which are necessary to accomplish the project objectives.
Task Analysis	A process and associated form used to document the efforts, issue and cost associated with a complex task.
Team Building	The process of influencing a group of diverse individuals, each with their own goals, needs, and perspectives, to work together effectively for the good of the project, such that their team will accomplish more than the sum of their individual efforts could otherwise achieve.
Team Member	The individuals, reporting either part time or full time to the project manager, who are responsible for some aspect of the project's activities.

Technical Project Oversight	The processes by which a project oversight organization evaluates a design and development product to determine whether it satisfies specified requirements, and whether the products of a given development phase satisfy the conditions imposed at the start of that phase. This evaluation is a process separate from the actual project execution activities, and status is reported external to the project.
Technical Specifications	Documentation that describes, defines, or specifies the goods/services to be supplied. Generally, technical specifications refer to the specifications related to computer architecture, database, operating system, etc.
Variance	Any actual deviation from an intended or budgeted figure or plan. A variance can be a difference between intended and actual time. Any difference between the projected duration for an activity and the actual duration of the activity. Also, the difference between projected start and finish dates and actual or revised start and finish dates.
Version	Represents a major addition in functionality and/or the look or use of a product. This generally refers to software.
Version Control	A method used to control the release and installation of versions. This includes recording and saving each release and documenting the differences between the releases. Version control applies not only to developed software, but also to off-the-shelf software systems that are used as part of the project.
WAN	Wide area network is a means by which multiple workstations and/or servers interconnect to share common peripheral devices and data with multiple locations.
Work Breakdown Structure (WBS)	A division of tasks that organize, define, and graphically display the product to be produced, as well as the work to be accomplished to achieve the specified product. Decomposition of a project into a set of defined sub-tasks.
Work Packages	The descriptions of work to be accomplished within a given task. Theses work packages are given to individuals who are then accountable.
Work Product Identification (WPI)	A report, which identifies the deliverables to be produced during a project. The report is part of the project plan but is also included as a part of each status report package.
Work Schedule	Contains target hour and start and finish dates for each activity, group of activities and the project as a whole.
Work Unit	A calendar time unit when work may be performed on an activity, i.e. hour, day, week.

15.3 Washington Terms in Alphabetical List

We also include the Glossary of Access Washington USA, Official State Government Web Site.

A

Acceptance: The formal process of accepting delivery of a product or deliverable.

Acceptance Criteria: Performance requirements and essential conditions that have to be achieved before project deliverables are accepted.

Alternatives: A number of different solutions and approaches that must be evaluated and chosen to attain the objectives of a project.

Approach Statement: A high-level description of how the project will accomplish its goals and objectives.

B

Balanced Scorecard: A management and measurement system that enables organizations to clarify their vision and strategy, and translate them into action. It provides feedback for both the internal business processes and external outcomes in order to continuously improve strategic performance and results.

Baselines: Reference levels against which the project is monitored and controlled.

Business Drivers/Background Statement: An explanation of why the project is needed and why it is being recommended at this time. It describes the business problem or issue that will be resolved by the project as well as any background information necessary to understand the problem.

Business Goals: The underlying basis for which a project is undertaken.

Business Teams: Members of the organization unit, usually benefitting from the project's outcomes.

C

Charter: A formal document providing authority to a project manager to conduct a project within scope, quality, time, cost, and resource constraints as laid down in the document.

Constraints: A condition or occurance that might restrict, limit, or regulate the project. Generally constraints are outside the control of the project team.

Contingencies: Planned actions for minimizing the damage caused by a problem, in the event that problem should occur.

Critical Path: The series of tasks that must finish on time for the entire project to finish on schedule. A delay in any task on the critical path will result in a delay in the project.

D

Deliverable: Any measurable, tangible, verifiable item that must be produced to complete the project.

Design Specification: A document that specifies the "design-to" requirements and may include functionality, performance, interfaces, constraints, effectiveness, and verification.

E

Exposure (rank): The likely loss or consequence of a risk. It is the combined probability and impact of a risk usually expressed as the product or probability x impact.

F

Feasibility Study: A study to examine the viability of taking on a project.

Fiscal Year: The 12-month period of July 1 to June 30 used for financial planning and reporting purposes.

G

Goal Statement: A high-level statement of the project's object of study, its purpose, its quality focus, and viewpoint. Should reference the project's business benefits in terms of cost, time and/or quality.

Governance: The planning, influencing and conducting of the policy and affairs of the project.

Governance Committee: A group of interested people (customers, technicians, managers, etc.) providing direction, guidance and approval for a project.

Governance Model: The agreed upon processes, roles and responsibilities for governing the progress and direction of a project.

H

I

ISB Oversight: The Information Services Board (ISB) is a 15-member Board made up of leadership from the Legislature, state agencies, higher education and the private sector. State law directs the ISB to:

- develop standards to govern the acquisition and disposition of equipment, software and purchased services;
- approve IT acquisitions or set rules that delegate acquisition authority;
- develop statement or interagency technical policies;
- review and approve the statewide strategic plans;
- provide oversight on large projects;
- establish and monitor appeals processes.

Portfolio: A model for the management of Information Technology ( ) resources adopted by the Washington State Legislature and the Information Services Board. Beginning in January 1998, the ISB approved a body of portfolio management policies, standards and guidelines developed in collaboration with the Department of Information Services' Customer Advisory Board.

Under the portfolio concept, state agencies manage their resources as one would manage investments in a real estate or stock portfolio. The portfolio facilitates the alignment of technology investments with agency business needs and the analysis and proper mitigation of IT investment risks.

Impact: The harm or consequences to a project of a risk if it occurs. Usually expressed on a relative scale such as low, medium or high.

J

K

L

Lessons Learned: A set of statements captured after completion of a project or a portion of a project. The statements describe in a neutral way what did or did not work well, along with a statement regarding the risk of ignoring the lesson. Capturing and sharing the lessons learned is an important part of process improvement.

M

Maintenance And Operations: The process of keeping an information technology application running and performing its functions on a routine basis. Project activities do not include maintenance and operations tasks.

Milestones: An event of no duration. It usually marks the completion of a critical part of the project.

Mitigation: Actions taken to eliminate or reduce risk by reducing the probability and or impact of occurrence.

Mitigation Strategies: Identification of the steps that can be taken to lessen risk by lowering the probability of a risk event's occurrence, or to reduce its effect should the risk event occur.

N

Non-labor Resources: Anything that can aid or support a project that is not a person. Most often refers to hardware tools, software tools, equipment, and facilities.

O

P

PIR (Post Implementation Review): Also known as Close Out Report. This is a report compiled upon completion of every project, which determines if the expectations established for the project outcome were met. It documents the comparison between actual results of a project and the objectives and deliverables specified in the project's Charter.

Performance Outcomes: Results or consequences of the efforts enacted during the project's planning and execution.

Performance Measures: Performance measures describe how success in achieving the agency goals will be measured and tracked. Performance measure targets provide the quantifiable answer to the question, "How will we know when we've been successful in achieving our goal?" Analyzing the gaps between current performance levels and performance targets helps organizations identify priority areas needing improvement and develop strategies that will close the gap.

Phases: Distinct stages of a development project or of a version within a project; the high-level divisions of a project. The recommended project phases for a system development project are: Conceive, Plan, Design, Develop, Test, Train, Implement and Close-Out.

Probability: The likelihood of a risk occurring. Usually expressed as a probability percentage or a relative scale such as low, medium or high.

Program Manager: The person who directs the planning and execution of a program and is held personally accountable for the success of the program.

Project Approach Statement: A statement of the way the project will do things. For example, project planning may require different approaches, or different approaches may be considered as a way of reducing project risks.

Project Assumptions: Written statements relative to the project, which help to clarify scope, objectives and other relevant factors that cannot be known at a given point in time.

Project Environment: The combined internal and external forces, both individual and collective, which assist or restrict the attainment of the project objectives.

Project Management Life Cycle: The sequential major time periods through which any project passes, namely:

Initiation
Planning
Execution & Control
Closure

Each period may be identified as a phase and further broken down into stages.

Project Manager: The person who has been given the responsibility and authority to manage a project effectively.

Project Objectives: Descriptions of the project's intended results.

Project Organization Chart: A chart that indicates project staff roles, responsibilities, and reporting relationships.

Project Outcomes: A result or consequence of the project activity.

Project Resources: Anything that can aid, support, or execute a project. Most often refers to project staff with specific knowledge, skills, and abilities.

Project Scope Statement: A concise and accurate description of the expected work, products and deliverables. Also includes work and products that are not included in the project.

Project Sponsor: The executive who manages, administers, monitors, funds and is responsible for the overall project deliver.

Project Statement: A concise statement that clearly identifies the project's purpose, or desired outcome. It generally includes three components: cost, time and performance.

Project Status Reports: Written reports given to both the project team and to a responsible person on a regular basis, stating the position of an activity, work package, or whole project. Status reports control the project and keep management informed of project status.

Project Team Members: Members of the core project team and those that are assigned to development and/or support the project deliverables.

Q

Quantifiable Measures: Scientific measures.

R

Resource Pool: A set of **project resources** that is available for assignment to the accomplishment of project tasks.

Required Approvals: Required sign offs, usually by higher authority.

Risk: A future event or problem that exists outside of the control of the project that will have an adverse impact on the project if it occurs. Risk involves the probability of occurrence and the possible consequences or impact. Unlike an issue that is a current problem that must be dealt with, a risk is a potential problem that has not yet occurred.

Risk Analysis: An examination of risk areas or events to assess the probable consequences for each event, or combination of events in the analysis, and determine possible options for avoidance.

Risk Exposure (rank): The likely loss or consequence of a risk. It is the combined probability and impact of a risk usually expressed as the product or probability x impact.

Risk Impact: The harm or consequences to a project of a risk if it occurs. Usually expressed on a relative scale such as low, medium or high.

Risk Management: A process to assess potential problems (risks), determine which risks are important to deal with, and implement strategies to reduce the likelihood or consequences (impact) of those problems.

Risk Mitigation: Actions taken to eliminate or reduce risk by reducing the probability and or impact of occurrence.

Risk Probability: The likelihood of a risk occurring. Usually expressed as a probability percentage or a relative scale such as low, medium or high.

Risk Trigger: Events or thresholds for indicators that specify when an action such as implementing a contingency plan needs to be taken.

S

Scope Creep: The process by which a project slowly grows beyond its initial scope by the changing or addition of new requirements, activities and/or deliverables.

Service Level Agreement (SLA): A contract between a service provider and a customer that specifies, usually in measurable terms, what services the service provider will furnish.
SMART: The five elements for a well-worded objective, namely Specific, Measurable, Achievable, Realistic, Time Bound.

Staffing Profile: A listing of the knowledge, skills, and abilities of project staff assigned to, or needed by, a project and when they are needed.

Stakeholders: The people who have a vested interest in the outcome of the project.

Steering Committee: A group of people who monitor the project and give guidance to the project sponsor or project manager.

Strategic Plan: A plan that is tightly tied to the organization's mission, vision, values and objectives, and depends heavily on high-level coordination and influences management to achieve their goals.

System Lifecycle: The sequential major time periods through which any system passes.

T

Technical Committee: A committee that administers the technical aspects of the project.

Technical Requirements: Documentation that describes, defines or specifies the goods/services to

be supplied.

Technical Team: A team that provides help in specific technologies.

U

User: Any individual or organization that uses the system or the results of the system.

V

Vision Statement: A statement that captures the long-term picture of what the organization wants to become. A vision statement must be inspirational, memorable and reflect the desires of those with vested interests. An example would be, "To be recognized for leadership, innovation and excellence in improving the health of individuals and populations."

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17. APPENDICES

In **Appendix A** all Templates of the Data Collection Matrix are presented.

In **Appendix B** the Templates used as examples.

Panos Antonakopoulos
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15 October 2004

APPENDIX A

PROJECT MANAGEMENT TEMPLATES				DATA COLLECTING MATRIX					
FORM NUMBER	TITLE	FILE	INITIATED AT PHASE	OPTIONAL	CONTROLLING AREA	PROCEDURE	REVIEW FREQUENCY	REVIEW AUTHORITY	OPTIONAL REVIEW
F1	SCOPE & DEFINITION	doc	PLANNING	NO	SCOPE	CHANGE	MONTHLY	STEERING COMMITTEE	YES
F2	RISK	xls	PLANNING	NO	SCOPE	RISK	MONTHLY	PM	YES
F3	QUALITY PLAN	doc	PLANNING	YES	QUALITY	QUALITY	MONTHLY	QAM	YES
F4	COMMUNICATION PLAN	xls	PLANNING	NO	QUALITY	COMMUNICATION	MONTHLY	PM	YES
F5	COMMUNICATION TEMPLATE	doc	PLANNING	NO	QUALITY	COMMUNICATION	MONTHLY	PM	YES
F6	ISSUE LOG	doc	EXECUTION	NO	ALL		ON GOING	PM	NO
F7	ORGANISATION PLAN		PLANNING	NO	TIME & COST	TIME & COST	MONTHLY	PM	YES
F8	SCHEDULE	doc	PLANNING	NO	TIME & COST		weekly update	PM	NO
F9	COST	xls	PLANNING	NO	TIME & COST	TIME & COST	weekly update	PM	NO
F10	MS Project3	mpp	PLANNING	NO	TIME & COST	TIME & COST	weekly update	PM	NO
F11	STATUS REPORT	doc	EXECUTION	YES	ALL		MONTHLY	PROJ TEAM	NO
F12	MEETING AGENDA	doc	REVIEW	NO	REVIEW	REVIEW	EACH MEETING	PM	NO
F13	MEETING MINUTES	doc	REVIEW	NO	REVIEW	REVIEW	EACH MEETING	PM	NO
F14	PROGRESS REPORT	doc	REVIEW	NO	ALL	REVIEW	AD HOC	STEERING COMMITTEE	NO

SCOPE AND DEFINITION

Project Desription					
Issued By:	<Name Surname> <Position>	Date Prepared:	dd/mm/yyyy	Revision Number:	x
Approved By:	<Name Surname> <Position>				
Project Reference					
Project Name					
Project Purpose	***To:*** implement a project .... ***in a way that,*** • provides ....; ***so that:*** the department can				
Project Background	History; who involved, when, why; what results if any...				
Project Scope	**In Scope:** The scope of investigation will include: • Systems Development... • Departments in scope include: • Production ... • Processes in Scope Include: • Quality Control • **Out of Scope:** The following services are out of scope: • Departments not managed by XX division • Departments Out of scope include: • Marketing • .... • Operations Service Level Metrics Processes Out of Scope Include: • Client Management Process • ... ***Critical Requirements Within Scope*** 1. xxx 2. yyy 3.				

Constraints	1. fff 2. ggg 3. **Dependent On:** • Implementing projects for .... • Provision of financial support by ... • Resources availability from XXX organization **Projects Dependent on This One:** AAABBB.		
Deliverables	What are the main Project Deliverables?	When expected?	To whom provided?
	• XXXX		
	• YYYY		
	• ZZZZ		
Organisation			
Project Sponsor	<Name Surname, Department, Position>		
Project Manager	<Name Surname, Department, Position>		
Project Stakeholders	<Name Surname, Department, Position> <Name Surname, Department, Position>		
Project Review	By: <Name Surname, Department, Position> <Name Surname, Department, Position> <Name Surname, Department, Position>	Frequency:	
Resources & Responsibilities	• Project Manager --half time -- Run Project until full time staff is hired • Quality Consultant --full time – Quality System Design, Diagnostic Audit, Procedures Design, Data Acquisition, Local Training Plan and Delivery, Project Reviews • Quality Trainer -- full time -- build training package as required, provide implementation support • Temporary Clerical help -- full time -- after Package Selection • Technical Expert		
Schedule			
Start Date			
End Date			
Estimate	Calendar Time = from agreement to certification - • 45 days for Diagnostic (Gap) Analysis Research • 60 days Procedures Development • ... • ... Assumptions • Project Manager is a company employee • Existing procedures cover technical issues • Client personnel will provide instructions •		
Location (s)	The services will be provided at....		
Final Product			
Project Approach	• Refer to MSProject Plan PMC1.MPP		
Interim Products	What are the products of the milestones?		
Business Objectives			
Project Justification			

Risks	
Preventive measures	
Costs	Summary Values:

				S/W License	S/W Maint.	Media/ Docs.	Consulting Services	Internal Resources Time Est.	Internal Resources Cost	H/W	TOTAL
General Total	0	0	0	35,000	3,000	0	60,000		132,000	0	232,640

<PROJECT NAME>

External Dependency Risk Factor	Value	Score	Problem	Preventive Action
Multiple vendors / contractors?	Y = 2, N = 0		Coordination.	Ensure adherence to standards, both technical and managerial. Emphasize the importance of regular status reporting.
Poor vendor support?	Y = 1, N = 0		Time wasted waiting for response to queries or due to rework arising from mistaken assumptions made by the project team in the interim.	Impose contractual constraints/safeguards. Request documentation in advance. Ensure effective account manager. Identify a user group with other clients.
Critical dependence on external suppliers?	Y = 2, N = 0		May miss milestones waiting for deliverables.	Ensure suppliers are aware of schedule commitment. Request interim status reports and review of partially complete deliverables so that the project team can verify the supplier's estimates of the effort to go. Impose contractual obligations.
Number of inter-project dependencies?	< 3 = 0, 3-5 = 3, > 5 = 5		Time wasted awaiting completion of other projects not within the stage manager's control.	Have a co-ordination project with the critical path specified in terms of projects. Recommend a strategic / architectural plan is produced.
Overlapping scope with other projects?	Y = 3, N = 0		Parallel, or duplicate, development of similar areas with different approaches causing confusion and irritation to the user.	Establish cross-project standards to ensure consistency. Establish change control procedures to manage the different changes proposed by different systems. Recommend a strategic/architectural
Contradicts LRSP direction?	Y = 10, N = 0		Project initiated for no justifiable reason, e.g., political.	Ensure Project Board and Strategy Committee are aware of the situation.
Plan requires extensive recruitment of resources?	Y = 2, N = 0		Time and expense	Investigate training current resources. Plan gradual take on to allow for familiarization and training. Investigate viability of using short term experienced contractors.
External Dependency Total		0	Low Risk	

F2 RISK **<PROJECT NAME>**

Organizational Risk Factor	Value	Score	Problem	Preventive Action
Number of user areas and decision makers?	Equal to number of user areas / decision makers.		Not obtaining consensus.	Identify key representative. Establish decision making process/responsibilities.
Multiple geographical locations?	Equal to number of geographical areas divided by the number of implementation sites		Time to distribute deliverables and co-ordinate activities.	Select a pilot implementation site then a phased implementation. Establish focal point for development activities.
Previous user IS project experience?	Y = 0, N = 1		Unrealistic expectations. Lack of communication. Lack of knowledge of roles and commitment.	Schedule briefing and training sessions early in project. Increase user involvement/participation.
Size of departments impacted?	< 200 = 0, 200-500 = 1, 500-2000 = 3, > 2000 = 5		(This is the number of people whose function will be changed as a consequence of the new system) Complexity of requirements and possibility of conflicts.	Training requirements and implementation logistics. Consider phased implementation if self-contained increments can be identified. Plan implementation as early as possible.
Inappropriate level of sponsorship?	Y = 10 N = 0		When a problem arises, the sponsor may not have the authority, or perspective, to support the project adequately.	Extend project board to include a more appropriate sponsor.
Key users unavailable?	Y = 5, N = 0		Lack of understanding of requirements. Lack of involvement of users in production of deliverables with a consequential lack of commitment to project.	Use techniques which are less dependent on user input, e.g., relational data analysis rather than data modeling. Use user representative on Project Board to "encourage" user participation.
Organizational changes required (in terms of structure / responsibility)?	Y = 2, N = 0		Resistance to system by organization.	Hold briefings throughout project on what the repercussions will be. Increase user involvement. Obtain top management commitment.
Level of changes required to user procedures?	High = 3, Moderate = 2, Low = 1		Users inadequately prepared for a successful implementation and handover.	Increase level of user training, use of prototypes and presentations of the new procedures, both system and

Are users dually involved in the management and execution of the project?	Y = 0, N = 3		Lack of commitment to assuring quality of technical deliverables and to plan.	Increase user participation in the technical activities by use of JAD, and the interactive sessions, to gather information and create models. Determine user roles in the project organization (Project Board, Project Coordinators).
Will extensive education be required to facilitate use of the system?	Y = 2, N = 0		Inadequate budget and time frame for training.	Include prior walkthrough of the training sessions and materials to gain commitment from user management.
Organizational Total		0	Low Risk	

F2 RISK

<PROJECT NAME>

Planning risk Factor	Value	Score	Problem	Preventive Action
Dependent on scarce resources / skills?	Y = 5, N = 0		Competition for resources or personnel with appropriate skills.	Make resource requirements known as early as possible.
Complex task dependencies?	Y = 3, N = 0		Critical dependencies unknown, increased chance of slippage.	Increase level of planning. Tighten project control.
Critical implementation date?	Y = 5, N = 0		May have to cut back on quality and/or functionality, or project discarded if date missed.	Verify significance of date. Ascertain which portions of system are required for that date. Consider incremental development. Plan and control at detailed level.
Informal control procedures?	Y = 5, N = 0		Inaccurate Project Status information.	Encourage take on of formal controls by training and provision of project management software.
Effort versus elapsed time?	Effort time/Elapsed time		The greater this ratio, the greater the number of simultaneous tasks. Increased staff associated with development and associated	Increase control procedures and introduce additional level of management. Divide into achievable sub-systems.
Number of major subsystems?	< 3 = 1, >= 3 = 3		Managing Interfaces.	Have a co-ordination project. Establish overall architectural plan. Minimize project interdependencies.
Subsystem more than 3 elapsed	Y = 2, N = 0			Increase the number or control points.
Subsystem more than 12 elapsed months?	Y = 2 N = 0		Increased chance of slippage due to possible changes in requirements or scope over longer elapsed time.	Increase the number or control points.
Level of confidence?	>85% = 1, <85% = 3		Level of planning experience of unknowns within the plan may make estimates low.	Ensure management tolerances and contingencies are identified.
Key dates set by project team from the plan?	Y = 0, N = 3		No commitment to plan, unachievable date.	Verify significance and justification for dates. Produce a plan.
Experience of project manager?	High = 0, Moderate = 1, Low = 3, None allocated = 4		Plans may not exist. Control procedures may not be adequate.	Provide training and support from experienced project manager. Increase involvement by Project
Planned resources available?	Y = 0, N = 5		New plan will be required to fit with maximum resource constraint or project could be canceled/postponed.	
Planning Factor Total		0	Low Risk	

F2 RISK **<PROJECT NAME>**

Business Related Risk Factor	Value	Score	Problem	Preventive Action
Major increase in costs possible?	Y = 3, N = 0		If greater than +/-5%, then likely to miss stage end targets.	Set appropriate tolerance levels. Investigate mechanisms for further controlling costs.
Evolving business requirements?	Y = 5, N = 0		Do not know where project should be heading, difficulty in justification, significant rework likely.	Use iterative development approach. Establish detailed scoping study. Increase user involvement.
Incomplete definition of scope / requirements?	Y = 5, N = 0		Cannot estimate effort as a lot of rework is likely.	Involve more senior user representatives. Establish detailed scoping study. Increase time spent in analysis.
Ill-defined benefits?	Y=2, N=0		Difficult to select optional solution, potential for project being canceled.	Use CRA to help define tangible benefits. Establish focused sessions with user to evaluate benefits.
Lead time for return on investment	Twice development time = 2, Five times or more the development time = 5		May never achieve pay-back.	Reduce scope of system to include most profitable segments.
Mission critical system?	Y = 5, N = 0		Business may fail if project fails.	Increase planning and level of control.
Fundamental to IS strategy?	Y = 5, N = 0		Foundation system impacting other developments.	Increase planning and level of control.
Business commitment to development?	High = 1, Low = 3		System perceived as belonging to I.S. department.	Hold assessments requiring user sign-off. Increase user involvement. Produce detailed Business Case.
Business Case Total		0	Low Risk	

Technical (Environment) Factor	Value	Score	Problem	Preventive Action
Inappropriate development tools?	Y = 2, N = 0		Required tools unavailable.	Review tools and associated justification. Evaluate other productivity areas.
New / unfamiliar technology?	Y = 5, N = 0		Time required for learning curve during development.	Conduct training. Recruit experienced staff. Obtain vendor
Stable development team?	Y = 0, N = 5		Lost information. Time required for handover.	Document in standard format as project progresses. Increase attendance at reviews to spread
Low team knowledge of business area?	Y = 1, N = 0		Increased reliance on users.	Increased user participation. Increase frequency and formality of
Project team skills?	Expert = 0, Balanced = 1, Trainee = 5.		If the balance of expertise is low, then there is an increased risk of defects.	Increase the frequency of Quality Assurance Reviews and Project Checkpoints. Include experienced staff as specialized technical support. Account for experience levels when planning.
Use of development method / standards?	Y = 0, N = 2		Project team does not know what to do. Tasks may be duplicated or	Implement a standard approach to development, ensure staff familiarity.
Technical (Project) Factor				
Complexity of functions?	Low = 0, Moderate = 2, High = 5		Increased risk of defects.	Increase effort in Logical Design to validate. Increase level of reviews. Use formal techniques.
Complexity of database?	Low = 0, Moderate = 2, High = 5		Performance problems.	Increase data validation steps throughout. Ensure thorough Physical Design Tuning. Increase DBA involvement.
Database to be shared by a number of applications?	Y = 3, N = 0		Difficult to tune successfully in Physical Design.	Attempt to establish overall volumes and requirements. Keep design flexible.
Number of physical system interfaces?	< 3 = 0, >= 3 = 3.		Increase risks of systems failure.	Increase time in defining interfaces in detail. Involve experts from associated systems.
Clearly specified requirements?	Y = 0, N = 3		Rework may be necessary as systems may not meet users' needs.	Increase user involvement.

Number of design decisions at discretion of systems architect (no user	0-25% = 0, 25-60% = 3, 60%+ = 5		Rework may be necessary as system may not meet user's needs	Increase user involvement.
Is a package solution available?	Y = 0, N = 3		Effort required in design, construction and testing.	Ensure buy/build option is appropriately conducted.
If using a package, was the package evaluated and selected, based upon detailed specifications and	Y =0, N = 3		Mismatch likely.	Carry out evaluation if cost justified.
If using a package, were package changes required?	0-5% = 0, 5-15% = 3, over 15% = 5		Required information may be difficult to obtain, or not supported.	Contract vendor to do changes. Evaluate alternative solutions. Minimize changes to front/back ends.
Complex on-line networks?	Y = 2, N = 0		Increased risk of technical problems (incompatibility, etc.)	Add activities to prototype the on-line architecture. Involve technical experts in physical design stage.
Multi-level hardware requirement?	Y = 2, N = 0		Interfaces, data distribution.	Separate technical feasibility project started early. Ensure availability of required skills.
Technical (Operational) Factor				
Upward compatible hardware?	Y = 0, N = 3		Hardware constraints will increase problems in physical design and implementation.	Increase time scheduled for physical design and construction stages. Involve technical experts in physical design stage.
24 hour availability?	Y = 3, N = 0		Tight timing constraints will increase problems in physical design and construction.	Increase time scheduled for physical design and construction stages. Involve technical experts in physical design stage.
Rapid response time (below 2 seconds) ?	Y = 3, N = 0		Tight timing constraints will increase problems in physical design and construction.	Increase time scheduled for physical design and construction stages. Involve technical experts in physical design stage.

Small batch window?	Y = 3, N = 0		Tight timing constraints will increase problems in physical design and construction.	Increase time scheduled for physical design and construction stages. Involve technical experts in physical design stage.
High-volume throughput?	Y = 3, N = 0		Tighter performance constraints will increase problems in physical design and construction.	Increase time scheduled for physical design and construction stages. Involve technical experts in physical design stage.
Very large database?	Y = 3, N = 0		Performance and storage constraints will increase problems in physical design and construction.	Increase time scheduled for designing the database and for storage and performance predictions. Involve technical experts in physical design stage.
Short recovery cycle?	Y = 3, N = 0		Tighter recovery constraints will increase problems in physical design and construction.	Increase time scheduled for physical design and construction stages. Involve technical experts in physical design stage.
Technical Total		0	Low Risk	

RISK Factor		Score	Risk Level
External Dependency Total		0	
Organizational Total		0	
Planning Total		0	
Business Case Total		0	
Technical Total		0	
Overall Project Total		0	Low Risk

PROJECT QUALITY PLAN

Project name *insert project name*

Release Draft/Final
Date:

Author:	
Owner:	
Client:	
Document Number:	

Overview

Introduction To define the quality techniques and standards to be applied, and the various responsibilities for achieving the required quality levels, during the project.

Contents This plan contains the following topics:

Customer's quality expectations

Methodology Description

Deliverables Description

Acceptance Criteria

Quality responsibilities

Standards Used

Managerial

Technical

Quality control and audit processes

Project management

Specialist work

Quality tools (Corrective & Preventive Action Plan, Check Lists)

Quality Review (per phase)

PROJECT COMMUNICATION PLAN

Stakeholder/Group & Contact Information (Recipient)	Role	Information Required	From Whom (Sender)	Schedule of Delivery	Means of Delivery	Format	Start Date (dd/mm/YYYY)	End Date (dd/mm/YYYY)	Comments
This person or group	*in this role*	*needs this information*	*from this person or group*	*on this schedule*	*delivered by*	*in this format*	*starting this date*	*and ending this date*	
Sponsors	Sponsor	Project Status & Progress	Project Manager	Monthly, 4 days in advance of Progress meetings	Written report and 60 min meeting	Standard Project Status Form		Project completion	
Name	Project Manager	Project Status	Project Team	Weekly	oral reports	Team meetings	Project start	Project completion	
Name	Project Manager	Project Status	Project Team	Daily	Update status files	Update status files	Project start	Project completion	
Executive Committee	Management oversight	Project Status	Project Manager	Monthly	Executive Committee meetings	Formal presentation	Project start	Project completion	
Name									
Name									
Project Team				Weekly					
Name									
Name									

PROJECT COMMUNICATION PLAN

Group Name	Member Name (* = primary)	Mobile Number	Phone Number	E-mail
Sponsors	* Name1 Name2 Name3			
Project Team	* Name1 Name2 Name3			
Risk Mgt Team	* Name1 Name2 Name3			
Quality Team	* Name1 Name2 Name3			
Team Name	* Name1 Name2 Name3			
Team Name	* Name1 Name2 Name3			

PROJECT COMMUNICATION PLAN

Meeting Name	Purpose	Schedule	Place	Contact	Preparation of Agendas, Mintues	Attendees
Team Meeting	Project status, problem-solving, review upcoming project targets	**Weekly** on xxx from xx:xx to xx:xx	As agreed	Name, mobile tel, e-mail	Project Manager	Project Team, name1, name2, name3
Project Progress Meeting	Official presentation to the customer of monthly progress	First Monday **every month**, 09:30	As agreed	Name, mobile tel, e-mail	Project Manager with customer aproval	PM, QAM, some Project Team members, Sponsors, name 1, name2, name3
Project Management Review	Review, Decisions	Twice per projet	As agreed	Name, mobile tel, e-mail	Project Manager with customer aproval	PM, QAM, Sponsors, Direct Beneficiaries, name 1, name2, name3

F5 COMMUNICATION TEMPLATE <PROJECT NAME>

Communication Plan

				Audiences –TO--		
What	When	How	Responsible --FROM--	*Sponsor(s)*	*Project Team*	*Beneficiaries Or users*
Project Kickoff	*Project Start (include date when planned)*	*Meeting Attendance*	*Project Manager*	*Approve*	*Receive*	
Project Plan	*Start & Upon Updates*	*Document*	*Project Manager*		*Receive*	
Team Meetings	*Weekly*	*Meeting Attendance*	*Project Manager Invite (agenda)*		*Attend*	
Team Meetings	*Weekly*	*Minutes (F13) via e-mail*	*Project Manager*		*Receive*	
Progress Meetings	*Monthly*	*Meeting Attendance*	*Project Manager Invite (agenda)*	*Attend*	*Attend*	
Progress Reports	*Monthly*	*Document (F11) via e-mail*	*Project Manager*	*Receive*	*Receive*	
Major Milestone Announcements	*As completed*	*E-mail*	*Project Manager*	*Receive*	*Receive*	
Auditing Schedule	*Prior to start (5 days)*	*Letter or e-mail*	*Project Manager*	*Receive*	*Receive*	
Audit Results	*As completed*	*E-mail*	*Project Manager*	*Receive*	*Receive*	
Certification Dates	*As planned*	*e-mail*	*Project Manager*	*Receive*	*Receive*	
Achievement of Certification	*End of Project*	*Document*	*Project Manager*	*Receive*	*Receive*	

Instructions for Use

Italicized items are provided for example only. Modify content of the columns to meet project specific needs.

What – List items or occurrences to be communicated.

When - Indicate when the item should be generated and or updates distributed.

How – Indicate the form the communication will take.

Responsible – Indicate the name of the person or team responsible for producing and/or delivering the communication (who will it come from?)

Audiences or Targets – Add more columns as needed and replace "*Who?*" with names of persons, entities or groups impacted by the communication plan. In their respective columns, indicate an appropriate level of involvement for that person, entity or group. Four common areas of involvement include:

- Person(s) who **consult** with the communication lead to produce the communication.
- Person(s) who have **input** on the communication and whose comments will result in changes to the communication before it occurs.
- Person(s) who **approve** the communication prior to dissemination or distribution.
- Person(s) who **receive or review** the communication, but who do not have review or approval role in the communication.

Issue Log

No.	Issue Title	Type Risc NC	P'ty (High med low)	Receipt Date	Orig'tor's Name	Asgn'd To	Response Date Required	Status (open, progress, closed)	Resolution (or progress todate)	Close Date
1				dd/mm/yy			dd/mm/yy			dd/mm/yy
2										
3										
4										
5										
6										
7										
8										
9										
10										

Organization Plan

Document Revision History

Version Number	Date	Description

General Information

Project Name:
Project Manager:
Project Begin Date:
Project End Date:
Prepared by Resource Planner: Signature:

Required Skills

Fill-in this grid to whatever level of detail required to identify skills needed to achieve project objectives.

Objective	Needed KSA (knowledge, skill, ability)	Likely Source	Quantity
Objective #1	Project Management	Consultant	1
	QAM	Consultant	1
	Trainer	Internal Staff	1
	Senior Consultant	Internal	2
	Technical Expert	Contractor	1
	Administrative support	Internal	1>
	etc., etc.		
Objective #2	Team Leader	Consultant	1
	Acquisition Specialist	Internal Staff	1
	Lead Auditor (Certified)	Certification Orgaqnisation	
	Quality Control	Internal	1
	etc., etc.		

Team Profile

Fill-in grid to whatever level of detail is required starting with most immediate timeframe and moving towards most distant timeframe.

Calendar (month or quarter)	**Resource** (personnel category)	**Level of Commitment** (utilization rate)
Quarter 1, 2003	Project Manager	1 – Full time
	Business Analyst	1 - Quarter time
	Quality System Consultant	2 – Half time
Quarter 2, 2003	etc.	etc.

Organization Chart

Insert Project Team Organization Chart here. Chart "boxes" should contain, at a minimum, name, title and role of team members. Reporting relationships should be indicated.

Other Needed Resources

Insert list of resources not noted above in this section.

Staffing Plan

Insert calendar table for planned and actual resource monitoring. Excel file is recommended. Sample table:

POSITION	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Manager	1	1	1	1	1	1	1	1	1	1	1	1
Sr. Consulting Eng.	1	1	1	1	1	1	1	1	1	1	1	1
Q A Mng & Auditor	1	1	1	1	1	0.5	0.5	0.5	0.5	0.5	1	1
Consultant			2	2	3	3	3	3	3	3	3	2
Trainer			0.5	1	1	1	1	1	1	1	1	1
Technical Expert	0.5	1	1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Admin Support	0.25	0.5	0.5	1	1	0.25	0.25	0.25	0.25	0.25	1	0.5
TOTAL												
PLANNED	3.75	4.5	7	8	8.5	7.25	7.25	7.25	7.25	7.25	8.5	7
POSITION	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Project Manager	1	1	1									
Sr. Consulting Eng.	1	1	1									
Q A Mng & Auditor	1	1	1									
Consultant			2									
Trainer			1									
Technical Expert	0.5	1	1									
Admin Support	0.25	0.25	0.5									
TOTAL												
ACTUAL	3.75	4.25	7.5	0	0	0	0	0	0	0	0	0

Schedule

Document Revision History

Version Number	Date	Description

General Information

Project Name:
Project Manager:
Project Begin Date:
Project End Date:
Prepared by: Signature:

Software Usage: Microsoft Project 2000.

The instructions in **BOLD** refer to MS Project terminology, views or tables.

Preparation

In order to prepare the Project Schedule we need to consult the F1 Scope and Definition document, the F3 Quality Plan and the F4 Communication Plan. The project requirements, activities, deadlines, constraints, objectives, boundaries & intersections with other projects or work packages, and other time & cost commitments are recorded there.
Also F7 Organization Plan should be available.

Estimating the Project Schedule using the WBS

- Select the WBS appropriate for the selected project life cycle (e.g., Waterfall, Incremental Release, etc)
- Use the table below to draft the WBS, Duration and Predecessors
- Enter the WBS into a tool like **Microsoft Project**.
- In the **GANTT CHART** view enter a project start date to allow the tool to begin laying out the project work onto a calendar.
- Break down the work into individual activities and tasks.
- Fill in the **RESOURCE SHEET** with names of consultants, type=work, including their standard and overtime rate in Euro/hr
- Consult F7 Organization Plan document. Then assign effort and resources to each low-level **TASK INFORMATION>RESOURCES**. The tool you are using should translate effort and resource availability into calendar duration

for each task. Alternatively, you may wish to directly enter an estimated duration for each low-level task.

- If duration must be <u>your</u> estimate then **TASKS** should be set as **TASK INFORMATION>ADVANCED>TASK TYPE>FIXED DURATION**.
- Fill in the predecessors for each task in **TASK INFORMATION>PREDECESSORS** of MS Project.

Account for vacation time, training time, holidays, and unproductive time like traveling.

WBS	TASK NAME	DUR	PREDS

Develop Team Matrix and Profile

To assist in assigning human resources to tasks, develop a matrix which shows the roles or skills needed for the project, their percentage of time needed and the time frame they are available to work on the project. See F7 Organisation Plan.

Assumptions

Any assumptions should be documented here.

Create Project Schedule

The overall project schedule, showing project phases and duration can be represented using a **Gantt Chart** or a **Network Diagram**.

To create the schedule, determine the percentage effort in each of the phases, using the data from resource matrix and using historical data from past projects.

Applying these effort estimates to the overall resource matrix will result in a schedule showing project phases, start dates, and end dates. Project milestones are also shown on the schedule.

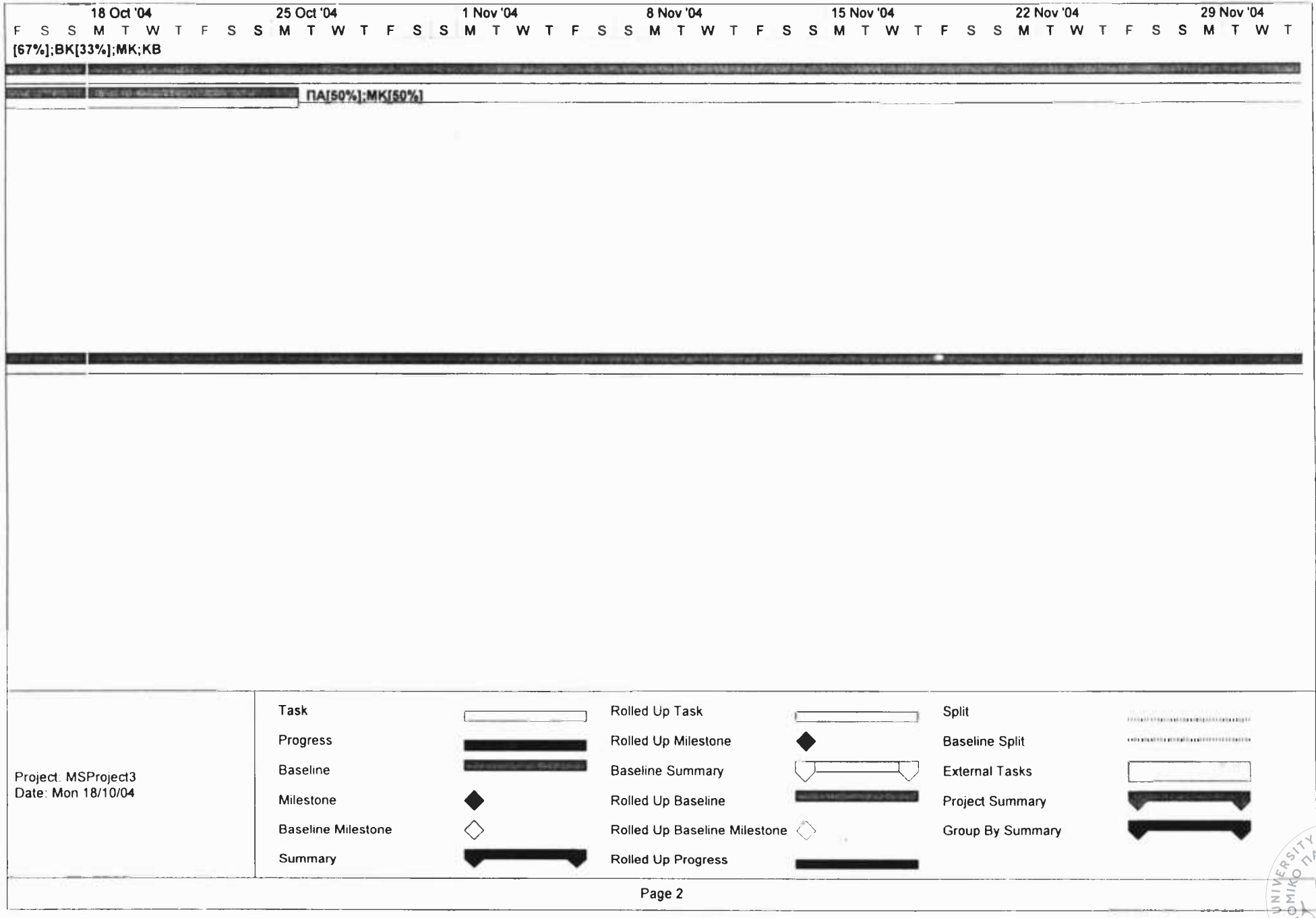
Approval

It is recommended that the team reviews project schedules prior to finalization. Project schedules must have the approval of the Project Manager and/or the Steering Committee prior to their use in the Project plan and prior to being stored in the project file. All assumptions made in deriving the schedules are also reviewed and agreed on.

Update

When schedules are updated, after being logged into the project file, a new version number must be used to identify it and a summary reason for the change must be indicated. The Project Manager will decide whether the old schedule should be retained or discarded.
Versions of the schedule for the same project should use the same format wherever possible.

Stage Name	Daily Rate	Baseline Days	Baseline Cost BCWP	Total Cost ACWP	Actual Days	Actual Cost To Date ACWP	Remaining Cost BCWS	Cost Variance BCWP-ACWP	Schedule Variance BCWP-BCWS	CPI = BCWP/ ACWP	SPI = BCWP/ BCWS
Summary of Staff			105.200	152.320		152.320	0	47.120	-105.200	0,69	#ΔΙΑΙΡ/0!
Proj Team	400	100	40.000	72.000	180	72.000	0	32.000	-40.000	0,56	#ΔΙΑΙΡ/0!
Pilot Users	400	62	24.800	13.600	34	13.600	0	-11.200	-24.800	1,82	#ΔΙΑΙΡ/0!
Other Support	560	30	16.800	37.520	67	37.520	0	20.720	-16.800	0,45	#ΔΙΑΙΡ/0!
Project Board	400	15	6.000	3.200	8	3.200	0	-2.800	-6.000	1,88	#ΔΙΑΙΡ/0!
Subcontractors	400	20	8.000	8.000	20	8.000	0	0	-8.000	1,00	#ΔΙΑΙΡ/0!
Other	400	24	9.600	18.000	45	18.000	0	8.400	-9.600	0,53	#ΔΙΑΙΡ/0!
	Unit Cost	Units									
Offices & Hardware			12.000	11.300		11.300	0	-700	-12.000	1,06	#ΔΙΑΙΡ/0!
Travelling	550	8	4.400	15.000		15.000	0	10.600	-4.400	0,29	#ΔΙΑΙΡ/0!
Project Training	1.500	2	3.000	6.000	4	6.000	0	3.000	-3.000	0,50	#ΔΙΑΙΡ/0!
Auditing for Certificat.	1.000	3	3.000	3.000	3	3.000	0	0	-3.000	1,00	#ΔΙΑΙΡ/0!
Miscellaneous			2.000	600		600	0	-1.400	-2.000	3,33	#ΔΙΑΙΡ/0!
Total Costs			129.600	188.220		188.220	0	58.620	-129.600	0,69	#ΔΙΑΙΡ/0!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1 Nov '04
8 Nov '04
15 Nov '04
22 Nov '04
29 Nov '04
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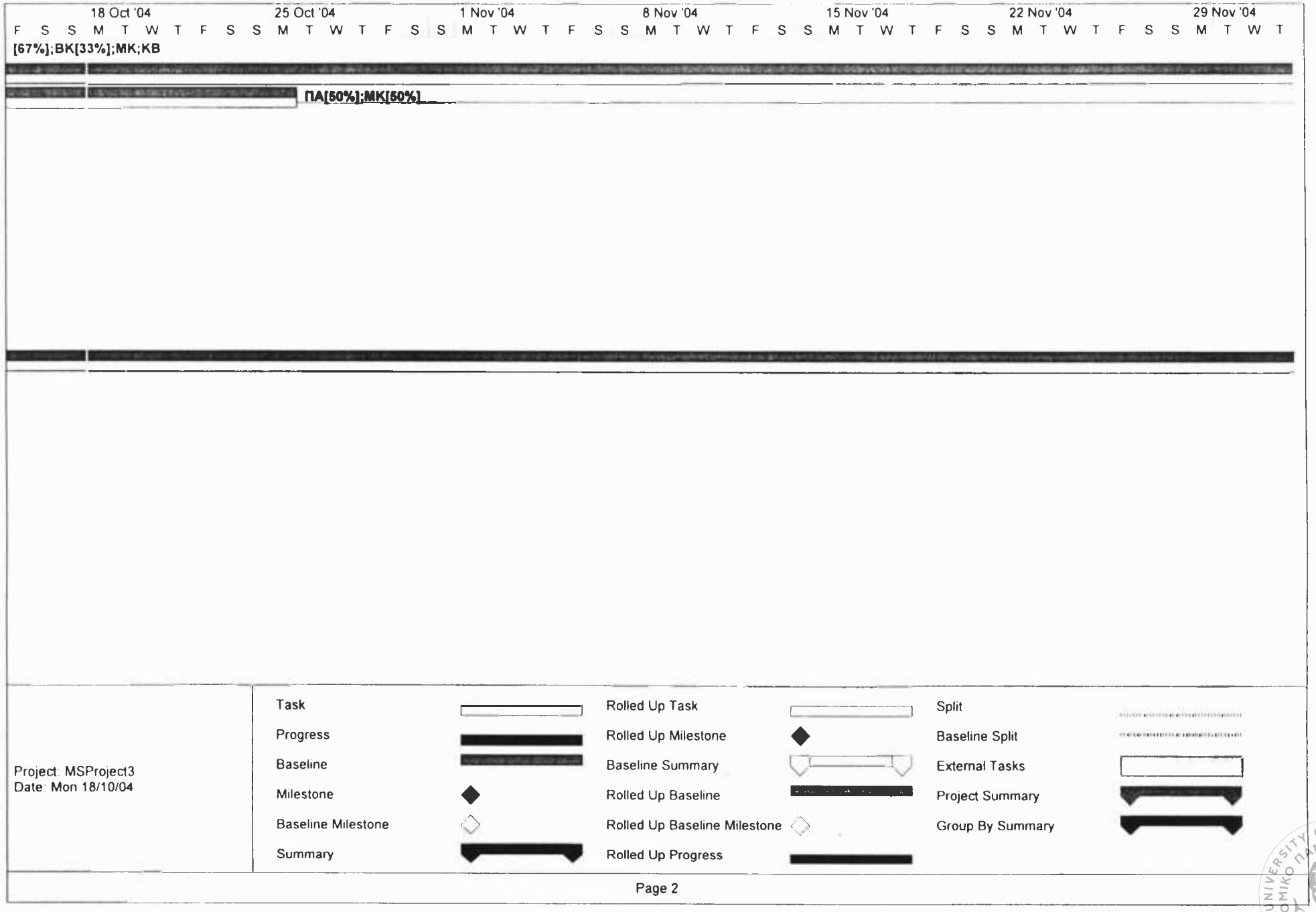
ПА[50%];МК[50%]
Project: MSProject3
Date: Mon 18/10/04
Task
Progress
Baseline
Milestone
Baseline Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Baseline Summary
Rolled Up Baseline
Rolled Up Baseline Milestone
Rolled Up Progress
Split
Baseline Split
External Tasks
Project Summary
Group By Summary
Page 2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29 Nov '04
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ПА[50%];МК[50%]
Project: MSProject3
Date: Mon 18/10/04
Task
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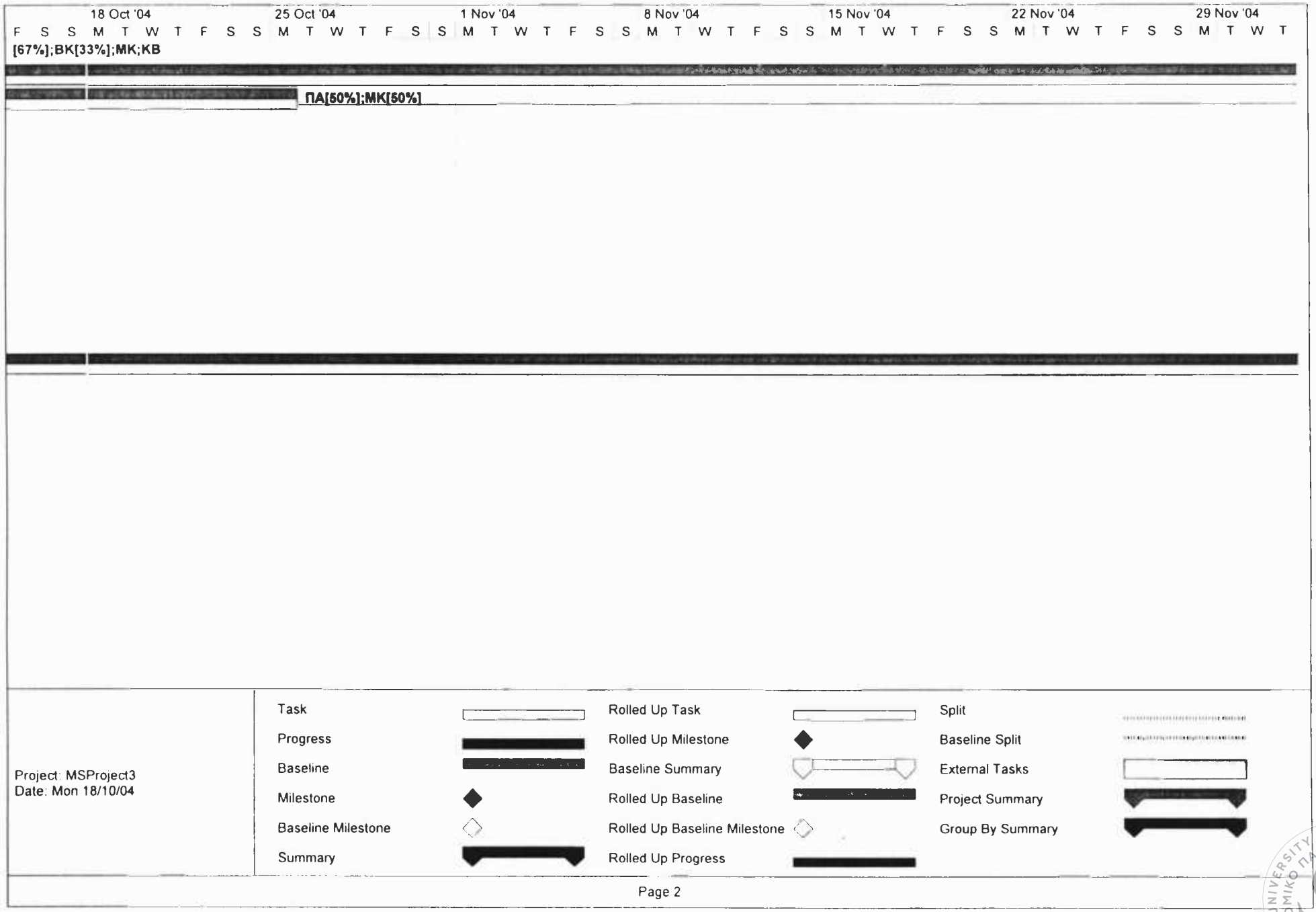
Baseline Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Baseline Summary
Rolled Up Baseline
Rolled Up Baseline Milestone
Rolled Up Progress
Split
Baseline Split
External Tasks
Project Summary
Group By Summary
Page 2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8 Nov '04
15 Nov '04
22 Nov '04
29 Nov '04
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[67%];ΒΚ[33%];ΜΚ;ΚΒ
ΠΑ[50%];ΜΚ[50%]
Project: MSProject3
Date: Mon 18/10/04
Task
Progress
Baseline
Milestone
Baseline Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Baseline Summary
Rolled Up Baseline
Rolled Up Baseline Milestone
Rolled Up Progress
Split
Baseline Split
External Tasks
Project Summary
Group By Summary
Page 2

PROJECT STATUS

Period _____

Project Title:

Project Description:

Accomplishments:

Schedule Status:

Upcoming Tasks:

Issues:

Quality Review:

Project Manager:
Client Contact:

Status & Progress Meeting Agenda

Project X

Meeting Date: Month DD, YYYY (Day)	**Meeting No:** No/YYYY	**Meeting Time:** XX:YY am or pm to RR:DD am or pm Total Time XX Hours
Meeting Location: Conference Room ABC		**Attachments:** TYZ
Leader: Name (Project Manager) Name (Alternative)		**Note Taker:** Name Name (as needed)
Attendees: XXXXXX CCCCCC VVVVVV NNNNNN MMMMM	 SSSSSS DDDDD FFFFFF GGGGG HHHHH	**Please Bring or Prepare:** 1. All outstanding project issues and change requested 2. Any written documentation pertaining to activity deviations or new risk elements. 3. Project progress report and attachments.

Agenda Item	To Be Accomplished	Person Responsible	Time Allotted
Minutes of Last Meeting (F13)	Review	XXXXXX, PM	15 Min.
Issues outstanding list review	Review & Update	DDDDDD	15 Min.
Project overview for reporting period	Inform & Discuss	XXXXXX, PM	15 Min.
Quality overview		DDDDDD, QAM	
Schedule overview	Inform & Discuss	CCCCCC	15 Min.
Financial overview	Inform & Discuss	ZZZZZZ	10 Min.
Technical overview	Inform & Discuss	VVVVVV	10 Min.
X team for project	Inform & Discuss	NNNNNN	10 Min.
Y team for project	Inform & Discuss	MMMMM	10 Min.
Scope Management update	Update	SSSSS	20 Min.
Risk Management update (F2)	Update	FFFFFF	20 Min.
Other issue	As defined by presenter	GGGGGG	20 Min.
Review of action items	Review	XXXXXX	5 minutes
Date of next Meeting	Decide	XXXXXX	5 Min.
Close Meeting	Review	HHHHH	5 minutes

Purpose of Meeting

The purpose of the Project Status Meeting is to coordinate the schedule, resource, and financial needs of the project. The objective will be to share and receive data, and to make group decisions critical to the project plan. Areas of prime interest are the quality, financial, schedule, and technical issues of each group and how they work together within the overall project structure.

MEETING MINUTES - <*Project Name*>

Date of Meeting: (dd/mm/YYYY)

Minutes Prepared By:

Type of Meeting :

Number of Meeting: NN/YYYY

1. Purpose of Meeting

>

2. Attendance at Meeting *(add rows as necessary)*

Name	*Department./Company*	*E-mail*	*Phone*

2. Meeting Agenda

>

3. Meeting Notes, Decisions, Issues

>

4. Action Items *(add rows as necessary)*

Action	*Assigned to*	*Due Date*	*Status*

5. Next Meeting

Date: (dd/mm/YYYY)		*Time:*		*Location:*	
Agenda:					

Progress Report

Client Representative Name
Identify the name of the person responsible for the project.

Project Name
Identify the name of project.

Review Interval
Indicate the review period covered by this report.

Date
Identify the date of report.

Contact Information
Identify the name and phone number of the individual to contact for follow-up information on the report.

Budget Status

Budget To Date
List the budgeted, actual and variance amounts for the month-to-date and the cumulative project to date. Explain reasons for variance and planned corrective action.

Budget By Phase
List the phase, start and completion dates, budgeted cost, cumulative budgeted cost and cumulative actual expenditures.

Milestones and Deliverables

Current Report Period
List the milestone and deliverable events/activities for the current month or report period, due dates and status. Explain reasons for variance and planned corrective actions.

Upcoming Report Period
List the milestone and deliverable events/activities for the upcoming month or report period, due dates and status.

Sub-project Status
Describe the status of all sub-projects including any variance to milestones, costs and/or scope. Explain reasons for variance and corrective actions.

Project Communications
Describe project communications during the reporting period, including type of communication, purpose and media employed. Include project surveys or other feedback tools.

Project Risks
Describe any risks that need to be communicated to or addressed by the Project Steering Committee.

Project Issues
Describe any issues that need to be communicated to or addressed by the Project Steering Committee.

Change Requests
Provide a description of any change requests affecting scope or cost that need to be communicated to or approved/rejected by the Project Steering Committee. Attach a copy of the full change request.

Project Quality Activities
Describe activities related to quality assurance, quality improvement or performance measurement.

Recommendations
Include any recommendations or revised outcomes that require Project Steering Committee approval.