

STATE OF THE ART OF PROJECT MANAGEMENT: 2003

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PART 1

PROJECT MANAGEMENT WITHIN ORGANIZATIONS

Three topics are discussed in this part:

Part 1-1 Characteristics of PM: How does PM differ from managing functional organizations?

Part 1-2 Projects, Programs, and Project Portfolios: Their classification and management needs

Part 1-3 Organizational Capabilities and Maturity in PM: Assessing and improving PM capabilities

PART 1-1

CHARACTERISTICS OF PROJECT MANAGEMENT

How does PM differ from managing functional organizations?

Projects exist in every type of human enterprise. They are unique, complex undertakings that create new products, facilities, services, and events, among other things, bring about major organizational and other desired changes or recovery from natural or man-made disasters. Projects have starting and ending points in time and progress through a number of life cycle phases.

The discipline of project management has evolved because the more traditional, well-established industrial age principles and methods for managing our classical functional organizations (involving on-going, repetitive operations of various kinds) do not work well for planning, controlling, and managing projects, programs, or project portfolios. Projects are comprised of diverse tasks that require diverse specialist skills, and hence cut across the traditional functional organizational lines. They are temporary endeavors with a finite lifetime and so do not provide stable organizational homes for the people involved. The challenge is to accomplish the right projects at the right time while providing stable homes that develop the diverse skills needed for all the specialists who contribute to the projects.

Key differentiating characteristics of PM when compared to functional organization management are:

Assignment of integrative responsibilities related to each project, program and project portfolio (as defined in the following section):

- ÿ General manager/managing director
- ÿ Portfolio steering groups (or portfolio governance committees)
- ÿ Project and program sponsors (or directors)
- ÿ Manager of project management (or Chief Projects Officer/CPO) (the Project Management Office/PMO)
- ÿ Project and program managers
- ÿ Affected functional (specialist) managers and functional project leaders.

These responsibilities are fully described in current PM literature (for example see Archibald 2003, pp 82-106 and 201-225.)

Application of integrative and predictive practices, methods, systems and tools for producing and effectively using the information required to plan, schedule, monitor, and control the scope, risks, schedules, resources and costs of projects, programs and project portfolios, integrating their entire life cycles. Iterative processes are sometimes required, (for software or R&D projects) but these still have a predictive objective for the entire project

Building and directing each project and program team, comprised of the multi-disciplined functional managers and specialists needed to create, plan, execute, and manage each project and program.

In almost every case the evolution of the PM discipline within a complex organization results in a project/functional matrix of responsibilities that can range from a weak to a strong matrix, referring to the authority of the project and program managers to give project direction to the project team members.

Managing the Total Project Life Cycle:

The primary (some say the only) difference between projects and an ongoing enterprise as something to be managed is that the project has a life cycle: it starts, is executed, and it ends. More elaborately, a project has a number of life cycle phases, the simplest definition of which includes concept, definition, execution, and closeout phases. (Life cycle models are discussed in more detail in a later section.) The practice of PM has moved from focusing in the early years on planning and controlling the execution of projects to include presently the conceptual phases, and project portfolio management (discussed later) provides the needed linkage between strategic growth management of the organization and PM. Extension of the project life cycle to include achieving the desired results from completion of a project is now a reality for some practitioners.

Achieving the Project Benefits:

In 2003 we see movement toward including within the PM discipline the important post-completion objective of achieving the benefits from completion of the project. Projects frequently require changes in the organization itself in order to gain the benefits from the results of the project. Thus project management often encompasses organizational change brought on by the successful completion of a project. This can be considered as a post-completion project phase, perhaps named "project results integration" or "project benefits realization." If the project has

been executed under contract for an external customer, then the primary benefit will be whatever financial profit has been realized under the contract, plus of course the experience gained and the possibility of future business with that customer, or with other customers using the experience gained. For the customer or purchaser of the project it is necessary to integrate the project results (new information system, new office building, new process plant, new product, for example) into the ongoing business operations.

An example of this movement is provided by Fern (1999) in his book *Time-to Profit Project Management*, which emphasizes that the goal of new commercial product development PM is not simply to launch a new product, but to achieve a profit with that product in the marketplace. "Most Chief Executive Officers now want to know when they will get the benefits and the forecast level of benefit, rather than when the project will be complete and at what cost. Processes and systems to answer these questions are still being developed and are far from maturity" (Harpham 2000, p 4). A "business change manager" is sometimes appointed with responsibility for realizing the project benefits.

PART 1-2

PROJECTS, PROGRAMS, AND PROJECT PORTFOLIOS

Their classification and management needs

Projects-with different size, shape, degree of risk and complexity, and widely varying products or results-are the common denominator for project management. Having a practical scheme for categorizing projects would be useful to all organizations for a number of reasons, but a widely accepted project classification system does not exist at present. Two efforts are currently under way to develop and test such a scheme (see Archibald and Voropaev 2003, Crawford et al 2002, and the PMI research project on "potential classification systems for projects" at http://www.pmi.org/info/PP_ResearchCurrentProjects.asp).

Table 1 shows the list of categories and sub-categories presently being tested by the survey at <http://www.ipmaglobalsurvey.com>.

Project Categories Each having similar life cycle phases and a unique project management process	Examples
1. Aerospace/Defense Projects 1.1 Defense systems 1.2 Space 1.3 Military operations	New weapon system; major system upgrade. Satellite development/launch; space station mod. Task force invasion
2. Business & Organization Change Projects 2.1 Acquisition/Merger 2.2 Management process improvement 2.3 New business venture 2.4 Organization re-structuring 2.5 Legal proceeding	Acquire and integrate competing company. Major improvement in project management. Form and launch new company. Consolidate divisions and downsize company. Major litigation case.
3. Communication Systems Projects 3.1 Network communications systems 3.2 Switching communications systems	Microwave communications network. generation wireless communication system.
4. Event Projects 4.1 International events 4.2 National events	2004 Summer Olympics; 2006 World Cup Match. 2005 U. S. Super Bowl; 2004 Political Conventions.

5. Facilities Projects 5.1 Facility decommissioning 5.2 Facility demolition 5.3 Facility maintenance and modification 5.4 Facility design/procurement/construction Civil Energy Environmental High rise 5.5 Industrial Commercial Residential Ships	Closure of nuclear power station. Demolition of high rise building. Process plant maintenance turnaround. Conversion of plant for new products/markets. Flood control dam; highway interchange. New gas-fired power generation plant; pipeline. Chemical waste cleanup. 40 story office building. New manufacturing plant. New shopping center; office building. New housing sub-division. New tanker, container, or passenger ship
6. Information Systems (Software) Projects	New project management information system. (Information system hardware is considered to be in the product development category.)
7. International Development Projects 7.1 Agriculture/rural development 7.2 Education 7.3 Health 7.4 Nutrition 7.5 Population 7.6 Small-scale enterprise 7.7 Infrastructure: energy (oil, gas, coal, power generation and distribution), industrial, telecommunications, transportation, urbanization, water supply and sewage, irrigation)	People and process intensive projects in developing countries funded by The World Bank, regional development banks, US AID, UNIDO, other UN, and government agencies; and Capital/civil works intensive projects—often somewhat different from 5. Facility Projects as they may include, as part of the project, creating an organizational entity to operate and maintain the facility, and lending agencies impose their project life cycle and reporting requirements.
8. Media & Entertainment Projects 8.1 Motion picture 8.2 TV segment 8.3 Live play or music event	New motion picture (film or digital). New TV episode. New opera premiere.
9. Product and Service Development Projects 9.1 Information technology hardware 9.2 Industrial product/process 9.3 Consumer product/process 9.4 Pharmaceutical product/process 9.5 Service (financial, other)	New desk-top computer. New earth-moving machine. New automobile, new food product. New cholesterol-lowering drug. New life insurance/annuity offering.
10. Research and Development Projects 10.1 Environmental 10.2 Industrial 10.3 Economic development 10.4 Medical 10.5 Scientific	Measure changes in the ozone layer. How to reduce pollutant emission. Determine best crop for sub-Saharan Africa. Test new treatment for breast cancer. Determine the possibility of life on Mars.

Table 1. Proposed project categories/sub-categories, with each category or subcategory having similar project life cycle phases and one unique process management process [Adapted from Archibald 2003, Fig. 2.3, p.35].

Projects within these different categories and often within the sub-categories:

- Y Typically exhibit or require very different life cycle models
- Y Require different planning and control methods, systems, and tools
- Y Use different terminologies
- Y Demand different knowledge, skills and experience of the project managers and project team members
- Y Place differing emphases on the detailed aspects of planning, scheduling, cost estimating, reporting, controlling, executing and closing.

This is becoming recognized more widely today, as indicated by PMI's Government Extension to a Guide to the Project Management Body of Knowledge/PMBOK® Guide (October 2002), for

projects under government contracts within the U. S., and PMI's Construction Extension to the PMBOK® Guide (2003). Current standards projects are in progress by PMI to create two additional extensions to the PMBOK® Guide, one for the U. S. Department of Defense projects, and one for automotive projects (see 'Standards' at www.pmi.org). In addition, new standards for Program/Portfolio Management, Configuration Management, Scheduling, and Work Breakdown Structures are under development by PMI (PMI Today, October 2003 Supplement). All PMI standards can be downloaded by members at no cost.

Software/Information Systems/IS Projects:

To illustrate the wide differences in the results of one project category compared with another, compare a facilities design/procure/construct project with an information system/IS project. The products of IS projects are inherently invisible until they produce displays of the information they handle on computer screens. A skilled, successful IS project manager would likely fail if placed in charge of a power plant design/construction project, and vice versa. Bullock (2003) presents a useful description of "The Top 10 Ways Software Projects are Different."

Defining Project Categories and Sub-Categories

Ten recommended basic project categories are listed in Table 1, plus an eleventh category for all others, oriented primarily to products (results) of the projects. It is recognized that this list is preliminary and incomplete: a 'work in progress.' Projects within each of these ten specific categories are believed to use similar life cycle phases and utilize similar authorizing, planning, budgeting, scheduling, monitoring and controlling procedures and tools throughout their life cycles.

Subcategories are identified in Table 1 within nine of the basic categories. In most cases there will be differences-in some cases significant-between the project life cycle management process for the basic category and at least some of its subcategories. Others may wish to add subcategories to those shown in Table 1, or to add additional subcategories to those that are listed. Additional major categories may also be required to assure that all conceivable projects of significance to the international PM community are included. The names and terms used in Table 1 will no doubt undergo extensive changes before a broadly accepted list of categories has been established.

It should be noted that these categories are not mutually exclusive: many projects will include aspects of two or more categories. For example, most communications systems projects include at least the adaptation of information system software. Many facilities projects also include communication systems, and vice versa. In such cases the project probably should be classified in the more dominant category, or-if justified by their size, complexity, or risk-defined as two or more projects (of different categories) within a program, with each project having a different life cycle definition.

Classifying Projects Within Categories and Sub-Categories

There is a wide range of projects within each project category or sub-category in large organizations. The project management process for each project category must provide the flexibility to choose the proper level of detail for planning and control of large, complex, high-risk, 'new territory' projects compared to smaller or 'old hat' projects. It may be necessary or useful to further classify projects within categories or sub-categories using the following (or other) characteristics:

- ÿ Project Size
- ÿ Project Complexity
- ÿ External or Internal Customer
- ÿ Degree of Customer Involvement in the Project Levels of Risk in Projects
- ÿ Major and Minor Projects Within a Category
- ÿ "Mega" Projects or Programs
- ÿ "Stand-Alone" Versus "Create Supporting Infrastructure" Projects:
- ÿ "Standard" Versus "Transitional" Projects

(See Archibald and Voropaev 2003 for a more detailed discussion of these factors.)

Multi-Project Programs

Programs are defined as long-term undertakings that include two or more projects that require close coordination (Archibald 2003, p 25). Projects within a program are usually closely related in some way, such as using common resources, having dependency relationships (in which tasks within one project cannot proceed until the results of tasks within a second project have been completed,) or supporting common strategic objectives. Programs may be related to a particular product line, operating division, or geographic area, for example. Projects having a common customer may also be grouped within a program, as another example. A UK definition of the term programme (in the PM arena) is "a set of related projects with a common strategic goal or aim" (Harpham 2002, p 7).

The responsibilities of a program manager are similar to but broader than those of a project manager, since the program manager gives direction to and integrates the efforts of two or more project managers. The program manager role is of longer duration than that of any of his project managers, since the overlapping projects within a program rarely, if ever, start and end at the same time. "Unlike projects, programmes had no distinctive start or end, rather the strategy could be accelerated or slowed down, by introducing new projects, speeding up old existing ones, or slowing up projects, or stopping existing or planned projects respectively (Harpham 2002, p 3).

Project and Programme Management Within the UK

The UK's Office of Government Commerce/OGC has for some years developed and promoted PM concepts for governmental and non-governmental applications. Its publications include:

- ÿ PRINCE2 (Projects IN Controlled Environments): "a structured method for effective project management (OGC PRINCE2 2002, p iii).
- ÿ Management of Risk/M_o_R: Guidance for Practitioners that "sets out a framework for taking informed decisions about risk at a project, programme and strategic level to assure that key risks are identified, assessed and that action is taken to address them (OGC M_o_R 2002, p ix).
- ÿ Managing Successful Programmes/MSP: "a pragmatic approach that will help

organizations deliver and realize the required benefits, innovation, and new ways of working that will take them through the next decade (OGC MSP 1999, p xi).

Programme management as practiced in the UK and its sphere of influence in Europe and elsewhere is essentially the same as project portfolio management in North America and elsewhere. "Programme management exists to bridge the gap between Corporate Strategy and Projects. It enables that fundamental question to be asked before starting the project - 'where does it fit into the corporate strategy?'" (Harpham 2002, p 5)

Role of Program Management:

A current example of the role of program management within General Motors' new car model development and launch operations is given by Spina (2003, p 23) as:

- ÿ Align organizational resources
- ÿ Create single integrated program management organization
- ÿ Provide single voice for Program Management with Product Development
- ÿ Coordinate major work processes
- ÿ Balance process and organizational stability with improved competitiveness.

Program Management in Governmental Agencies:

Many public agencies use a "planning, programming and budgeting system" that involves a number of high level programs that are really a hybrid form of program management since they are made up of projects plus on-going "level-of-effort" operating activities.

Project Portfolios

A major development in the state of the art of project management has been the recognition that projects, like other investments, must be managed on a portfolio basis in most large organizations. Program management is a step in the right direction, but more formalized project portfolio management goes beyond what is usually termed program management. As indicated above, a common understanding and use of the terms program, programme and project portfolio management has not as yet been established.

The key differences between portfolio and multiple project management are shown in Table 2.

	Project Portfolio Management	Multiple Project Management
Purpose	Project Selection and Prioritization	Resource Allocation
Focus	Strategic	Tactical
Planning Emphasis	Medium-Term (annual/quarterly)	Short-Term (day-to-day)

Table 2. High-Level Comparison of Project Portfolio Management and Multiple Project [or Program] Management (Source: Dye and Pennypacker, 2000).

Three General Types of Portfolios:

As indicated in Figure 1, a project portfolio consists of the programs and projects supporting a given higher-level strategy. There could be only one overall corporate project portfolio, but it generally makes more sense to define more than one portfolio on a strategic basis in large organizations to reflect product line, geographic or technological divisions of the organization, industry or market. Combe and Githens (1999) identify three general types of project portfolios:

- Value-Creating: Strategic or enterprise projects.
- Operational: Projects that make the organization more efficient and satisfy some fundamental functional work.
- Compliance: "Must-do" projects required to maintain regulatory compliance.

Others have defined other types of project portfolios that reflect the specific organizational and industrial environments that are involved (OGC MSP 2002, Pellegrinelli 1997, Dye and Pennypacker 1999).

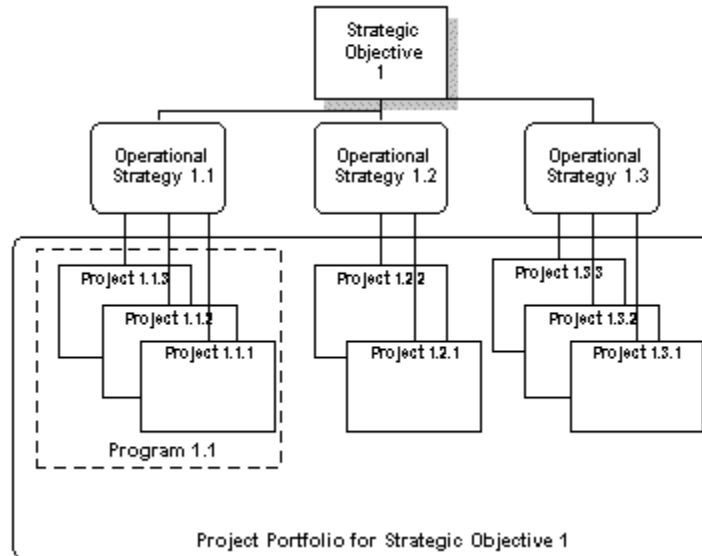


Figure 1. Schematic of Strategies, Projects, a Program and a Project Portfolio (Archibald 2003, p 13).

Project Portfolio Management Process: A typical project portfolio management process consists of these 12 steps:

1. Define the project portfolios required.
2. Define the project categories within each portfolio based on uniform criteria.
3. Identify and group all current and proposed projects within appropriate categories and programs.
4. Validate all projects with the organization's strategic objectives.
5. Prioritize projects within programs and portfolios.
6. Develop the project portfolio master schedule.

7. Establish and maintain a key resources data bank.
8. Allocate available resources to programs and projects within portfolios.
9. Compare financial needs (primarily cash flow) with availability.
10. Decide how to respond to shortfalls in money or other key resources and approve list of funded projects and their priorities.
11. Plan, authorize, and manage each program and project using the organization's PM process and supporting systems and tools for each project category. This step comprises the entire practice of what has traditionally been thought of as "project management."
12. Periodically reprioritize, reallocate resources to, and reschedule all programs and projects as required within each portfolio (Archibald 2003, pp 12-14 and 175-177).

In organizations that are mature in their PM capabilities a Project Portfolio Steering Group (or Portfolio Governance Committee) is responsible for this process and for making the decisions that are involved in its effective use (Archibald 2003 pp 87, 177-179).

PART 1-3

ORGANIZATIONAL CAPABILITIES AND MATURITY IN PM

Assessing and improving PM capabilities

PM Maturity Models:

"In recent years the use of maturity models has grown in popularity for evaluating where a given organization stands in comparison to its potential and to other organizations in particular areas of management. Improving an organization's project management capabilities generally involves moving up the ladder of whatever maturity model best suits the needs of that organization. Such improvement, however, involves looking at the specific areas of project management and introducing improvements where the greatest payoffs exist, while keeping in mind the total picture of integrated project management principles and practices" (Archibald 2003 p 62). Greater PM maturity is presumed to indicate greater capability for successfully selecting, authorizing, planning, executing, controlling and closing out projects and programs that achieve the strategic goals of the organization.

"Unfortunately, there is no consensus as to the contents of an organizational project management maturity model, or even the principles on which such a standard is constructed. Some 30 existing models serve the market, with more appearing all the time. Books on the subject are now beginning to appear (e. g., Kerzer 2001, Knutson 2001)"

(Cooke-Davies et al 2001). Some of these models are listed on <http://www.pmforum.org> : go to [The Profession], then 'Standards.'

The basic purposes of all of these maturity models are 1) to assess an organization's current PM capabilities, 2) to educate and train people involved in PM, and 3) to enable continued improvement in organizational and individual PM capabilities.

PMI's OPM3:

The Project Management Institute (PMI) has announced that it will release its Organizational Project Management Maturity Model/OPM3 in December 2003 (more info at opm3info@pmi.org). This elaborate model, developed by a team of 200 some volunteers over a five year period and building on the widely used PMI PMBOK Guide®, consists of four levels (standardizing, measuring, controlling, continuously improving), and relates the five PM process groups identified in the PMI PMBOK Guide® (initiating, planning, controlling, executing, and closing) to each of three levels of application: projects, programs, and project portfolios.

OPM3 will include a database with descriptions of best practices, capabilities, outcomes, and key performance indicators of success, and will interrelate these factors and allow user interrogation. It will be available in CD format with a paperback version of the knowledge element of the model (Fahrenkrog et al 2003, PMI Today Supplement October 2003). PMI expects that OPM3 will be used to assess and improve the PM capabilities and maturity of many types of organizations, as well as to educate practitioners in currently accepted best practices.

Maturity Models in the U. K.:

In the United Kingdom the APM Group (<http://www.apmgroup.co.uk>) accredits and assesses the capabilities of training organizations, trainers, consultants and practitioners and their organizations in various areas of project management, on behalf of the UK government's Office of Government Commerce (OGC) and its PRINCE2 and other project management initiatives. The OGC Successful Delivery Toolkit can be downloaded at <http://www.ogc.gov.uk/sdtoolkit>. This Toolkit includes OGC's Project Management Maturity Model, for which the APM Group has recently developed a Maturity Level Assessment Tool for PM organizations to use in determining their current maturity level.

The OGC Maturity Model will soon be augmented to include Programme and Portfolio Management, and the assessment tool will likewise be augmented. Only PM consulting organizations who have been accredited by the APM Group are licensed to use the OGC assessment tools.

Japanese P2M:

In Japan a major, important initiative is under way: Project and Program Management/P2M (Tanaka 2003, Taketomi 2003), developed by the Engineering Advancement Association of Japan (ENAA) with funds provided by a research grant from the Japanese Government Ministry of Economy, Trade and Industry (METI.).

Australian Professor Lynn Crawford has stated "the P2M is potentially the most significant advance towards integration and acceptance of the role of project and program management at the enterprise level. Factors contributing to this significance include development with the support of government, industry and professional associations; expected support and application within enterprises; and being the first guide that develops an approach to enterprise project and program management that starts afresh from the viewpoint of the enterprise rather than drawing on project paradigms developed in the context of large, single, physical projects as the day to day business of project based organizations:

- Directly addresses program management (rather than focusing only on single projects)

- Ÿ Recognizes and responds to the complexities of fast moving, multi-stakeholder environments
- Ÿ Recognizes and addresses the systematic nature of projects and programs" (as quoted in Tanaka 2003, p 2.)

P2M is briefly described as "integrated program management.... comprised of six management areas: 1) Profiling management, 2) architecture management, 3) program strategy management, 4) platform management, 5) program life cycle management, and 6) value assessment management" (Taketomi 2003). A complete description of P2M has yet to be made available in English.

Chief Projects Officer/CPO:

"The next organizational change necessary to enable project management to be fully effective will be to have a CPO managing cross-functional activities and providing the strategic perspectives that every organization needs" (Bigelow 2003). The most appropriate location for the CPO is probably for him or her to be in charge of the Project Management Office/PMO at corporate or operating division levels.

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