A Guidebook of Project & Program Management for Enterprise Innovation

Summary Translation

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(PMCC)

PREFACE

This brochure is an interim summary English version of "A Guidebook for Project and Program Management for Enterprise Innovation" or abbreviated as **P2M.** This interim summary version is issued by Project Management Professionals Certification Center (PMCC) of Japan, and is intended to provide readers with an overview of the innovative program and project management guide.

PMCC is the non profit organization, responsible for promotion of the project management and it's Certification System for Project Professionals into wide varieties of industries in Japan, and also responsible for maintaining and upgrading of P2M

P2M is originally a 420-page Japanese document, for enterprise innovation by way of program and project management, which hopefully will serve as a gyrocompass for enterprise growth and survival in this globally competitive business and public services environment and will supplement each other with the existing international project management bodies of knowledge and project management competency standards.

P2M has been developed by the Engineering Advancement Association's (ENAA) Committee for Innovative Project Management Development Committee, a team of selected visionaries and practitioners of project management and program based business management drawn from project industries, academia and consulting disciplines, over the past 30 months as of November 2001 on the belief that reflecting the ongoing highly challenging Japanese economic situation, setting aside its prosperity in the 70's and 80's, the nation needs a zero-based Program and Project Management paradigm to give a second thought to mere dependence on the delivery-focused traditional project management models and to develop a guide to allow the integration of project business strategy elements and utilization of valuable knowledge created through projects and programs and subsequent projectized management of operation and maintenance of projects into the traditional project management dimensions.

The key word throughout P2M is **value creation to enterprises**, either commercial or public, and **a consistent chain from a mission, through strategies to embody the mission, a program(s) to implement strategies, to projects comprising a program**.

P2M should not only benefit Japanese organizations but would profitably apply to any organizations globally who seek an all-in one package that offers a

comprehensive guide to program and project management while the brochure is a little bulky compared with the existing project management guides but does not require readers to hop around a variety of referenced documents.

This English summary version covers the total of Parts 1, 2 and 3 of P2M that provide a holistic, unique structure of program and project management and an overview of Part 4 which offers eleven project segment management areas.

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Introduction - "P2M" – A guidebook of Project and Program Management

This guidebook, "P2M", is provided for corporate strategic managers, program managers and project management practitioners, either on managerial, intermediate or on entrant levels, educators/trainers and students seeking a career edge in the emerging management by projects era, and is intended for modular uses depending on the respective readers' levels of maturity or exposure to project management or their positions in relation to strategic levels of project and program management deployment, viz., from the highly strategic deployment of program management, through the secure delivery management of discrete projects , to elementary or trial use of project management knowledge. "P2M" is the abbreviation of the "A Guidebook of Project and Program Management for Enterprise Innovation.

P2M has been developed by the ENAA Committee for Innovative Project Management Development Committee, a team of selected visionaries and practitioners of project management and program based business management drawn from project industries, academia and consulting disciplines, over the past 30 months as of November 2001 on the belief that reflecting the ongoing highly challenging Japanese economic situation, setting aside its prosperity in the 70's and 80's, the nation needs a zero-based Program and Project Management paradigm to give a second thought to mere dependence on the delivery-focused traditional project management models and to develop a guide to allow the integration of project business strategy elements and utilization of valuable knowledge created through projects and programs and subsequent projectized management of operation and maintenance of projects into the traditional project management dimensions.

In the current society, a variety of professionals such as lawyers, licensed engineers and CPAs provide services in their own professional disciplines in more or less vertically walled spheres. While this professional system offers in-depth specialization in the respective disciplines, given the ongoing circumstances in which the world constantly poses, either in the public systems or in business, complex challenges requiring totally optimized solutions, the society is increasingly in demand for professionals capable of competently solving complex issues, problems and tasks, collectively referred to as missions, by cutting across related disciplines and combing the expertise and wisdom of each and applying a holistic trade-off and integration capability. Particularly, in the knowledge and information society where hybrid deployment of a variety of natural and human science disciplines, translated into technology and engineering, as well as art outputs, is a way of life, such mission-achiever type professionals are expanding their horizon to prove their value. It is not an exaggeration to claim that the performance of a society is dependent of the availability and quality of such professionals. Any society or enterprise should seriously recognize the knowledge, expertise and attitudes of program and project management professionals. P2M has been in place to fulfill this social demand.

P2M is also the basis of Japan's new certification system for project and program managers. Those professionals to be qualified through the certification are classified into the following three categories, from the lowest to the highest, according to their levels of positional missions, responsibilities and experience: Project Management Specialist (PMS), Project Manager Registered (PMR), and Project Management Architect (PMA).

In P2M, Section 1, Project Management Entry, describes the relation between the modern society and professionals, requirements for mission-performer professionals, the history of project management and its application in the modern society, as well as offers a general guide to use this brochure.

In Section 2, Project Management, the Definition and basic framework of a project and project management are given, focusing on a common view of project management and the relation between integration management and segment management elements.

Section 3, Program Management, discusses the Definition and basic framework of program management. Program management consists of an intrinsic common view for the integration of projects under a program and characteristics of program management aiming for optimization of programs.

Section 4, Project Management Segments gives eleven discrete elements, or also called areas of project management, which are the backbone of project and program management. These elements are woven into project and program management being combined in the totality or in several of them depending on the

phase of project or program management but always within the mission context of a specific project or program management.

Although P2M is considerably more extensive than the existing PM BoKs or PM competency standards, it does not try to explore every detail of the topics discussed. Project and program management practice capability should be expanded not only with the professional experience but also with the development of related disciplines of science and technology; mission-performer professionals are expected to commit themselves to continuing education in the disciplines and related areas.

- P2M is a guide to enable mission-performer professionals to acquire a unique knowledge system of program and project management.
- P2M is intended to serve as the fundamental referendum to qualify mission-performer professionals.
- P2M consists of four sections: Project Entry, Project Management, Program Management and Project Segment Management.
- P2M defines essential technical terms.

Part I. Project Management Entry

Chapter 1 Project Management and Mission-performer Professionals

● Roles of Responsibility of Mission-performer Professionals (Project Professionals)

Hereafter, mission-performer professionals are referred to as “project professionals”. Project management entry is an introductory anatomy of project management for project professionals. Project professionals handle complex issues requiring optimum solutions for a society or an organization(s). They therefore possess capability, attitudes and qualities that integrate knowledge and expertise of multiple disciplines, exercising functional authority to cut across the disciplines involved in a program or project from a total optimization viewpoint. Broader views, a systematic body of knowledge and affinity with a range of related emerging technologies and techniques are indispensable ingredients. P2M sets forth the minimum baseline of project management, program management and eleven segments of project management.

As projects affect, to a varying degree, not only sponsor organizations but also the society, project professionals are required to maintain high morale, ethics and commitment to contributing to the welfare of human beings and the society through due diligence of their services. Such accountability to the profession and to the society required of project professionals cannot be achieved without building competent capability. P2M is a guide that describes the knowledge and experience that professionals should master in practical contexts.

P2M, as a hybrid product of professional practice and practically applied science, delineates its contents as recommended practices based on management science, systems science, information science, and human science of which effectiveness and validity are recognized by business, public sectors and society in general. To develop competent capability, it is indispensable for project professionals to meet the three factors: systematic knowledge, practical experience, and attitude/qualities that include professional ethics. In addition, project professionals are required to continuingly enhance competence through learning and practice. P2M aims at presenting a "capability building baseline (CBB)."

- Mission-performer professionals are integration-oriented professionals who perceive complex problems and issues from a high perspective and realize right and optimal solutions.
- Mission-performer professionals are required to acquire a body of knowledge that provides a broad perspective.
- To develop professional capability of mission-performer professionals, three factors are necessary: a body of knowledge, practical experience, and attitude/qualities.
- Mission-performer professionals should fulfill their responsibility through continuing efforts to improve themselves through learning and practice.
- P2M is described in an intelligent manner based on proven knowledge and experience.
- P2M aims at providing the Capability Building Baseline (CBB).

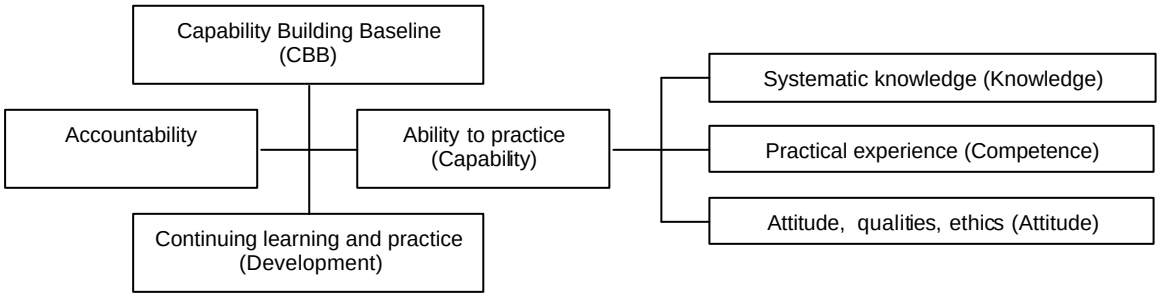


Figure 1-1: Three Factors for Responsibility and Capability Development of Professionals

Case ◆ Broad Vision and High Viewpoint

Technological development for global environmental preservation is a typical case of a complex issue. Policy planners should recognize the issue with a broad vision, taking into account ecosystems, preservation technology, social agreements, legal frameworks and economic effects, and should launch a project with an effective policy plan from a higher viewpoint, which is acceptable to the society, industry and local community affected.

In addition, policy planners cannot fulfill their accountability as professionals without a confident attitude and ethics to achieve sustainable growth, e.g., never to generate waste as byproduct of the policy that places priority on economy.

● Value Creation by Project Professionals

Project professionals should contribute to value creation. The value of project professionals lies in giving satisfaction to sponsors. The degree of satisfaction depends on a balance between the benefits that a sponsor enjoys and costs expended to realize the benefits.

Lawyers offer services and create values for clients through legal consultation and lawsuits defense. Project professionals should likewise satisfy sponsors by offering highly professional services for projects including their conception, planning, implementation and management, and by enhancing efficiency. Efficiency means the productivity to utilize resources without waste, unreasonableness and inconsistency.

What is stressed in the activities of project professionals is the solution of complex issues that are hard to be tackled independently by professionals in individual disciplines if without integration by project professionals. Complex issues are difficult to grasp in the core as a multitude of areas are interwoven into the issues. Solutions to these issues could only be created and implemented with close collaboration among experts in the respective related areas. Complex issues are characterized by the paring of complex Definitions of issues and their solutions. This leads to the point that the value of project professionals depends on their competent capability to effectively solve complex issues. The effectiveness can be measured by comparing the costs incurred for solution(s) with the level of benefit realized; such benefit should not be realized in parts but in totality meeting the core mission of the issue. The broad scope of effectiveness means not only enhancement of satisfaction by clients but also coordinated balancing of interests for a wide range of parties from those concerned with the project to the society that is potentially affected by the project. This means that projects should not only meet the objectives and expectations of direct sponsors but should also be compatible with those of other stakeholders and, in the overall analysis, with the society affected by the project. A questions raised is "Are the project and its management acceptable to the society as a project with right management would enhance and have enhanced the value of the society?"

P2M targets project management professionals who are capable of providing sponsors with quality satisfaction by solving overall, not partial, issues. In solving overall issues, attention should be paid not only to segments but also to their interrelation, mutual influence, synergy, etc.

- Project professionals should offer high quality professional services and contribute to value creation with efficiency.
- Project professionals should focus on solution of complex issues and demonstrate the effectiveness of solutions.
- Project professionals should perform value creation activities to enhance project acceptability by coordinating interests of a broad range of relevant parties.

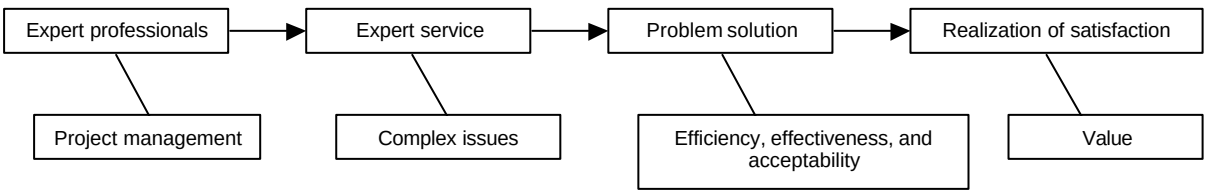


Figure 1-2: Value Creation by Expert Professionals

Case ◆ Roles of Project Management Professionals

When a company needs a sales information system, neither system engineers nor marketing experts can handle the case alone. An expert in the planning section would be lost at how to plan and implement an inexperienced system. Accordingly, an expert team consisting of planning staff, marketing persons and system analysts has to be formulated under the functional direction of a project manager. Then a project manager confirms an investment budget, expected results and delivery timeline with the sponsor executive. Based on the executive charter, he/she would have sales experts study ways to improve the repeated order ratio and order volume increase, and have the information technology section design the information system to support such marketing initiative. The project manger solves complex issues in the project by profiling the intent of the sponsor executive, namely, by clarifying the mission of the proposed project, its objectives and goals, asking a question "Why do we develop a sales information system?" A solution is worked out by effectively combining technical expertise of planning staff, marketing experts and systems analysts. The project manager is a new type of professional who offers such expert capability.

Case ◆ Systematic Knowledge

For instance, in the consultation for an improvement of poor product sales, marketing experts would often address the issue on their own expertise. However, project management would solve the issue in a project way by setting a due time for solution and approaching the task as a complex issue of supply chain, involving customer information data, speed and service. In this case, the systematic knowledge of project management is required.

- Project professionals refer to professionals who provide customers with satisfaction by solving complex issues.
- Project professionals refer to professionals who can define sponsors' ambiguous yet profound requirements as a concrete project and lead the project to value creation.
- Project professionals refer to professionals who approach complex issues from relationship context.
- Project professionals refer to professionals who handle complicated and uncertain relationships.

● Development of Project Management

Project management has been studied and practiced since the 1940's: it was initially deployed by the U.S. Department of Defense in the military systems and space development fields. The Project Management Institute (PMI®) in the U.S.A. published its prototype body of knowledge of project management for the first time and pioneered the certification of project management professionals. PMI® issued "Project Management Body of Knowledge (PMBOK™)" in 1987 and revised it to "A Guide to the Project Management Body of Knowledge (PMBOK™ Guide) " in 1996, which has been updated to the 2000 Edition.

The number of PMI® members was only 12,000 in 1994 but reached 80,000 in 2001. PMI® started the certification of "Project Management Professionals (PMP®) in 1984. The PMP® certification system until early 1997 was rigorous mainly targeting North American project mangers, calling for a triangle set of candidates' academic qualifications, professional experience record and proof of dedication to the project management profession mainly in terms of membership and professional activities with PMI ® or PMI ® designated project management associations, before PMP® candidates can sit for examinations on project management knowledge. In line with the globalization of the project management profession and PMI ® members, PMI ® reengineered the certification system in 1997 along the guideline of the U.S. accreditation body, and a new certification system was put in place in 1998 which is providing a more ample opportunity for PMP® certification to not only North American but global project management practitioners by providing computerized knowledge examination in nine languages.

For some years after the foundation of PMI® in 1969, its members were mainly from the engineering and construction industry as well as defense industry but now the PMI® membership mix has shown a drastic change: members from IT/information management/information movement, financial and services industry are reported to account for some 75%.

In Europe, the International Project Management Association was established in 1967 with "INTERNET" being its common name, as an international umbrella project management association to which national associations belong. In 1997 the name INTERNET was dropped due to the furious spreading of Internet, and it was decided to revert to the abbreviation of its original name, IPMA. IPMA

includes 29 national associations in Europe and Egypt, India and China with combined worldwide members of some 20,000. The United Kingdom, France, Germany and Switzerland, which are leading members of IPMA, announced the IPMA Competence Baseline (ICB) in 1993, and the ICB has been developed into various National Competence Baselines (NCB), or guidelines for standard project management competency baselines reflecting each member country's project management development status and national cultures and practices. The professional certification system based on both bodies of knowledge and NCBs was started in 1997. There are four ranks of qualification certificates (from the lowest to the highest) : Project Management Practitioner based on certification of knowledge; Project Management Professional; Certified Project Manager; and Certified Program or Projects Director the last three based on the certification of knowledge, proven capability and attitude.

The National Competency Standard for Project Management (NCSPM) of the Australia, endorsed by the Australian Institute of Project Management (AIPM) defines the standards on specific competency criteria for project managers by adopting the framework of nine knowledge areas of PMBOK™ Guide but designing very specific skills and competency items for the respective knowledge areas. Its certification system is unique and is based on work-place assessment by registered assessors by industry affiliation. The NCSPM has three certification levels (from the lowest to the highest): Qualified Project Practitioner (QPP), Registered Project Manager (RPM) and Master Project Director (MPD). These three levels correspond to levels 4, 5 and 6, respectively, of the Australian Qualification Framework (AQF) sponsored by the government, which is the generic standard for professional performance capability in Australia.

Project management was introduced in Japan first into the engineering and construction industry in the early 60's for building modern oil refineries and petrochemical plants based on American process (production) technologies to cater to the Japanese industry in full swing to attain post-World War II recovery. As the production technology was from the US, project management was imported in parallel. Project management was then implanted into the general construction, heavy industry and heavy electricals companies. Lately since around 1995, thanks to the IT revolution, project management has been attracting more interest in the fields of information systems/solutions industry, manufacturing industry, as well as in business process reengineering and restructuring endeavors and financial circles.

In Japan, a dedicated project management department was inaugurated in the Chiba Institute of Technology in 1997, and the Japan Project Management Forum (JPMF) was founded in 1998 as a community for cross-industry networking and cross-fertilization for project management professionals, practitioners, educations and vendors. JPMF, in cooperation with ENAA, hosted Japan's first global project management conference "International Project Management Congress 2001 (IPMC2001)" in November 2001 with 460 delegates from 23 countries; P2M was announced to the world from the platform of IPMC2001.

In 1997, the first PMI® PMP® examination was administered in Japan by pioneering Japanese PMI® members; the number of PMPs in Japan jumped from just seven under the old system in 1996 to current 2,000. Also, the Society of Project Management (SPM) was established in 1999 as a unique academic project management society that is the hub of scientific research and development of project management; SPM's membership is not confined to Japanese but is open to the world. SPM will host its first global symposium in Singapore in July of 2002.

With the advent of ever-increasing pursuit of project management, in 1999, the Ministry of Economy, Trade and Industry (METI) proposed that the Japanese experience, knowledge and wisdom on project and program management embedded in the Japanese industry be intelligently collected and translated into a unified body and practical guide for the revitalization and competitiveness enhancement of the Japanese industry and subsequent managerial technology transfer to other interested counties and commissioned the realization of this vision to the Engineering Advancement Association (ENAA), a non-profit project industry initiative. Upon this valuable vision and research budget, ENAA formed the Committee for Innovative Project Management Model Development which has been headed by Professor Shigenobu Ohara of Chiba Institute of Technology and staffed with industry's leading project management visionaries, knowledgeable academia, management consultants with project business background, and business strategists. The committee, after three years of continuing research and development activities in a project way, has given birth to this P2M.

- Project management (PM), rooted in the defense and engineering/construction industry, is finding dramatically expanding application areas since the middle of 1990's and is now one of the most widely acknowledged business management systems.
- PMI®, a global PM association headquartered in the U.S.A., maintains its proprietary PMBOK® Guide as a PM body of knowledge and IPMA, dominant in Europe, maintains ICB as a competency standards brochure.
- PMI® confers PMP® certificates to those who passed both career verification and a knowledge examination; PMP® examinations are administered in Japan as well.
- IPMA grants four levels of qualifications for project professionals based on knowledge and proven capability.
- AIPM in Australian grants three levels of project management certification based on work-place project management competency.

A brief analysis of P2M's features is given.

Project management practices, generation by generation, have contributed significantly to the efficient development and execution of social infrastructures, capital investments and lately business process improvement.

The project management in the first generation focused on the management of the eternal triangle of Q-T-C or quality, time and costs plus later scope management. Project management, in this category, is project implementation or delivery focused, and because of its basic structure of defining the scope via WBS, i.e., decide and allocate resources to be utilized for each work package and plan-execute-monitor/control-feedback cycle, project management sets standards for how to most efficiently accomplish given unique tasks, meeting a given or set cycle time.

Project management of the second generation is often referred to as modern project management (MPM) and combines the features of the project management of the first generation, which may be classified as

hard processes of project management as it is rich in planning and control processes, and soft processes such as organization and communications management, in addition to reinforcing the hard processes such as scope, time, cost, risk and procurement management. In short, modern project management takes on a balanced process structure for wider applicability and envisions use for organizational competitiveness projects in addition to meeting external sponsor requirements such as capital investment and systems development. As a result, project management has dramatically expanded its application areas: it is being applied to national policies development and agency productivity enhancement, IT/information services, and product and services development using the F-B-C (faster-better-cheaper) concept.

While P2M should still go through evolution, P2M targets opening up the third generation. What is needed now in Japan are the restructuring of the total systems from a holistic viewpoint, whether company business structures, public works and public services that cannot adapt to changes in environment. The concept needed for breakthrough is not analytical ability, but broad visions, value consciousness, high viewpoint and rich insights that enable one to grasp the totality and foresee the future. The philosophy of project management embodied in P2M lies in deciphering complex issues, developing or interpreting missions for breakthroughs, and paving roads to optimal solutions through programs, which in turn consist of organically interrelated projects.

In other words, P2M expands the existing project management bodies of knowledge or competency standards to the total management of projects, or cradle to grave of projects, viz., from program conception for value creation, flexible and modular development of programs or projects, and ongoing projectized management of operation and maintenance (O&M) through smart utilization of value and knowledge created on programs or projects. This is also the rationale for certifying mission-performer project professionals based on P2M.

It should be noted that this grand vision does note negate delivery-focused project management that readers with less experience should perform day to day; owing to the modular nature of P2M, those readers can focus on Part 1, 2 and 4. Part 4 alone offers many elements of project management that have either not been given or are dealt with briefly in the existing project management bodies of knowledge.

● Japan's Certification System for Project Professionals

Project professionals should invariably possess competent professional capability backed by sound knowledge, practical experience and attitude. Entrance to project professionals is learning a systematic body of relevant knowledge, which is a prerequisite for becoming a specialist. It, however, is not the whole picture. Defining a problem, breaking it down into tasks, designing how to implement tasks and coordinating and controlling inter-related activities to meet project objectives requires in-hand, practical experience. Moreover, project professionals are responsible for their professional performance toward the society in addition to project stakeholders and abide by ethical codes.

Japan's Project Management Certification Center, an NPO, started certification in 2002. On the entrance level, the Project Management Specialist (PMS) certificate is granted to those who have demonstrated the mastery of the knowledge pursuant to P2M. The intermediate level is the Project Manager Registered (PMR), which requires higher competent capability and practical experience record to be qualified as such. The highest level is the Program Management Architect (PMA) characteristic of P2M. PMR is more or less equivalent to certified project manger qualifications according to the preceding qualifications systems in the world while PMA is a unique certificate for program management. For these two certificates, holding the PMS qualification is a prerequisite.

Abbreviation	Name	Qualification for Test, Effective period, Test type	Level
PMS	*PM Specialist* Project Management Specialist	Paper examination, renewal required every 5 years,	Primary
PMR	*Project Manager* Project Management Registered	PMS + PM experience in at least one project, renewal required every 5 years, thesis + interview	Practical
PMA	*PM Architect* Project Management Architect	PMS + experience in at least three projects, renewal required every 5 years, thesis + interview	High

Figure 1-3: Japanese Project Management Certification Systems

The introduction of the certification system is expected to bring the following positive effects:

- The qualification of PMS will accelerate the promotion of P2M education and learning of competent project management capability.
- The qualification of PMR will increase the chance for project managers to be socially recognized and enhance their employability.
- The qualification of PMA will increase the chance for revitalization or innovation through the re-creation of projectized businesses and public undertakings.
- The certification system will significantly improve the competence of project professionals to deal with complex issues, both in the private and public sectors.

● Social Changes and Project Management

Changes in social environments create chances to innovate the mechanisms or systems that underlie societies. Innovation can be a threat if no measures are taken for it, but adequate actions would produce chances for growth. Patterns to provoke such proactive actions are expressed as visions or strategies and their context depends on profound insight of top persons such as politicians, top executives and entrepreneurs. Insight signifies the interpretation of the total picture of complex issues and right orientation to deal with such and is a source to give birth to future values.

However, without project professionals, the context of strategy generated from the insight of such top persons cannot be organically understood, or cannot be molded as a project to achieve given mission and objectives. For example, launching of new business, business model structuring, development of new products, scheming project plans, plant construction, M&A, and organizational innovation or restructuring -- all of these are projects with a mission and objectives to be attained and need the competent capability of project managers.

These projects may be independent from each other, however, quite a few of them are interrelated as a complex project. Quite often, Customer Relationship Management (CRM) projects for enhanced response to customers with the 3S factors i.e., speed, service and satisfaction are launched, coupled with the Supply Chain Management (SCM) projects pursuing most reasonable, cost-effective business logistics. In the zero-emission operation policy triggered by the Law for Promotion of Utilization of Recyclable Resources, the total cycle of product development, design, manufacturing, and facility decommissioning are dealt with as a once-through project.

An organization embraces both operation type activities that are characterized by repetitive business activities producing stable returns or client satisfaction utilizing existing production facilities, infrastructure or service systems created through projects, and projects that are intended to add new value to an organization through adding new production facilities, commercial or public service systems, social infrastructure, IT solutions or new business models, which are triggered by organizational recognition that existing system are unable to cope effectively with market changes and no longer guarantee continuing returns or client satisfaction or lack of proactive project investment would leave the organization behind from competition. The operation type activity has to date accounted for 90 percent of the activities of business firms in general in Japan. However, a trend is that the share of project activities is increasing recently, there emerge companies that projectized businesses are a majority. For instance, in engineering and construction companies, solution (or in many companies, called services) divisions of IT industry and research institutes, since projects are exactly sources of their businesses, projectized operations are common. They manage their organizations and resources to most suitably fit operations of projects and their business systems are tailored for project type business running. In the current, drastically changing social environments, in order to stay in business or to continue to be a reliable and efficient public service provider, private and public enterprises should recognize the pressing need for "management by project" in which all echelons of enterprises have project mindset and produce and implement projects to pursue changes for the better. P2M finds its value where the guide is smartly used as a change agent and where project professionals certified through the mastery of P2M play as a pilot for changes.

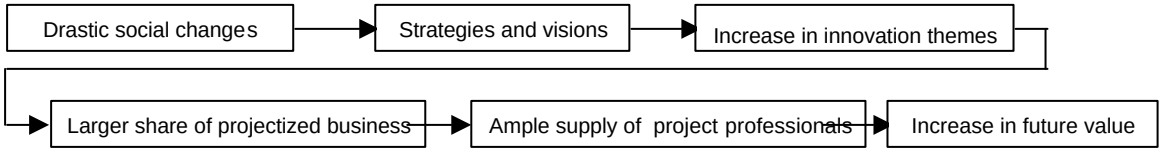


Figure 1-4: Corporate Innovation vs. Supply of Project Professionals

- Social changes invite chances for creation of strategic projects for changes based on sharp insights and visions.
- Projects include launching of new business, business model structuring, development of new products, plant construction, M&A, and organizational innovation or restructuring.
- Projects are undertakings pursuing future value and are either independent or interrelated.
- Management by project, or projectized operation of enterprises for innovation require mission-performer project professionals.

Case ◆ Construction of a New Business Model

In the environment where the world is connected real-time through the Internet, technological information exchange on some electronic parts is conducted using CAE/CAD/CAM on the global standard. A high-performing automobile company demonstrates its cost competitiveness by procurement using an Internet marketplace. Many agile top executives foresaw an economic advantage of network technology and smartly utilize it for innovative business models. The success of such companies depends on availability of smart project professionals.

■ Use of The P2M Template For Efficient Mastery of CBB

P2M is intended to facilitate readers to efficiently acquire the Capability Building Baseline (CBB). In CBB, knowledge, experience, practice and norm for project management are as sources of intended competent project management capability, which includes both tacit and implicit factors. The former can be acquired through learning or is more or less knowledge based, but the latter is related to judgment ability backed by practical experience and is thus hard to master for inexperienced project management practitioners. It is essential to transfer the know-how and wisdom of experienced project mangers to those inexperienced in as much a categorized format as possible.

Generally, experienced project mangers intuitively design the most efficient plans, work procedures and have a horse sense of predicting problems. P2M has tried to decipher such "implicit best practices" into visible format and express them in the form of P2M template **(note: that template in this context is not a standard format for some actions or reporting but refers to standard practice patterns).**

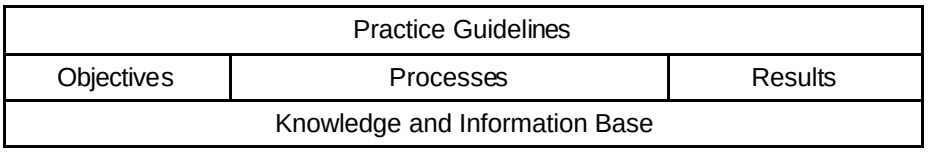


Figure 1-5: P2M Template Structure

■ Use of "Practice Frame" for Acquiring Judgment Capability

Where he or she detects a symptom of unusual phenomenon in project work, a project manager with broad experience starts defining the problem occurring, works out alternatives for solving the problem based on his/her past experience and lessons learned and predicts outcomes. One normally solves problems using the Experiencing – Memorizing – Recalling – Applying Lessons Learned pattern. (refer to Figure 1-6) . This structure of problem processing is called the "practice frame". In P2M, eleven segmnts of project management practice patterns which frequently occur in project and program management, are identified and laid out as segments of project management in Part 4.

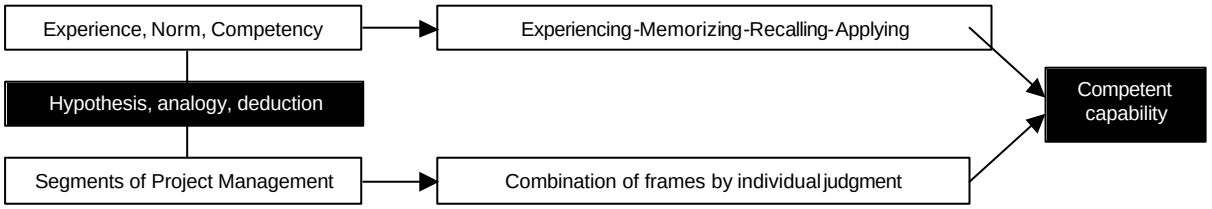


Figure 1-6: Structure of Judgment Capability

Whereas the eleven segments of project management as standard patterns to manage individual project objects is called "practice frames," the totality thereof or the complex utilization of individual practice frames is labeled as "total practice framework." In P2M, trend charts, layer charts, flow charts and fishbone charts, among others, are frequently used to expand applicability.

To put competent capability in actual use, soft thinking or zero-based, broad-spectrum thinking is required to freely combining all available intellectual or practical assets. P2M has tried to formulate soft thinking into the practice framework, not confining itself to the traditional coverage and Definition of program and project management Definitions as its mission is to help realize changes and innovations. In this context, P2M offer the following characteristics:

(1) Applicability deduced from practical experience
(2) Reflection of Japanese cultural, structural and industrial strength
(3) Avoidance of too meticulous Definitions and practices, thus providing leeway for case-to-case applications
(4) Setting of rules to utilize human intelligence and IT potentials
(5) Emphasis of total thinking rather than segmentation and precise combination of management elements

■ Competent Capability of Project Management

As a simple example of combination of frames, suppose that a delivery is slipped in a project. In this

case, what frame should be used for problem solution? A delay in the delivery will increase cost risk and cause client complaint or dissatisfaction. Sponsors also may complain. The project objectives must be met. Proper information and data should be obtained to make a quick and proper decision. Then a measure should be worked out to address this complex issue by combining three management frames of risk, relationships and objectives out of the eleven segments of projects management.

In P2M, these steps and procedures are described in the template with the necessary pieces of knowledge provided as a package.

[11 Segments of Project Management]
(1) Project Strategy Management
(2) Project Finance Management
(3) Project Systems Management
(4) Project Organization Management
(5) Project Objectives Management
(6) Project Resources Management
(7) Project Risk Management
(8) Information Technology Management
(9) Project Relationships management
(10) Value Management
(11) Project Communications Management

■ Program Management

As in project management, program management solves issues by combining the segments of project management. However, since a program consists of multiple projects interrelated to each other under a program, it features a double layer of management, viz., management of component projects and total management of the program focusing on the optimum integration of projects. Program management embraces the following four fundamentals and six features of integrative management:

[Fundamental Elements of Program Management]
(1) Mission ---------- Definition of the holistic mission of the program
(2) Architecture ---- Structure interlinking projects
(3) Community ----- Virtual space for integration of intellectual project professionals
(4) Assessment ---- Assessment of program value conceived, being achieved and actually realized

[Integrative Management – Six Features of Program Management]
(1) Profiling
(2) Strategy
(3) Architecture
(4) Platform
(5) Program Life Cycle
(6) Key Success Factors

■ Underling Concept, Orientation and Standard Approaches

As in project management, frames of project management are utilized. In both, project management and program management, basic concept, orientation and standard approaches are provided in the layers of (1) Definition, (2) basis attributes, and (3) common view.

	Project Management	**Program Management**
Definition	Value creative undertaking based on a specific mission	Value creating undertaking based on a holistic mission
Basic Attributes	Uniqueness, temporary nature, uncertainty	Multi-facets, scalability, complexity, uncertainty
Common view	Systems approach Project life cycle Project community Project stakeholders Use of management skills	Program mission Program value Program community Program architecture Use of program integration management skill

Figure 1-7: Project Management vs. Program Management

In summary, P2M is designed as follows:

- Templates are provided for ready retrieval of standard practice patterns.
- Standard frames are built on industry lessons learned accumulated through the Experiencing – Memorizing – Recalling – Applying cycle, which help acquire judgment capability.
- P2M allows project professionals build professional competencies by repeating deduction, prediction and application along the standard frameworks provided.
- Cases in P2M facilitate simulated learning.

Chapter 3 Strategic Use of P2M- based Project Management

■ Application Areas

Project management is even applied in daily lives, such as travel plans, school festivals, local festivals, concerts, social services activities and all sorts of events. Project management is increasingly deployed in ordinary business firms, introduced in colleges and government offices. Recent applications cover government policies, public services, corporate innovation, business model development, product development and education reform.

Project management application areas are largely categorized into the following groups by way of illustration:

Social infrastructure projects	Energy systems, environmental preservation, civil infrastructures, transportation systems, defense systems, urban development, regional development, national industrialization programs, trunk public information systems
Engineering projects	Engineering-procurement-construction of production plants and facilities, commercial facilities, consulting services
Information infrastructure projects	IT-based solutions, systems integration, software development, information networks, e-businesses
Management innovation and reform projects	Management reform, restructuring, reengineering, mergers and acquisitions of enterprises
New business creation	Research and development, creation of new business, creation of new business models, venture incubation, partnership development
Government initiatives	ODA planning and management, technology transfer, international development consortium
Innovation of manufacturing system	Automation, AI application systems, CIM, virtual factories

■ Shift from Projects to Programs

As seen in the above generic application areas of project management, a salient trend is that generally projects are evolving to be more sophisticated in complexity and mission and be larger in investment costs and resource utilization volumes, and are implemented in increasing uncertainty due to the rapid technical innovation and market changes. Yet, the traditional project management is used on projects of all sizes from hundreds of thousands to billions dollars. Apart from investment costs, many of contemporary projects face high uncertainty. For instance, the development of leading-edge bio technology or electronic technology involves many uncertainty factors to overcome, which makes such development projects risky and traditional project management can contribute very little to raising a success probability. Senior management of corporations may mandate realizing a scheme for materials procurement on a global scale, developing a state-of-the-art management information systems coupling ERP, SCM and CRM systems, and carrying out organizational structure innovation all at the same time to timely respond to the so-called service economy. In this reality, principles and methods of the traditional project management are valid in developing detailed plans for projects and control the implementation of the plans but are not as effective to guide the mission and strategy formulation of projects and to manage interrelated component projects as an organic total program. Here comes the importance of program management.

For program management, P2M first elaborates the concept and features of program management that can rarely be found in an integrated manner in the existing literature, and proposes a modular approach to a program in which component projects are structured to be modular for enabling combination or contraction, if warranted, commensurate with changes in the program environment and frames of project management can apply to component projects, thereby the strategy side and the management controls side of program management balance.

Figure 1-8 indicates that the complementary nature of project and program management and the frame elements of project management support both project and program management.

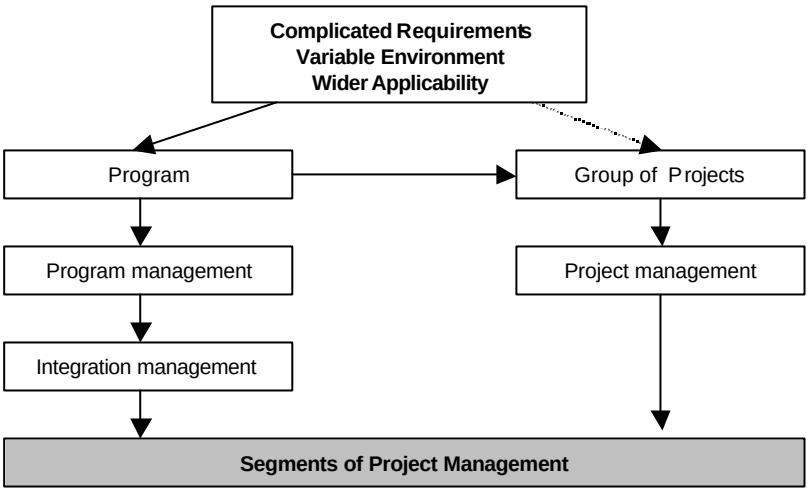


Figure 1-8: Relationship between Program and Project

Case ◆ A New Target of Project Management

We are in the era where virtual enterprises perform activities on networks across the borders without time constraints. P2M is expected to support corporate planning and state policy-making for the next generation to accommodate futuristic business transactions and public services. Administrative reform and one-stop public services that citizens desire, demand the integration, as a program, of traditional discrete projects of national competitiveness strategy formulation, rational legal system, e-government utilities, recycling promotion system, technology development structure, to mention a few. Chances are that the value of public agencies is assessed against alignment to this global trend.

Case ◆ Promotion of Corporate Innovation Project

The percentage of knowledge, information and service industries of GNP in industrialized countries has reached as high as 60 to 80 percent. In these growth industries, information and knowledge resources that satisfy customers are valued higher rather than physical resources, and many competitiveness enhancement projects run.

On the other hand, manufacturing enterprises are promoting various innovation projects for survival as a program, such as a restructuring project, professional development project for selected few high-performer employees (departure form equal education opportunity characteristic of Japanese corporations), competency based employee appraisal, downsizing (rightsizing) project to withdraw from unprofitable business lines, quick response as core customer services using IT systems, and business process reengineering.

In both cases, whether project (program) management is smartly utilized or not should influence corporate success.

Chapter 4 Project Management Tower – P2M Tower

The "Project Management Tower" in Figure 1-9 shows the Overview of P2M as PMI® uses the abbreviation "PMBOK® to popularize its body of project management knowledge and IPMA depicts the overview of its competency base , ICB, in a "Sunflower" format.

I. Project Management Entry of P2M describes how to make a first step as a professional. II. Project Management explains the basic Definition and framework of project management. III. Program Management introduces program management that organically combines multiple projects. IV. Project Segment Management offers 11segments of project management. Project management segments are used in a standalone or combined manner for individual tasks and challenges of project management and program management.

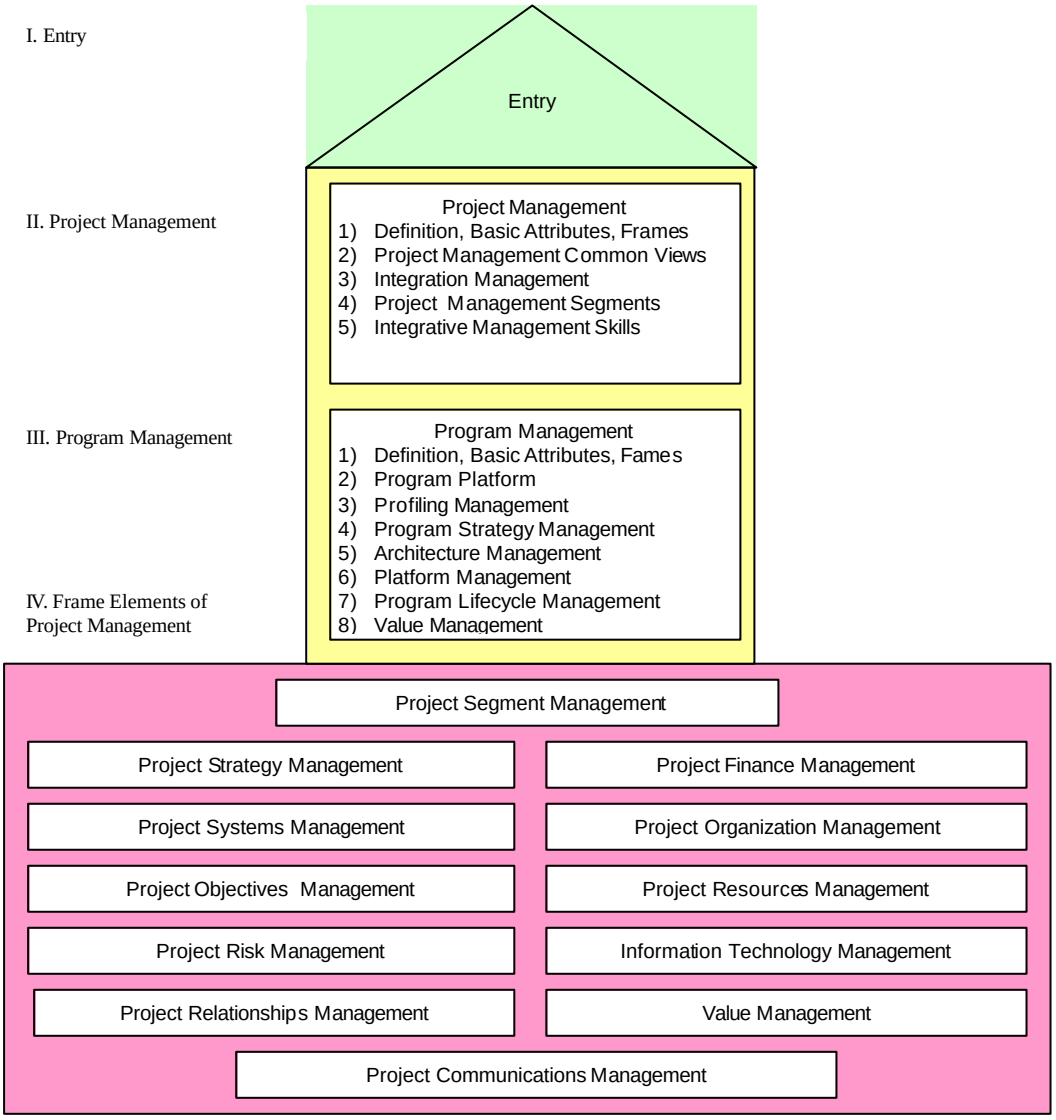


Figure 1-9: P2M Project Management Tower

- P2M enhances project professionals' competent capability to apply right knowledge and wisdom embodied throughout P2M to project specific tasks and challenges
- A standard for structured knowledge base is important for the development of knowledge, knowledge education and qualification of project professionals.
- This brochure is intended to be a structured guide for forming competent capability, not a textbook that covers all about it.
- P2M is a project and program management guide first published in Japan. It will go through continuing refinement with feedbacks from actual applications. Until it becomes prevalent, familiarization education is provided through dedicated seminars and reference literatures will

be introduced.

[Bibliography]

[1] "Japanese Version of A Guide to Project Management Body of Knowledge", Hiroshi Tanaka, PMP, et. al, the Engineering Advancement Association of Japan, 1997, under license from the Project Management Institute (PMI®)

[2] "ICB IPMA Competence Baseline" G. Caupin, H. Knoepfel, P. Morris, E. Motzel, O. Pennenbaecker, International Project Management Association

[3] "Comprehensible Project Management" Katsuki Nishimura, Nippon Jitsugyo Publishing Co., Ltd., 2000

Part II. Project Management

Chapter 1 The Project

Definition
A project refers to a value creation undertaking based on a specific mission, which is completed in a given or agreed timeframe and under constraints, including resources and external circumstances.

■ Specific Mission

A specific mission means a fundamental state of achievement for that a project is created and that a project is expected to attain. Project management starts with the interpretation of this mission into a set of requirements and defines objectives, guidelines and policies, strategy, and essential action plans to meet these. Then, a project sponsor(s), when satisfied with such project fundamentals, accepts the value of the project and commits resources, including an investment fund.

■ Basic Attributes of Projects

A project has three basic attributes: they are uniqueness of a project's mission, temporary nature with the starting and closing times set and uncertainty affecting a project, such as environmental changes and risks, and on top of that value creating nature.

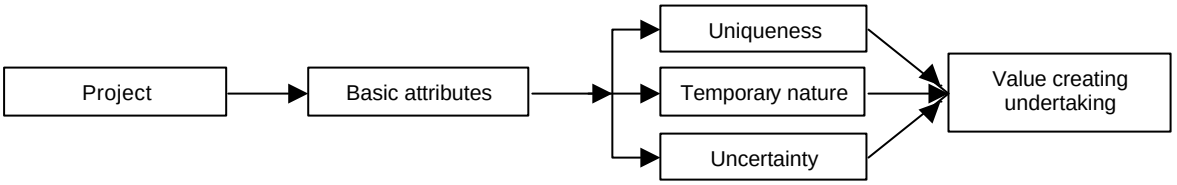


Figure 2-1: Definition of A Project

Chapter 2. Attributes of Projects

■ Uniqueness

Uniqueness means the non-repetitive characteristics of projects. Even if some projects seem to resemble each other, a project is never executed under exactly the same environment and context as with others. Respective projects encourage pursuit of differentiation, new combination of approaches, novelty and innovation. If some projects have seemingly same missions, each project can be unique so that it does not attain the same results as it entails different requirement interpretation, constraints, context and a project team. Uniqueness demands shifts of viewpoints, tailoring of approaches, and all in all wisdom.

■ Temporary Nature

Temporary nature is characterized as such that each project has a defined start and end point. The start time is clear as it is not only stated in the project schedule but a project team is organized based on the project's mission and the team's key persons are nominated. However, except for projects in the hardware-oriented project industry, there are cases where the timing of the project completion is not necessarily clear as in software development projects as debugging and or feature additions due to unclear scope definition continue for an extended period. Defining conditions for project completion should be carefully done.

■ Uncertainty

Since projects are executed assuming specific conditions and situation, the achievement of their missions is quite often affected by uncertainty. This uncertainty causes risks caused by indefinite information, immature or unproven technology and unpredictable factors. In projects, these risks are overcome proactively employing project manager's and team members' combined knowledge, judgment and creativity. A salient feature of a project is a project team's coordinated challenges to uncertainty.

■ Value Creation

Projects embody insights of planners into given missions, which lead to the creation of new value enriched by uniqueness, differentiation, novelty and innovation. In day to day life, business and public scenes, one carries out some sort of value creating activities in pursuit of happiness, self-realization, profit, welfare and so on. A value creating activity is defined as an activity to realize value to meet needs of human being, industry and the society, which is carried out by one or more persons on the basis of intellectual, physical and financial resources.

Routine manufacturing activities in production facilities are repetitive, whereas the development of new products has a unique mission to satisfy customers' specific needs and, if successful, enhances corporations' profitability. However, a mission is stated briefly as a desired state to reach and thus signifies connotative requirements. It follows that it is essential for a program or project manger to clarify, project goal, objectives and constraints that include, by way of illustration, basic functions, grade, design features, production processes, production costs, time to market and marketing strategy. In summary, a project can be defined as an undertaking embracing the following characteristics:

- A project is a value creating activity to meet a specific mission.
- When a project is successfully completed, it delivers novelty, differentiation and innovation on its product, either in a physical or service form.
- A project has a temporary nature having its defined start and end times.
- A project has inevitable uncertainly factors due to its nature.

Chapter 3. Definition of Project Management

Definition

Project management is the total framework of practical professional capability to deliver a project product meeting a given mission, by organizing a dedicated project team aware of due diligence, effectively combining the most appropriate technical and managerial methods and techniques and devising the most efficient and effective work breakdown and implementation routes.

■ Due Diligence

Due diligence here means proper methods and procedures abiding by social expectations and ethical standards in general and in conformity with applicable laws, standards, widely accepted practices and where applicable, international standards that a sponsor(s) of a project, in carrying out a project, mandates to the project team. In this way, the project is held accountable to the society as well.

■ Efficiency

Efficiency refers to the ratio of output gained against resources mobilized; it signifies a physical productivity indicator with production plants and manmade structures. Project management requires procedures, knowledge and means to minimize irrationality, waste and inconsistency. In recent years, in addition to physical productivity, intellectual productivity is proving important: agile use of market information or production data, supply chain analysis, unique combination of technology elements, all leading to value enhancement.

■ Effectiveness

Effectiveness means an indicator of favorable overall effect brought about by projects and a level of satisfaction of stakeholders who are directly or indirectly involved in a project. Effectiveness is also evaluated in terms of benefit acquired against investment costs. Effectiveness depends on the quality of project professionals. A project team is formed with expert professionals drawn from permanent organizations and the team exists temporarily over the project period.

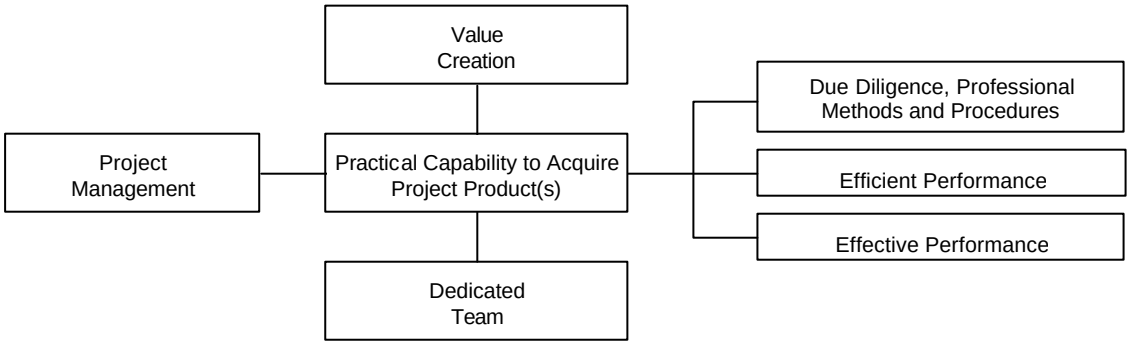


Figure 2-2: Definition of Project Management

The professional capability of project management is largely classified into the following three categories:

(1) Capability to translate a mission into concrete objectives and schematically design processes, major work items and paths to attain these objectives.
(2) Capability to ensure the delivery of a project product through proper planning, management, coordination and controls.
(3) Capability to ensure overall stakeholder satisfaction by coordinating a variety of and frequently conflicting stakeholder interests.

Chapter 4. Project Management Capability Framework

Project management should be based on competent professional capability and be a value creating activity. To deploy this capability, the integrative application of the common view underpinning project management and the segments of project management are required. It is also crucial for project management to harmonize objectives of a broad spectrum of stakeholders such as, typically, project sponsors (investors), project owner, project team member, contractors/vendors, regulatory agencies, and the society/community in general. A variety of objectives are a collection of expectations toward a project mission as viewed from the respective stakeholders; they should be essentially oriented toward a same core mission but connotations may be different, which make harmonization difficult.

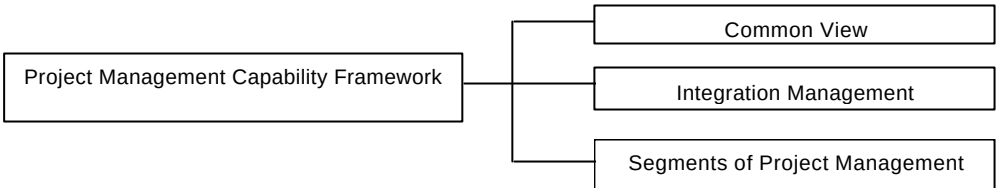


Figure 2-3: Project Management Capability Framework

[Value Produced by Project]

Project value refers to the benefit that a project product renders when the requirements embodied in the project mission are fulfilled. There are prerequisites to attain value. The first is a necessary condition that the framework of practical capability is in place to achieve a project as envisioned; the second is that the project product should bring about value to all the stakeholders harmoniously. In short, a project produces **asset value** as a direct outcome of its undertaking, **innovation value** as its product generates profit or enhanced services to the public and **synergy value** that produces synergy for future beneficial collaboration or new cross-industrial business models, when a project has successfully balanced interests of stakeholders.

[Public Value and Private Value]

From the public viewpoints, value of projects includes realization of social benefits, public safety, serviceability, facility safety, human welfare, social acceptability and environmental conservation. From the private viewpoints, project value refers to corporate benefits such as profitability, innovation, growth, stability and trustworthiness.

[Planning and Assessment of Value]

Project value is planned or evaluated on such criteria as the comparison of the benefit created by a project with the costs expended. Typical methods and indicators used for this assessment are CBA (Cost Benefit Analysis), CF (Cash Flow), NPV (Net Present Value) and IRR (Interest Rate of Return).

Case ◆ Public Project and Private Project

For example, a park project produces benefits such as comfort, rest, relaxation and fine view, but a profit cannot be expected because it is a public project. Accordingly, it is important to plan the project to acquire maximum value by optimizing a ratio of benefit to the cost for land acquisition, facilities and landscaping.

For enterprises, as is the case in product development, timely injection of the product superior to those by competitors contributes to future cash flow. Moreover, it also contributes to a rise in the company's stock value, which, in turn, improves asset value, accelerates growth and increases creditworthiness, and, as a result, facilitates fininancing.

Chapter 5. Project Management Common View

■ Project Management Common View

The Project Management Common View refers to common understanding of the basic attributes and patterns whereby the project segment management and integrative management are employed, and natural, socio-political and economic factors exercise their influence on project activities. The elements of the common view consist of, regardless of project types and sizes, systems approach, project life cycle, project mental space, project stakeholders, and management skills.

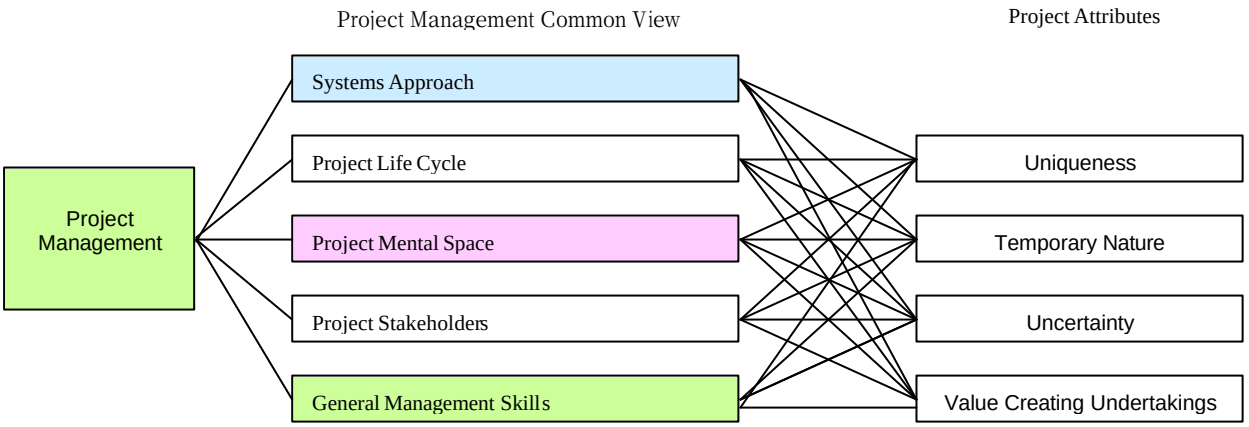


Figure 2-4: Project Management Common View

■ Identification of Issues by Systems Approach

Project management resorts to the concept of addressing complex issues based on the systems approach and no other methods are found to fit better. In project management, the following seven elements are recognized as a process: input, process, output, constraints, disturbance, management cycle, and knowledge-tool-database.

In project management, constraints are given premises at the outset. Any change in premises needs to be endorsed by stakeholders on the strategic level and is beyond the authority of the project manager. Disturbance should be classified into two types: those within and beyond the control of the project manager. Where any disturbance of a vital scale occurs that significantly affects the project product, re-design of the system should be carried out. The project manager must be mature enough to judge whether the change in question is within or beyond his/her authority.

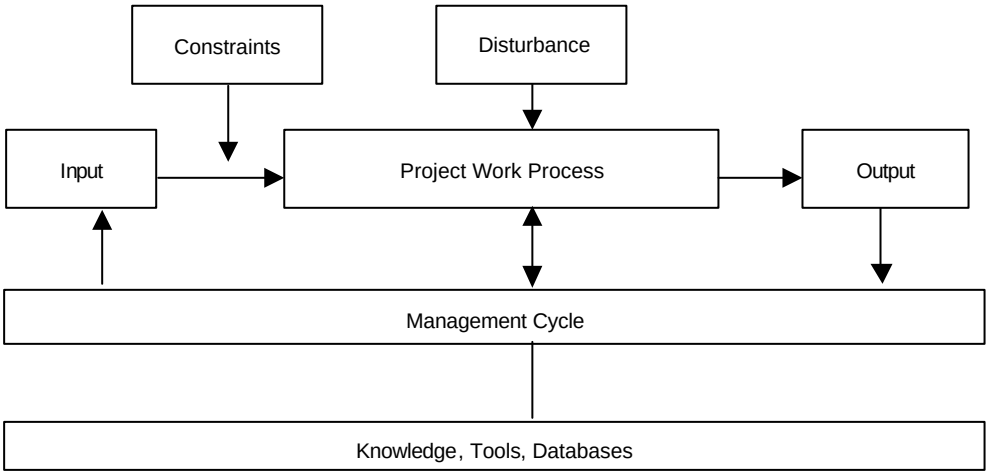


Figure 2-5: Systems Approach Theory

The segments of project management in P2M facilitate the process design of project work and its performance. Project management in the 21st century should pursue, in addition to traditional application areas, value creation in highly complex issues characterized by uncertainty by combining material, intellectual, financial and information resources. Development of a specific mission often leads to formation of a cluster of projects in which a number of projects are implemented in parallel or in sequence.

■ Project Engineering

Project engineering (note: this in not the project engineering used in the engineering and construction industry) is one phase of systems approach. Project engineering in project management means the systems approach for analyzing, defining, and proposing a solution(s) to complex issues involving socio-political, economic, managerial, informational, techno-engineering and financial needs

Case ◆ User-friendly Financial Information System

In building a financial information system, the knowledge on financial business, machines, IT and human engineering is necessary for designing software and applications platforms. For instance, to build an ATM system for cashing, deposit and transfer, a combination of knowledge on optical reading, transactions and verification is required, and besides, ergonomics is essential.

■ Project Life Cycle

To profile the total project, one should know how the project is formed and implemented phase by phase: each project phase is characterized by its distinctive attributes in terms of mission implementation and deliverables. Thus a project life cycle approach is universal in the project world.

Each project has a project life from the conception of a project to its completion; and each project has its own project life cycle pattern. With the period of a project plotted as the horizontal axis and amount of efforts expended as the vertical axis, a build-up curve is derived and the accumulated amount of efforts is shown as an S curve. When the curve is demarked by milestones unique to the project, the divided periods are recognized as a phase. Milestones vary with the industry branch or project type such as product development, computer programs and plant construction, and can relate closely to management practice in each field.

A typical project life cycle includes the initial, intermediate and final phases. The intermediate phase is divided into two ore more phases. These phases are represented, among others, by tangible intermediate or final deliverables. This deliverable differentiation demands work objectives and contents and management objectives. Thus, each project phase requires a tailored approach.

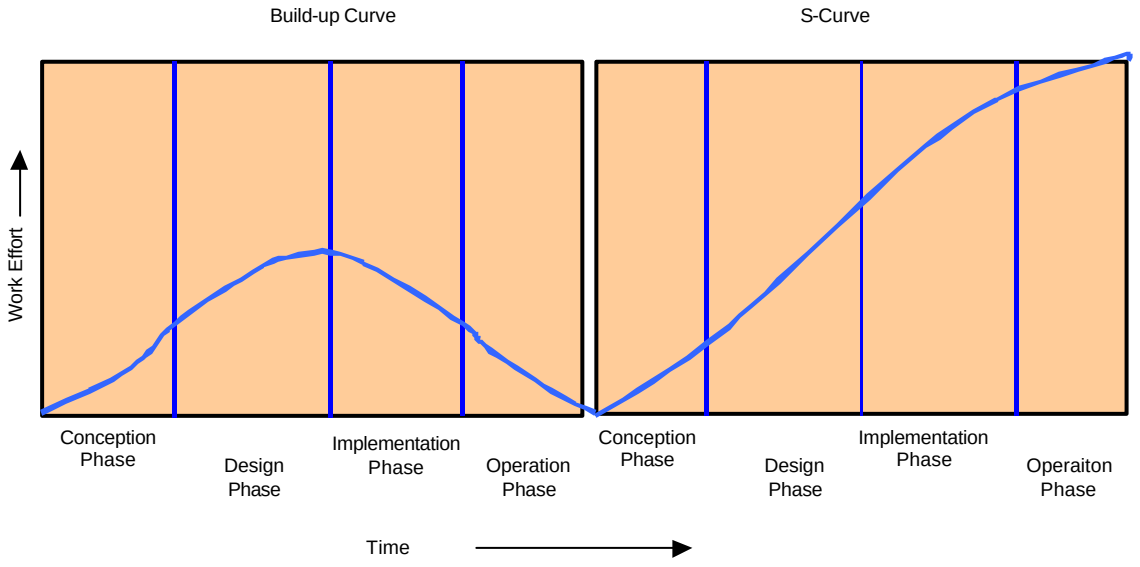


Figure 2-6: Project Phases vs. Types of Effort Curve

■ Project Mental Space

The project mental space refers to the virtual, morale space where stakeholders recognize the value of a project mission; commit themselves to the project from a variety of geographical, cultural, industrial, academic and organizational spheres; and helps build interaction and collaboration through a project specific communication base, including a virtual one. Project performance is greatly influenced by whether or not the project can create an active project mental space.

On projects, as a variety of stakeholders, culture and information are interwoven into context, it is part of project management's important function to positively deal with complexity, uncertainty and multi-facets of a project toward a given mission, pursuing fusion, alignment and motivation, which creates high mental energy. Natural, socio-political and economic influences within, exterior to and on the interface with the project are important factors that a project should consider to utilize them favorably for, or mitigate adverse impact on, the project. The socio-political influences refer to interaction among human beings, communities and organizations exerted by or impact on political systems, social norms, state of life, custom, culture and manners of communications. Where a project is executed through an international consortium, the project would encounter misunderstanding, and confrontation if attention to cultural diversity is not paid.

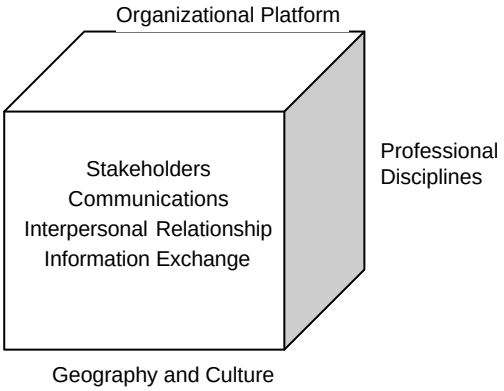


Figure 2-7: Project Mental Space

In recent virtual project teams in which team members co-work on electronic networks, common sharing of project objectives and interest in project work are a bondage and communications are cyber-based. Project management in the 21st century should consider characteristics of cyber project teams and how team spirit and collaboration is maintained; "high-tech, high touch" should be one important factor. Regardless of physical characteristics of project teams, a single set of mission and objectives, finely knit communication routes and teambuilding activities shape the backbones of project mental space

Case ◆ Project Mental Space

The four industry key words, i.e., focus on customer satisfaction, work-front first, team work and perfection orientation born in Japan have been imported into project management and are predominant objectives in project work. Pursuit of these key words drives project teams and helps produce unique idea and work manners. Behavior such as endeavoring to honor contractual terms, avoiding lawsuits, seeking harmony by avoiding confrontation may produce both positive and negative results. However, a negative side can be minimized if the project mental space is designed properly. Quality teams is a good example.

■ Project Stakeholders

Project stakeholders are those directly or indirectly participating in a project or are affected by projects and include sponsors, owners, financiers, contractors/subcontractors, materials or services suppliers, regulatory agencies, consultants, project manager, project team members, among others, who create value in a way or other. Typical indirect stakeholders are local government agencies and community that are affected by the projects.

Project sponsors are required to make a project investment decision not only based on analyzed project value but also giving due consideration to stakeholder context to obtain a balanced project picture. The project manager is a primary stakeholder who is a mission-performing professional endowed with the necessary authorities by the project sponsor to direct and integrate project; his/her role is to develop the given mission into specific objectives and execution strategy as well as forming a project team with expert professionals to execute project work under a set of constraints

- Projects are performed by players and sub-players who are both stakeholders.
- Projects exert influence on third parties who do not directly participate in the project.
- Due attention should be paid to the stakeholders for total harmony of the project.

■ Use of Management Skills

Management skills are such skills to properly utilize professional competency in forming an organization, getting assignments done with expected results through project organization members efficiently and effectively while motivating them. Management skills are acquired from management theories and workplace application and a driver for work execution with high efficiency through job descriptions and integrative management. People who belong to an organization are motivated by interest in jobs, zeal for work completion and comfortable working environment. A basic logic for management is, therefore, to form an organization most suited to the attainment of organizational objectives and motivation enhancement of organizational members by the manager.

However, what is more important is effectiveness. Effectiveness means the overall satisfaction and results of performance with well-balanced partial efficiency. Orientation and coordination among segments are required to achieve effectiveness. Leadership shows correct orientation and solutions by demonstrating adaptability to changes in environment and situation. The knowledge source of these management skills is theorized as the discipline, norm, practice, wisdom and expertise that are acquired through practical experiences. The strength of practical learning lies in the knowledge that is acknowledged as effective through practice.

● Common Management Skill

Project management skill refers to an ability to use the skill for ensuring deliverables through the complex use of common management and the 11 areas of project management segments in order to demonstrate the largest efficiency and effectiveness by understanding the total and common view of project management and adapting to changes in situation and environment. For demonstration of competent capability, skills in project management segments is stated with the template that integrates and formalizes the flow of objectives, work execution and results, constraints and disturbance due to environmental changes, and the measures, knowledge and data for coping with them.

In project management, the project manager forms and manages a temporary organization whose activity is limited to the performance of a specific mission by maintaining relations with the parent organization. Whether a mission is for profit or not for profit, a temporary team is formed within an organization, or across organizations, or by gathering expert individuals from various outside sources. Project leaders normally demonstrate exclusive management ability by exercising specialized authorities and have the responsibility for achieving results.

Thus, project management is a type of management dedicated to projects. However, a considerable part of general management practices backed by proven theories can apply to project management. Typical general management skills as applied in project context are shown below.

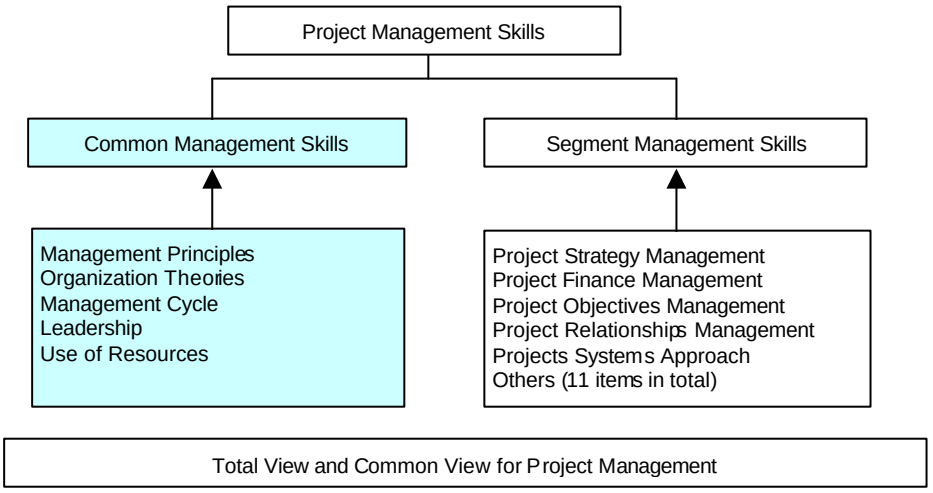


Figure 2-8: Project Management Skills

● Basic Activity Chain of Project Management

Project activities in the P2M context refer to value creation activities by the project team. Core activities of project management consist of planning, integration and coordination for efficient and effective project execution with good progresses and results. Project management provides competent direction to project work with leadership, policy planning, process design, goal setting, organization, task tabulation, resource assignment and adjustment and project team building, including motivation.

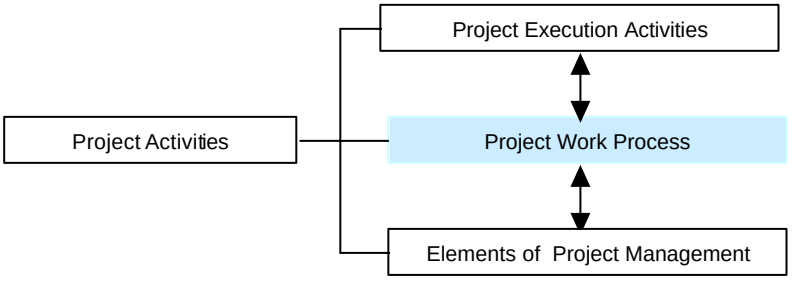


Figure 2-9: Overview of Project Activities

● Project Work Process

The concept of project work process is necessary to understand the relationship between project execution activities and of project segment management. Project work process shows a flow of overall execution activities from the beginning to the completion of a project as described in Figure 2-10. It also shows time phases to which segments of project management apply.

Project work process can de described by distinguishing between project execution work and project management but importantly both are interlinked closely. While project execution breaks down project work elements and produces products for each work package, project management serves as a gyrocompass for project execution work by applying leadership and the management cycle.

Project work process consist of the following:

(1) Work process for the total project

(2) Work process for specific parts that constitute the total project

The work process for a specific part is referred to as the work process module, which can be characterized with unique products produces by work items contained in the module.

Work process refers to work procedures and is often described with a diagram. Figure 2-10 shows the total work process.

■ Viewpoint of Process Management

Project work process signifies a standard pattern showing the flow of project execution activities along the time axis. To understand this work process from the viewpoint of management, recognition of two key points is required.

(1) Efficiency

The standard work process should be reviewed on an ongoing basis and be improved efficiently since it may have waste, inconsistency and unreasonableness with time.

(2) Effectiveness

The standard work process should be improved from the viewpoint of stakeholders, customers in particular, on an ongoing basis to demonstrate its effectiveness.

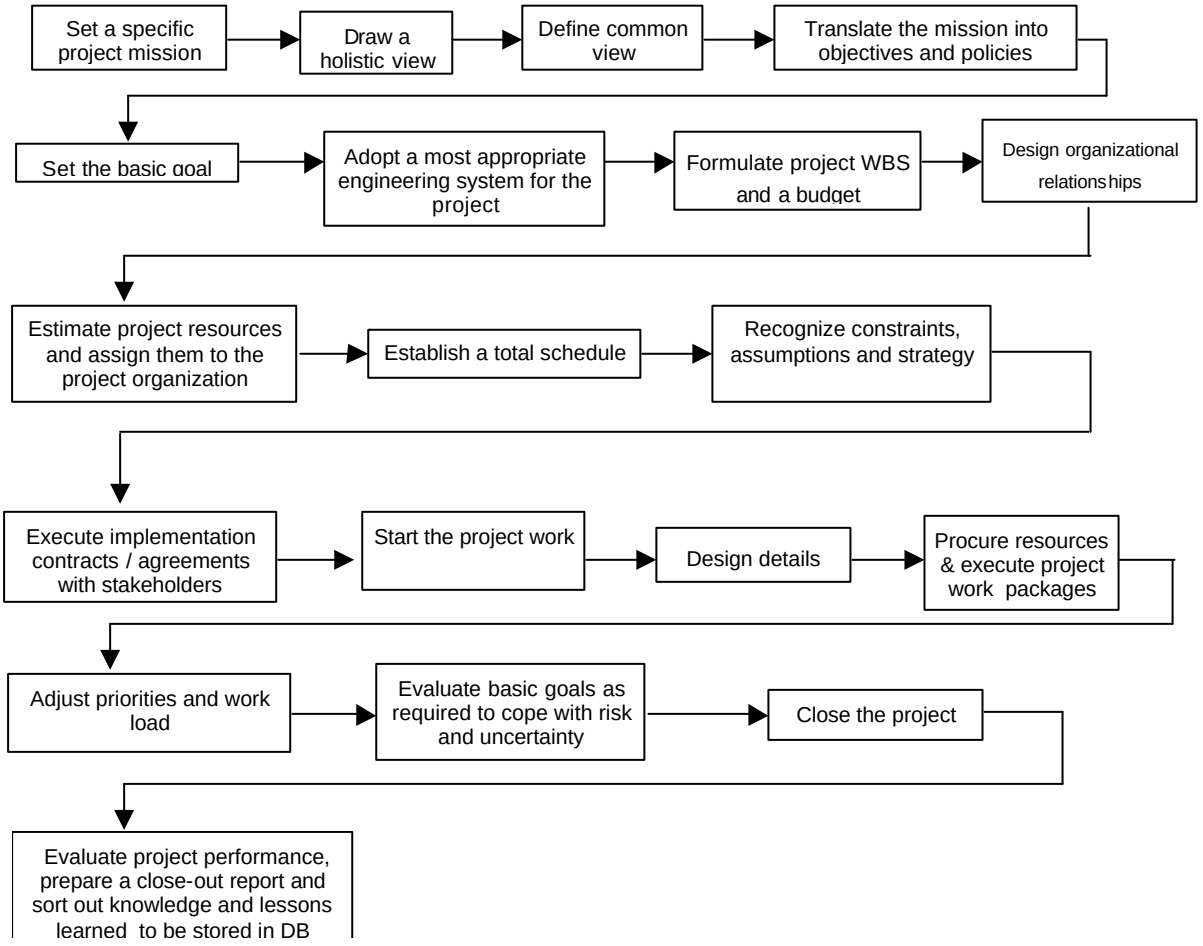


Figure 2-10: Standard Project Work Process

■ Types of Work Process

Since projects are value-creating activities, they go through resources mobilization, conversion and product acquisition. When conversion is viewed from added value, there are value creation, evaluation and enhanced value utilization via digital media.

(1) Work Process from Value Creation Aspect

The viewpoint of the value creator, which was proposed by Michael Porter, is called the value chain. Here, functions such as conception, R&D, design, procurement, construction, testing and trial run are expressed as a chain of work process. Human resources management, finance and accounting and other corporate planning and management services are classified as support functions.

(2) Work Process from Evaluation Aspect

Evaluators are in the position to evaluate project products such as manmade structures and services produced from the value chain. If they find that the value created does not meet the conditions for quality, performance, costs, delivery time and other parameters set out in the contract, the product must be modified, repaired or rejected. Value creators, then, need to reengineer the work process so as to satisfy evaluators.

(3) Digital Work Process

Work processes may take such a form in which work execution are supported by CAD / CAE / CAM with accumulated data, information and knowledge. Also, we are in the age where virtual work-flow backed by digital network is in place that enables virtual exchange of product data and their review and approval.

■ Reengineering of Work Process

The Business Process Reengineering (BPR) has been proposed by Michael Hammer and James Champy. BPR supports customer's viewpoints and is the methodology guide for reducing lead-time and costs by drastically reviewing existing processes from scratch, eliminating waste, and making the best use of information technology. This concept can be applied to project work processes as it is. It is highly important to re-design the work process that enables the maximum accomplishment of a specific mission by eliminating work overlaps, pursuing parallel work chains and adopting digital work processes.

● Project Leadership

Leadership refers to interpersonal influence that leaders exert on team members to effectively achieve project objectives and goals by giving psychological energy to project teams to motivate their group endeavors. Leadership has two factors: position authority-based influence in the organization and personal influence that includes personality-related charm or competency based on experience.

Leadership also has four common elements: indicating right directions; distilling mental energy; help team members understand the core of the issue; and suggest solution for a crisis. Project leadership should be expressed in the appropriate style that meets the respective project type and situation.

Creativity-focused leadership style, objective-centered style, teamwork-focused style and others could be developed through study and exercises.

● Project Organization

The organization with diversified expert professional is the basic principle to achieve high productivity. Organizations generally aim to have a common objective, confirm collaborative work setting and enhance productivity to ensure performance by achieving a mission with communications being the centerpiece to attain this mechanism. Project organizations are established for a specific mission on a temporary basis either anew, as an expansion to or independently from the existing parent organization. Their resources such as human resources, technology and information are dependant on the existing organizations. Although project organization show various patterns and are of a temporary nature, all should have one common aspect that is value creation through the organization under uniqueness and uncertainty environment. Project organizations are largely grouped into two groups: functional project organizations and projectized organizations.

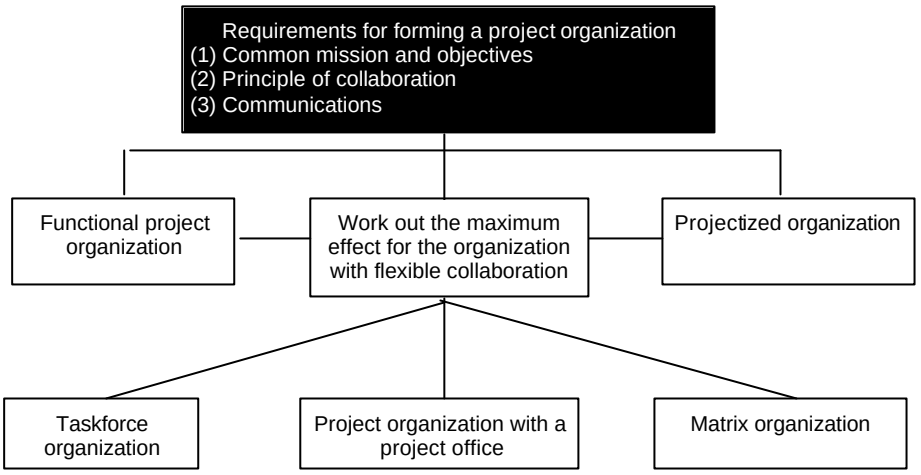


Figure 2-11: Project Organization

The former type of the organization is often found in mass-production type manufacturers and service providers. The latter is popular among make-to-order type engineering and construction companies, IT services firms and research institutes. In the functional organizations, since operational work has more weight than project work, projects are pone to be given lower priority. Meanwhile, in companies that place greater weight on projects than operations have established systems that respond to the formation of a project team at any time under the matrix organization system.

There are many other types between these two typical organizational formats: a typical one is a dedicated task force that forms an independent project organization on a temporary basis. This organizational type is useful, in particular, for mission-critical themes, presents strong authority of project managers, and affords high mobility. In the matrix organization, a project team and functional departments coexist and staff-members may be engaged in work on both sides, which might trigger conflicts as to work priority.

When synchronized coordination is essential and a project office is established for special coordination, a resource-pool management type is adopted. In recent years, a network type organization fully supported by IT is gaining popularity. They have a feature in common of co-existence of operational work and project work. Objectives of organizations include those for profit, not-for-profit, and mixed. Non-profit organizations are for policy planning, regional development by local public entities, academic symposia, development by enterprises, development of computer programs, innovation of organizations, rescue operations performed by volunteer groups, and planning of special themes.

■ Team Building and Competency

A critical issue for team building is whether optimum human resources are secured. As a significant factor for this, competency is drawing attention. Competency refers to the trait of an incumbent employee who achieves excellent performance repetitively for a given duty in the organization. It has been found that such competency is created in many cases from behavior patterns owing to personality and quality such as attitude and commitment toward work, enthusiasm and sense of value, rather than from job knowledge or skill. People produce results by making combined use of gifted ability, competency acquired through learning, and work-related behaviors. The most significant element is behavior pattern.

It is significant that such high performing person with a characteristic competency serves as a model for team members. This is because they achieve remarkable performance in work models, set standards, competency and due diligence. Particularly, as Figure 2-12 shows, they constantly have innovation awareness, display a behavior pattern to maintain a broad human link, detect issues from the status quo, conceive good ideas, think of strategies logically, coordinate the whole organization, and accomplish results, taking into consideration time and information availability or constraint. Persons having such qualities are appropriate for project leaders.

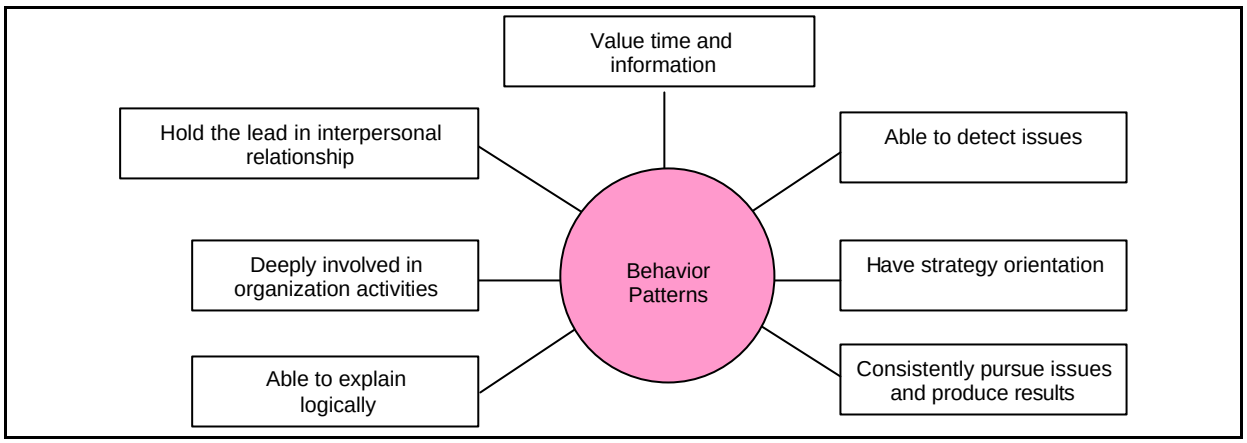


Figure 2-12: Team Building and Competency

■ Assessment of Competency of Team Staff

Projects need various expert human resources; in-house entrepreneurs who have ingenious imagination, experts who demonstrate competent capability supported by abundant experience and ensure expected results, project managers who can integrate their teams, and managers who have mobility to avert conflicts in the organization and to motivate others. For assessment of such human resources, the following procedure for creating competency models is necessary,

(1) Select a selected number of high performance achievers,
(2) State the business process in the style of interviews,
(3) State key points for implementing each process,
(4) State desirable behaviors in each process, and
(5) Arrive at common desirable behaviors and create job competency models.

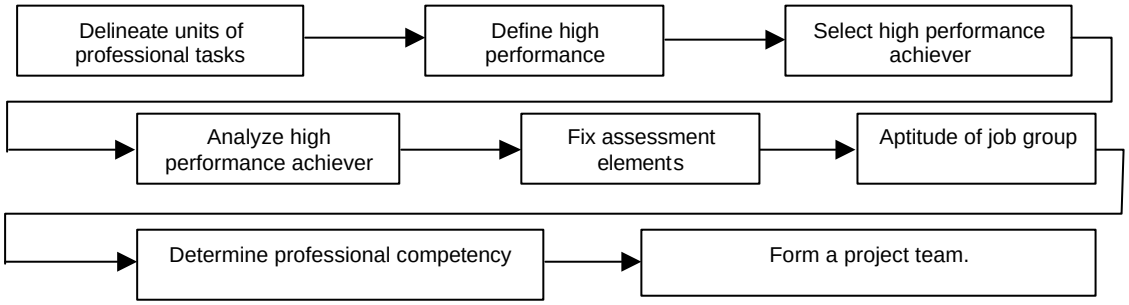


Figure 2-13: Job Analysis for Project Team Staff

Case ◆ Competency in International Procurement

Suppose international procurement of materials needed for a project. Select 10 persons who have negotiation skills to procure quality materials within the budget. Then, prepare a question list on key points for procurement business process and behavior patterns to survey behavior patterns behind competitive procurement. Thus, the competency data on procurement work should be collected.

● Project Resources and Arrangement

Project resources include six types of resources: material resources, labor resources, intellectual resources, information resources, financial resources and platform resources. Material resources include machinery, parts, materials and raw materials. Information resources encompass base intelligence, information and data necessary for decision-making and knowledge formation. Intellectual resources include knowledge, know-how, techniques, skills and services created by men. Financial resources are a source or measure that enables procurement of capital and funds. Idea is not a project but with organized injection of necessary resources, it can become a project. Concerning project resources, attention should be paid to availability constraints, interrelationship and recycling.

Since resources are limited, they are a constraint for project management. Intellectual assets are formed by the fusion of information and intellectual resources. Intellectual assets have the benefit of recyclable knowledge resources to improve a project itself or productivity of project management across geographic distances, cultural spaces and time.

As a result, they can impact the necessary amount of material and labor resources. As is represented by assembly work, advancement in automation and artificial intelligence realizes labor saving. In addition,

financial resources are one of the resources but it has a special characteristic as a means to procure other resources. In other words, projects cannot be materialized without financial resources.

To date, project management has positioned the approach to financial resources and its framework as a prerequisite of a project. Financial resources should be recognized as significant resources that unite project needs with seeds. Project management acquires new information and knowledge in the process of creative coordination activity in which project resources are utilized and products are acquired. Moreover, workers can upgrade their skills through experiences and intend to recycle material resources as new resources through disposition.

Lastly, platform resources refer to service resources to be acquired from institutional, social platforms such as legal system, networks and roads.

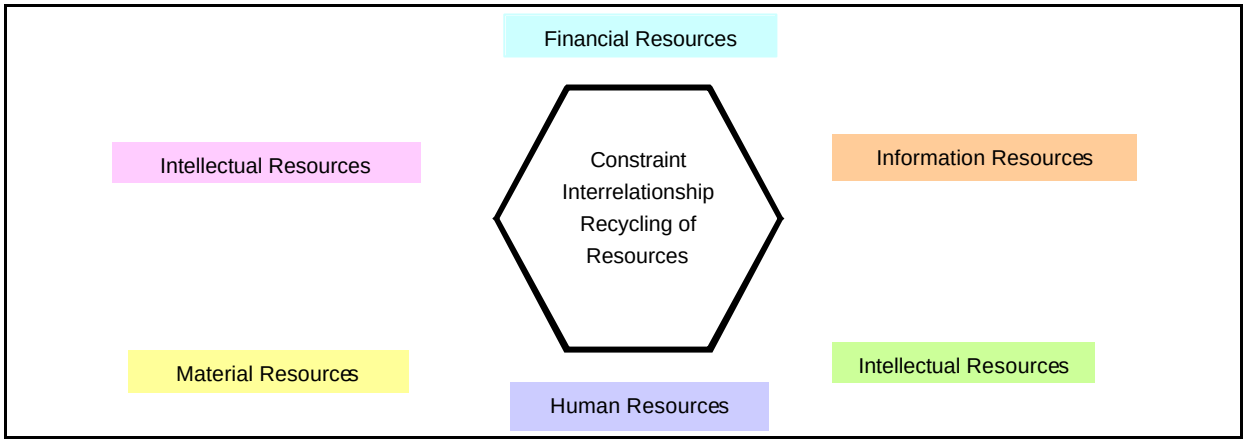


Figure 2-14: Project Resources

Case ◆ Notable Intellectual Assets

The advent of information society has given rise to the influence of intellectual assets on economy. In project management, attention should also be paid to the superiority of financial, information and intellectual resources. The knowledge related to this is an essential object of education for professionals concerned with project management.

Case ◆ Powerful Platform Resources

Today, the use of networks is essential for project management. Therefore, optical fibers are one of the powerful platform resources. The environment for free trading with less restriction, fair and safe human or legal service, and right protection also belong to this type of resources. These resources work as a significant, efficient support for performing projects.

● Project Management Cycle

Project management cycle is a common procedure available for enhancement of the problem-solving skills in the overall project, models, phases and workflows as well as improvement in efficiency and effectiveness. This cycle has uniqueness in practical operations of a project but its standard pattern is acknowledged as appropriate.

The procedure of action is formed by the following five process elements: designing, planning, implementing, coordinating and delivering. Project activity has a tendency to collect information for prediction or forecast of the future and responds to uncertainly in accordance with policies and various goals. The procedures for this response also correspond to the action patterns for decision making until the goal is achieved.

The design element suggests the action procedure in which originality, idea and plural optimum plans, which are essential for launching a project, are combined as a design that has been elaborated up to the level that allows adequate planning. The coordination element aims for the solution through the consultation among interested parties concerning occurrence of issues, pursuit of their causes and measures. The element refers to the concept that replaces the control element that aims for reduction of the difference between goals and results by monitoring it. The control element is combined with the environmental factor caused by situational changes, accidental factor, interference between goals, obstacles to collaboration, and malfunction. Therefore, coordination measures based on analysis and assessment should be taken through prior consultation.

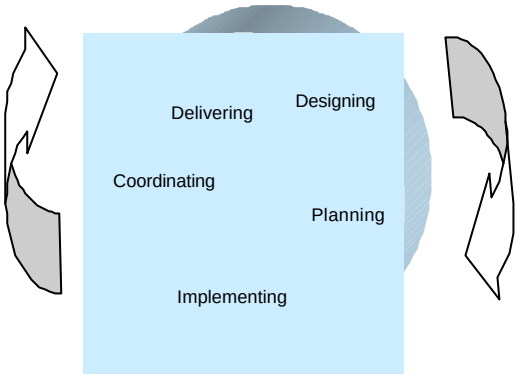


Figure 2-15: Project Management Cycle

The capability of project management is achieved by combining two types of management: product –delivering and issue-solving. The product–delivering type means continued project management life cycle for ensuring products by coordinating the difference between the design and results of the plan. Meanwhile, the issue-solving indicates a single or complex use of segment management to respond to modifications and situational changes in the course of performing a project.

In the product–delivering type, coordination for changes or modifications becomes a key point, but in the problem-solving type, breakthrough in individual problems is a key point and standard solution procedures are prepared for it. These individual problems frequently occur as unique similar phenomena, therefore the procedure and method for solving problems are stated together as a set. The basic patters of recognition of problems, solution procedures and solution methods are integrated and stated as a management model based on abundant practical experience. Therefore, the product–delivering type has a merit of more systematic, practical and agile response.

Segment management is the competent capability framework consisting of 11 segment management frames and 70 units of frame modules. The 11 management are as follows: project strategy management, project finance management, project systems management, project organization management, project objectives management, project resource management, project risk management, information technology management, project relationships management, value management, and project communication management.

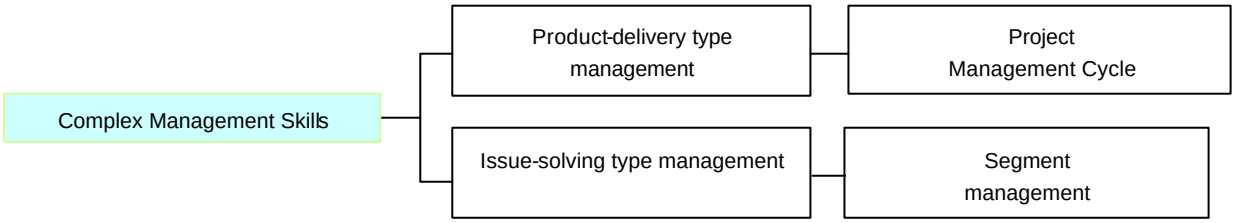


Figure 2-16: Complex Management Skill

[Bibliography]

[1] "Project Management Innovation" Yoshiaki Shibao, JPC-SED Publishing, 1999
[2] "Project Management Practical Course" Azumi Shiba & Yoshiaki Konishi, Daily Industrial News Co., 1999
[3] "`Challenge-Achievement Type` Goal Management in the Age of IT" Suemitsu Asae, Sanno Institute Management, Publishing Dept. 2000
[4] "Current Management Accounting Dictionary" Noboru Nakagaki, Ryuji Kondo, & Yoshimasa Tomosugi, Yachiyo Publishing, 1995
[5] "Age of Project Management----Corporate Innovation, Now" Masato Shiga, Kogyo Shosakai Publishing, 1993
[6] "Project Management Visualizing Future" Hiroshi Masukura, SCC, 1999
[7] "Practical Project Management" Motoichi Kobayashi & Akatsuki Takahashi, Ohm Publishing, 2000
[8] "Illustrated Project Management Practical Manual" Tatsuma Okude, Daily Industrial News Co., 2000
[9] "Space Management---New Management Paradigm" Takayuki Itami, NTT Publishing, 1999

Part III. Program Management

Chapter 1 The Program

Definition

A program is an undertaking in which a group of projects for achieving a holistic mission are organically combined.

Multiple projects are in the strict sense treated separately from programs since their respective projects have weak relations with each other or are independent.

● Basic Attributes of Programs

In programs, the concept and fundamental requirements of a valuable undertaking proposed by an entrepreneur or owner is reflected in a series of meaningfully grouped projects that constitute the program. Such demand requiring solution of complex issues is related to various concepts in various manners and includes rich contents and context that suggest or predict road maps to solutions. This multiplicity of context refers to integration of various factors such as politics, economy, society, technology and ethics. Combination of these factors generally determines the size, dimensions and the scalability of programs.

Being an organic combination of multiple projects, programs present complexity arising from the interfaces between projects as well as combination and overlapping of project life cycles. In addition to the basic attributes of single projects, as basic attributes of programs, periods until completion tend to be longer and uncertainty is likely to be higher because they may confront environmental changes.

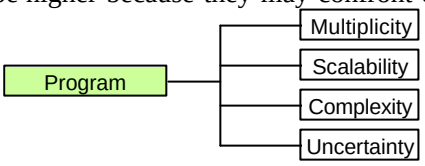


Figure 3-1: Basic Attributes of Program

Case ◆ Program of Project Apollo

Project Apollo is a case of a grand program. It was promoted by former US President Kennedy and achieved man's first round trip to and landing on the moon. It is well known that the United States, preceded by old Soviet Union in the development of artificial satellites, gave top priority to the recovery of political and military prestige as the leader of capitalist countries and worked on the Project with all its might by establishing the National Aeronautics and Space Administration (NASA).

A great number of projects, such as the development of the rocket shell, development of the engine, training of astronauts, control of space flight and flight monitoring, were placed under the integrated control as the programs and this scheme resulted in a great success.

- Programs are undertakings in which multiple projects for achieving a holistic mission are organically combined.
- Programs have multiplicity that includes significance or context that suggests solutions.
- Programs are applied in politics, economy and society and have scalability in size, dimensions and structures.
- Programs have complexity arising from interfaces between projects as well as combination and overlapping of project life cycles, and confront uncertainty due to environmental changes since periods until completion are usually longer than with ordinary projects.

Chapter 2 Strategic Nature of Programs in the Contemporary Society

Project management is used in a great number of areas. Project management of the first generation had been used for many years in engineering projects as an effective management method for achieving objectives of given time, quality and costs with planned results.

It is widely known that project management of the second generation is applied to a variety of business solution projects, work process innovation projects for building an agile organizational structure, emerging "management by project" applications to both, manufacturing and services industry, in addition to the traditional infrastructure and capital investment projects. Fields where the second generation project management is applied are expanding because it is used for management strategies and its effectiveness deserves great attention. However, the current world economy and social environment demand some new form of project management beyond that of the second generation; program management in the P2M context is addressed in the hope that it is useful for solving complex issues in the contemporary society.

Rationale for Programs

As mentioned above, effectiveness of project management is widely recognized in the fields such as improvement of social infrastructure, production facility construction, product development, new business launching and building of information systems among others, and companies launch a great number of projects in a decentralized manner to solve their problems.

However, if we trace the origin of projects, we would find that projects derive from any idea, strategy or holistic mission of management innovation and those projects should be intrinsically approached as a total management system of collaboration, combination and integration. Program management has traditionally been applied to large-scale management programs such as space development and military development. However, in this age of rapid and discontinuous social changes, accurate approaches to complicated events, speed and uncertain factors have become significant challenges for program management rather than a scale issue.

For example, management of projects constituting a program will become more effective when they are divided into small modular projects for flexible response to situational changes than when they proceed as fixed projects managed separately in discrete, multiple phases. Programs certainly have scalability but it would also be effective to consider the projects as a program and place them under the integrated management of modular projects.

Switching to modular projects to adapt to changes in circumstances would realize satisfaction of social needs, without losing mission values, such as solutions for complicated events, reduction of project life cycles and uncertainty in investment returns.

(Note) A "modular project" is the minimum management unit of a project, which maintains the basic attributes of a project and allows for acquisition of a completed product. When the size of a project increases, it is reasonable to re-phase an original project as a program to enables a flexible approach to complexity of issues or situational changes and treat the original phases as modular projects.

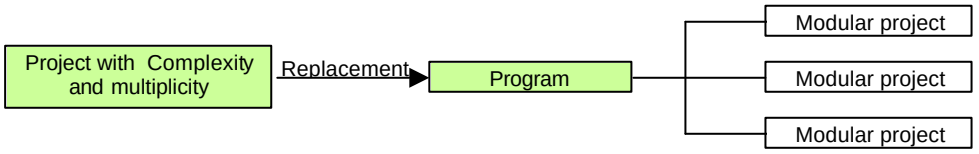


Figure 3-2: Relations Between Program and Projects

- Decentralized projects should be integratively managed under the program based on the strategic mission.
- In program management, approaches to complicated events due to discontinuous environmental changes, speed and uncertain factors are significant.
- Dividing into modular projects allows management to cope with changes in the circumstances.
- Integrated management of modular projects enables satisfaction of social needs, without losing mission values, such as reduction of project life cycles and uncertainty in investment collection.

Chapter 3 Concept of Program Integration

■ Concept of Program Integration

The concept of program management lies in harmonious satisfaction of demands of many stakeholders with many related interests and objectives by dividing a holistic mission into multiple projects for their organic combination. In other words, program management aims the capability to achieve the integration of projects from broad and high perspectives for enhancing the total value of a program, and this is exactly the core of the capability for mission-performing project professionals proposed by P2M.

Integration means organic and meaningful unification of multiple projects under a certain concept and creation of combined values of a program by paying full attention to overall efficiency, overall effectiveness, win-win principle and synergy effect, which arise as a result. To be specific, the concept of integration refers to wisdom, ideas, ability and dedicated efforts which avoid redundancy, waste, unreasonableness and hazards, eliminating unevenness or omission, and create plus values.

The basic ingredients of program management include integration, compounding, combination, collaboration or alliance, strategy, etc. This section focuses on integration and presents its interpretation.

In addition, multiple projects are considered as group management in a project, and, in terms of the enhancement of overall efficiency by group management, they are also considered as an expanded case of program management.

- In program management, demands of many stakeholders with many interests and objectives should be satisfied.
- In a broad and high perspective, the capability of integration to enhance overall value of a program is a core competence of mission-performing professionals.
- The role of a program is to create combined value such as overall efficiency and effectiveness, win-win and synergy effect.
- Multiple projects may seemingly have no direct relations among component projects but should be an objective of program management to enhance overall efficiency by group management.

■ Basic principles of integration activities

The activities in program management are in a higher layer than in project management and center around harmonizing the structure among projects and their interactive mechanism and proactively reacting to necessary changes with a grand vision and sharp insight.

The role of program is to adapt a project's organizational ability to changes in external environment by conducting planning, consistency assurance, monitoring, intervention, coordination, alternative selection and changes, across the related projects.

Since the objective of integration is enhancement of value, the guidelines for activities that base the concept of integration consists of the following four basic principles:

(1) Principle of zero based approach

Program management works effectively for solution of complex issues that the present society faces. Complex issues have are difficult to profile and solve and require a new framework based on innovative conception. This approach starts with a mission that focuses on insight profiling that converts the status as it is to the ideal status. Then, based on the mission, a basic framework is built for subsequent program development. All these activities should be worked on based on the zero based thinking.

(2) Principle of flexibility to changes

Since programs are exposed to discontinuous and rapid changes in circumstances, originally intended values might have to be re-evaluated as circumstances warrant. To cope with such uncertainty, in program management, relations between projects should not be designed too rigidly and component projects should be treated as discrete unites while maintaining basic interrelationship. Through this process, a system and skills should be provided which support decision making on speedy and timely adoption of alternative plans, suspension or cancellation and maintain validity and enhancement of program value.

(3) Principle of competence base

In the modern society, focus has been shifting from industrialization to building of a system that creates value by combining unique knowledge with useful information. The core capability in organizations is called core competency. Value creation is most commonly achieved where the mental space for open communications and smart IT utilization are combined.

For efficient and speedy promotion of this knowledge creation activity, common information base storing

processes, knowledge, historical project data and information should support stakeholders. In the project mental space for open communications, not only is an efficient information network required but also creation of such a climate based on common and deep understanding of issues regardless of nationality, culture, organization and profession is encouraged as a base of program competence.

With this culture and climate as a background, wisdom and knowledge are produced. Therefore, the system and skills for linking knowledge, information and culture should be carefully considered.

(4) Principle of value assessment

An original mission is converted into a product with unique asset value through planning and execution of the program. This unique asset also has the innovation value that is expected in the program as a mission.

Stakeholders receive this asset value and product function in their respective roles, and their levels of satisfaction are closely related to the harmonization value that is generated through the processes of management from planning, implementation and completion. In addition, stakeholders can acquire intellectual asset value such as know-how and proprietary data from their contribution to, exposure to and experience in the program.

These four types of values are subject to due and fair assessment and serve as vital guidelines for management in decision-making in the face of environmental changes in terms of relative value positions, market, competition or technological innovation. In particular, well balanced, program-specific qualitative and quantitative indicators play an important role in providing management with visual yardsticks to gauge planned effectiveness, suggest enhancement and trigger modifications in the program through pre-evaluation, in-progress evaluation and post-program assessment.

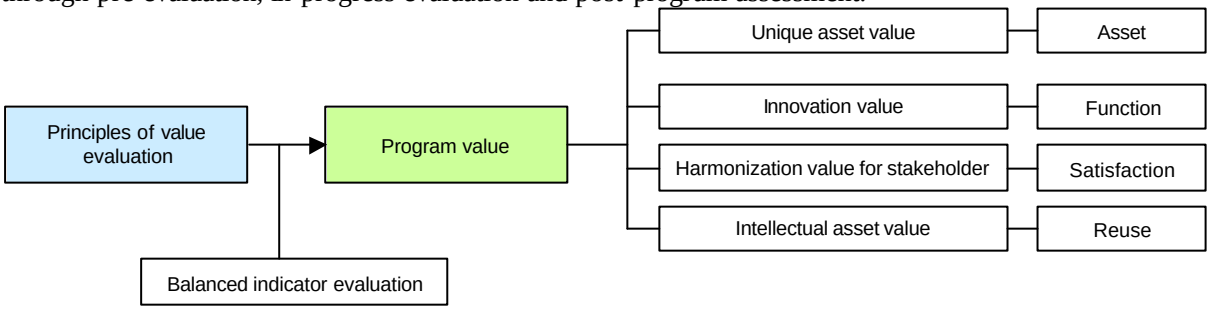


Figure 3-3: Value Principles and Program Values

Case ◆ Adaptation to Market Change Speed

Adaptation to market change speed, or time to market imperative is a very significant factor affecting value. In product development, if timing of placing products in the market is delayed, large investment money might result in waste, or the market share and competitive position in novelty and costs would accrue to competitors.

Currently, businesses are also racing against time. As the life cycle of products is being shortened, for flexible approach to situation changes, companies have to take whatever measures against value loss by reducing the time for product development as well as for investment return. This is especially true of R&D of pharmaceuticals, computers and other IT-related devices and automobiles.

Road Map

Figure 3-4 is a road map showing the four basic steps in program management. In addition, four steps are required for the approach in a program: they are (1) defining, (2) sharing a common view, (3) building a common base and (4) using the skill for integration management.

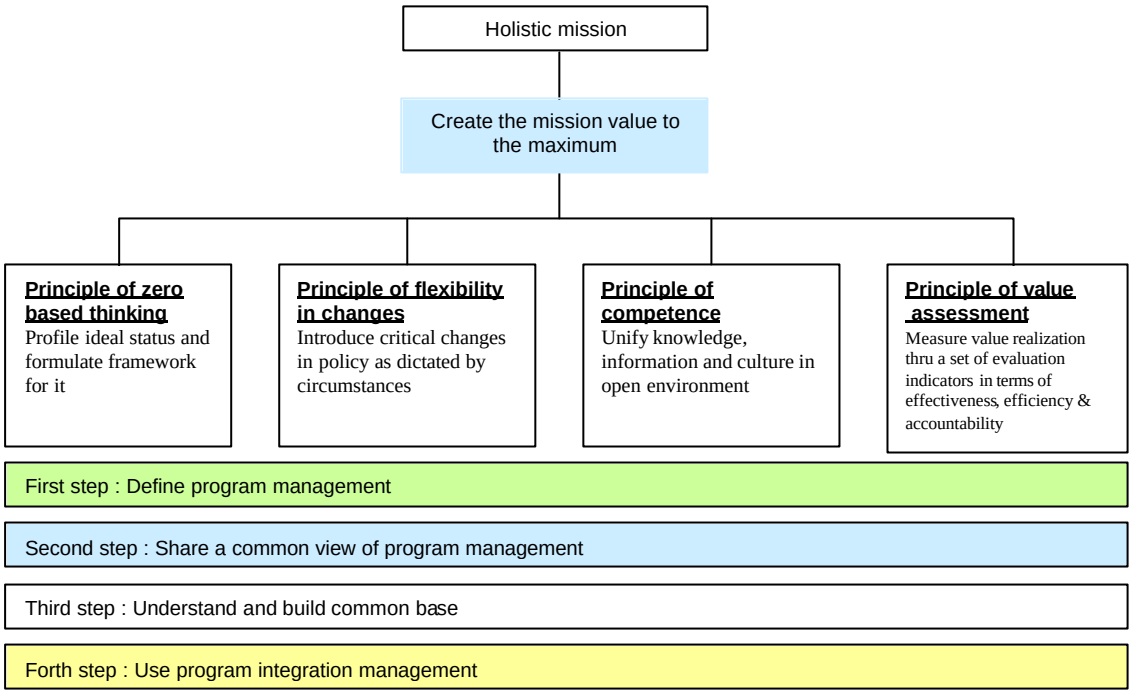


Figure 3-4: Step Approach in Program Management

- Integration activities are represented by understanding of the mechanism among projects and coping with changes in external environment.
- Typical means for coping with changes in external environment and adapting organizational ability are planning, consistency pursuit, monitoring, intervention, coordination, alternative selection and changes.
- Integration activities have four basic principles.
- Integration builds a basic framework and starts from insight profiling using zero based thinking.
- Integration may demand a shift to an alternative plan, suspension, and cancellation of component projects under the principle of flexibility to changes.
- Integration requires the system to unify knowledge, information and culture under the principle of competence.
- Integration clarifies approach to maintenance, improvement and modification of program values under the principle of value evaluation.
- Well balanced, program-specific, qualitative and quantitative indicators play an important role in providing management with visual yardsticks to gauge planned effectiveness, suggest enhancement and trigger modifications in the program through pre-evaluation, in-progress evaluation and post-program assessment,

Chapter 4 Program Management

Definition
Program management refers to a framework of the capability to flexibly adapt organization's performance ability to changes in external environment, devising ways to cope with such changes, for achieving a holistic mission. This capability is demonstrated in integration activities to enhance holistic value and achieve the mission by optimizing relationship between or combination of projects.

Management of multiple projects is a similar term to program management but this term is used to refer to management of a group of projects without consistent total management policy or just physically proceeding in parallel with strong independence. However, if multiple projects need to come under group management in any manner, they are classified into an expanded category of program management.

● Steps in Program Management

For demonstration of the capability in a program, it is necessary as the first step to understand the program's basic attributes that constitute the basic framework. As the second step, the common view required for program management should be acquired. The third step requires understanding of the meaning of the common view and necessary skills to implement integration management in actual program initiation based on the common view.

Part II, Project Management, of P2M provides an overview and principles of project management, including project segment management most of which are valid in program management as well although program management have its own areas of competence, frames and attributes. It is not prudent that program management exists in vacuum.

For example, in program management, if a critical event occurs due to a situational change, measures may be taken, by way of illustration, in program management using the Project Risk Management and Project Relationships Management knowledge and skills discussed in the Project Segment Management of this P2M. Program management intervenes in component projects which are directly or indirectly affected by such changes, from the overall program view and interest. The relationship among program management, project management and segment management in P2M is standardized as an overall framework based on the common view.

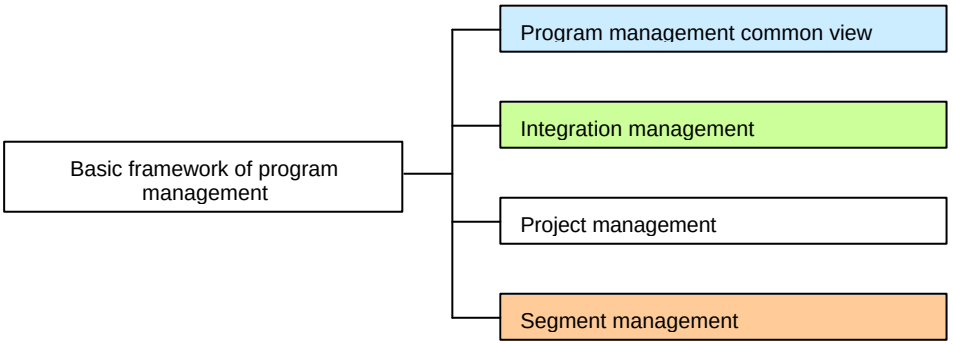


Figure 3-5: Basic Framework for Program Management Capability

● Program Management Common View

The program management common view refers to the common understanding for specifying program management methods that are molded by segment management, integration management, and socio-economic and political implications and their interaction on the program.

Principal prerequisites for the program management common view comprise five factors: program mission as holistic mission, program value, program community, program architecture and program integration management skill.

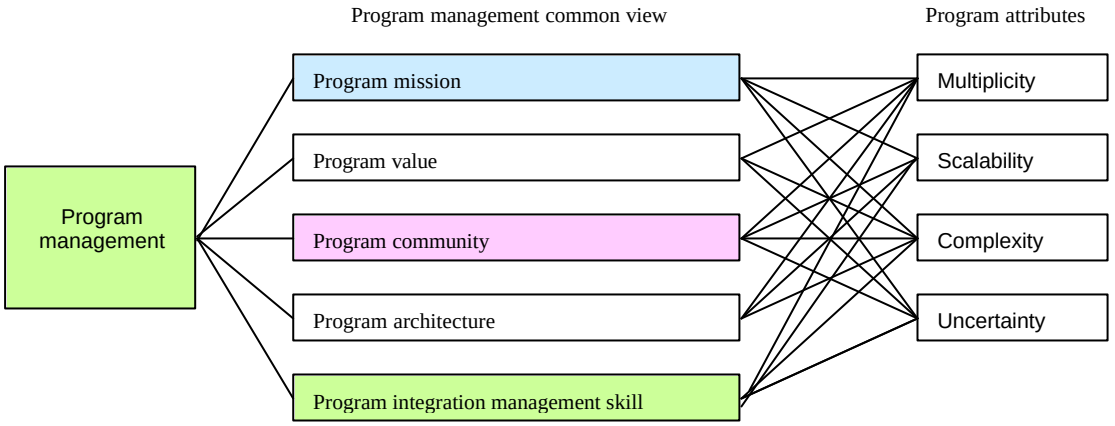


Figure 3-6: Program Management Common View

- Program management, project management and segment management are interwoven and standardized as an overall framework.
- Understanding program management requires the meaning of and skills for basic framework, basic attitudes, common view and integration management.

● Program Platform and Integration Management

The program platform refers to the main object of program management that is derived from the common view recognized to integrate projects. Unless this foundation is firm, the architecture called the program will collapse. Program management, in a way, is a struggle to make this platform as firm as possible to withstand all weathers.

The conventional project management standards or literature have limited description or discussions on program management platform and frameworks for consistent integration of projects but have rather focused on the description of planning and implementation control of discrete projects and short definition of program management.

Program management in the ongoing social and business spheres needs a structured framework for four platforms based on the principles and common view of program management. The four platforms are: mission profiling to clarify a mission; community to integrate intellectual resources as source of value creation; architecture to give rational relational structure among projects; and assessment to evaluate results of integration management.

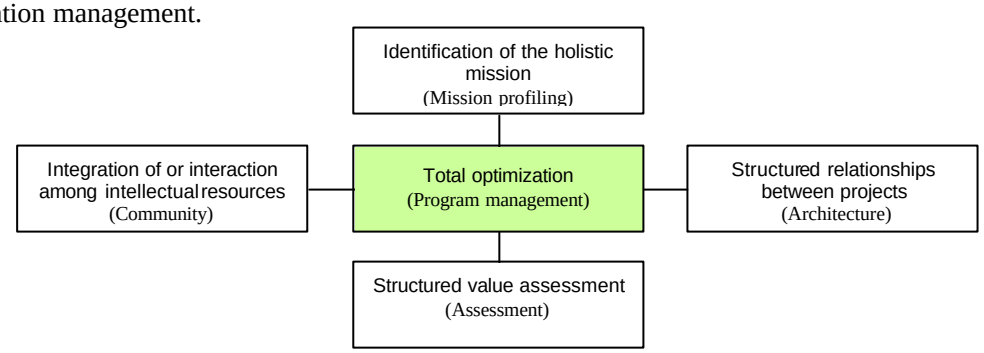


Figure 3-7: Total Management and Four Platforms

The following statement constitutes the essence of the program management common view.

- **Program mission** signifies the high-level shared view of what to attain as a program that reflects the holistic mission demands entertained by stakeholders of the program.
- **Program community** signifies the community where core competencies of program /project teams are centralized.
- **Program architecture** signifies the basic architecture or architect's rendering as to how to build a program, blue print for fundamental concept and structure of the program.
- **Assessment** signifies the common, explicit criteria to evaluate a program at key milestone in terms of value creation and stakeholder satisfaction.
- **Integration management** is the integrative management of projects from a set of program management principles and policies and constitutes the basis of core competency of mission-performing professionals.

- Implementation of program management needs the formalization of the four platforms based on the basic principles and program management common view.
- The four platforms are mission profiling to clarify a mission; community to integrate intellectual resources; architecture that designs relationships between projects; and standard criteria for program assessment.

● Mission Platform --- Clarification of Holistic Mission

Definition
A holistic mission refers to comprehensive demands for a program and deals with, for instance, a national policy or a strategic corporate goal; as such it is characterized by rich, high-priority and complex nature and uncertainty.

Holistic program management is distinguished from the management of specific missions that are embodied in individual projects. For convenience of distinction between these two concepts, the holistic mission is hereinafter referred to simply as "the mission" and specific mission as "the project mission."

Clarifying the mission requires definition of strategic intent, objectives, goals, policies, measures, action guidelines, etc. It should be noted that allocation of resources for a program is decided through

recognition of the mission's value.

■ Relationship Between Mission and Vision

A mission is generally interpreted in management theories as the concept to show the rationale for corporate existence and business direction. However, in program management, the mission refers to directions for achieving a strategic mission required in a program. The document describing these directions is called the program mission statement.

The mission is a guide of the demand that directly represents a strategic plan, while a vision serves as a guide for thought and action to achieve the mission. A mission and vision, however, are co-related to each other. They are sometimes described with the same meaning, but the mission indicates objectives of implementation, goals, policies, mutual relationships of interests and serve as action guidelines for project teams.

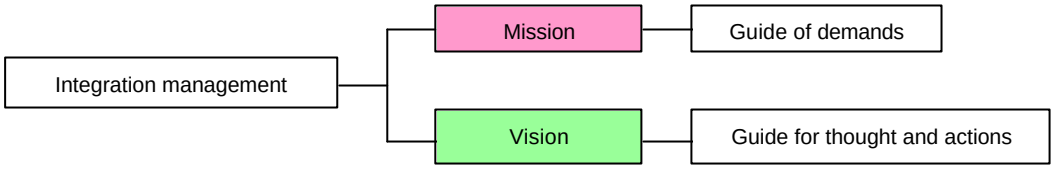


Figure 3-8: Mission and Vision

Case ◆ Mission and Vision

In the case of the Tokyo Bay Aqua Line (underwater tunnel) Project its mission was grandiose and was intended to alleviate traffic intensity along the bay in the Metropolitan Area as well as vitalization of East-Kanto region by connecting the industrial zones in Chiba and Kanagawa Prefectures via this Trans-Tokyo Bay Highway. This mission was of a social-economic mission nature for the Kanto region. Meanwhile, its vision was posted more specifically, viz., "Stakeholders of the program, i.e., the central government, the related public corporations, municipal governments such as Tokyo, Chiba and Kanagawa, complete Aqua Line by 1995 fully deploying leading-edge technologies, coordinating interests among the concerned parties for subsequent smooth management by a third sector corporation, and promote the program with concerted efforts.

■ Philosophy and Insight

Broad visions and high viewpoints are generated through practical experience and cross-disciplinary knowledge. Statesmen, top executives, and program managers have their own excellent philosophy. Philosophy is the belief to realize an ideal image and recognizes the value that dominates the totality in a complex issue. Stakeholders endorse this philosophy for programs and commit themselves to the program in expectation of program actions and results.

Insight refers to the ability to read trends of politics, society, economy and technology based on this philosophy and to predict future directions, reason of existence and own capabilities vis-à-vis critical decisions.

■ Holistic Mission and a Mission Statement

A holistic mission means the demand for achieving program goal with significant context that fully covers meaning of the program, stakeholders, description of the issue, direction for solutions and suggestion of disciplines involved.

The document that describes this demand for goals is called a missions statement and the direction for this is normally given in the top-down manner.

■ Process for Clarifying A Mission

Clarification of a mission refers to the description of a holistic mission for value by defining the direction for addressing and solving the issue in complex circumstances arising from environmental changes. The process of clarification includes prediction of results based on observation of the issue; profiling of alternative hypotheses for solution, illustration, and evaluation of solution plans; it requires expert management.

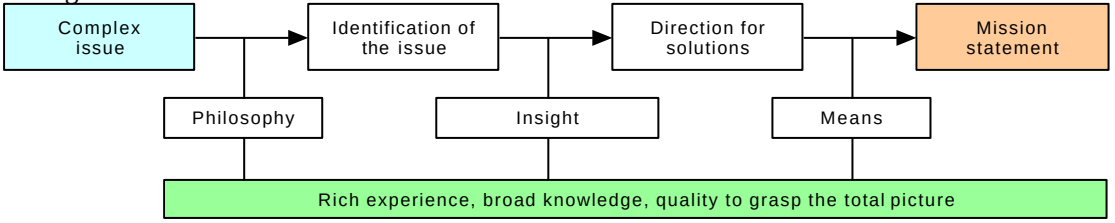


Figure 3-9: Profiling and Holistic Insight

The conventional thoughts address issue grasping and directions for solutions mainly based on logic and analysis. However, for complicated phenomena, even if ambiguity resides, it is essential to describe a holistic mission based on philosophy, insight and means.

Case ◆ Grasping Total Picture

Planning an environmental policy in the resource-recycle society requires an eye on the total picture, including philosophy for global environment, sense of crisis for global warming, its influence on the society and environmental management policy of corporations.

For grasping such a total picture, broad knowledge, abundant experience and sense of justice are necessary, such as survey into environmental pollution or public nuisance and endeavor to solve such issues, relevant laws, damage to local society, abatement technology, fund raising methods and understanding of local residents' mindset.

- A holistic mission is the total demand for a program and is considered as a complex theme relating to policies and strategies.
- A mission defines and clarifies strategic intention, objectives, goals, policies, means and action guidelines.
- A mission is the guide for demand and a vision is the guide for thoughts and actions. They are co-related to each other.
- A mission cannot be clarified without the description of a holistic mission based on philosophy, insight and means even if ambiguity remains.

● Assessment Platform

Definition

Assessment refers to systematic evaluation, which serves as a basic framework for systematically evaluating, maintaining and advising means for increasing, and preventing a decrease in the value of a program through concerted activities of design, planning, implementation and acquisition of results.

(Note) The value of a program includes four types: unique asset, innovation, harmonization and intellectual asset. (refer to "Principle of Assessment" in this part).

■ Value that Varies According to Environmental Changes

Since program value changes with the lapse of time, changes in environment and circumstances, expected value has to be continuously checked against the original plan. Changes in circumstances stem from a wide range of factors such as politics, society, economy, market, competition and technical innovation. Program value is a primary indicator to determine the direction of management.

Case ◆ Investment Projects Affected by the East Asian Monetary Crisis

A fall in foreign exchange rate for a nation seriously affects the value of a program/project. At the time of Asian Monetary Crisis in 1997, many capital investment projects in the developing countries supported with foreign currency loans were cancelled or suspended as exchange rates deteriorated in extremely short terms. Stagnant demand and loan repayments have become heavy burdens for debtor nations and the project asset value has considerably decreased.

■ Value that Varies According to Stakeholder Roles

Stakeholders with different interests and roles participate in a program expecting different values. Therefore, it is crucial to balance value attributes as much as possible to satisfy all the stakeholders. However, in reality, a change in circumstances will cause imbalance in the value accrued to stakeholders. In such cases, release of information on analysis and prediction of and outlook for changing asset value indicators would help prevent confrontation among stakeholders.

■ Balanced Overall Value Indicators

Many benchmarks can be mentioned as assessment indicators such as achievement of the mission, objectives, goals, products and stakeholders. Assessment should be made at least prior to the sanction, at major milestones of and upon completion of a program. Assessment indicators require such features as (1) easy to understand, (2) quantified, (3) visualized, (4) timely released, (5) readily prepared and (6) consistent in contents.

In addition to these conditions, the most significant viewpoint is well-balanced assessment. Standard indicators for assessment needs five "E"s: Efficiency, Effectiveness, Earned Value, Ethics and Ecology, and two "A"s: Accountability and Acceptability.

Five "E"s

(1) Efficiency refers to resource efficiency in projects, viz., output (benefit) vs. resources employed.
(2) Effectiveness refers to the level of satisfaction by stakeholders before and after the project and represent benefit side of the efficiency equation.
(3) Earned Value refers to a universal yardstick to measure progress in projects by co-relating project scope, time schedule and costs (resources).
(4) Ethics refers to the concept to respond to generally accepted, fair and right ideas, social and industrial ethics and expectations.
(5) Ecology refers to a benchmark for endorsing sustained growth by paying due regard to global environmental protection.

Two "A"s

(1) Accountability refers to management responsibility of being held responsible for program/project outcome, including interim results toward stakeholders and includes, transparency, visibility and disclosure of program/project status to a generally accepted degree.
(2) Acceptability refers to a set of terms agreed among stakeholders regarding value realization normally expressed as amount of capital invested, guaranteed returns and cash-flow plans.

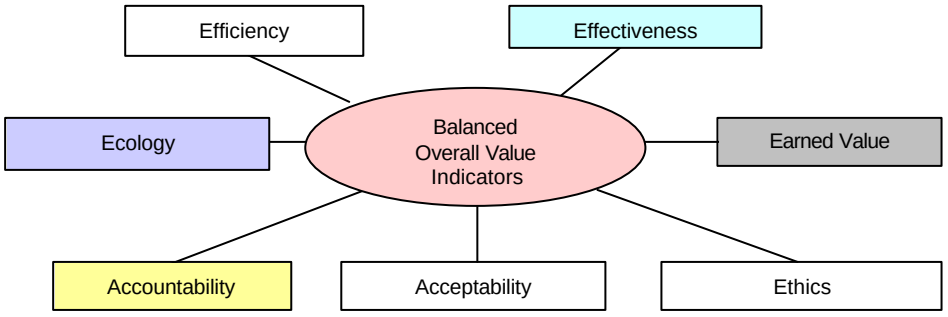


Figure 3-10: Total Value Benchmark

Case ◆ Balanced Score Card

For safe, secure and comfortable landing of an airplane in a destination, a pilot is required to operate an airplane by reading a variety of information such as speed, altitude, direction, air current, weather and fuel balance from instruments and in-flight information systems and make prudent decisions. Flight technologies and decisions needed for take-off, cruising, crisis aversion and landing are indispensable to pilots.

Integration management also has project models that correspond to take-off, cruising, landing and maintenance, and mandate visions, goals or objectives that correspond to safety, certainty and comfort. In addition, the approach to read internal and external changes by using proper indicators for decision, actions, implementation and assessment is similar to flight operation. Accounting professors Robert Kaplan and David Norton developed a unique enterprise performance measurement method called the Balanced Score Card that is intended to gauge corporate efforts for improved competitiveness, which also works effectively for program management.

- Assessment refers to the basic framework for sustaining value by a systematic assessment of program activities.
- Program value needs assessment since it inevitably may evolve with the lapse of time, changes in environment and circumstances.
- Assessment requires the indicators represented by five "E"s: Efficiency, Effectiveness, Earned Value, Ethics and Ecology, and by two "A"s: Accountability and Acceptability.

● Community Platform --- Aiming for Integration of Intellectual Resources

Definition

Community refers to a common mental space where people communicate with each other for common themes, objectives and goals to create new values through concerted efforts.

■ Community that Replaces Organizations

The concept of a community in program/project context is similar to that of an organization. Organizations place high value on achievement of duties while community focuses on demonstration of creativity. In organizations, deeply concerned with split of functional responsibility, power and culture, authorities and responsibilities of superiors and subordinates are clear and work procedures are standardized hierarchically or vertically. In program implementation activities, solution of issues is given a top priority unlike corporate way of thinking that this is our organization's matter and that is not, or by others.

Accordingly, release of human resources from organizations' vertical pools and the formation of a flat community consisting of heterogeneous people across the walls work as a base for extracting creativity by way of self-fulfillment, self-starter mindset and own professional capability. The community is based on the concept of combining individuals with a team to overcome weak points in organizations and embodies demonstration/formation of professional ability, learning opportunities, satisfaction with work and demonstration of creativity by reaping combined strengths of professionals.

The community has at least the following six "C"s: Context that underpins the program overall; Creativity of professional human resources with a broad vision needed for programs; Collaboration in a common space; Communications in a free network environment; Contents with a high intellectual level needed for programs; and Concentration using experience and wisdom. What are common to these six "C"s are three platforms, namely, human, information and cultural platforms.

Human platform — The engine that works as value sources is professional human resources who can use knowledge and wisdom. It is well known that when people work in a group for a project, group dynamics such as teamwork functions for the better. The relationship between team members and the team requires a platform in which the basis for authorities, responsibilities and compensation committed to team members lies in empowerment in that leaders take direct responsibility and not in mere delegation of authorities.

Information Platform — In a "net team" dependent on the Internet, members of the community has self-initiative and relative freedom and have more active relationship of collaboration with others through the network in addition to face-to-face relationships. In addition to the communication via the Internet, shared reports and communications using groupware, program community members require free access to information, knowledge and technology data bases that support engineering and management.

Culture platform — Achievement of a holistic mission requires a virtual space that brews a common value of the program and generates culture or distill motivation to collaborate freely although, if typically on international projects, differences in nationalities, races, custom, cultures and social systems tend to deter

realization of a truly collaborative program space.

- A Program/Project Community is a common virtual space for people to create new value for a common theme.
- A community has attributes of context, creativity, collaboration, communication, contents and concentration, each of them should depend on human, information and culture platforms.

● Program Architecture

Definition
Program architecture refers to the grand design of program structure, overall and basic operability to embody program profiles and root demand of program scenarios as its design base.

■ Contents of Architecture

(1) Five Function Designs for a Holistic Program

Architecture means the design function of defining basic requirements, program life cycle, basic structure, total functions and basic operability to embody profiles and scenarios.

It is noted that profiling defines the root requirement of a mission and preparing scenarios examines a program's dynamic stories with future predictions including hypotheses.

(2) Development to Project Model

In the holistic structure, interfaces and relationship between projects are coordinated to allow program segmentation into multiple projects. In the holistic function, basic specifications are determined based on the project's holistic functions and the project is developed into necessary modular projects.

(3) Program Operability Design

In the overall operability, a road map and management rules for the program are developed.

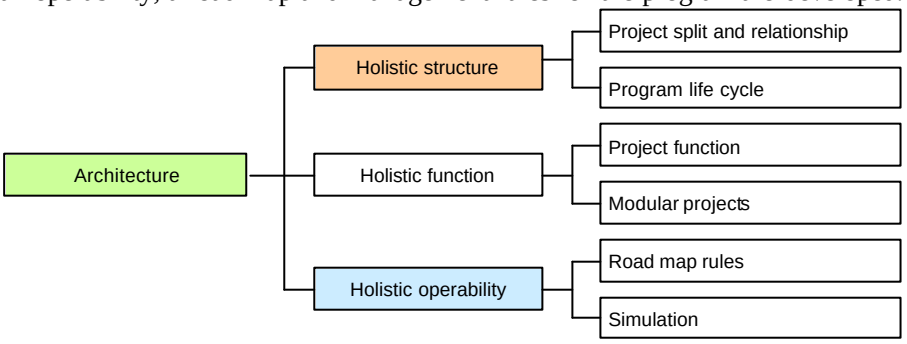


Figure 3-11: Structure of Architecture

In addition, in consideration of prerequisites or hypothesis for scenarios, designs that allow for changes in situations with progress and possible disturbances should be considered to secure program success.

Thus, the objective of architecture is to generate grand designs and management plans for achieving the thoughts and stories of a holistic program. Architecture is a design plan to demonstrate the holistic efficiency, effect and synergy effect of a program, and is the base to determine program value.

Case ◆ Significance of Architecture Prediction

Motorcycles and bicycles have different architectures. Bicycle parts are of an open type with historically standardized interchangeability, while motorcycles are made of closed type parts with no standardization because different types of parts have been developed for each model change.

In the product development in the Japanese automobile industry, sharing of parts that vary according to models and reduction of excessive diversity were implemented first as well as the design rationalization movement to the extent that integration was not damaged. This simplification of design patterns has realized the shift of production bases to foreign countries in a shorter period and contributed to the improvement in performance.

The origin of such car production lies in the architecture that production of different models of cars shares a common production floor called a platform. High grade CAD/CAE now allows production simulation on the screen. What is further important is not only right market outlook analysis and technology advances, but also prediction of production modes is vital, which will drastically change prevailing common sense and routines. Hybrid cars imply the advent of a new architecture.

■ Components of Architecture

Architecture refers to a type of presentation that coordinates, based on the holistic view represented by a

mission, the definition of basic demands, basic requirements, basic objectives, goal, measures, policies, characteristics, composition, structure and functions. Architecture is represented by such products as models, documents and drawings, which symbolically reflect a holistic mission.

■ Program Management Architect

An architect means an expert on grand design for buildings. A program management architect refers to a person who is endowed with the sense and talent that enable comprehensive understanding of the society, technology and culture, and has the experience in designing multiple programs in a specific expert field, and is able to develop a program into a tangible architecture by reading the given scenarios. An architect needs to understand program scenarios, divides them into concepts or models for stakeholders to understand, and design the structure and function for them. Program managers perform their duties focused on implementation of programs, while program management architects are further required to possess broad knowledge and implementation power with influence.

Case ◆ Temple Building Architecture

Suppose you are commissioned to build a temple. Temples have their own contexts, e.g., denomination such as Buddhism or its Zen-sect, a mission such as being a feudal lord's family temple or a religious space for people; a place for enshrining a Buddhist image or focus on gathering serving also socializing needs; who provides the fund, feudal lords or people donating. The scenario describes something, but what people understand would be different according to their backgrounds. An architect embodies them through design and makes them visible by determining a specific form, shape and function for a temple building, to present the basic value that the temple offers.

Case ◆ Architecture for Service Engineering

For offering of total services such as accurately grasping customer requirements on an ongoing basis, production to customer needs, flexible response to changes and quick responses, in the manufacturing and engineering/construction industries, a mission of converting to "the super-manufacturing industry" or "service engineering industry" is being proposed. A certain research group has developed an object-oriented manufacturing program to achieve highly flexible approach to rapid changes and frequent alterations, by dividing the objective into response to individual customers, continuous improvement of products and attention to parts suppliers through utilization of the accumulated knowledge in the Japanese manufacturing industry.

- Program architecture represents the grand design of overall structure, overall functions and basic operability based on basic requirements of the scenarios.
- Architecture refers to a type of presentation that coordinates definition of basic demands, basic requirements, basic objectives, goal, measures, policies, characteristics, composition, structure and functions
- A program management architect signifies a professional who is able to comprehensively understand the society, cultures and technology and to develop the programs into practical architecture.

● Profiling Management

Profiling refers to the process that clearly defines as a mission the issue that is molded insight from complex phenomena in the initial process of the program.

Definition
Profiling management refers to a framework of the competent capability to develop a mission into a form of feasible scenarios by interpreting the intent of a holistic mission from wide perspectives that is molded from the "status as it is" and by presenting it in a broader value structure to pursue the "ideal status."

This activity should not be performed only once when a program is drafted but be repeated for maintaining the validity of the mission whenever any change is encountered in the process of the program due to environmental changes. A program starts with a mission. The definition of a mission has an important role in drawing the total picture for solution by way of hypothesis using deduction from past experience and knowledge to depict value even ambiguity exists.

[Compositions of Profiling Management]

The structure of the profiling management is as shown in Figure 3-12 below.

The first step is mission expression that describes the mission and analyzes context and meaning. The second is relationship analysis that analyzes the meaning of the total and parts and clarifies the relationships of cooperation and interests. The third is the scenario statement that works as a bridge for the realization of a program through description as a story to achieve the mission, feasibility study and scenario simulation. Profiling management is the capability to integrate these pieces of work into a basic plan for the program.

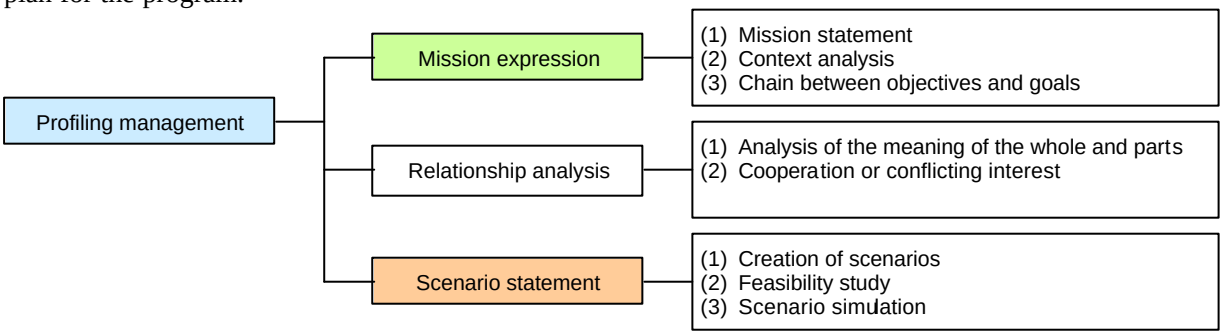


Figure 3-12: Profiling Management

Scenarios have the bridge function of projectization by finding issues from the current mission and directly connecting them to solutions. Thereby it focuses on predicting a mission's picture in the future.

[Steps of Mission Expression]

■ Attributes of Mission

Since the statement of a mission shows the total picture expected by the sponsor or owner, it serves as the source of program value that reflects the sponsor's or owner's views of the time, world and total picture. What a mission suggests is largely classified into two categories: current issues and desire for the future after overcoming the current issues. Statement of the issue-solving-type mission for realizing an ideal picture is mixed with objectives, contents, methods and policies, and is filled with multiplicity and ambiguity that make the mission novel but hard to understand. There are deep meaning and significance between each expression as context. They are the value of a mission, not a mere issue. An issue derives from a mission.

Therefore, a mission should not include specific intention or distortion by the writer. The writer has to elaborate, edit and present the statement repeatedly until the owner becomes satisfied with the expression of the mission. In editing, it is significant to detect and describe basic value, key words representing value, issues, objectives, policies, etc., and to use allegory for ambiguous items.

It is also necessary for a mission statement to esteem the concept value of the owner and make description as true to the owner as possible to convey the value by confirming if there is any addition or

detection.

- A mission has presentation of issues and desires as a pair.
- A mission has direction for solutions.
- A mission has multiplicity and ambiguity.
- A mission has novelty.

■ Skills for Mission Expression

A mission statement requires the skill to correctly express the intent of the program. It should fully comply with the intent and be comprehensively expressed in a rich manner without any omission or inconsistency. It should not necessarily be described logically. The most basic skill to prevent ambiguous expression or omissions is "6W1H," a method for preventing apparent omissions by clarifying "Who, What, When, Why, How, Which and Whom."

In addition, skills for expression such as allegories with simile and metaphor and figures of speech are used for expressing multiplicity and ambiguity. Simile is paraphrasing with other similar words. Metaphor is an expression to convey contents with implicit words. Moreover, a mission should be expressed after grasping the key for the value that dominates the owner.

- The method of expressing the total picture is 6W1H.
- Expression skills of analogy and metaphor are used for expressing multiplicity and ambiguity.
- Future desires such as existence value, direction and expected results should be expressed by approaching the owner's sense of value.
- Task for transmissibility and confirmation is important for a mission statement.

Who	Owner	Mission Planner
What	Problem and solution	Multiple projects
When	Start and end	Schedule, uncertainty
Why	Significance of existence	Value, objectives, expectation, policies
How	Engineering	System, resources, budget
Which	Direction, selection	Policy, direction, alternative plans, decision making
Whom	Stakeholders	Person interested

Figure 3-13: Method for Clarifying Ambiguity

Case ◆ Prevention of Global Warming

For example, the statement of "For preventing global warning, we want to reduce carbon dioxide emitted by enterprises by 10 percent within five years through energy conservation and new technology" represents a political mission but shows no process for realization. This will be more clarified if described with 6W1H.

[Context Analysis]

■ Grammar for Interpreting the Mission

Context corresponds to the basic interpretation grammar for understanding the total picture. Particularly, when the interaction of multiple values is expressed abstractly, the expression not compliant with the grammar causes different interpretation or misunderstanding.

Misunderstanding occurs because the concept of context is not fully taken into consideration or the approach method is not developed. Therefore, the basic interpretation grammar for describing the mission should be prepared.

Since multiple values are included in interpretation of a mission, as one of the methods of creating interpretation grammar, there is a method of listing those value items for clarification.

■ Visualization of Context

Rich conception in a mission statement has positive aspects such as innovation, foresight and novelty, but has negative aspects such as incomplete recognition of issues, ambiguity and lack of logic. In context analysis, the grammar for reading the overall context should be presented in a visible manner and the value of the owner or planner should be realized at maximum.

Assessment / Desire for Results	Income	Growth	Market Share	Adaptation to Environment
Innovation	B	A	B	A
Sociality	B	A	B	A
Foresight	B	B	A	A
Novelty	A	A	A	A
Ethic	B	B	B	B

Figure 3-14: Case of Value Design Matrix

As an example for visualizing mission context, as Figure 3-14 shows, there is a method of creating a value design matrix by clarifying desire for results and assessment items for the program.

This matrix has the merit of designing items and assessment benchmarks as well as visualizing the key points of context. However, it needs consultation or confirmation with the owner and planner before creating the matrix.

The value design matrix shown in Figure 3-14 indicates that the context of this case is an environment-adaptation type project that focuses on future growth based on a plan with high novelty at the sacrifice of current profitability. Therefore, contents of the program do not necessarily value the market share.

By evaluating multiple values such as innovation, sociality, foresight, novelty and ethic based on the value design matrix, the grade of context should be enhanced.

In addition, in context analysis, it is also one of the methods for clarifying the intent of the planner that project architects or producers join the analysis to interview the owner or planner and discuss or confirm the such items as value, objectives, policies resources, and expected results.

Case ◆ Selection of Preferential Issue

An automotive company built a specific mission program for urgent revitalization to overcome the managerial crisis. In the context of specific missions, such factors as survival of the organization, recovery of trust, response to customers, recovery of profitability, and base for future growth are incorporated complicatedly.

In this context, the issue with top priority is conversion from deficit to profitable status in a short period. In order to recover profitability, the company intended to reduce fixed costs with a project for closing unprofitable plants and formed a procurement project to screen material and parts suppliers for low-cost supply on a long-term basis. In addition, the company formed a project to sell off its space business department to focus on the core automotive business. The company also integrated the projects to innovate personnel and education systems through the president's frequent spot inspections, preferred appointment of younger staff to responsible positions, and renaissance of employee awareness through education.

In the above-mentioned program, top management gave the vision and specified the mission; a variety of projects to realize those were formed through communications with middle management.

- Context is the basic interpretation grammar for understanding the total picture.
- Abstract expression of the interrelationship between multiple values will generate different interpretation.
- Context analysis requires a method to maximize visualization of the planner's desire for results.

■ Chain of Objectives and Goals

As the next step, the chain of objectives and goals should be read from context analysis by discomposing a mission in a logic-tree manner as Figure 3-15 shows.

Objectives signify the reason for projects' existence and goals mean the results expected. In other words, "what for" is questioned in terms of objectives, while goals are defined by specific items such as "what," "by when", or "how". Objectives are placed in a higher position than that of goals and have a higher level of abstractness. Meanwhile, goals indicate specific, assigned tasks and involve lower degree of abstractness. In addition, objectives are assigned to organization groups or individuals. Clarification of objectives and goals generates significance and motivation for achievement, respectively.

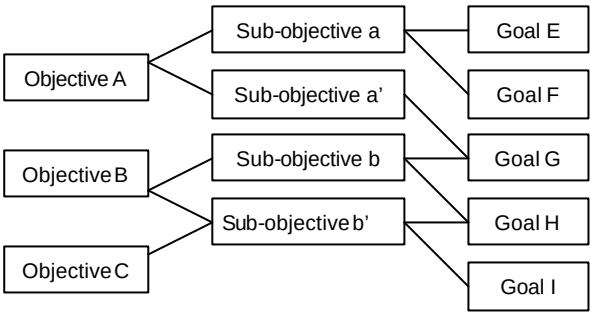


Figure 3-15: Chain of Objectives and Goals

This step gives structure to objectives as well as goals and serves as the procedure for making scenarios, which is shown as follows:

(1) Illustrate the interrelation between objectives and goals based on context statement.
(2) Modify the interrelation from the viewpoints of external environment and organizational policy, and create multiple diagrams.
(3) Modify the interrelation between objectives and goals in the case of cooperation, confrontation, contradiction or constraints among stakeholders.

One of the roles given to profiling management lies in the competent capability to prevent deviation from the mission and themes, of objectives and goals, and goals and measures as well as their distortion, planning, maintaining and coordinating their consistency.

Such programs are likely to cause displacement or inconsistency between a mission, objectives, goals and results. The displacement of a mission and objectives is called "displacement of objectives from a mission."

Case ◆ Consistency of Mission and Objective

The Trans-Tokyo Bay Highway, Aqua Line, opened in December, 1997. The highway runs for 15.1 km across the Tokyo Bay and connects Kawasaki in Kanagawa Prefecture with Kisarazu in Chiba. Users can drive over the Tokyo Bay in only 10-15 minutes.

This project aimed for economic boosting arising from the connection of industrial areas and sightseeing routes between Chiba and Kanagawa, without passing through Tokyo, and for alleviation of traffic congestion in the metropolitan area. However, there are fewer users and the initial goal for income has not achieved yet. The corporation has to rely on public subsidy for relief. This status of the Aqua Line is attributable to the inconsistency in the chain of a mission, objectives and goals.

- Read the chain of objectives and goals by discomposing the mission with the logic tree through context analysis.
- Objectives signify the reason for projects' existence and goals mean the result expected.
- Modify the interaction between objectives and goals in the case of conflict of interests between stakeholders.

Steps for relationships s cover the issue of interests in addition to the relation between the whole and parts.

Relationship between the Whole and Parts

Further advancement in a mission statement and interpretation of context requires attention to how to relate the whole to parts.

Solutions to complex issues require knowledge of the relationships between the whole and parts to enable achievement of a mission as a program, as well as examination of achievement by maintaining the self-sufficiency of the whole and parts. This is because it is an essence of program management that, for addressing solutions and uncertainty, individual projects and programs should demonstrate self-sufficiency and initiatives, liaise with each other, influence each other in a positive way. Therefore, there are no difference in ranks between programs and projects although the layers are different, and both of them are principally expected to harmoniously proceed and generate the results expected in the mission.

One of the methods for relating the whole to parts is creation of Relationship Property Matrix (RPM) as shown in Figure 3-16. In this method, concerning the items stated in program mission, the relationship between the whole and parts should be classified into (1) principle, (2) organization, (3) rules and (4) behavior, and the interrelation before and after the implementation of program should be recognized,

	Detect prior relationship	Examine prior relationship	Design prior relationship
Principle			
Organization			

Rules			
Behavior			

Figure 3-16: Whole and Part

Case ◆ Product Development

In the development of new automobiles, a variety of development principles, cooperation between organizations, project rules and team behaviors exist at enterprises. Rules and behaviors that delay development or cause failures should be corrected at the beginning of the program.

- It is required to know, examine and design the relationship between the whole and parts to interpret context.
- It needs to demonstrate the self-sufficiency of projects and programs to address solutions and uncertainty.
- The relationship between the whole and parts can be grasped by (1) principle, (2) organization, (3) rules and (4) behavior.

■ Stakeholders

Program stakeholders are those who have specific interests in programs.

Those directly involved include program planners, program participants, participants in multiple projects and their supporting parties. Collaboration partners which directly or indirectly influence programs have stronger economic interests through program resource transactions and are more related to social interests, and may be concerned with environmental factors such as preservation of ecosystem. Thus, for implementation and realization of projects, various entities such as the owner, investment institutions, financial institutions, consultants,, designers, project teams, project managers, contractors, engineering companies, manufacturers, think tanks and regulatory agencies participate in a program to perform value creation activity to varying degrees.

Not only players who directly participate in a project but also cooperative partners such as services companies, manpower supply companies and distribution companies join a project as sub-players.

However, there are local public agencies and local residents who do not directly join or are not involved with the project but suffer social influence from the project. Interests differ with the respective stakeholders dependence on and involvement with program, intrinsic interests of their roles.

In program profiling, recognition of the total picture of interests is indispensable for the development of program. The reason is that a smooth progress or otherwise in a program changes dependent on negotiations between those interested. Since involvement or concern of stakeholders change in the interfaces and interrelation between projects, recognition of overall position becomes significant.

As a method of analyzing such relationships, the dependence and negotiation relationship matrix works effectively. The case for this is shown in Figure 3-17 below.

Dependence / negotiation	Participation relationship	Cooperation relationship	Coordination relationship
Resource dependence	Investment	Venders	Procurement negotiation
Human resource dependence	Parent organization	Manpower agencies	Specific requests
Organization dependence	Partner enterprise	Outsourced firms	Competing enterprises
Technology dependence	Technology provision	Technology providers	Technology negotiation
Environmental burden	Environmental conditions	Condition setting	Negotiation for conditions
Permit dependence	Explanation	Request	Persuasion
Strong restriction	Solution and alternative plans	Request for participation	Persuasion

Figure 3-17: Dependence & Negotiation Relationship Matrix

- In programs, attention should be paid to stakeholders who change existing specific interests.
- Interests in a program differ with a party' dependence on and level of involvement in the program as well as the nature of interests and adversity of the program to the party..
- What is important is positioning of interests and negotiation based on the interfaces and interrelation between projects.

[Step for Scenario Statement]

■ The Scenario

A scenario means a type of presentation for depicting a story on how to realize "what it should be" from "what it is". A scenario has a function to bridge the present and future with a project. Major points expected in a scenario are issue identification, solution implication, road maps, methodologies and performance. Stating these as a story is a method of expression for scenarios.

■ Method for Creating Scenarios

A story has to include the statement of the following three factors with a certain level of persuasiveness: a sense of reality like "likely to realize," a sense of urgency like "must practice" and a sense of expectation like "hope tot".

Persuasiveness should include grounds and attractiveness that appeal to mission planners and program initiators or supporters. Although persuasiveness is required, it is in fact difficult to depict a story by predicting a future in complex phenomena. However, since a program does not proceed without a scenario, a story with a sense of reality is needed to achieve a mission. Therefore, a basic scenario closest to a mission should be prepared first.

Then, plural plans should be drafted with prerequisites including both, favorable and unfavorable, predictions, and plural scenarios that respond to situational changes should be developed in the middle of program implementation. This multiple-scenario method is expected to produce three scenarios and nine derivative ones. If a certain scope of tolerance is set for the basic scenario, seven types of scenarios can be depicted.

A scenario refers to a method of depicting future environment and circumstances by adding hypotheses.

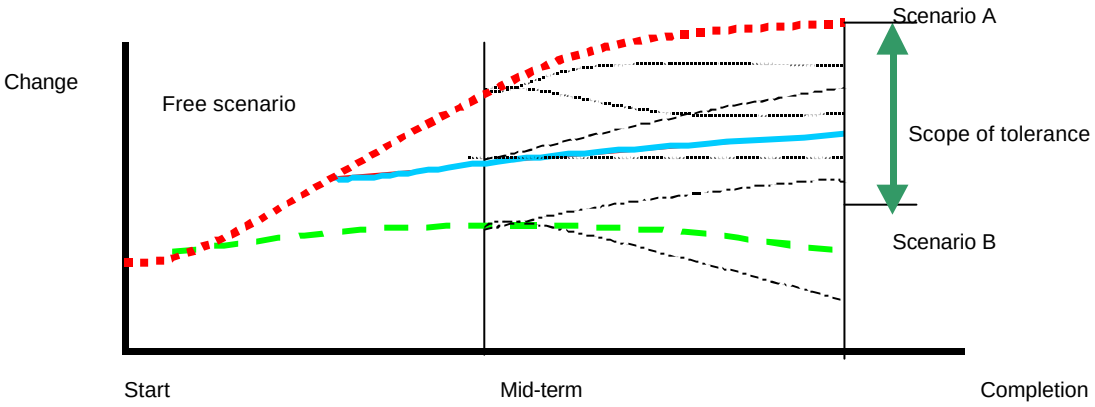


Figure 3-18: Development of Scenario

Scenarios also work as a procedure for drafting alternative plans for a program with creativity. There are many methods for scenario statement such as 6W1H, KJ, brain-storming, Delphi, and Kepner/Tregoe. In either case, the intuitive grasp of an entire complex system into a story is a significant preliminary step for the program.

Scenario value sources are (1) contents of innovation, (2) anticipation of future value, and (3) coexistence. Scenario creation means incorporation and further actualization of situational changes into the mechanism of these three value sources and assumption of future total pictures and processes. It is also a step for forming consensus among stakeholders.

Case ◆ Plan Management Scenario

Public-private cooperation type projects by third-sector (quasi-public) corporations in Japan have been widely developed throughout the country as an ideal pattern for local revitalization but most of them are suffering a big deficit.

Typical cases are that man-made facilities as projects' products were completed to meet the project objectives in terms of budget, construction period and quality; however, the mission of revitalizing local economy has not been achieved and those facilities have become heavy burdens for corporations and their supporting local governments. This problem is attributable to the insufficient consideration of planning or management scenarios.

[Summary of Profiling Management]

- Program scenarios serve as a mechanism for completing a basic program plan.
- Profiling needs procedures for mission expression, relationship analysis and a scenario statement.
- Context signifies the analysis based on multiple value benchmarks such as consistency and logic.
- Relationship refers to the analysis of the whole and parts, cooperative relationship, adversary relationship and interests.

● Program Strategy Management

[Relationship between Management Strategy and Program]

It is generally said that only 10 to 20 percent of basic policies or management strategies are realized as results of undertakings. Common causes are : (1) strategy planning and its implementation are split off and there is a gap between them; (2) strategies become meaningless due to changes in circumstances; (3) empowerment by top management to the head of line units virtually does not exists and nullifies the mission and responsibility; (4) top management's commitment is too formal without follow-ups, and (5) strategies are biased intentionally in lower tiers and used differently from the original intent.

These causes could be coupled as a single comprehensive analysis, viz., a lack of a well-conceived basic framework with stakeholder buy-ins for strategic program integration that provides a holistic and practical picture of decision-making and processes from the mission given by management.

On many projects implemented to date, once determined, they were often executed inflexibly in regard to changes in circumstances with ambiguous strategic intent, which used to make projects useless. In addition, many enterprises take a "hands-off" position when projects are completed, and has no structure to pursue coordinated life cycle utilization to deeper satisfaction of stakeholders.

Although the fulfillment of the terms of an implementation contract is certainly basic requirements, project should be deemed as a failure case unless effectiveness or valuable serviceability is proven after the completion.

Many innovations include complex values and meanings, tangled objectives, and complicated problems with unclear objectives and factors for realization. In the complex program that has a high level of intellectual asset and dynamic combination of multiple projects, optimization of the total program should be pursued.

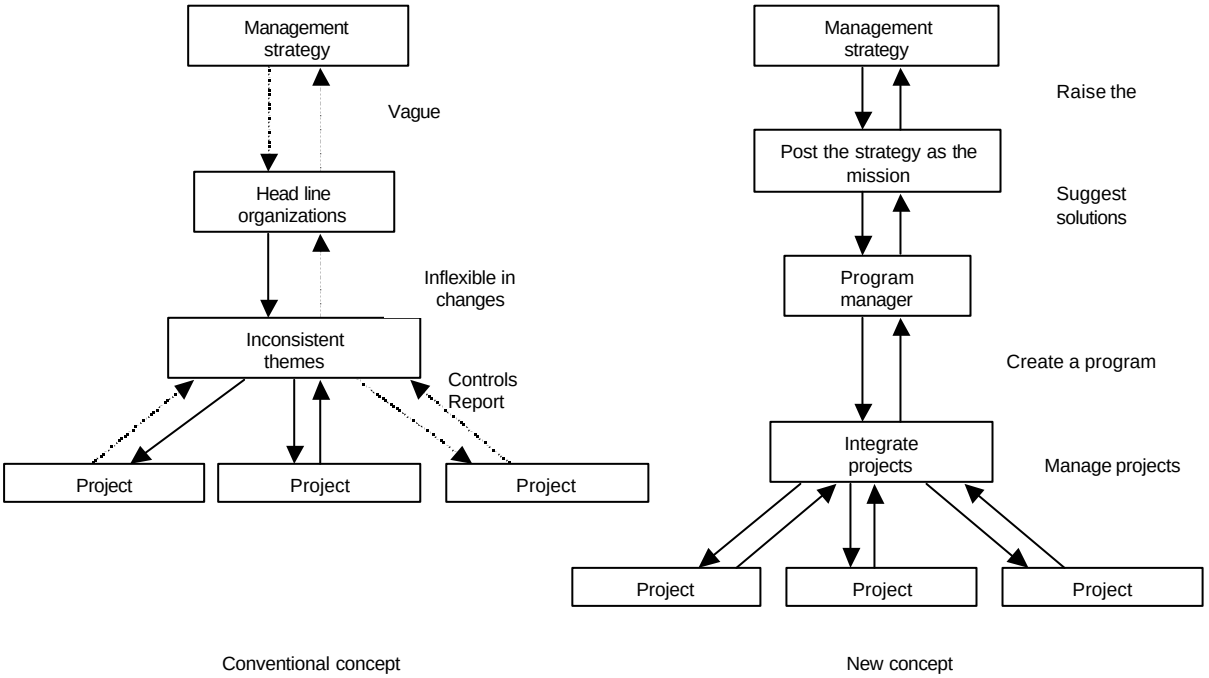


Figure 3-19: Integration of Management Strategies and Programs

■ Merger of Two Management Thoughts

Integration management, which has a mission to solve the issue involving management strategies, signifies implementation management to be carried out through a strategic breakthrough mindset that creates organizational capability by flexibly adapting to environmental changes and should never fail to achieve the mission. This is the concept that places a top priority on the achievement of a mission in spite of uncertainty.

Therefore, the realization of this concept requires a way of thinking in which logical proposals or procedures are prepared as an overall basis over conventional concepts and, by setting their priorities, decisions are made according to given situations. In other words, strategy and integration are primarily included in program management, and this is what characterizes program management.

Program Management Thought Aiming Strategy

(1) Plan the total picture depicted by insight without omissions or waste. Orientation to Mutually Exclusive Collectively Exhaustive (MECE) developed by Mackenzie Co.
(2) Build a basic framework for solutions by giving weight to the mission achievement value (Framework orientation).
(3) Use wisdom for planning and implementation by thinking freely without sticking to conventional concepts (Zero based thinking).
(4) Make decisions by setting priorities on multiple plans according to situations (Option orientation).

Program Management Thought Aiming Integration

(1) Prepare logical proposals and procedures as a basis (Road map orientation).
(2) Structure a mission into projects to enhance feasibility of management (Architecture orientation).
(3) Illustrate work process with a consecutive flow to streamline the relationship of operations and changes of the status (Process orientation).
(4) Analyze the cause and effect relation between goals and results to adjust gaps between them (Coordination orientation).
(5) Give autonomy, specialty and right for decision to projects to enhance motivation for collaboration through decentralized integration (Community orientation).

- Programs with ambiguous strategic intent causes an inflexible approach to circumstances and will not bring overall coordination or satisfaction.
- Integration management refers to the concept to place a top priority on mission achievement with uncertainty being taken into account, prepare overall logical proposals, and make decisions according to situations by setting priorities.

[Definition and Overview of Program Strategy Management]

Definition

Program strategy management signifies the decision-making activity that places a top priority on the achievement of a mission in all processes of program performance by interpreting the holistic value of the mission with strategic benchmarks and by clarifying interrelationship of themes, objectives, goals and measures to set their basic frameworks and specific critical limitations.

■ Mechanism of Program Strategy Management

The basic concept of strategy management has been summarized in the section of Strategy Thinking (refer to 3.6.1). It substantiates feasibility, prior to program implementation, even if environment changes, based on the vision for achieving the original mission.

Drawing up strategies is called strategy formulation and its realization is called strategy implementation. Strategy formulation is expected to reflect a mission on a program more accurately and enhance possibility of success.

When a strategy is not achieved as formulated, it is in many cases attributable to insufficient design to cope with changes in environment and circumstances, or inadequate decision on the selection of an alternative plan. In terms of implementation, the causes may be a shortage of core human resources that work with competence and problems with team formation, leadership and communications. These critical factors that decide the success or failure of a program is called strategic drivers.

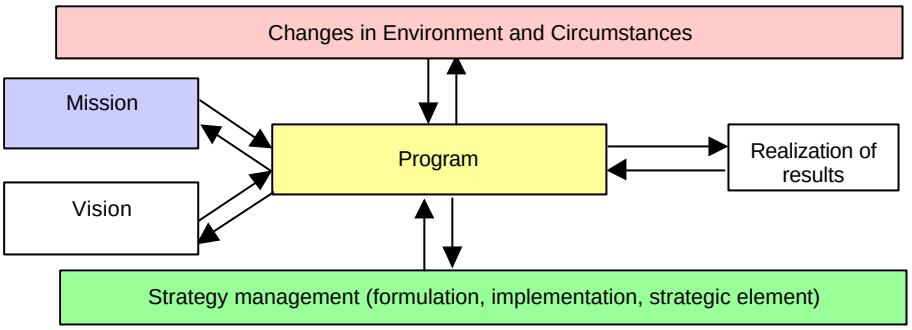


Figure 3-20: Strategy Program Management

■ SWOT Analysis on Programs

Programs have various strategic elements and the SWOT analysis is utilized for generally identifying these elements. SWOT is an abbreviation of "Strength," "Weakness," "Opportunity" and "Threat". Grasp of these four aspects on programs facilitates the identification of strategic elements.

In program activity, demonstration of core competence should work as "strength," and "weakness" should be made good with reinforcement. It is also important to decide whether a situational change would constitute an "opportunity" for the program or react unfavorably. Endeavor for foresight or prediction is important for addressing "threat". Diversification of threats can be realized by using the portfolio selection, combination of projects (refer to the sections of "Project Segment Management" and its "Portfolio Management", and "Strategy Option for Project Alternative Plan" (refer to "Real Option")

■ Relationship of Objectives, Goals and Policies

In strategies, importance lies in the integrated management of constraints as a strategic element by relating objectives, goals and measures and by setting their priorities. Each element of SWOT has its own objectives, goals and measures. Objectives signify the results to be realized when they are achieved, while goals mean more specific results to be achieved and accountability for the results is required.

In addition, policies are formulated since separation of objectives and goals cause a problem. Policies work as a guideline to connect objectives and goals. The more complicated are the rules for specifying a mission, the more objectives and goals are needed, as well as support by secondary objectives and goals,

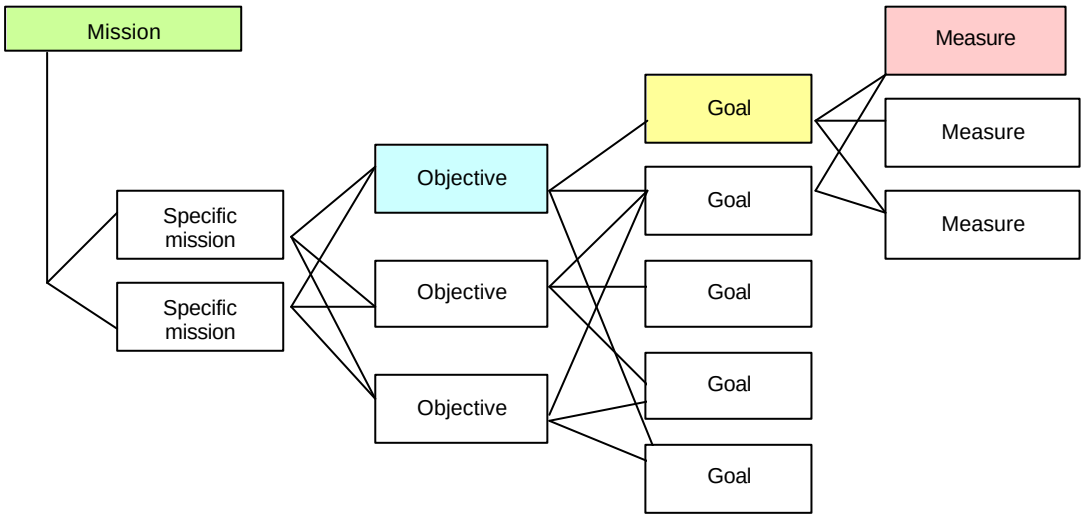


Figure 3-21: Chain between Mission, Objectives and Goals

Case ◆ Gap between Plan and Goal

A chemical company drew up a two-fold income boosting plan and implemented the program through participative discussions. However, only two years after the start of the program, actual performance figures indicated a variance from the goal under the plan, and greatly dropped in the third year.

What was the cause for this? In short, there was a shortage in strategy thinking and strategic elements and in the recognition of the chain among objectives, goals and measures. Although figures were set first of all in expectation for growth, actual transition proved to depart from the prediction as accurate recognition and solution of the issue were not intended since attention was paid only to the values that exceeded the realistic prediction.

■ Decision-Making Process in Program Strategy

The magnitude of recent environmental changes is large and changes show discontinuous patterns, and are fast. Therefore, although long-term plans are necessary, it cannot be expected that things will proceed as laid out in the plans. However, a mission must be realized as expected. Then, the following decision-making processes are adopted in strategies: (1) prediction of environmental changes, (2) identification of strategy elements, (3) assessment of the gap between goals and results, (4) assessment and selection of alternative plans, and (5) decision making for the optimum plan.

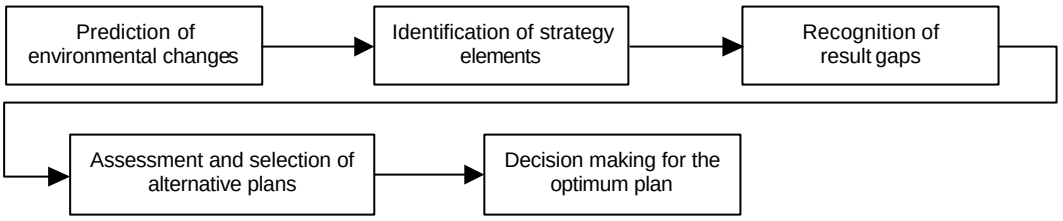


Figure 3-22: Decision Making for Program Strategy

- Strategies have two aspects, namely, strategy formulation and strategy implementation.
- Strategy formulation requires accurate definition of a mission, recognition of changes in environment or circumstances, and provision of alternative plans.
- Strategy implementation requires team formation, leadership and communications.
- Programs have various strategic elements and the SWOT analysis is utilized for identifying them.
- Project portfolio is one of the methods for risk responses.
- In strategies, objectives, goals and measures are placed under integrated management as strategic elements for their orderly chain and setting their priorities.
- Strategies have the decision-making process.

[How to Overcome Uncertainty]

■ Uncertainty and Alternative Plan

Management of uncertainty is one of the basic issues in the strategy theory. Uncertain future phenomena, which are unpredictable, occur outside the project and inside the organization, and cause trouble, crisis or loss in the course of implementing a program. Projects in progress face crisis triggered by changes in government policies or regulations, emergence of alternative technologies, changes in the competitive market, economic fluctuation, etc. Moreover, inside the organization, development projects with complicated requirements or systems often cause delays in the schedule or budget overruns due to a shortage of information and lack of technologies or knowledge. Since project values change according to changes in circumstances, it is critical to maintain the mission value for a program period by modifying schemes, systems or alternative combination thereof.

In program strategy management, the scenario method and portfolio method can apply. The former is for writing plural scenarios for solutions by assuming uncertainty and for determining the achievable level by analyzing the route and key elements of a program. Moreover, the scenario method is based on the concept of maintaining the achievement level by coping with situational changes and providing for alternative scenarios. The latter, the portfolio method, is for minimizing the influence of uncertainty in total by individually assuming frequency of uncertainty and its impact. The project portfolio analysis is based on the concept of minimizing the uncertainty without losing the mission or value by deciding whether to do or not and by combining projects in uncertainty.

There are the K-J Method for creating ideas (a method of integrating ideas developed by Dr. Jiro Kawakida), and the Delphi Technique for assuming mid- and ling-term scenarios. In addition, as an

analysis-oriented method, there is PPM (Product Portfolio Management), a well known analysis method developed by Boston Consulting Group, which has various applications areas and ways to apply), the Kepner Method and Tregoe Method (analysis based on four processes including status analysis, issue analysis and potential issue analysis). In addition, the analysis of relationships between elements can accept the use of ISM (Interpretive Structure Modeling, a method developed by Warfield for recognizing relationships by pair comparison between elements).

■ Types of Project Portfolios

There are typical cases as follows in the project portfolio analysis.

(1) A value creation portfolio for innovation programs.
Selection of high-risk and high-return projects, which include creation of business or product development.

(2) A value creation portfolio for renovation programs
Asset reinforcement type such as those for introducing production management system into a factory to improve portfolio productivity; selection of low-risk and high-return type programs.

(3) A value creation portfolio for network type programs
Selection of low-risk and high-return type programs that enhances asset value by connecting multiple project assets on a network.

(4) A value creation portfolio for service type programs
Selection of low-risk and low-return type programs that expands the asset use for another undertaking of service.

■ Method of Portfolio Management

The basic method of portfolio management is classification of projects into "what should be done" and "what need not be done" by recognizing the asset properties of programs.

(1) Create multiple program plans by combining project models.
(2) Make an assessment based on the asset properties and effect of programs.
(3) Make an assessment from the viewpoint of reasonable resource allocation.
(4) Make an assessment from the viewpoint of uncertainty.
(5) Set priorities on programs.
(6) Adapt to changes in circumstances by assuming optimistic, pessimistic, and most probable cases.

Thus, the procedures for portfolio management means to reasonably select an optimum combination of projects to reap the maximum value of a mission. For example, in the case of a project model to be achieved quickly with a low cost, portfolio management means to make an assessment as to whether to "make or buy" and to make a decision. In other words, portfolio management serves to examine the possibility for drafting broad strategy plans by considering strategic properties concerning the project model.

● Architecture Management

[Process of Architecture Management]

Architecture management not only copes with changes in environment but also creates innovation based on a mission. It has the following five functions: (1) Create the strategy process for a mission, (2) Create project models, (3) Build structure (4) Assign functions to the structure, and (5) Load information on the architecture.

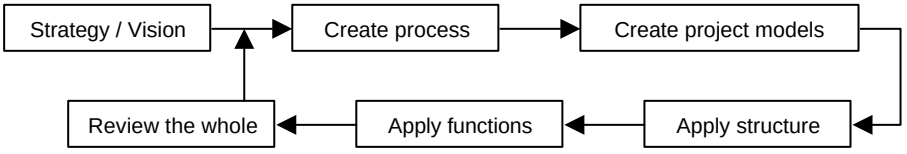


Figure 3-23: Mechanism of Architecture Management

■ Development from Project Scenarios to Architecture

Project architecture means designing a creative mission. However, the creative mission does not necessarily indicate a specific, fixed set of a project mission but has many variations according to the insights as to how to integrate philosophy, idiosyncrasy, sense of value, individuality and sensibility. In other words, those insights include self-assertion of breakthrough as background. Breakthrough means issue setting and overcoming. It requires an original vision that shows the right direction and gives team members pride, satisfaction and confidence.

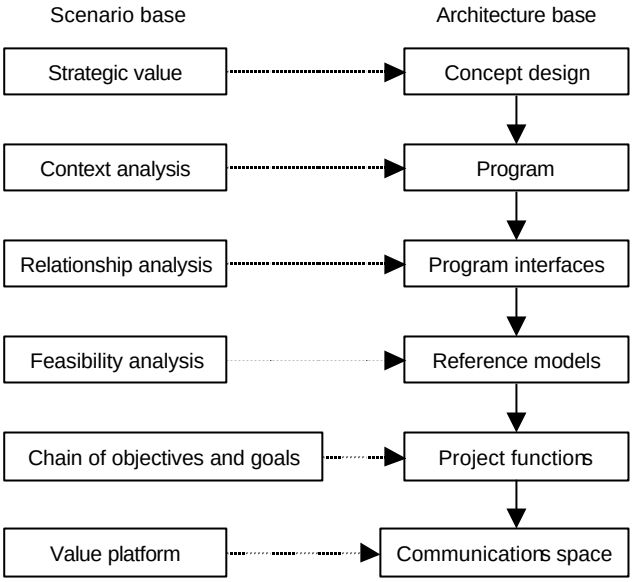


Figure 3-24: From Scenario to Architecture

- Architecture serves to apply the structure and functions and to provide information in creating strategy process and project models.
- Architecture means the task of designing a creative mission.

[The Standard Project Models]

The standard project models refer to standard forms of programs that integrate overall projects comprising a program as independent management units. A project model has common basic project attributes of an independent package with unique theme, goal, process, team and tools, and generates added value through combination or substitution with other project model.

In the face of discontinuous and drastic changes in circumstances, built-in flexible arrangements are necessary for a program in which component projects may be re-phased, suspended or cancelled as warranted as if one plays a mosaic work thereby maintaining the original value of the program

ISO's standardization subcommittee for automation of information has been working on research of definitions and model creation. They aim to shift the total picture of project activity to standard forms considering the maximum use of advancing IT. Attention should be paid to at least the following four items for development of standard project models which serve as reference models.

(1) Coordinate the holistic mission with the objective structure

(2) Ensure flexibility to maintain mission in situational changes.

(3) Ensure model's self-sufficiency, connectivity and synergy effect.

(4) Make a model considering uncertainty.

■ The Scheme Model

A scheme means a conception plan to develop a mission into multiple scenarios, with a scheme report concerning the feasibility as a deliverable. The contents of the scheme model include the activity to draft basic conception documents, basic policy paper and basic drawings for projects through research and survey of the following items: (1) the objective and goal of a project, (2) basic management policy, (3) basic requirement specifications, (4) project stakeholder collaboration relations, (5) expected results, (6) constraints, and (7) estimated required resources.

The intent of the scheme model lies in the definition of feasibility, internal structure and external relationship, and flexible adaptation by modifying assessment to respond to requests for changes by the owner or user arising from environmental shifts. The products of the scheme model are basic conception documents, feasibility survey reports (technology, financing requests, investment readiness, economic and socio-political environment and ecosystem among others), documents for soliciting bids for projects, investment and finance plans, etc.

- A scheme means a conception plan, which serves as a model that has a survey report on feasibility as a product.
- Scheme modeling includes the activity to draft basic conception documents, basic policy paper and basic drawings.
- The intent of the scheme model lies in flexible adaptation by changing the assessment of feasibility and external relationships.
- The scheme model explains the basic design for participation in a project and responsibility to stakeholders.

Case ◆ Scheme Model

In the industries such as banking, automobile and chemical, international alliance is becoming a managerial issue and corporate survival for the future greatly relies on the basic plan for reorganization and merger. Schemes signify the result of idea and wisdom concerning whom to select as a partner, whether to choose capital alliance or operational alliance, whether to use market, manufacturing or technology alliance, etc. Competition needs many resources and has time pressure. It is hard to survive on a single corporation's own. The project scheme model defines a process for survey, assessment, contract and implementation concerning future collaboration partners for co-growth.

■ The System Model

The System Model is based on systems approach. In this methodology, when the allocation of resources, incorporating uncertainty, is decided for the first time in complex system projects, it encompasses the design of details for materialization, system planning and verification. This method principally pursues optimization with the project engineering technique, of which typical cases are program design and EPC (Engineering, Procurement, Construction) for projects.

This method focuses on control with the phase approach that divides work process by the time axis and by the work breakdown concept. In this respect, this method has its advantages, but in the knowledge and information society, increase in the added value is not expected without compounding of this model with the scheme and service models. Non-alignment with the scheme model is given as one of the reasons why a reasonable profit cannot be attained in services organizations (contractors) in spite of the demonstrated superior project execution performance in terms of delivery time and quality, excellent operability and resources productivity in completing a large scale plant contracted for through competitive bidding.

- The System Model is based on systems approach.
- The model encompasses the design of details for materialization, system planning and verification.
- The model basically intends optimization by the project engineering method.

Case ◆ Value Creation Program for System Building

A project to customize a company-wide resource program or a plant construction based on process engineering are the system model with the aim of efficient and effective construction of a system through contracting services. A contract defines objectives of projects, construction period, budget, quality, scope and others. This model takes in various risks in the projects, such as risks for design, technology, procurement, construction, performance, guarantee service and delivery. This model creates value (profit) from contracting services for systems integration or construction of a plant.

■ The Service Model

The service model draws on a completed system's functions to create potential value. The service model takes the form of a project in which goods are produced and services are provided by using a completed system through a program or project. The operation of systems (note that systems are not necessarily information systems) is routine work; therefore it has been treated in the same way as general operations. However, such a period until a system becomes operational, or a period when returns on system investments are interlocked to such schemes as BOT (Build-Operate-Transfer) and PFI (Private Finance Initiative), should be recognized as a project period during which risk and returns are inter-related. Therefore, there should exist motivation and incentive for achieving goals as a program or a project that generate values in operations.

What are acquired through system deployment management, such as quality, brand, technology, know-how and data, are the resources needed for new value creation. They can be fed back to the system model or fed forward to reinforce the existing scheme model. In other words, the service model bear

properties similar to operation project development, and is based on the knowledge management in which the experience, information and data that maximize the value of system management are used for a new business opportunity.

- The Service Model produces goods and provides services by using a system as a product of a program or a project.
- The period during which The Service Model is deployed is recognized as a project period during which risk and returns are inter-related.
- The Service Model accumulates new resources such as quality, safety, technology, know-how and data.
- The Service Model is based on the knowledge management that is used for a new business opportunity.

Case ◆ Service Model in an Oil Company

An oil company introduced a simulator for product mixing in blend tanks and shortened the production lead-time. The service model realized flexibility and quick response to customer needs and market changes. The company also introduced the total preventive maintenance (TPM) for preventive maintenance and production improvement using production data and ensured the operation level that is twice the defined capability with small investment.

Case ◆ Service Model in an Aircraft Engine Maker

An aircraft engine manufacturer in the US collected engine operation data on airplanes in operation throughout the world, and analyzed the parts data, leading to developing a service model for improving the airplane availability rate by dispatching a repair team when airplanes land.

[Architecture and Interface]

Program interface means the division of a grand design into a number of projects and their classification into standard models that visualize not only structural relationships between projects but also simulation for dynamic interaction of multiple projects. Since architecture maximizes the value generated by combination of standard project models, logic that shows value structure, innovativeness, visibility and accuracy of architecture presentation are required. Architecture management also means interface management of projects. It is the management to categorize into visible formats, common orders and tacit knowledge based on the accumulated effective practices in the layers and processes through visualization of the total picture. Architecture management addresses:

(1) Complex system phenomena (perceived in a multi-facet way).
(2) Open system model (design of relationship between models and core values as a pattern issue)
(3) Process adjustment (control of situational changes by phasing approach)
(4) Structuring (systems can be controlled by breakdown to layers)
(5) Knowledge skill (able to organically deploy in-hand and additional skills to be acquired)

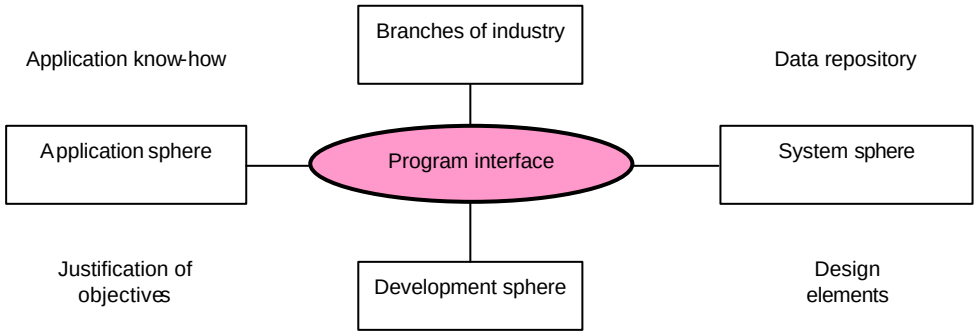


Figure 3-25: Program Interface

Programs have interfaces with the four spheres, i.e., branches of industry, development, system and application. These four spheres are reflected in the three project models depending the nature of a program or project. They are also represented by the standard project models. Extraction of hypothesis on dimensions, elements and constraints from each model based on concept models also clarifies requirement specifications. Concept models, relations between environment and models, and functional and non-functional requirements by models can be simulated by applying them to a project model.

- Architecture management requires logic that shows value structure, innovativeness, visibility and architecture presentation.
- Architecture management categorizes common order and tacit knowledge.
- Program interfaces have the four spheres: branches of industry, development, system and application.

Case ◆ Development of An Information System

Let us take a case of developing an information system. First, there is the sphere of client industry affiliation or as to whether the information system is for a pharmaceutical company, travel agency, financial firm or others. Each branch of industry has its own unique systems requirements and practices. The objective that shows why the information system in question should be developed relates to the specificity in the sphere of application. In the case of a pharmaceutical company, the objective is to support the development of materials for new products or new manufacturing methods. For such system development, decision is made in consideration of complexity, performance based on novelty, development cycle time, cost, and success probability.

[Concept of Object Orientation and Technology Application]

Since information technology is developing at a fast speed, it becomes necessary to apply the concept of poly agent systems that have been created on the object orientation to program management. Program management requires a framework that identifies and recognizes basic objects. Objects comprise accumulation objects and element objects. They are also characteristic of flexible presentation of the layer structure of the whole and parts, and of the relationship between classification and instance cases.

For example, the project risk management is part of integration management. Success and failure cases in risk management are related to class attributes of risk management such as identification, quantification and response measures. Objects are like a capsule where the data structure and operational method are integrated. They are ready for operation when a client conveys the message. Such object-oriented frameworks are highly useful.

Case ◆ Information Technology Tool

In particular, the use of IT CASE tools can generate application generators, database call, and user documents, which are connected with the repository accumulating and allowing retrieval of specifications and data. In this case, attention should be paid to the usability engineering or integrated software development environment (ISDE) such as CASE.

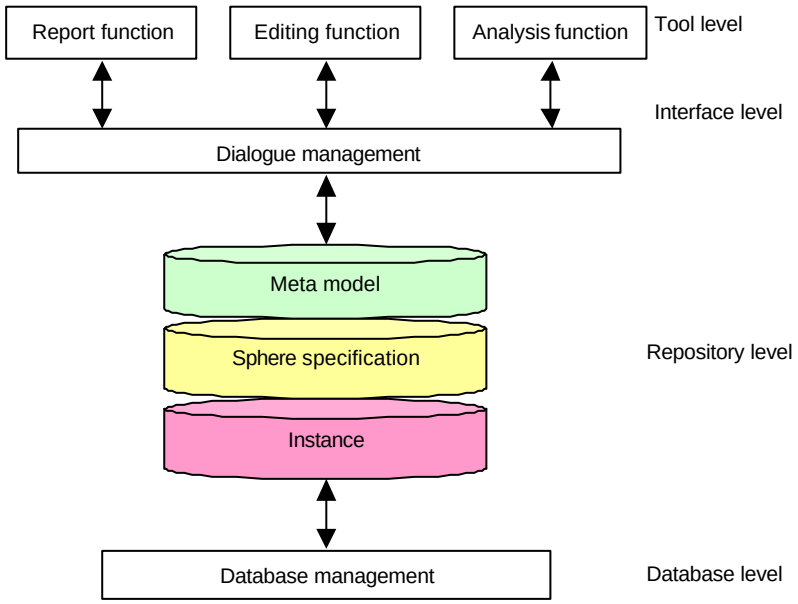


Figure 3.26: CASE Tool Architecture

In the service model, the functions of human interfaces, repository and communications can be applied to improvement of the status quo and new value creation for systems. CASE tools can generate application generator, database call and user documents through connection with the repository for accumulating and searching for specifications.

- Program management requires a framework that uses object orientation.
- Objects represents the layer structure of the whole and parts, classification and instance cases.
- Objects are like a capsule where the data structure and operational method are integrated with ease of operation.

Case ◆ Application of Information Architecture

An architecture of an information system consists of the part that man can see (front-end) and the part that he/she does not (back-end). The front-end is the part where data such as documents are created on the screen and the back-end is the part for back-office processing such as CPUs, and ERP, PDM, CAD and other application packages.

The connection of these two architectures is fixed and there were many problems even if either was changed. However, a business-to-business work integration system called Enterprise Application Integration (EAI) has been created for flexible connection of the systems through their separation. When Web is used for the front-end and EAI for the back-end, the class and message can be separated since they are created on the object orientation technology.

What should be noted here is application of the data and knowledge as corporate know-how, which are accumulated in the back-end. Corporate data are stored separately within companies such as manufacturing data in plants, market data in sales sections, and financial data in the mainframe at a head office.

Sharing such decentralized data exactly leads to the construction of a value platform for people, information, and organizational culture. If an enterprise has strategic intention to reinforce value platform by utilizing knowledge assets, it is required to approach how corporate data and knowledge should be used by employees, for projects, or among projects from the aspect of both platform and architecture management.

● Platform Management

[Definition and Overview]

Definition

■ Definition of Platform

Platforms refer to a specific community space to move a program or a project, which is provided for collaborative work essential for building on, acquiring and sharing information and knowledge on human, information and cultural aspects.

In other words, a platform is the space for communications where issues that cannot be communicated only on architecture are handled.

Definition

■ Definition of Platform Management

Platform management refers to such management activities that include definition from human, information and cultural aspects, appraisal, design, launching and ongoing improvement of platforms to help reinforce organizational competence for overall programs, which in turn pertain to value creating platforms.

[Procedures of Platform Management]

Platform Management has tow major roles: establishment of platforms and their management. The establishment includes securing or buy-in, implementation and modifications vis-à-vis the mission, objectives, policies and rules. Meanwhile, its management refers to the platform maintenance related to the improvement and connection with management systems or external services. Procedures for platform management are shown below.

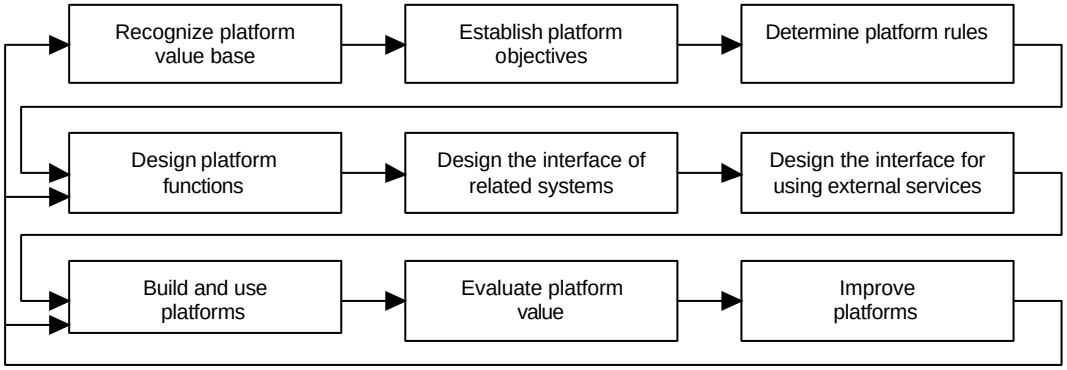


Figure 3-27: Work Process for Platform Management

- Platforms refer to a specific community space where people, information and culture are integrated.
- Platform management refers to the activity to reinforce organizational competence and value base.
- The establishment of platforms includes buy-in, implementation and modification vis-à-vis the mission, objectives, policies and rules. Its management refers to the platform functionality assurance and connection with management systems or external services

■ Design of Community

From the viewpoint of value creation, the design of a platform space or the project mental space discussed in Part 2, Project Management, is one of the most important elements. The space in question specifically refers to meetings, space on networks and work front. The following three elements are important for its design and management. First, the communication aspects are indispensable for human networking. Today, digital networks are essential vehicles. Secondly, the concentration of talented professionals is a significant issue. Recruiting of multi-national professionals is not feasible without providing a demonstrated atmosphere that accepts cultural differences in nationality, race, religion and profession. Lastly, attractive missions, themes and leadership are core of a project community. These three elements produce effects that harmonize with teamwork, and each element is deeply concerned with or combines elements of human, information and cultural aspects. Thus, a harmonized platform geared with human, information and cultural systems considerations exert positive influence on value creation activities.

■ Two Elements of Context and Protocol

Basic elements of platforms are expert context competency to interpret the meaning of programs and the protocol to understand special languages for communications. Context indicates guidelines, practical experience and knowledge concerning project management. Protocol is the language to be shared for communications such as the English language, project management terminology and computer languages.

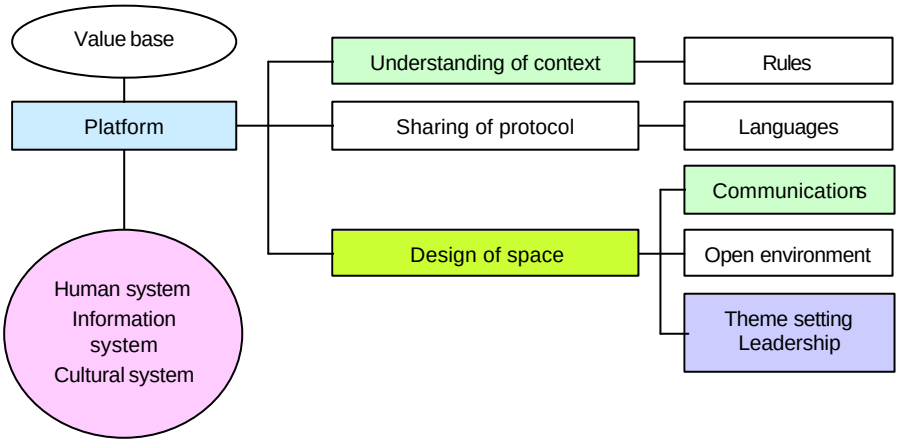


Figure 3-28: Image of Platform

[Value Base of Platform]

Platforms signify the base for creating new value by concentrating professional human resources from different cultural backgrounds with a broader sense and by integrating global knowledge.

Human system

Knowledge, know-how and skills that are injected into programs are integrated into the human system category that is deeply embodied in human beings. They are generally classified into the category of labor, personnel, human resources management, or knowledge management in recent years.

Information system

However, knowledge and service produced from human system needs to be processed rapidly by incorporating new information and to be promoted en bloc through digital accumulation processing. Knowledge is merged through human system communications and undergoes digital processing for solutions, and then its value is created through accumulation and transmission.

Cultural system

Core competence with high specialty forms the principles for ethics, society and duties, dominated by

characteristic uniqueness based on the cultures of race, region, enterprise, organization and occupation. Global and open collaborative work is promoted through the endeavors for advancement of human communications based on mutual respect without eliminating such cultural differences, for merger of global knowledge and culture, and for coordination with preceded rules, custom and procedures.

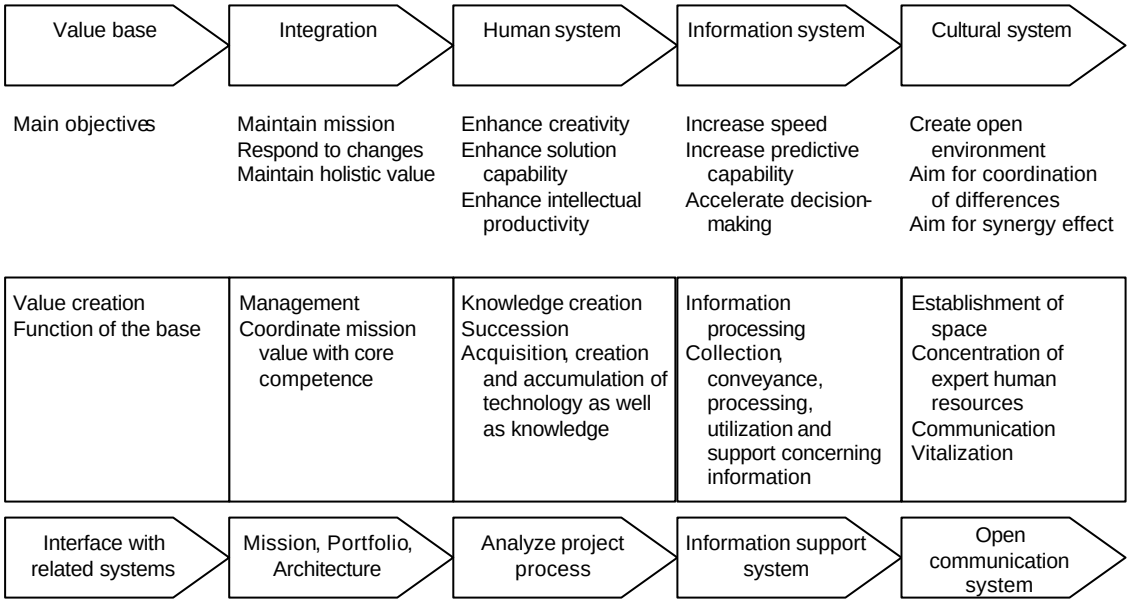


Figure 3-29: Value Base Controlled by Human, Information and Cultural Systems

- The community space needs communications, concentration of human resources, attractive themes and leadership.
- Value creation activity is influenced by human, information and cultural systems.
- A basic element of platforms requires the competency to understand context and protocol in a special language for communications.
- Context refers to rules, practical experience and knowledge, and protocol refers to a language shared for communication.

[Objective of Platform Management]

The objective of platform management lies in the role to build, maintain and improve the value base for creating core competence in the process of knowledge creation, which is the core of program activities.

- The community space where professionals with diverse specialty gather and conduct work efficiently using protocol should be provided.
- The community space where professional and companies can conduct transactions using program protocols and formats should be established.
- The community space should be established where flexible response to rapid changes or frequent fluctuations is possible with a network.

[Rules for Platforms]

In programs, professionals from different segments collaborate for a mission. Platforms are the competence space for concentrating professional competence, encouraging cross-fertilization among professionals for greater professional potential. On the program level, the most critical requirement is interfaces for combining relationships of organizations and human beings in collaboration. At least the following five rules are required for the competence platform that includes understanding of common context and development into mission reading, context and knowledge creation activity for concept.

(1) Mutual reliance – common objectives, social ethics, attitude for collaboration, and fulfillment of promises.
(2) Sharing of program context and rules – understanding of the mission, objectives and roles, and technical terms.
(3) Sharing of program protocol – rules, discipline, common language, communication terms, and transaction standards.
(4) Professional ability – professional capability to contribute to work.

(5) Community – participative space to be used by program stakeholders while maintaining their own professionalism and abiding by certain minimum rules.

[Functional Design of Platform]

Physical space

Since platforms are the space enabling exchange in a variety of formats, for a program, the space insides a physical building and other facilities for collaborative work.

Electronic space

Electronic spaces are cyber spaces that allow program participants to conduct teamwork and other type of collaboration through communications on networks where e-mail, Internet, groupware, server and database are provided.

Space for coalition

For formation of core competence, platforms require another virtual space by way of congruent that transcend different cultures. This "space" includes a clear program theme that should be shared, openness, transparency, fairness, free participation, responsiveness, global standards, English, etc.

■ Use of External Services

Specialized functions of external services mean business mediation services over digital networks. Internet providers, portal site businesses, auction agencies, security providers and info-mediaries are typical mediation functions. Major mediation functions consist of the following four items.

(1) Information Services -- Website businesses that match-make business partnerships, introduce specialists, and provide useful information, etc. for fee.
(2) Security Services – Security specialists sell security measures for digital transactions, systems, information and communications.
(3) Payment Settlement Services -- Businesses that mediate settlement of transactions
(3) Procurement Marketplace -- Businesses that provide electronic marketplaces for equipment, materials, parts, services, etc.

■ Evaluation and Improvement of Platforms

Platform management requires three factors: visualization, readiness for use and freshness of content information. Visualization of plans versus actuals, quantitative indicators, and cause and effect relationships should be pursued for participants to consider platforms as being useful. Moreover, it is desirable for a platform to be capable of offering ready access to databases or data marts at any time from any place; otherwise platforms may not be able to attract first-class talents. Excellent managers are well aware that the key factor for producing intellectual productivity is communications supported by far-reaching information systems, databases and knowledge bases, as well as well-motivated, self-starter team members at the front of the program.

Case ◆ Platform Management

Iit is one of the major tasks in platform management to create such a system that enables data communication with the XML (extensible Markup Language) by applying EAI (Enterprise Application Integration) to systems with different protocols, and allowing visualization on diverse systems with GUI at the front end. There have appeared system integrators that by way of this architecture, design and build large-scale decentralized systems on the Internet.

- The objective of platform management is the establishment, maintenance and improvement of program value base.
- A platform means a created space where human resources act efficiently with a certain set of protocols.
- A platform also refers to a space where project-related organizations can make transactions by using communication standards or formats.
- A space that realizes flexible responses to rapid changes or frequent modifications on a network should be established.
- Five rules are required for competence platforms.
- A platform has physical space, electronic space and virtual bondage space.
- A platform has mediation functions such as information provision, security and transaction settlement.
- Platform management requires three factors: visualization, readiness for use and freshness of content information

[Trends of Platform Management]

Platform management is indispensable for advancing programs in the global-scale competition and

collaboration through surviving professional persons with superior ability rather than the masses. For collaboration with program partners, it is necessary to access reliable procurement data, human resources data, technical data and corporate data services, in addition to the data made available within single corporations.

In project management associations in the US and Europe, professionals certified with qualifications for project management are registered. There is also a good supply of reliable project management consultants, tool venders and application software packages. Efficient and rapid implementation of knowledge creation should flexibly deploy information management for appropriate architecture design and information and data flow.

Collaboration between organizations, communications among different businesses and international partners in programs and projects should be increasingly common for Japanese corporations; however quite often, the international nature of collaboration can be a fatal cause of failure. A closed society has a strong sense of boundary with no concept of platform management and tends to stick to existing frameworks. As a result, joint work with external entities and responses to foreign cultures have caused confrontations or handicaps, and it has become a high barrier to collaboration. Platforms cover the activity base for integrating people, information and cultures.

Case ◆ Intellectual Asset of the Japanese Traditional Manufacturing Industry

Large manufacturing companies in Japan are facing stagnant performance due to stubborn business units and functional departments with strong power which stick to the myth of making high quality products. In spite of huge intellectual assets, corporations have repeated failures in building a database for smartly utilizing those assets. Building a database naturally requires extensive data input, which needs steady efforts and perseverance without being rewarded or considered as a merit point in performance evaluation. Only the use of information and data has been stressed but input work that requires plenty of time and cost has always lagged behind, which has made DBs quasi empty knowledge boxes.

This is one of the reasons why we need to stress platform management in which all projects can use common DBs and have instance access thereto. An important task of program management is to create such positive feedbacks from work-fronts by proving well thought-out and efficient information systems that encourage them to continually input required data and use them to produce higher project productivity.

Case ◆ Integration of Planning and Track Record Systems

One of the values of project management lies in achievement of a mission by controlling risk to a minimum through flexible responses to situational changes, adjustment and adoption of an alternative. For example, reduction in lead-time increasingly needs integrated use of a planning and track record systems on data transactions on an online or overnight feedback basis. In an enterprise attempt of specific innovation by way of program management, the first step is to combine a planning function at a head office, a marketing force, a manufacturing function, all decentralized, as a single data model so that all of them can debate and share business concepts and data on a common basis.

- Platform management is indispensable for advancing programs in the global-scale competition.
- A closed society has a strong boundary sense tends to stick to existing frameworks, which has become a high barrier for collaboration, the modern key word for business growth.

● Program Life Cycle Management

[Definition and Overview]

Definition

■ Definition of Program Life Cycle

Program life cycle represents continuous program transition from the beginning to the end and consists of recognizable phases with different gate deliverables.

Program life cycle should also be viewed from the aspects of cost, environment, economics and uncertainty.

Object	Scheme model	System model	Service model
Life cycle viewpoint of cost	Forecast of repayment of investment costs Calculation of life cycle costs	Sanction of budget for project system (project product) Firm estimating of costs by project	Minimization of maintenance costs Change in maintenance costs
Life cycle viewpoint of environmental load	Forecast of environmental load	Environment design and implementation Environmental protection system	Measurement of environmental load Recycling/no emission
Life cycle viewpoint of economics	Forecast of return on investment Pre-assessment of investment value	Implementation of investment Interim assessment of investment	Maximization of return on investment Post assessment of investment
Life cycle viewpoint of uncertainty	Program design Portfolio selection	Changing program design Execution of options, as warranted	Changing program design Execution of options, as warranted

Figure 3-30: Viewpoints of Life Cycle in Project Model

Definition

■ Definition of Program Life Cycle Management

Program life cycle management is such management intended to realize the maximum use of program assets from the life cycle viewpoint of the overall program by overcoming uncertainty either by alternatively combining projects or by selecting options, in order to maintain mission value considering increases or decreases in the intended value arising from changes in environment and circumstances.

(1) The Program Design

Program design means designing program functions, combination of projects and their interfaces from the viewpoint of life cycle. The viewpoint of managing costs and environmental load over the program lifecycle is one of the typical cases of program design.

(2) Option of Program Alteration

Through execution of options upon changes in structure, functions and circumstances that occur during program planning and implementation, influence on the program life cycle should be evaluated and mission value should thus be maintained.

- Program life cycle is aggregation of segment program life cycles.
- Program life cycle should also be analyzed from the aspects of costs, environment, economics and uncertainty.
- Program life cycle management refers to management to maximize program value by alternatively combining component projects or adopting options to cope with situational changes.
- Program design means designing functions, combination and interfaces from the viewpoint of life cycle.
- Program options mean options available to maintain program value and to be executed when evaluation of influence of situational changes in program warrant.

[Program Design]

■ Intent of Program Design

Programs include projects of various types, e.g. those of development type that starts from scratch, innovation type, system type that combines existing and new elements and service type that acquires operation know-how through new system operation.

Interrelationship of such different types of projects has been collectively handled under programs. Meanwhile, program design is drawing attention as the management that provides powerful measures for dealing with structural and situational changes surrounding programs and brings about value synergy effect,

innovation effect and chain effect.

■ Classification of Combination Patterns

Programs consist of multiple projects that are related to each other and are combined in multiple patterns to achieve a mission. There are three basic patterns for the combination: (1) Sequential project combination, (2) cyclic project combination and (3) concurrent project combination.

Multiple projects that include independent projects with no direct inter-relations are most frequently found in engineering and construction (E&C) companies. However, management methods similar to those of program management are actually adopted in such companies as seen in the group management for organizational efficiency in resource utilization or process management. In such cases, economics by synergy effect is generated through integrative management of decentralized groups and corporate management.

■ Sequential Project Combination

Sequential project combination refers to the combination of multiple projects, e.g., A, B and C, which linearly proceed in the order of A, B and C along a time axis, keeping precedence relations with each other. This is seen when a large contracted project is divided into planning, construction, operation, etc. Projects A, B and C actually may overlap to some extent in schedules or work interfaces but they are basically linear projects.

Why are A, B and C not managed as one project? The best reason is that if any environmental change occurs at the completion of A, the project may be changed to B', not B as it is, or if any change occurs in B', the project may even be switched over to C". Such flexibility is taken into consideration in the program viewpoint. In other words, projects in a traditional sense have tendency to rule out flexible response to changes once started, but program allow for changes in the future and should have built-in flexibility to adopt optional alternatives

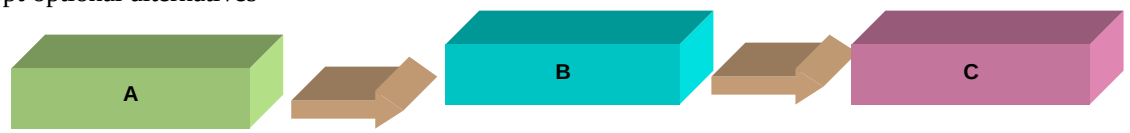


Figure 3-31: Sequential Project Combination

Case ◆ Right Capacity of A Manufacturing Plant in the Face of a Drastic Economic Change

A financial crisis occurred in East Asia. A manufacturing plant, which had been planned in the growth period expecting hefty market demand, was completed according to the original plan amid the crisis expecting recovery of the regional economy soon, but the demand dropped to one-third and the huge investment is continuing to be a heavy burden, causing a bad debt. If an alternative plan to reduce the plant capability to a half, while variable costs might increase by 20 percent but fixed costs would have been decreased by about 40 percent. They could have waited for recovery of the market for plant expansion, viz., reinvestment.

■ Cyclic Project Combination

If a development type program has favorable results, future development will utilize successful experience for further improved programs. A development type program start with a conception project, prototyping a product and, if successful, proceed to a commercial design-build project. However, while structural data can be obtained in design and construction, comprehensive data can only be collected after the project is started. These comprehensive data are reflected in the subsequent program development.

Three projects of the scheme model, system model and service model are combined as a cyclic combination and the next project will spin off from the original cyclic model. This is called the cyclic project combination. In software development projects, this type of development is called a spiral model since phases form spirals, and sequential combination is usually called a waterfall model. The concept of a program extends the scope of the project concept to both, the upper stream and lower stream, acquires products from project systems or products, which is reinforcement of processes, but does not stop there.

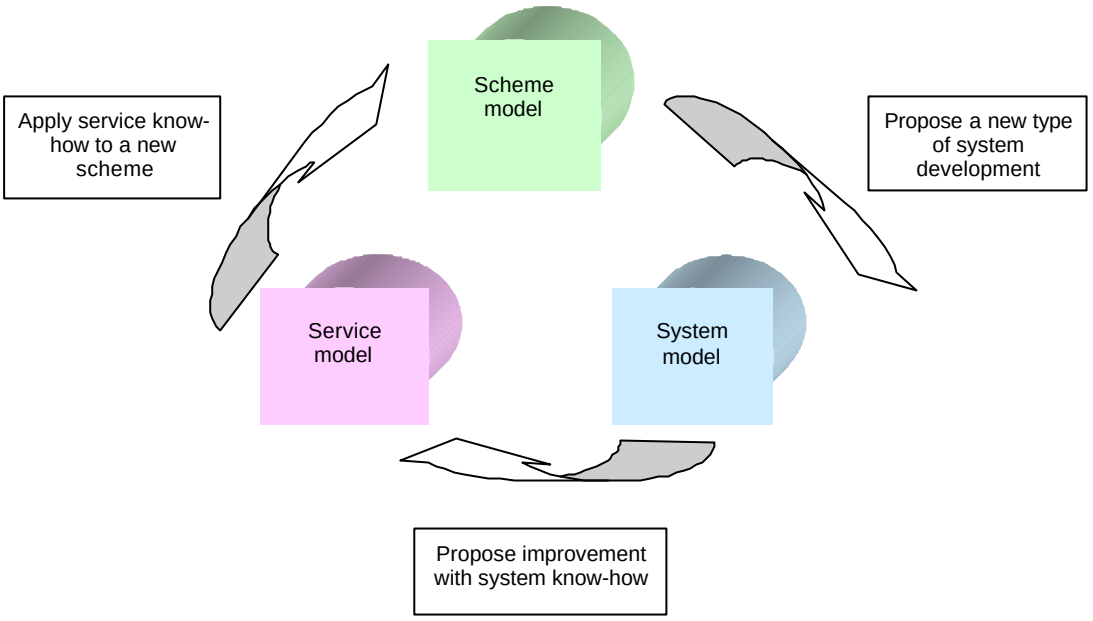


Figure 3-32: Integration of Project Cycles

A program recognizes the scheme model to plan a system and service utilizing the system as component projects. They also comprehensively collect, accumulate and process knowledge, know-how and data and have a mechanism to incorporate intellectual productivity improvement supported by knowledge management into design. What is important in program design is a viewpoint of pursuing value in the chain and not in segmented phases or projects, using knowledge and know-how acquired under a program; such value can offer a chain effect.

Case ◆ Project Cycle Combination

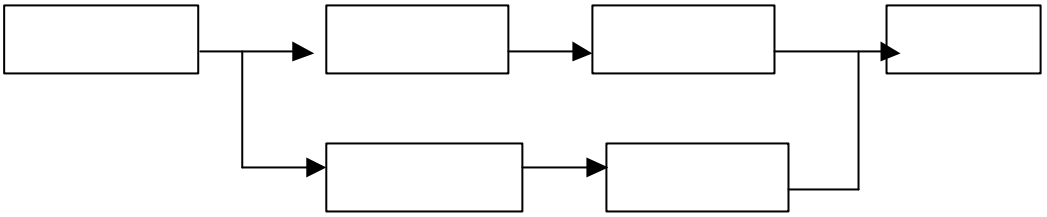
Many airline companies now consider that airfare and stand-alone package tours should not be their main revenue source. Based on partnering with aircraft manufacturer, airline companies have started Internet connection and air-borne phone services and comprehensive mileage card businesses that combine mileage credit with ground amenity services. An airline company and an aircraft manufacturer have considered in-flight space and flight time as a business opportunity and developed a chargeable Internet connection service for passengers' PCs. The key concept behind this is smart utilization of customer database, perks temptation, and advanced IT and communication technologies.

■ Concurrent Combination

Concurrent combination is a model of combining projects that is used for crashing development or manufacturing lead-time, compressing costs and enhancing chances of detecting solution elements by overlapping originally sequential multiple projects. As one of such methods, concurrent engineering is well known, developed by Boeing for concurrent design, procurement and production of airplanes. Specifically, it is a project management method that realizes reduction in lead-time, cost compression and better client satisfaction by forming a Design & Build Team (DBT) and using three-dimension CAD for design, layout arrangement and assembly simulation on the computer screen to decrease design and production recycling. This is a type of multi-project management used for multiple projects but having no distinct project life cycle, maintaining interrelationship by consistently pursuing value for a mission.

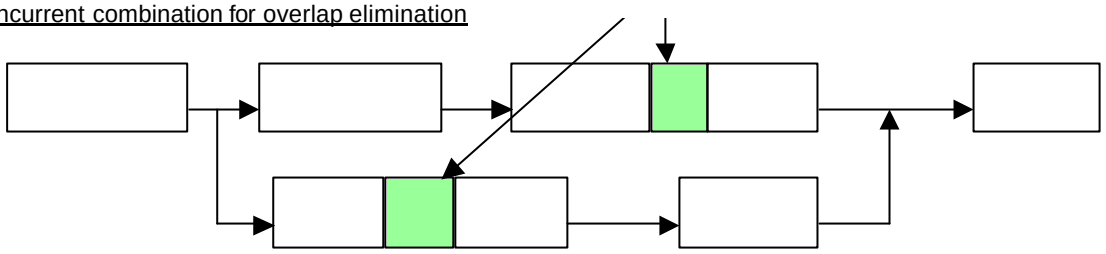
The concurrent combination has three typical cases and features. The first case is for the reduction of uncertainty in project cycle time by executing multiple projects concurrently and thereby reducing program lead-time. In this case, overall standardization of work processes that allows for concurrent work execution and computerized simulation tools for downstream work are essential. The second case is intended for elimination of overlapping between projects and resulting reduction of lead-time by forming projects concurrently. The third case is for enhancement of success probability by intentionally letting concurrent projects compete for better outcomes when uncertainty is rather high.

(1) Original concurrent combination



Eliminate overlap and combine the two

(2) Concurrent combination for overlap elimination



(3) Concurrent combination for intentional competition

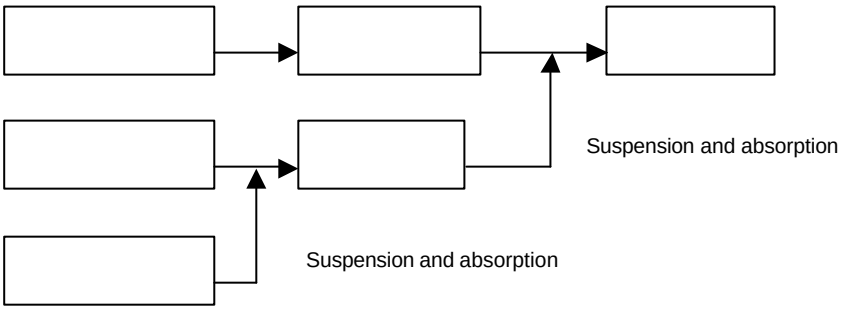


Figure 3-33: Three Types of Concurrent Combination

(1) Original concurrent combination is often seen in product development in the auto industry which values organic multi functions. A corporate competitiveness recovery project consisting of multiple strategic projects such as workforce reduction, new product development and procurement reform often comes under this category.

(2) Concurrent combination for overlap elimination is a method to cut fat, waste and inconsistency of overlapped portions through combination of projects in addition to the natural merit arising from concurrence. Multiple projects in airplane manufacturing have achieved good results with this method. In regional development projects, integrative management must be applied cutting across multiple projects otherwise independently executed concurrently over a certain time span to avoid, for instance, the construction of roads and bridges that are not used by local community members.

(2) Concurrent combination for intentional competition is found in new product development programs with high uncertainty. The pharmaceuticals and electronics industries, which are racing against "time to market" to grasp widows of opportunity in changing market needs, endeavor to raise chances of success by allowing multiple projects to compete for results on specific themes such as products, manufacturing methods, materials of construction and marketing strategies according to sub-missions divided from a holistic program mission.

Case ◆ Development of New Products

High-risk and high-return programs for the development of new products such as high-performing lithium batteries, new integrated circuit parts and new drugs, may improve the probability of success by introducing the competition principle to form plural project teams for the same theme. The essential objective of program management cannot be achieved by simply increasing the number of projects.

- Program design brings about value synergy effect, innovation effect and chain effect.
- Basic patterns of programs are (1) sequential project combination, (2) cycle project

combination and (3) concurrent combination.

[Program Change]

■ Guidelines for Initiating Program Change

Three elements should be recognized as the guidelines for activating program changes: change attributes that indicate whether a change is structural or situational; permissible level for value evolution, or departure from the original value; and critical value factors for programs. If it is predicted through report analysis and constant monitoring of relevant project information by means of a change monitoring system that any environmental change would affect these three elements, change management should be initiated to refer to the critical value factors to judge whether it is necessary to make modifications in the original program or to shift to alternative plans.

(1) Change attributes

Uncertain political situation, financial crisis, unpredicted technical innovation, market changes, appearance of competitors, serious delays, confrontation with stakeholders, defective technology problems, change in rules governing transaction contracts, etc.

(2) Permissible level for value evolution

Qualitative and quantitative evaluation for value evolution is performed with the Balanced Score Card method.

(3) Critical factors

Program leader, project manager

■ Real Options

Real options refer to expanded, readily available options, other than financial assets, for program evaluation and implementation under uncertain conditions. This is a significant concept suggesting combination of projects, alternatives and eventual balanced decision-making seeking real program and project values which might be otherwise glossed over.

Based on the right option that suits situational changes and associated wise management's decision, real option based present asset value is likely to become greater than that calculated under the conventional DCF method. Therefore, the real option is also called extended NPV. In this sense, real option can be defined as the portion of project value accruing from future options.

There are the following options available for projects. In the DCF method, unless a rate of return exceeds capital costs, decision on the investment is not made and good investment opportunities are likely to be lost. With the real option method, alternative plans for project models through options allow flexible responses to uncertainty of investment opportunities.

(1) Option to postpone

This option is to postpone the decision-making on investment, waiting for a decrease in uncertainty to a permissible level, to enhance the project value.

(2) Expand option

This option, notwithstanding the high uncertainty, is to anticipate future growth and make a minimum investment in a project, allowing an option to expand the project in the future when the situation changes.

(3) Option to contract

This option is to reduce the size of the project if estimated maintenance cost has proved to be higher than plans or the initial investment or environment deteriorates.

(4) Abandon option

This option is to abandon the project if market environment deteriorates and depreciation costs are incurred over an intolerable long period.

(5) Time to build option

This option is to allow for phased realization of a project so that either of the option to postpone, suspend or to abandon can be selected when the environment becomes adversary.

(6) Option to transfer

This option is to transfer use of assets according to changes in situation.

(7) Shut-down & restart option

This option is to suspend the project until the market recovers where if market deterioration causes a fall in the product or service price and variable costs eat expected profit.

(8) Cancellation option

This option is to minimize risk by means of a cancellation clause in a contract that is triggered when project viability is lost.

Case ◆ Manufacturing Volume Fit for Demand

A beer brewer has attained a business success by constructing a new brewery whose production output is less than the half the normal economic volume in accordance with the demand in the Hokuriku Region of Japan which enjoys abundant pure natural water coming from mountains. The associated manufacturing costs are relatively higher but due consideration has been paid to the fact that the market is matured and a large demand growth cannot be expected and quality, fresh local beer is put on the market so that the beer can compete with mass production brands. If the company had made a decision based on the commonsense economic production capacity, initial investment costs would have become a burden on company viability. It is a good lesson that overseas power companies and petrochemical companies are actually suffering from escalating bad investment risk due to the financial crisis after the construction of their plants.

- In program changes, change attributes, permissible level for value evolution, and critical value factors should be identified.
- It is crucial to constantly monitor projects and initiate change management based on the assessment of influences.
- Real options refer to the options of actual assets other than financial assets.

● Value Indicator Management

Value indicator management is a part of program integration management intended for program assessment platforms.

[Definition and Overview]

Definition

Value indicator management refers to a framework of the competent capability to set indices of program values and to continuously measure value indicator indices on an overall program at the planning stages, upon any changes, key implementation milestones and upon completion in the interest of maintaining or even increasing the value of the program.

■ Value Indicator Management Activities

The scope of major activities and roles of value indicator management include the design of a basic framework, development of indicators, regular evaluation of program and projects, preparation of reports, proposals, reporting to stakeholders, examination of actual indicators and their feedback for improvement and data accumulation.

■ Basic Framework

Assessment is a systematic evaluation of programs. A basic assessment concept and measures are essential for assessment. This concept clarifies efficiency effectiveness and contribution to society of program management. In addition, economics, entertaining stakeholder interest and sustainable global development should be taken into consideration. This concept has to be incorporated into projects that constitute a program.

The basis of assessment lies in whether the mission maintains its value as expected. The realization of this value is also related to the methods and results of integration management and ways of assessment vary according to scheme, system and service models. The adoption of five "E"s and two "A"s as common assessment indicators for the overall program enables balanced assessment of the program and its social significance. It is also important to examine and identify what indicators are common to projects or programs from the viewpoints of stakeholders, project team, innovation, process and cash flow. In the Balanced Score Card method, mission strategy objectives, goals, key factors for success, etc, are given in program models. Its basic framework is shown below.

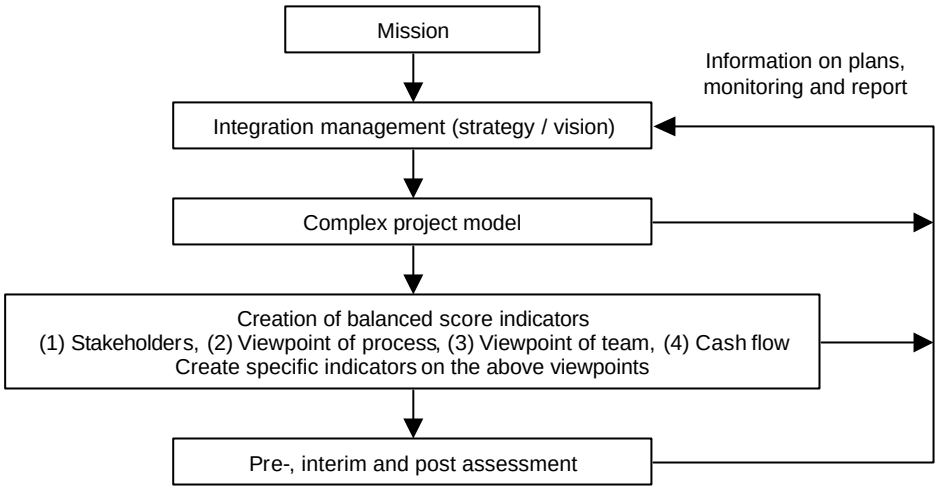


Figure 3-34: Mechanism of Balanced Indicator Management

[Practice for Value Indicator Management]

■ Balanced Score Card

The balanced score card was developed by Robert Kaplan and David Norton and is widely used for business management indicators. The salient characteristic of this method is that management visions and strategies are not in management's hand only but are shared by employees, shareholders, customers and often community members and incorporate balanced viewpoints of customers, finance, process and human resources.

When this assessment method is applied to a program, it will become clear what is expected and evaluated in project management, which also clarifies a mission, shows direction with a vision, and obtains stakeholders' support. The balance referred to in the Balanced Score Card is the value indicators expected in programs. Programs need five "E"s and two "A"s instead of customer, finance, process and human resources.

■ Development of Standard Balanced Indicators

Balanced indicators may be developed by the person responsible for the program based on his/her own concept and benchmarks. Balanced Score Card based indicators are already in use in Northern Europe. Its software package is available for project management. The objective of assessment is to offer a navigation role to judge current status to detect any variances from plans to realize future results. Project management requires the strategic concept to coordinate the team capability in collecting information on situational changes. Balanced indicators incorporate strategic success factors into plans and an assessment system.

There may be cases based on balanced indicator evaluation that projects may be reduced in sizes or suspended until recovery of markets comes. Many projects, without periodical balanced value evaluation, lose a chance of real options such as implementation deferment, suspension or cancellation and incur large losses. If harmonization is recognized as a common view in project management, the cycle of planning, implementation and assessment can be generated using quantitative and qualitative indicators from the integration aspects of strategies and visions. Combination of project models formulates a value creation process from the beginning to the end. For example, standard or reference models are divided into a scheme project, a system project and a service project, and are integrated into a program.

Project Model	Scheme Model	System Model	Service Model
Value	Concept value Innovation value	Realization value Value added by system delivery	Utilization value Value added by system utilization
Balanced indicator Key assessment factors Performance assessment factors	(1) Mission (2) Scenario (3) Alternative plan for change (4) Innovation value (5) Investment value (6) Definition of required function (7) Stakeholder requirements	(1) Client satisfaction (2) Stakeholder harmonization (3) Achievement of contract objectives (4) Satisfaction of required functions (5) Securing profit (6) Risk containment	(1) After-sales service (2) Acquisition of knowledge (3) Maintenance and preservation of assets (4) Cash flow (5) Preservation of required functions (6) Business opportunities
Efficiency (Internal measurement indicators)	(1) Contract objectives (2) Productivity of knowledge (3) Selection and decision by investors	(1) Contract objectives (2) Productivity of resources (3) Implementation of investment	(1) Contract objectives (2) Productivity of resources (3) Return on investment
Effectiveness (External measurement indicators)	Evaluation of economic effect	Design of economic effect	Realization of economic effect
Ecology	(1) Environmental preservation plans (2) Environmental consciousness	(1) Environmental design (2) Environmental aspects of contract	(1) Environmental management (2) Measurement of environmental load
Eamed-value	Investment accounting	Management accounting	Financial accounting
Ethics	(1) Regulatory framework (2) Program ethic rules (3) Transaction rules	(1) Regulatory framework (2) Program ethic rules (3) Transaction rules	(1) Regulatory framework (2) Program ethic rules (3) Transaction rules
Accountability indicator Consistency Social acceptability Feasibility	(1) Coordination of mission and objectives (2) Multiple alternatives (3) Benefits versus costs (4) Information disclosure (5) Base for feasibility	(1) Requirements and goals (2) Options on situational changes (3) Benefits vs. costs (4) Contract clauses (5) Contract forms	(1) Requirements vs. performance (2) Contractual obligations (3) Assessment of benefits vs. costs (4) Development Harmonized with local community (5) Safety and trust of management
Acceptability	(1) Expected results (2) Expected reward (3) Expected chain effects	(1) Functions realized (2) Reward for realization (3) Acceptance according to contract	Management results Reward for performance Expanded utilization effect

Figure 3-35: Project Models and Value Indicators

Case ◆ Coordination with Stakeholders

Construction of an airport has a variety of missions such as safety in take-off and landing, benefit and convenience for users, access from international cities, and contribution to regional development. Complex projects including runways, a control tower, airport facilities, and access to railway(s) and other ground transportation should be concurrently promoted. Also, harmonization with stakeholders' interests must be ensured, such as convenience and safety for air careers, pilots and passengers, consideration to noise abatement and environmental protection for local residents, and services and tariffs of airport authorities.

■ Design Considerations for Indicator Application in Project Models

Three are various key factors for success in service models. For example, after-sales service, data

management, rapid response to customers, environmental response, harmonization with local residents, etc. are factors for success. It is important to devise quantifying these success factors.

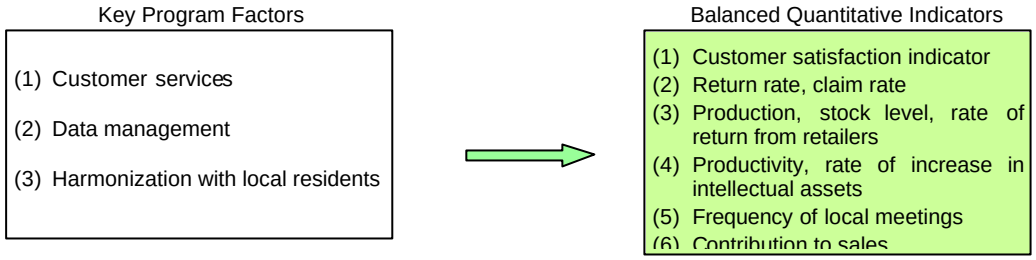


Figure 3-36: Design for Indicator Application

■ Value Indicator Management

Value indicator management is based on the concept of management by key objectives that what matters for effective value attainment is not the number of value indicators to be measured but is the right selection of strategic indicators that shall materially govern or constrain program value. Systematic analysis by co-relating strategic management strategy, value engineering, standpoint of business process re-engineering, financial management, human resources management, is important. A suggested flow is as follows:

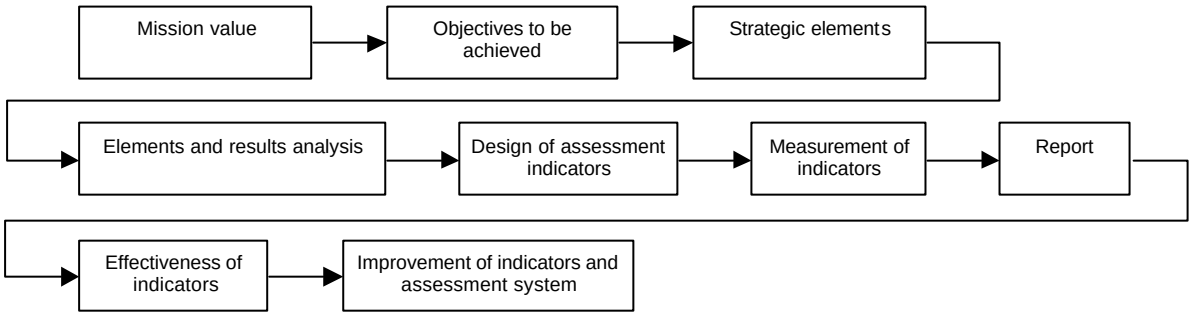


Figure 3-37: Value Indicator Management Process

There are many existing mathematical theories on some related areas. It is, however, the author's view that the Balanced Score Card based assessment is most practical yet comprehensive; the method is increasingly used by corporations and supports them in the introduction of program management.

- The value indicator management refers to the competent capability to assess mission requirements.
- The value indicator management includes the design of a basic framework, development of indicators, assessment of actual values, reporting to stakeholders, appraisal, improvement, and data accumulation.
- Five "E"s and two "A"s are adopted as common program assessment measures.
- Due attention should be paid to stakeholders, project team, innovation, process and cash-flow

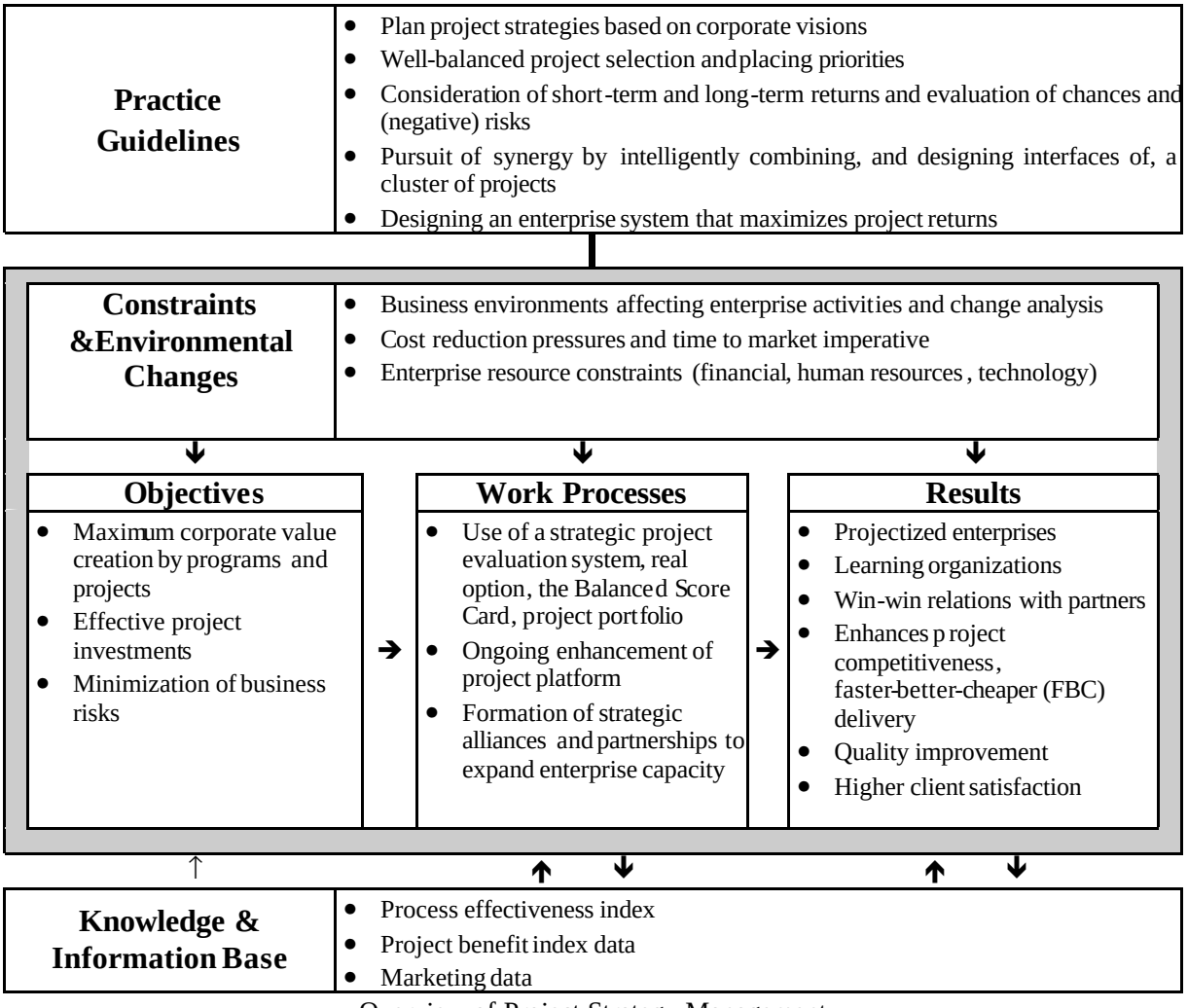
Part IV. Project Segment Management
(Summary Only)

The term "Project Segment Management" is similar to "Knowledge Areas of Project Management". However, as P2M embodies practical professional capabilities of project management, this unique term is utilized. For the meaning of "frame" or logical frames, refer to the definition in Part 1, Chapter 2 of this Guide.

Chapter 1. Project Strategy Management

The Project strategy management is the management that ensures the most harmonious coordination between the enterprise strategies and individual programs or projects; here enterprises include not only business firms but also government agencies, public corporations and non-profit organizations. Project strategy management is intended to effectively incorporate programs and projects into enterprise value building chains. Project strategy management consists of two primary elements: one is a system for enterprises to select right projects at right times and the other is enterprise commitment to and ongoing improvement of building and maintaining a comprehensive platform to facilitate planning, implementing, evaluating results of, and feeding back knowledge created through programs and projects.

If an enterprise selects a wrong project, it cannot attain success or, even worse, causes an eventual loss from the enterprise's total value even if a project has successfully achieved the given project goal. Commitment to a project means staking an enterprise's future. Go or no-go decisions on projects should be made strategically with a view to whether or not it adds value to the enterprise. Right project selection naturally requires enterprise mission, objectives and strategy and project selection criteria to explicitly indicate expected relationship between those and planned programs and projects and how to prioritize among them.



Overview of Project Strategy Management

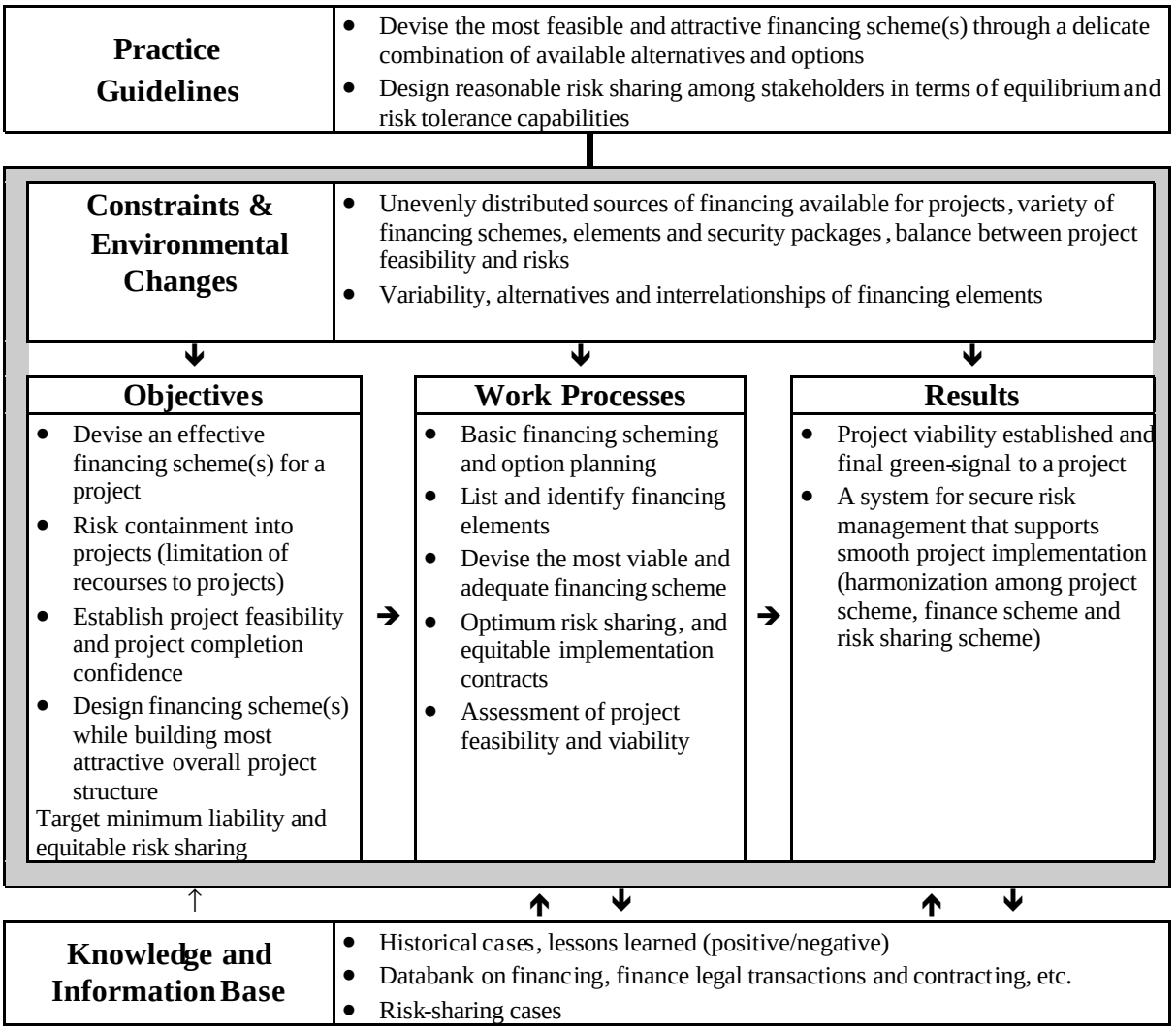
Given the environment that objectives and expectations of projects are increasingly diversified, it is risky to give a green signal to a program or project only on short-term interest. Enterprises have long-term objectives such as expansion and enhancement of technology base and higher customer orientation, which also should influence project selection. Currently, enterprises find themselves with parallel programs or projects in progress, competing for human and financial resources. Thus, priority setting is a crucial issue. Primarily, a close look at the absolute evaluation of value is necessary. For effective investment, trade-off between expected value and risks is another matter of significance. The Balanced Score Card and the Project Portfolio Analysis are frequently used for project evaluation in addition to the conventional financial analysis methods such as NPV.

Project success is also relative to market and other external factors as well as an enterprise's project management infrastructure. Particularly, an enterprise's affinity with project culture, business processes, organizational structure, financial strength and knowledge forming its project infrastructure makes a remarkable difference. Also, a streamlined chain from corporate strategy through programs down to projects would take an enterprise a long way against competition. The key words are senior management's commitment to program oriented enterprises, corporate culture to admit that program/project management is its core competency, and coordination from upper strategies to individual projects in terms of a set of objectives, and synergy among programs and projects.

When enterprise environments are drastically changing, resources needed by enterprises are also greatly changing, which leads to the imbalance between those really needed and those enterprises have entertained to meet conventional operational needs, and enterprises find it highly challenging to fill this gap in the current stiff competitive environment. This means that enterprises should not merely rely on internal resources but resort to external resources in the form of outsourcing, partnering and strategic alliances.

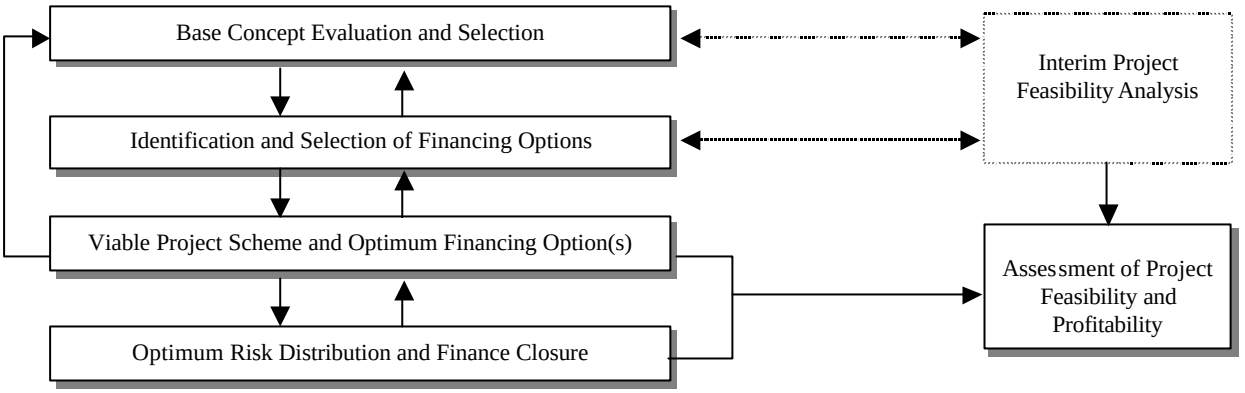
Chapter 2. Project Finance Management

The Project Finance Management is the management to build and implement a framework for procuring funds that are necessary to implement a program or a project. A project can only be materialized, pending satisfying other essential prerequisites, when a secure framework for project finance is established. Project finance management is not mealy a process to design finance alternatives. It finds its intrinsic value when it materially raises the feasibility of a proposed program or project with innovative financing schemes. Project finance management is a high-priority component of strategic project development efforts.



Overview of Project Finance Management

In scheming financing for a project on a project financing basis, it is essential to recognize that the primary entity to organize financing is the project itself and that not a single entity, be it a specific project company, corporation, sponsor or financier, should provide a loan repayment guarantee but project stakeholders in their totality should agree and design such a structure that require each of the stakeholders supports financing based on its role in the project with a set of security packages. For this, the stakeholders first design a basic finance framework and resort to markets for optimum finance options. This process taxes on financing viability analysis by way of trials and errors taking into account project constraints, and culminates in optimum distribution of risks among stakeholders. A final financing scheme is decided by repeating this process. Any substantial selection of options should be consistent with viability of the selected options and the total project as well as the value creation opportunity of the project. In other words, project finance management is not a stand-alone managerial process but should be approached as a vital part of project architecture optimization exercise. The schematic flow of project finance management is as follows, which also shows interactivity of activities and evaluation gates.

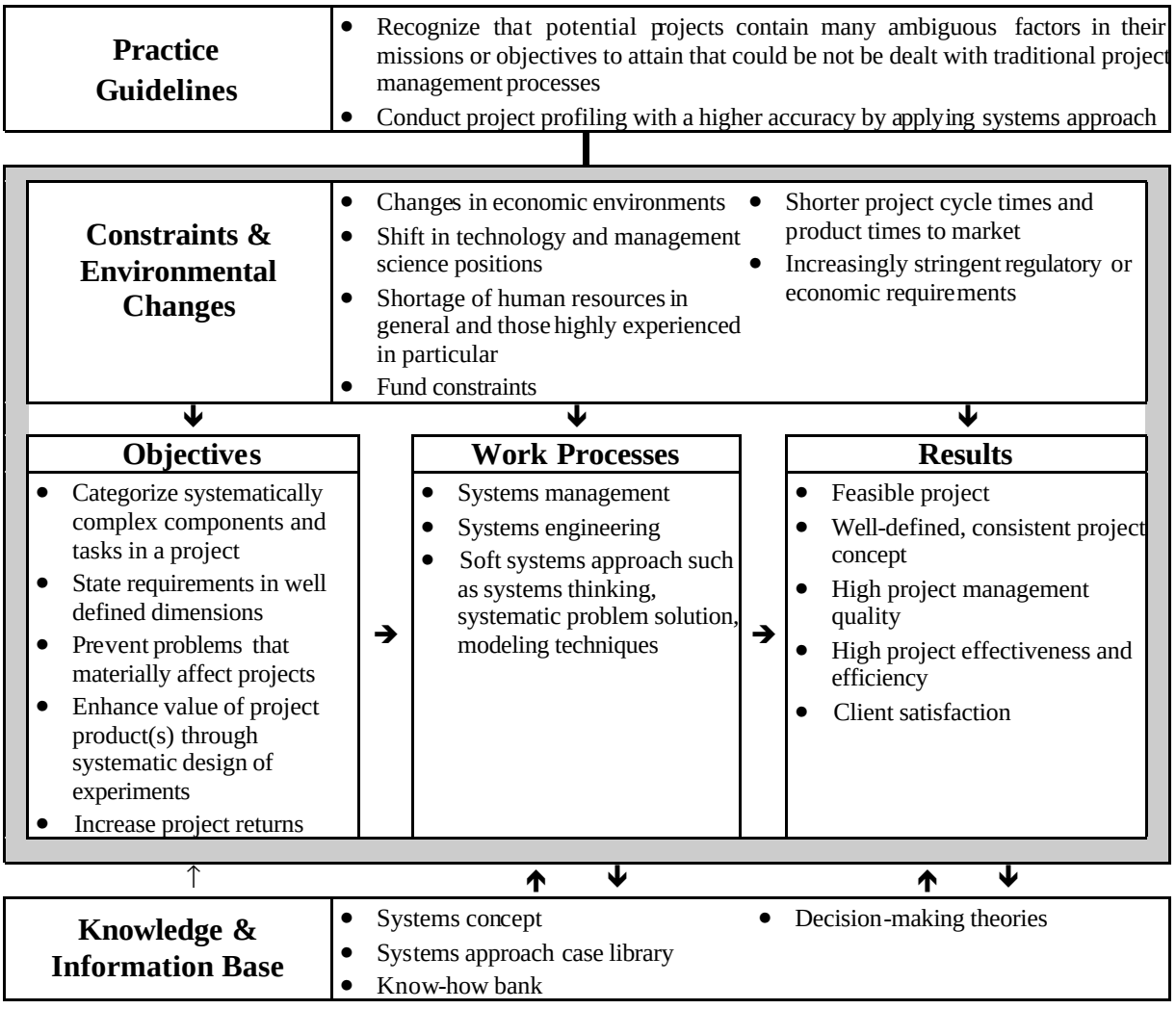


Flow of Financing Management

Chapter 3. Project Systems Management

The Project Systems Management is the management process to apply a variety of systems engineering approaches to project profiling, dealing with complex issues.

One often encounters cases in performing project planning and management in which objects are too vague to be defined by ordinary project management methods or unexpected phenomena or disturbances (or opportunities) come up; one is essentially cognizant of an issue to solve but comes to a deadlock without a clue to approach it or after a project is kicked off, one loses its direction to lead tasks on the right track or encounters unexpected tasks, which all requires almost zero-based resetting of action courses. Use of systems approach to projects considerably lessens these phenomena. The systems approach is a problem solving approach based on systems engineering principles. It profiles a complex issue from a macro standpoint, approaches activities and objects as a organic system, or a group of objects having meaningful interrelationship, identifies, then, system components and their relationships, and analyzes details of each component. In the project management context, the project systems management facilitates profiling a program or project mission, scope and objectives, looking at not only project activities but also a project product(s). An overview of the project systems management is shown in the following table.

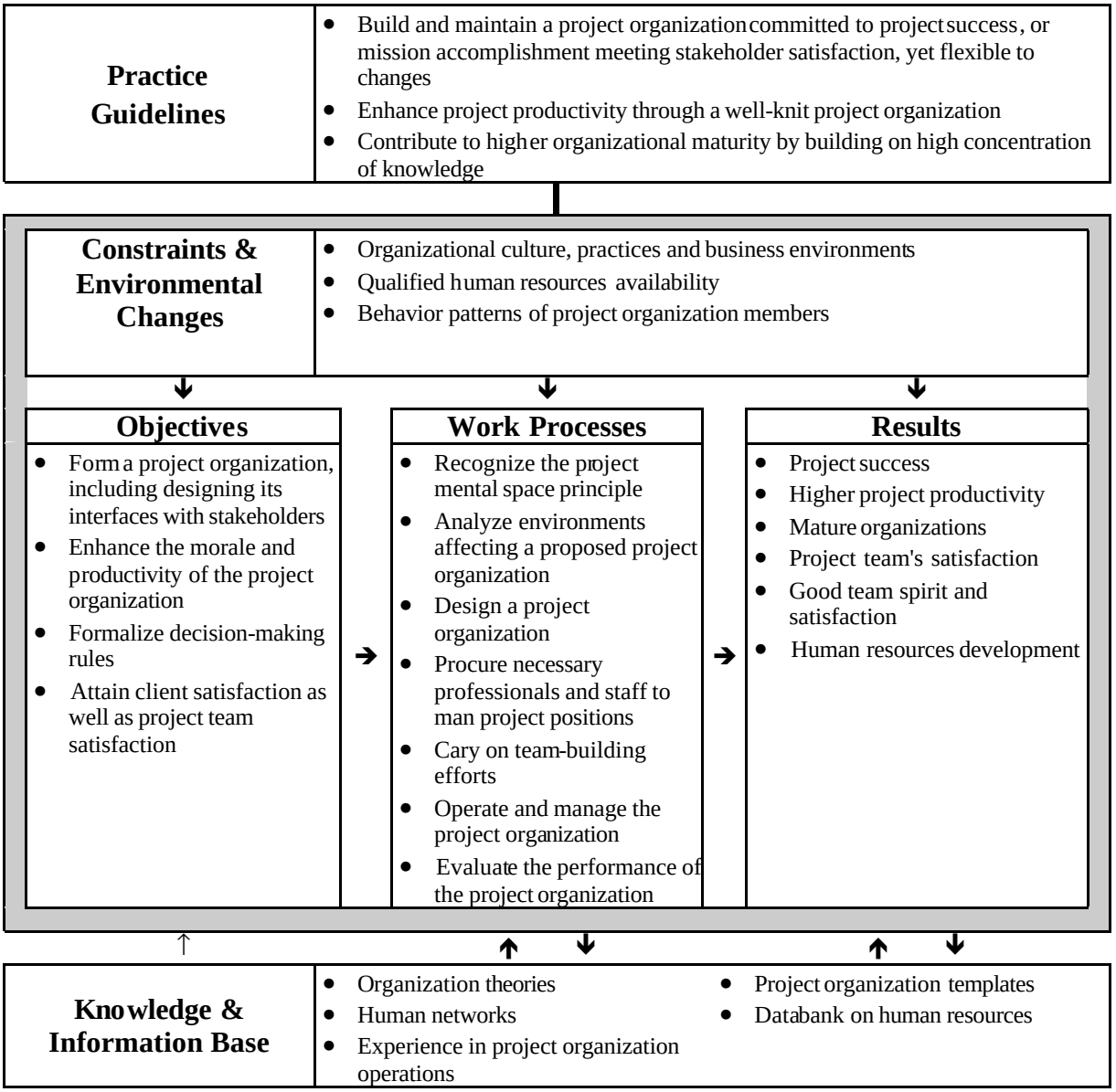


Overview of Project Systems Management

Chapter 4. Project Organization Management

The Project Organization Management involves designing and maintaining an optimum organization to perform and manage a project, which includes design of a project team; definition of interfaces between the project team and parent, functional organization(s); chartering chain of command and project position roles; staffing right persons to right positions; and devising atmosphere to motivate, and stretching potentials of, those persons assigned to a project, taking into consideration the project mission, nature and complexity of projects, talent availability, stakeholder interests, etc.

Project organizations are different from permanent organizations of business firms and public agencies in that they are temporarily formed by the members who directly participate in a project to achieve its mission. Another characteristic is that project organizations operate concurrently with their parent permanent organizations. As projects and eventually corporations move in fast changing environments, project organizations should have built-in flexibility to timely react to any environmental changes and disturbances while parent organizations should continuingly update organizational systems to positively support projects as projects are sources of added value, hence, enterprise competitiveness. In projects, value creation is ultimately a product of contribution of motivated individuals. Accordingly, motivation toward achievement, dedication to the mission, and self-satisfaction of individuals who join the project organization would greatly influence efficient project operation and its success. To motivate project participants, proper alignment of project members to the project mission and leadership are drivers, which are important ingredients of project organization management.

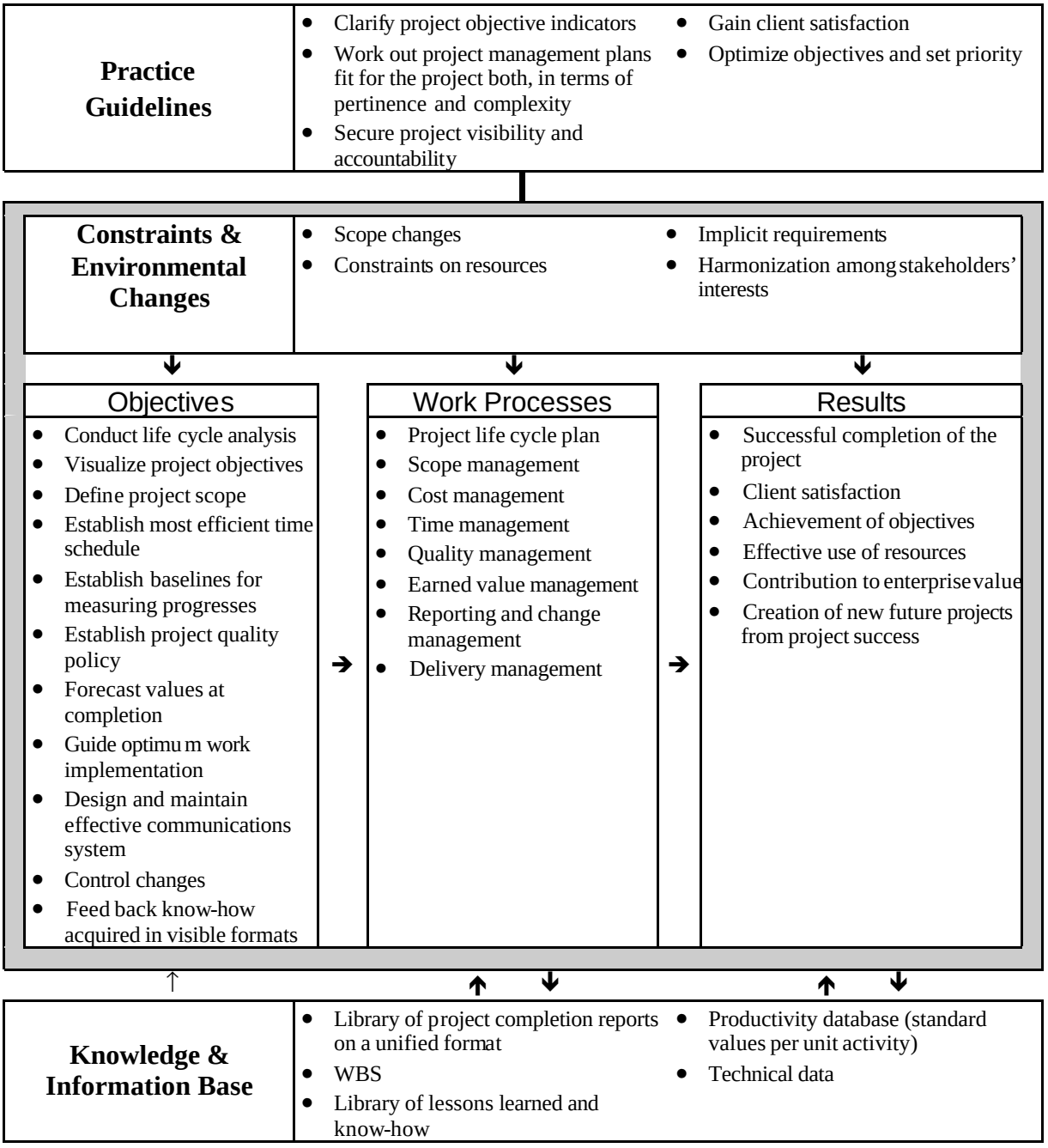


Overview of Project Organization Management

Chapter 5. Project Objectives Management

The Project Objectives Management is similar to the function of a car navigation system. A car navigation system has its basic function to map out from alternatives the most desirable route to a destination by inputting a destination and a driving objective that is, normally, the shortest and most economical; it is capable of identifying traffic jams or accidents on the way and suggests a detouring route. Such functions are true of the objectives management of a project. Simply stated, project objectives management is the management in which the project manager and project team members establish and follow up on a road map from project conception, or initiation, to completion, or attainment of a project mission and derived objectives by

- firstly, identifying the comprehensive structure of work items and deliverables required for a project, designing most reasonable activity paths and timetable for work items, planning most economical expenditure of resources and setting ways to assure agreed quality levels, within a set of project constraints,
- secondly, continuously monitoring and evaluating in progress project performance, and acting upon, when necessary, corrective actions, and,
- thirdly, verifying that all the required work items and deliverables are in place and the project product meets the project plan.



Project objective management is a core management process of project management and consists of sub-sets of:
Project Life Cycle Planning,
Project Scope Management,
Project Cost Management,
Project Time Management,
Project Quality Management,
Earned Value Management,
Project Reporting and Change Management, and
Project Delivery Management.

Important points in this management process are:
(1) Unifying the objectives and execution plans to attain buy-ins of all the project team members,
(2) Providing, throughout the project period, the client, sponsor, senior management of parent organizations and project team members with factual progress status data and analysis of areas of concern so that they have high visibility into project status and distill confidence in the project organization,
(3) Being held accountable to the client and sponsor for timely project performance and traceability, and
(4) Pursuing optimization for achieving the objectives by priority setting.

Project life cycle planning defines phases of a project for realistic planning management and indicates, by way of illustration, a guideline for arriving at optimum life cycle costs by trade-off between levels of investment costs and resultant costs of operation and maintenance.

Project scope management has the primary objective of defining the scope of a project based on a project mission charter and a set of project conception and definition packages; a state-of-the-art element of scope management is the front-end planning by combining knowledgeable inputs of professionals from all the related disciplines contributing to the project. Scope management breaks down all the project activities, materials resources and deliverables into work packages that are basic building blocks for project time management, cost management and quality management, which in turn are combined for integrated management, including trade-offs.

Earned value management is also conducted based on the WBS by comparing time-phased plans and in-progress results in terms of elapsed time and expended resources or costs for specific work packages or totality thereof, using the concept called “earned value”, an objective integrative progress indicator.
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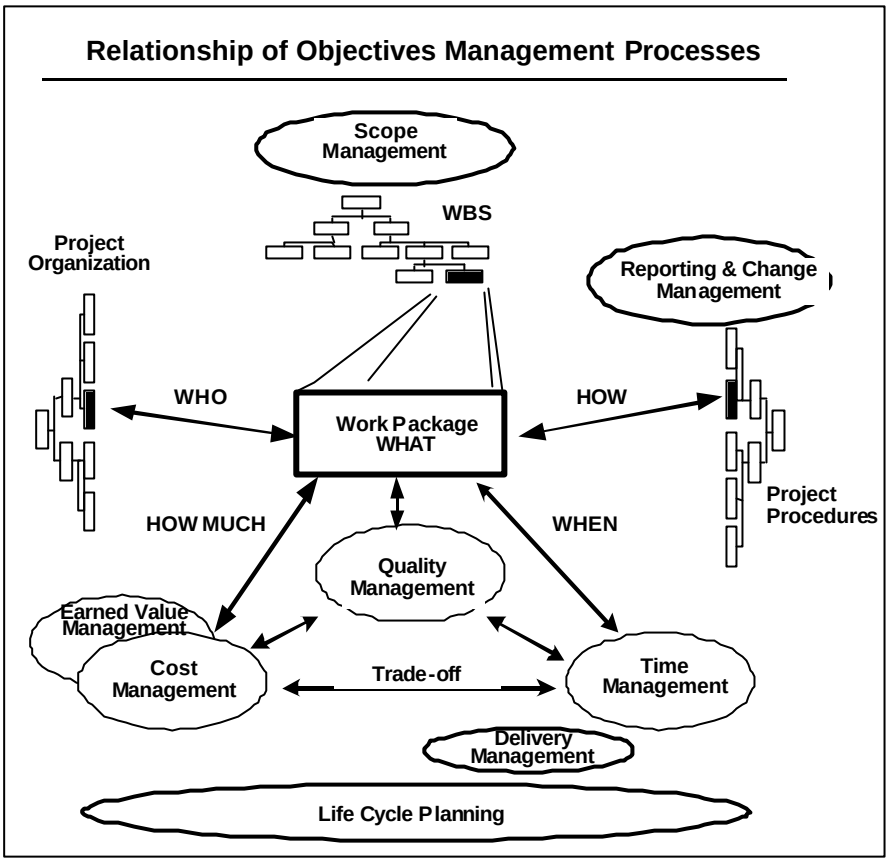
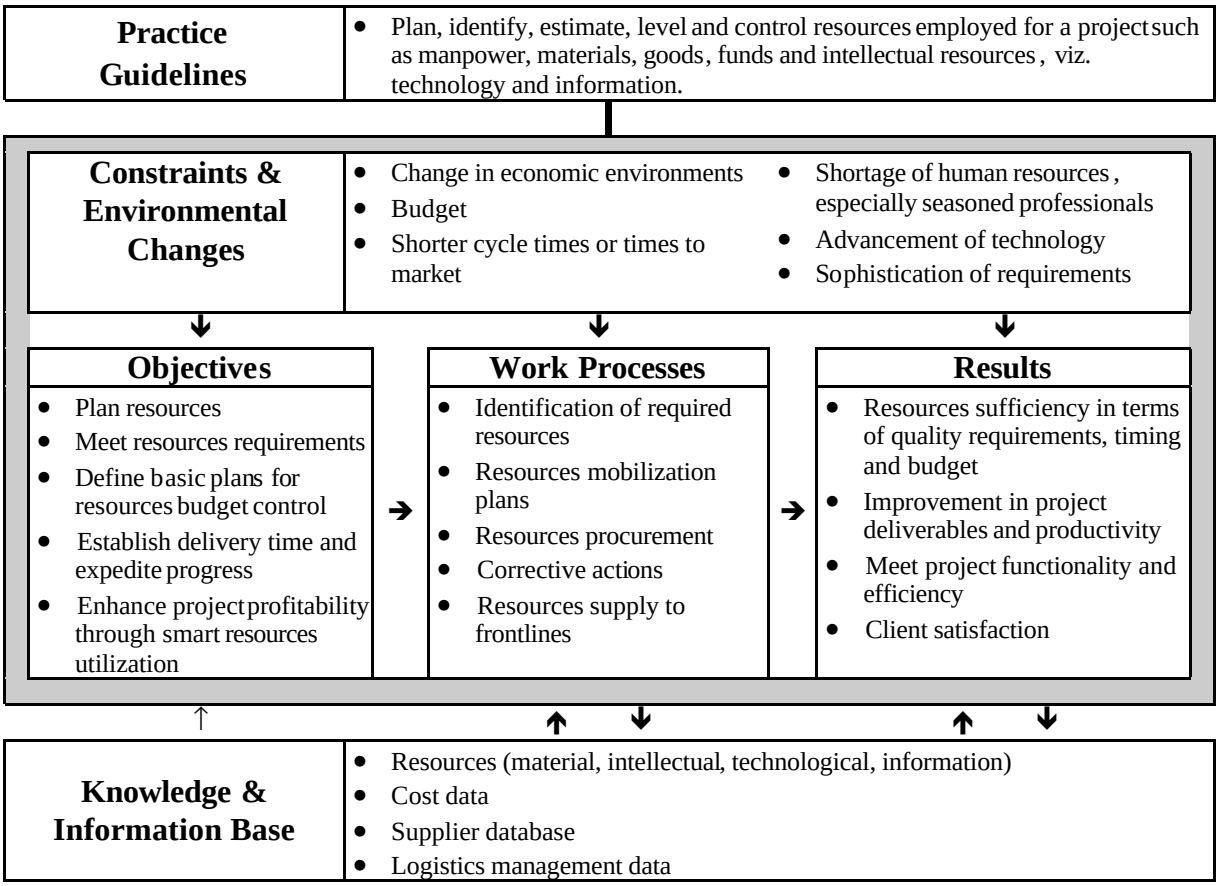


Project reporting and change management deals with reporting for project stakeholders and due diligence regarding change handling, and project delivery management defines turnover (cut-over) processes.

Chapter 6. Project Resources Management

The Project Resources Management is the management process to define the types, quantities and attributes of resources mobilized for a project and indicates how to optimize resources utilization, which greatly affect both efficiency and costs of a project.

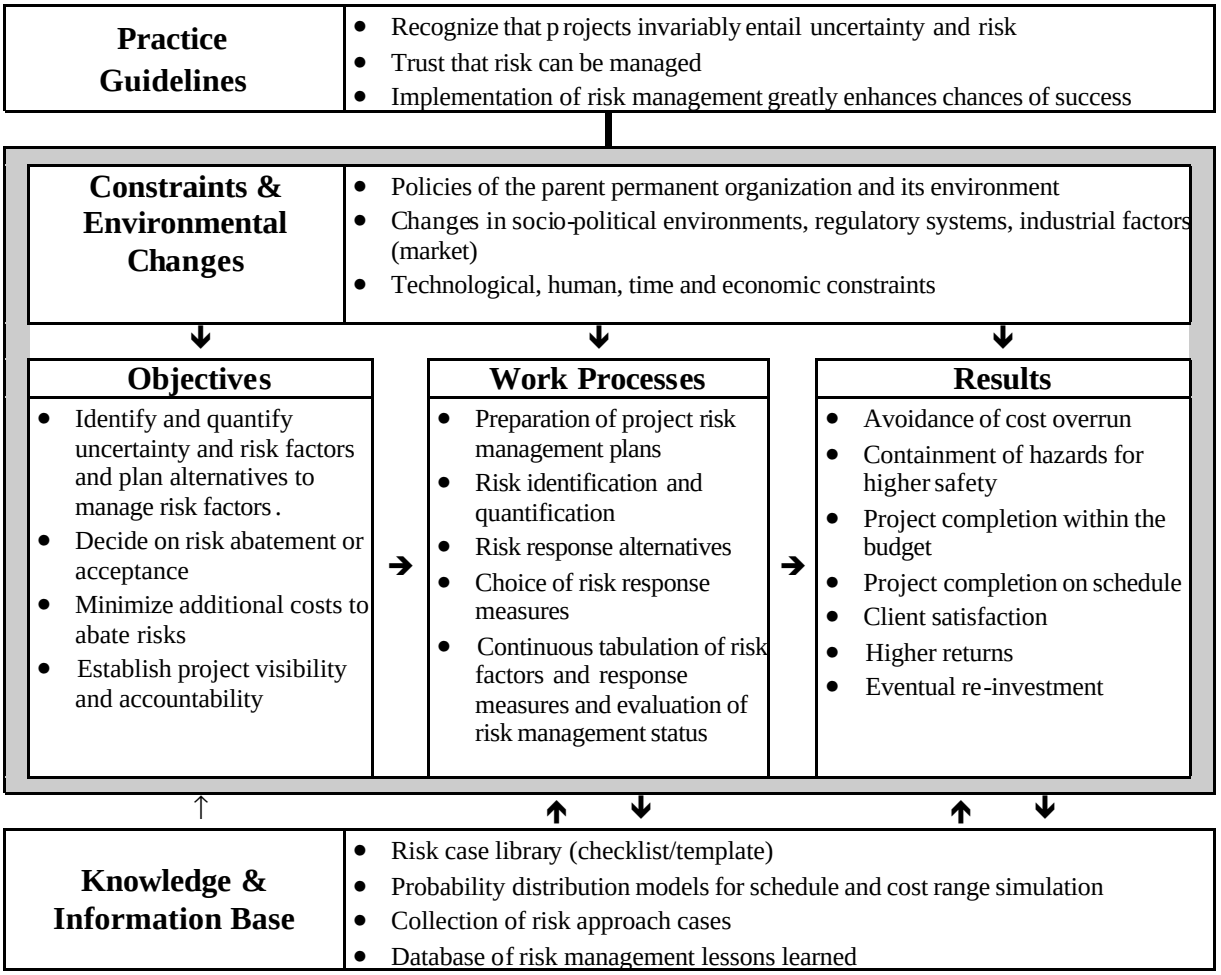


Overview of Project Resources Management

Chapter 7 Project Risk Management

The Project Risk Management is the management process to identify and evaluate project risks from program and project schemes and plans and to devise and initiate most appropriate responses thereto in order to raise project visibility.

Projects invariably involve uncertainty and risk, and without proper proactive measures, projects cannot attain success. It is important to consider that risk can be managed to a certain extent. In societies where fixed-price contracts prevail, as in Japan, risk management consciousness may be diluted as cost management responsibility resides with contracting organizations and it may not be mandatory to disclose cost management plans and procedures to other stakeholders, thus losing transparency of project cost status, with the results that intolerable schedule and cost overrun come up in the course of the project all of a sudden. This can happen even in public projects, especially pioneering type projects. Experience shows that proper investment of time for structured risk management greatly improves chances of project success.



Overview of Project Risk Management

Chapter 2, Project Finance Management, describes equitable risk sharing among stakeholders leading to overall lower project risk exposure.

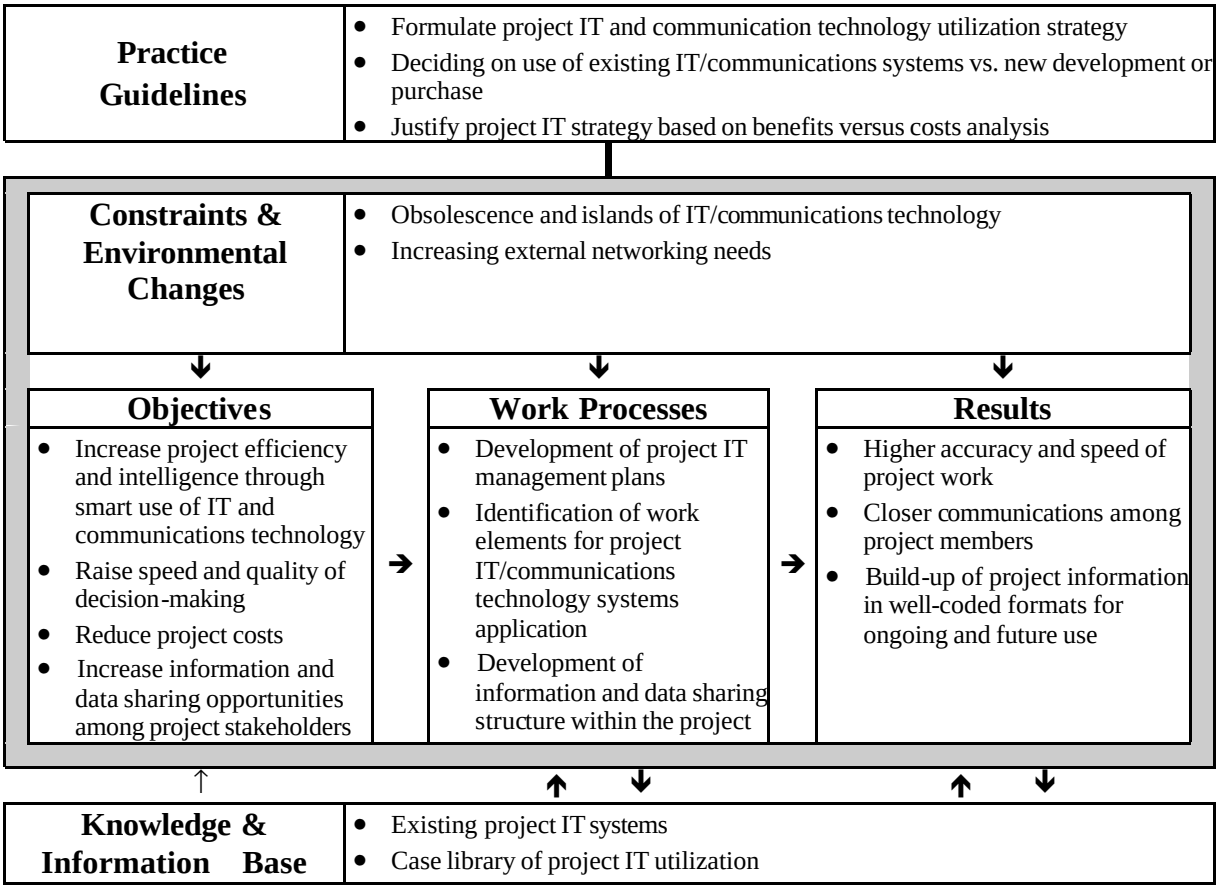
Project Risk Management starts with the development of project risk management plans based on the basic parameters of the project in the project definition document, which is followed by the identification of project risk factors considering uncertainty, lack of confidence and constraints identified from project policy, definition package and project execution plans. The next step is to quantify risk factors by a variety of methods such as risk probability percentage times evaluated monetary value if the risk in question occurred and to formulate most appropriate methods to respond to the respective risk factors, such as risk hedging by contracting, design-around, detouring, acceptance and funded contingency allowance, etc. Risk management is a continuous process throughout the life of the project. Also, data and lessons learned should be analyzed and filed for ongoing utilization.

Chapter 8. Project Information Technology Management

Many of recent projects are characterized by challenging, sometimes creative, and complex missions such as environmental conservation programs, the development of innovative business models enabling global competitiveness and face shorter cycle time pressures to produce products or results. This requires not only speedy project execution within a project organization, but also demands ready tapping to intelligence or information on technologies, economy, industry, and managerial issues available externally, which facilitates quick decision-making.

Information technology (IT) has proven to be a powerful tool to create such environment that responds to these requirements. IT management should be tailored for project operations and should be addressed separately from corporate information resources management (IRM).

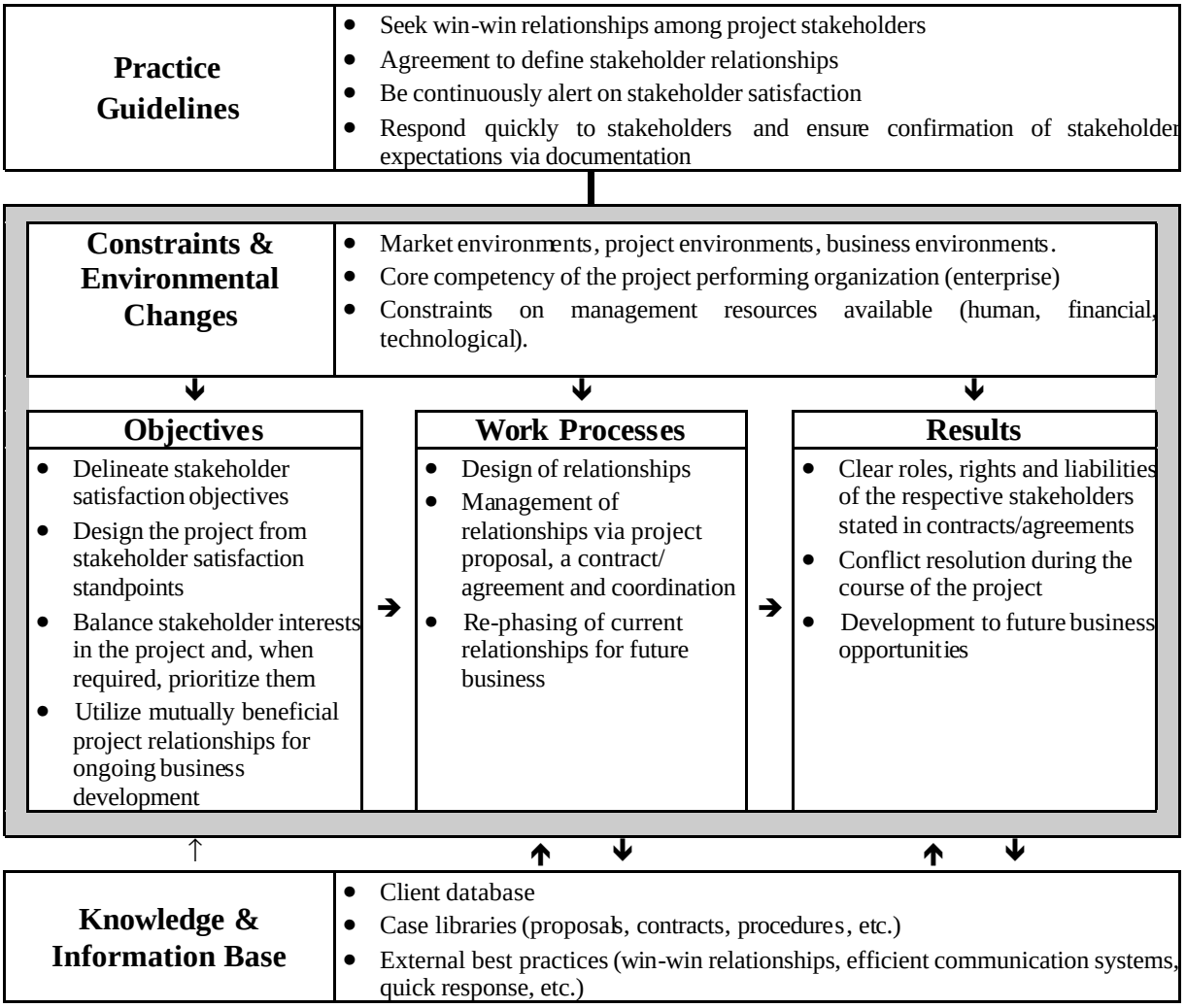
Project information management has the following structure.



Overview of Project Information Management

Chapter 9. Project Relationships Management

The Project Relationships Management refers to a series of processes that define the relationships among project stakeholders and maintain those relationship as trustworthy and efficient, a vital factor for project success. Its objectives is to design stakeholder relationships, especially that between the project owner and implementing organization, most conducive to project delivery with client satisfaction and to the ongoing relationship. A basic policy underlining the project relationships is the win-win structure.



Overview of Project Relationships Management

The Project Relationships Management consists of three phases, viz., **relationships planning, relations management and relationships re-phasing**.

Relationships planning reviews and defines what stakeholders will be involved in the project and in what terms. For instance, in a project of constructing a building, a landowner, aproposed owner, tenants, neighborhood residents, an architect's office, a contractor(s), and banks are most likely to participate in or be affected by the project. They are classified as stakeholders and the process of defining a manner to associate with them is called the design of relationships.

With the defined relationships, project relationships management is such that the project manager and project team members pay utmost practicable attention, in executing the project, not to cause conflicts among the stakeholders but in cases where a friction occurs, the project manger must solve the problem on the ground of contractual terms or from the shared ultimate objectives of the project.

A certain set of project specific relationships are, in themselves, of a temporary nature. However, organizations participating in projects are going-concerns and have high chances of associating with each other on future businesses; for instance, the contractor tries to secure next building projects and maintenance contracts for the building put in service. Thus, the set of relationships, especially those with good results, is repeated on other projects, or evolves with necessary modifications to fit given changes. Accordingly, in actual business, the relationship designed for a project is applied to the same type of

projects repeatedly, or continues by undergoing changes and restructuring according to business environments. This process is called re-phasing of relationships.

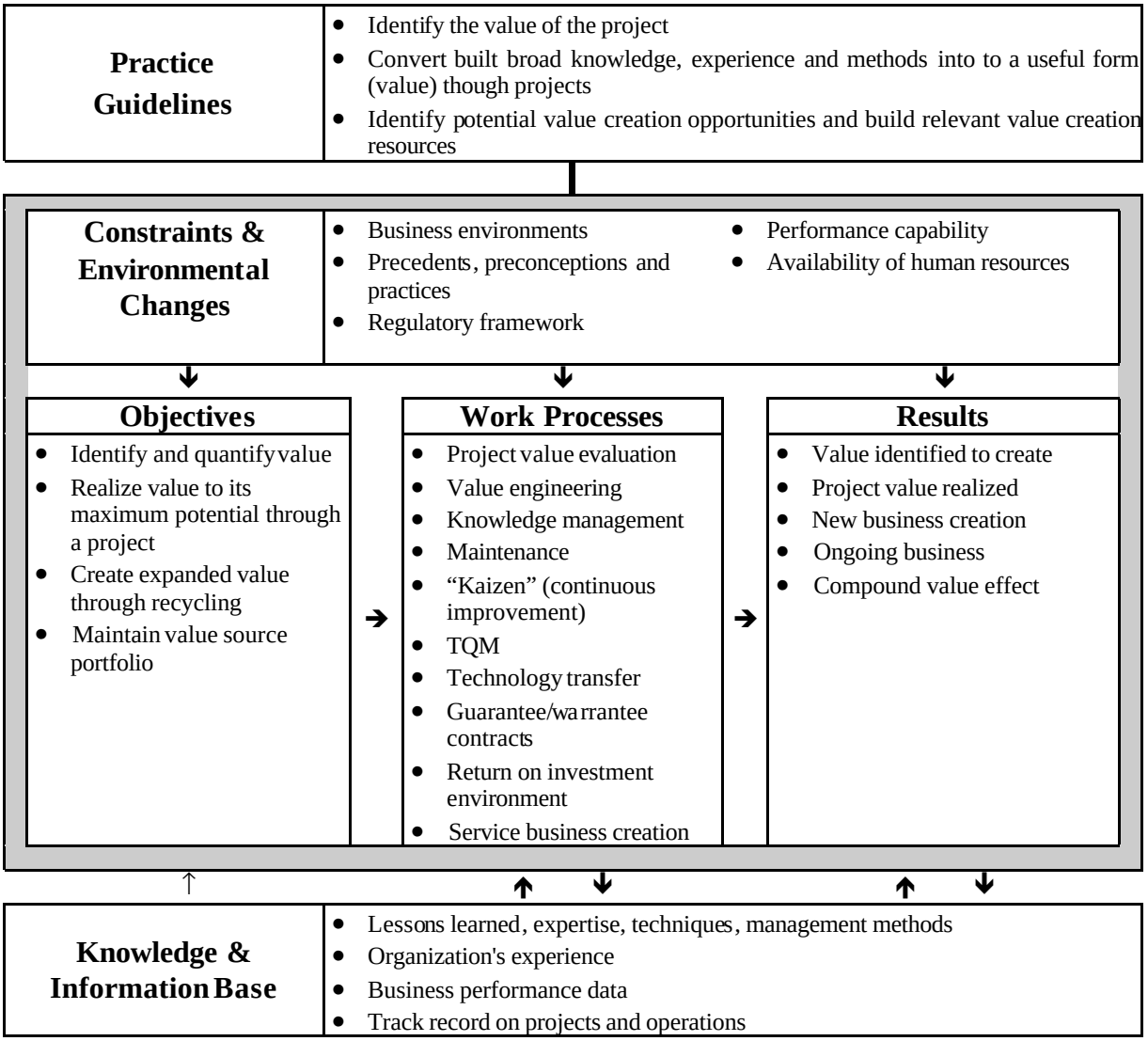
Results of this management are agreement on the roles, rights and liabilities of stakeholder parties stated in contracts, resolution of conflicts and fostering team spirit leading to project success and further, to future business partnerships.

Chapter 10. Project Value Management

P2M places great emphasis on value creation through projects defining that projects are value-creating undertakings. Project missions should be stated to realize values to project stakeholders. As such, project success means having realized the value stated in the project mission. Value created through projects cannot be best deployed if the utilization of project product is not effectively realized through "extended" project management called the service model of program management discussed in Part 3 of this P2M.

The Project Value Management is a cyclic management process of **value identification and evaluation, recognition of value sources** and **value feed-forward** and, in a broad definition, is to build sources of value such as knowledge, intellectual property, know-how residing in a portfolio of technical or managerial expertise acquired through business and project operations and feed forward such values to ongoing project activities.

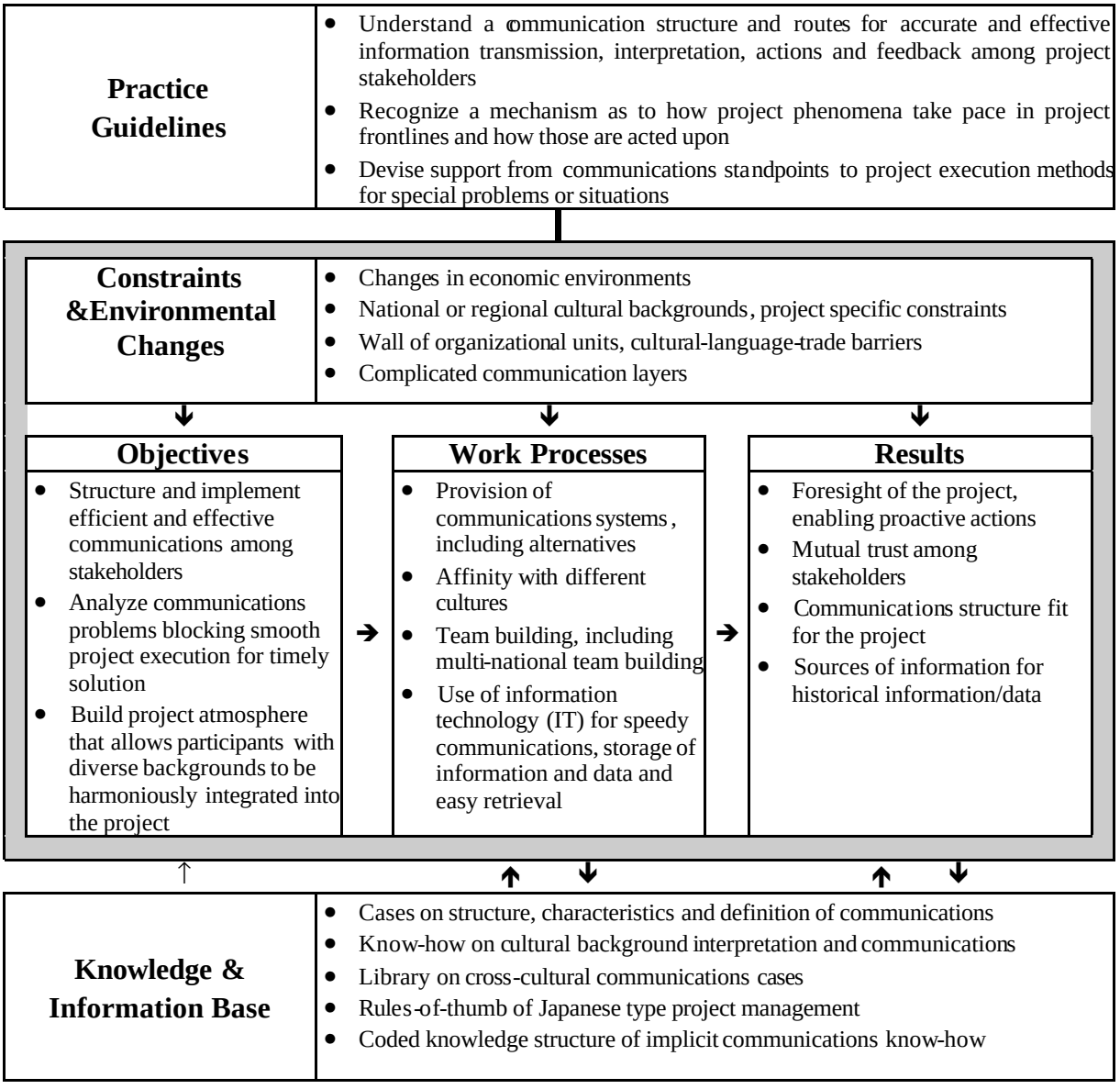
For any enterprise to create new value through a project thereby expanding, or at least maintaining, its business base, an enterprise should analyze the core of what a project sponsor or a project owner desires to achieve from a project (the project value); interpret sponsor requirements into a project mission coupled with quantified project objectives (value statement); profile an optimum project implementation scheme by combining best available in-house technology, expertise, information and data, and when warranted outsourcing part of resources requited (value realization scheme); implement the project execution plans by a proper combination of the frame elements of project management (value delivery); and feed forward thus acquired value to the ongoing operation of project product and supply it to future projects (value-feedback).



Overview of Value Management

Chapter 11. Project Communications Management

The 21st century, the century of globalization and diversity, makes such projects a way of life in which professionals with diverse nationalities, cultural backgrounds, and value systems work together for a program or project. The Project Communications Management is the process to glue together those borderless professionals and its proper use or otherwise can influence project success. Project communications management plays a vital role in predicting problems occurring in the project and helps project management trigger measures against problems proactively. The communication management here deals also with cross-cultural communications in addition to fundamentals of project communications management.



Overview of Project Communications Management

Project Management Professionals Certification Center (PMCC)
URL: http://www.pmcc.or.jp/