

Training for Project Management

Volume 1: Skills and Principles

Second Edition

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GOWER

Introduction

GUIDING PRINCIPLES

Not so long ago it would have seemed extraordinary that the very concept of work could come under such close scrutiny. It is perhaps a healthy sign that, at the change of the millennium, we are beginning to ask ourselves fundamental questions about the purpose of our lives and our relationship with the community, the family, the organization and the state. Work is no longer seen as being the unique province of the 'organization'.

This may seem like a strange way of introducing a collection of material which is designed to help people to develop their project management skills. And yet so much attention has been focused by management writers on the 'organization' over the past 50 years that the world of individuals and teams has tended to be overlooked. Suddenly there is a surge of interest in group dynamics and individual psychology, and their consequent impact on the workplace.

Managing by projects is about how people work and interact when they set out to create something new. Put simplistically, there are basically two types of work: work which is done repetitively, such as operating a production plant or maintaining assets and equipment; and work which is new, such as creating a new product or process, or providing a service to a new customer. There are many shades of grey in between, but the guiding maxim in each instance is quite different. Repetitive work seeks to minimize the variance between one unit and the next in order to achieve an assured level of quality. New work seeks to replace what existed before with something better and cheaper.

Not surprisingly, new work has become the fixation of our times. The realities of the world economy have limited the number of strategic choices available for the developed countries. It is almost a cliché to say that, in a world where new knowledge can be transmitted across the globe almost instantaneously, we need the ability to react rapidly to change. More than this, the challenge for our educated and expensive economies is to lead from the front. Competitive advantage is maintained by the rapid improvement of products, processes and skills to compensate for cost advantages enjoyed elsewhere. We need to remain pioneers and catalysts of change.

Most management literature implicitly addresses the question of 'competitiveness' – that is, survival – in the new world of work. Unfortunately there is a contradiction between the imperative necessity of competitiveness, which implies holding on to unique skills and resources, and the desperate need for the propagation of skills from the haves to the have-nots. These factors – the spread of information and knowledge, and the pressure to share skills and wisdom – increase the importance of learning.

What seems to matter is the *rate* at which we can convert the information into a usable form, like a chess player detecting the best sequence of moves from a million possibilities. Surely we are seeing a convergence of business and learning? The project – personal or organizational – sits at this point of convergence. A project can both generate new knowledge and convert knowledge into practice, because projects provide a way of organizing and structuring the development process. The structure and the technique are not only helpful for productivity; they are also mentally reassuring. Even as we are asked to modify our way of being, we can refer to familiar methods and thinking processes.

This volume contains exercises and activities which stimulate learning about managing projects. They are intended to not only make the learning more fun and more interesting, but also to speed up the learning process and help the participants to become better at learning. Above all, if the participants become better at learning, they will become better at projects.

The material is designed for shared learning in groups guided by a trainer. As far as possible, many of the exercises and activities are based on the principle of experiential or discovery learning. In these cases, the trainer's role is therefore more that of an animator, a facilitator, a coach or a catalyst, than a teacher in the classical sense. The implication is that learning is a shared experience between the participants and the facilitator. Thus the learning environment becomes a *Spielraum* – that is, a place for discovery and experimentation.

THE CHALLENGE OF PROJECT MANAGEMENT

The need for project management

For many people, project management still conjures up images of large-scale investments and huge quantities of resources. Many of the control techniques were developed in order to handle size, complexity and large quantities of information. These days, even small projects can be horribly complex. Integrated technology, team diversity and accelerated development cycles have raised the stakes. Whether it is to be incremental change, as with continuous improvement, or radical change, as with new product development and business process engineering, there is a need for more coordination and communication.

In a recent survey of management concepts in a European country, 78 per cent of senior managers cited management by projects as being of major importance to their current situation and 70 per cent believed the acquisition of project management tools and techniques to be one of their

main priorities. This placed management by projects firmly at the top of the list of current management preoccupations.

Unfortunately, knowing all the tools and techniques does not seem to provide all the answers. Projects continue to go over budget, miss their deadlines and disappoint their customers – usually due to some misunderstanding which was never clarified or detail which was overlooked. In other words, the right decision at the right time never happened.

Managing the project team

The project manager must get things done without controlling all the assets. This is a leadership role. The best project managers often behave like entrepreneurs, chasing opportunities, building alliances and continually refocusing on the big picture. Decisions can and should be made quickly, but this means summarizing data from a bewildering variety of sources. This organic complexity cannot simply be ordered hierarchically and vertically, cut and dried, but is multi-dimensional, fluid and subject to frequent redefinition.

Working in a project team

Project teams are responsive to customers and contracts. Their prime aim is job accomplishment. The challenge of meeting the objectives can bind people together. But, project teams are also multi-disciplined and transient. Everyone has their own set of priorities and there is an absence of rank. This multi-disciplined project-oriented way of working is loose and flexible in comparison with a traditional hierarchical form. It can seem messy. The most important nuggets of information are often ill-defined and haphazard.

Project interrelationships are dense

As timescales are compressed, the interrelationships and interconnections become much more dense. The logic of parallel processing of information and concurrent engineering implies more frequent interfacing at a more detailed level. Traditional sequential step-by-step planning cannot address this web of collaborative teamworking. Nevertheless, team members still need to know where they fit into the project and at what moment their contribution will be required. In a multi-project environment, resources should be allocated according to strategic priorities. This can mean slowing or even stopping one project to speed up or finish another. Effort must be concentrated on value-adding activities. In other words, the effort needs to be synchronized, and this requires a common language, common terms of reference and consistency.

Understanding the priorities

Unless everyone understands the business needs – what? who? when? how? how much? and, above all, why? – it will be difficult to define the project, and it could even lead to the delivery of a project which nobody wants. Benefits should be defined at the outset and quantified, so that measured trade-offs can be effected between cost, time and product further into the project. Risk analysis entails weighing up alternative scenarios, evaluating

the probability and gravity of negative outcomes and taking up-front decisions to maximize the chances of success.

Getting commitment to the project

Ultimately, it is people who determine the success or failure of a project – fully committed, fully trained, switched-on and signed-up people – anything less and the project will be carrying surplus weight. The commitment should be top-down from the project sponsors to the team and bottom-up from the team to its management. Trust is essential. Without trust there is no communication and without communication project control mechanisms will only fail. For trust to exist, responsibility must be aligned with authority and authority must be aligned with accountability. The best project team is not simply a collection of the most gifted individuals, as many would imagine, but a subtle blend of skills and psychology.

Planning the project

Well-defined methods and standards, which enable the project to be controlled against the agreed plans, are essential from the start. The best controls are the simplest. Team members need to know their inputs, their tasks and their outputs. They must believe in the procedures and be willing and able to put them into practice. Plans must be as visible as possible. It is more important to have clear and concise summary information than reams of data. Project estimates, by definition, can never be totally precise, and it is sometimes better to receive imprecise information on time than precise, but tardy, information.

Controlling the project

The focus should be on critical items and anticipated problems. The emphasis should be forward-looking. However, forecasting depends on measuring current progress. And work done is not the same as money spent, effort expended or time passed. Completed work means knowledge gained expressed in a document, a module finished or the successful execution of tests. Reviews should be both regular and related to project progress. They provide an opportunity to generate feedback, ask questions and listen. Problems should be brought out into the open, while there is still time to take corrective action. Different scenarios should be evaluated, explored and simulated. Fresh courses of action may need to be negotiated and their consequences recorded and monitored.

Mastering the project

The project manager must master the inherent complexity, sift the data and try to find the cutting edge – the key indicators which supply the best overall viewpoint on the unfolding project. If every possible technique was implemented, the project would sink under its own weight. Therefore, the project manager must have an instinct for the essential.

The project manager must be a decision-maker, someone who is prepared to measure the risk and to act, someone who has an intuitive understanding for

the client's needs and who accepts full responsibility for the success or failure of the project. Each project manager will forge their own style best adapted to the circumstances, and this management style may well have to evolve as the project moves through the phases of definition, execution and finalization.

A SHORT HISTORY OF PROJECT MANAGEMENT

In ancient times

Project management goes a long way back – at least all the way back to antiquity. The engineers of the great civilizations built the Seven Wonders of the World. The Chinese and the Egyptians embarked upon projects of stupendous ambition. Even earlier, wondrous water transportation systems were constructed throughout the Indus valley and Sumeria. The emperors and the kings of the time must have known that the projects were feasible and could be completed, or they would not have started in the first place. We know that the constructors of the pyramids and the Great Wall were aware of the duration of the effort and the number of slaves necessary to get the jobs done.

The first project manager to face up to the consequences of a failure of management technique was the Roman, Atticus. The aqueduct that he built was twice as expensive as he had promised. As a consequence, he offered to pay the difference out of his own pocket. It was a generous gesture which most modern project managers would be keen to avoid.

In the Middle Ages

The communities that commissioned the medieval cathedrals found another solution to their penury. If the town ran out of funds for the projects, they would find a way of raising the extra cash by displaying their relics. This could often delay the project by a century or so. Nevertheless, the project would still satisfy its objectives so long as the spire rose higher than the spire of the cathedral in the neighbouring town.

Many of the techniques used on the medieval cathedrals would prove an inspiration to us today. Each skilled artisan would act as a mentor to the young journeyman apprentices in his workshop – stone masons, carpenters, glass-workers, builders, cutters and carvers. When the project needed a talented architect, a project leaflet would be produced. With some luck this would attract the most brilliant individual available in Europe, who would be required to instruct the local people in his art.

The Industrial Revolution

The Industrial Revolution was the time of the great engineers. In the new urban factories, skilled engineers won jobbing contracts and would intervene at a negotiated daily rate with their own team. The Industrial Revolution also gave rise to the first buccaneering international companies. These proved that colossal sums of money could be made from administration and commerce. The project became the means to an end. Speed of execution, performance and cost were critical success criteria. Meanwhile, the railway

constructors learned all about the virtues of standards when they were initially unable to agree on a standard width for their track.

Scientific management

So long as industrial companies only produced one product, management methods could remain crude and unsophisticated. The primary model was the farmer and the serf. The birth of the conglomerate such as Du Pont, as well as complex production processes such as that for steel, made management techniques a necessity. 'Scientific management' was the term coined by F.W. Taylor to describe his formula for rationalizing the work process into discrete steps which could be timed and optimized. Taylor's only aim was to improve the work process by making workers more efficient, but his methods have now largely been discredited. Elton Mayo in the Hawthorne experiments redressed the balance between scientific management and people management by demonstrating that people improve their performance whenever they perceive that someone has taken an interest in their well-being.

Military pressures

Two world wars put the emphasis on rational logistics techniques for organizing men and resources. Operational research techniques such as linear programming, probabilistic analysis, forecasting, stock control, queuing theory and programme evaluation and review technique (PERT) were given an impulse by the problems encountered in war. The standard organizational model was now military, with hierarchical chains of command and a scientific and mechanistic approach to problem solving. This model then came to dominate our organizational assumptions for a number of years and sidelined the human relations strand of management thinking. Furthermore, the contrast between the complexity of the new multinationals and conglomerates and the lack of communication and resources for information processing limited the available organizational options.

The rise and fall of PERT

One of the techniques that seemed to offer enormous scope for the management of complexity was an operational research technique which had been further developed at Stanford University and was known as PERT analysis. One of the first and most famous projects to use this technique was the USA's Polaris submarine project in the 1950s. More than 60,000 activities were drawn up and displayed on charts all around the walls of the project offices. Not surprisingly, the technique proved to be almost useless for managing the project. Nevertheless, the project was an outstanding success, and the project team gained a reputation for absolute professionalism: they were using the latest scientific techniques. The PERT network served as a screen between the impenetrable expertise of the navy team and the 'meddling' outsiders from other branches of the armed services.

PERT was also introduced into pioneering companies like Bechtel and Fluor Daniels in the engineering and construction industry and also in other defence industry projects, although not always with the greatest of success.

Following claims that the method was too complex, it was simplified (by dropping probabilistic analysis). By now, several versions of the PERT model had evolved – the arrow diagram method was one, the precedence (or potential) diagram method was another. Problems were blamed on projects using the wrong method. Computers would churn away for hours during the night only to produce strange-looking results and columns of zeros. Clients noticed that projects were still going over budget and taking too long.

Cost/schedule control system (C/SCS)

During the 1960s there were several significant events. The Apollo space programme proved that outstanding results could be achieved given the right combination of skills, resources and leadership. A missile development at the Martin Corporation proved that a project could even be completed within budget provided that cost was imperative. The US Department of Defense designed C/SCS to replace PERT/Cost. Previous management specifications required that costs be linked directly to the resources on the PERT activities. This was universally rejected. C/SCS recommended that cost be managed at a higher level (cost account or work package) and left the contractor the freedom to plan the tasks. Meanwhile, the French and the British received a shock when they discovered that their governments were unable to keep the costs of Concorde under control.

The dedicated project management system

The 1970s saw a boom in military investment, in construction and nuclear projects and in the Middle East, as well as the rise of the offshore oil industry in the North Sea. Experience had shown that major projects could be hugely expensive and were extremely difficult to manage within time and cost. There was a desperate need for effective automated project management, and batch processing on large mainframe systems was not providing a satisfactory answer. Then the mini-computer appeared, together with mini-computer-based software packages which promised to integrate cost and schedule. Now, budgets, timesheets, document registers, materials and equipment could all be linked to the schedule and managed interactively. Not only was the computer dedicated to the project, there was also a project control department entirely dedicated to running the computer.

Increasing sophistication of project management techniques

During the early 1980s project management information and computer-aided design systems became the vehicle for an increase in the sophistication of project management techniques. It became customary to manage 'the triad' of cost, time and quality. Quality management became a major concern for organizations. Project management acknowledged that activities exist to produce output and meet technical goals as well as cost and schedule objectives.

Normalized management specifications laid down in considerable detail the recommended path to follow when managing a mega-project. Of course, these methods were not always suitable for managing smaller projects. When micro-computer planning packages became available, many companies jumped at the opportunity to keep things simple.

Desktop planning systems

Suddenly it became fashionable to run projects on a personal computer (PC), even if this reduced the number of data elements that could be intimately linked in one system. PC planning systems made it possible to automate small projects and produce project schedules at the level of a team of six or seven people. Project management rediscovered that in every project, even large ones, people are not merely resources on activities, but also communicate, work in teams, negotiate, handle conflicts and even become autonomous and self-motivated.

Team leadership and empowerment

At the beginning of the 1990s project management methods were simplified and increasingly customized to take account of not only the human aspect, but also the spread of project management techniques into all corners of industry, especially banks, pharmaceutical companies and consumer products. Team leadership and motivational skills were being freely discussed in project management circles. Organization structures became flatter and were increasingly built around projects and business processes. Most organizations had plans to upgrade a computer environment consisting of isolated disconnected PCs to a fully networked, organically linked web of computers capable of supporting creative constructive communication.

Networked project management

As companies move to network-based computer systems, they are discovering a need for evolution in their organizational 'culture'. There are four reasons for this. First, the project or business process extends well beyond the organization's boundaries. Second, no one can pin down exactly where decisions are made, or should be made, when the competitive situation is changing every hour of every day. Third, there is so much potential for cycling information around the company and gathering information from all kinds of sources that no one can quite decide how it should be circulated, or even how it could be used. Fourth, no one is quite sure how, or where, or with whom company know-how should be stored for use in the future. New digital technologies appear to offer the tantalizing prospect of a working environment where time and place ceases to be a constraint and where learning is a freely available commodity. Project management may or may not provide all the answers to these questions.

THE NATURE OF PROJECT MANAGEMENT

Projects are about managing change

'In calm seas, all ships alike showed mastery in floating.'

William Shakespeare

Project management is a way of structuring and organizing the process of change. A project always introduces something new to the world – for example, a product, a process or new behaviour.

Methodologies concentrate on the definition of the project scope – what is inside the project and what is outside. Projects begin with the end in mind. There must be a statement of objectives with priorities, required delivery dates and prices. This is reflected in a work breakdown structure with expected deliverables. When the work has been planned and costed, the project baseline plan, budget and specification are agreed and communicated, so that everyone on the project can commit to the time, cost and quality targets. The baseline can be modified to reflect changes, but it is always a representation of the planned path to the intended result. Any variance between the baseline and the actual performance can be used to forecast the most probable final outcome and compare this with the desired result.

Projects are about learning

'Could everything be done twice, everything would be done better.'

German proverb

At the end of the project we have the knowledge and wisdom that we sought to possess at the beginning. The new learning can be radical or incremental. It can be operational or strategic. It must, however, be shared amongst the participants through communication.

Projects require information channels and signals to capture knowledge and circulate the status of activities and outputs. Electronic systems and computers significantly increase the quantity and the complexity of the information that can be handled – but this is not all. The partners in the project need to spin a fine web of intelligence-gathering activities both inside and outside their usual domain. Useful past experience must be recycled and new ground explored as soon as possible in order to weigh up the risks and opportunities. The project is usually preceded by a study of the existing situation – a feasibility study, a business study, a concept study, a market research study or a contextual study, or all of these – in order to maximize the chances of success. This is one of the most important stages in a project. It determines what is already known, what remains to be learned and how easily, quickly and cheaply the remaining knowledge can be acquired.

Projects are about uncertainty

'I have never seen a plan survive the first five minutes of battle.'

Carl von Clausewitz

By planning ahead, by anticipating problems and opportunities, and by structuring future work into discrete parcels of work with clear, measurable objectives, people and organizations reduce risk.

All things on a project are liable to change. Risk analysis is a way of intelligently predicting what may or may not happen under different circumstances. This is a lateral-thinking process which rejects the assumption that everything will turn out for the best in the best of all worlds. Any situation, however serious, which can be anticipated can be addressed in a contingency plan. Moreover, project organizations need to be structured in such a way that they can react quickly, if necessary mobilizing and redirecting resources at short notice.

Projects are about flexibility

'All things are ready, if our minds be so.'

William Shakespeare

The point of 'time-based competition', competitive agility and 'lean development' is that the fastest companies are able to react more quickly to their customers' evolving needs.

Flexibility requires a willingness to accept ambiguity and take each decision at precisely that moment when it is most needed. If a project takes too long, it defeats its own purpose. A project which is executed quickly and efficiently increases its sponsor's ability to manage in a volatile environment; there are more opportunities to make decisions. Project management methodologies also recommend that clear and frequent milestones be defined. These project milestones make progress visible. They often occur where there is an interface between different parties and they allow decisions to be made. In most cases, the milestone will produce output that can be measured and delivered to the owner.

Projects are about teamwork

'If everyone is moving forward together, then success takes care of itself.'

Henry Ford

A project is usually considered to be a collaborative simultaneous effort. Above all, even on a small scale, it is about blending complementary, (multi-disciplinary) skills. These skills can be best exercised in a 'transversal' or 'horizontal' style of organization.

There is a tremendous awareness of the value of teamwork. There are also far too many psychological dimensions to be covered by any one methodology. Concurrent engineering recognizes the need to bring together people from different technical backgrounds. The reporting mechanisms, which are generally defined either within the context of the project schedule, or else in the communication or quality plan for example, exist to keep all parties informed. Transparency and openness nurture the trust which is a prerequisite of good teamwork and a good understanding with the client.

Projects are about investments

'We cannot adjust the wind, but we can adjust the sails.'

Anon

People and organizations invest time and money in projects. All resources on a project are in competition with alternative uses for those resources. This means that investment must be continuously assessed against other priorities – not just at the beginning and end of the project.

As each project represents a significant investment in time and energy for the project's sponsors, the return on investment needs to be continuously assessed. This translates into a need to measure the efficiency of each project's use of resources during its life cycle. There are always many rival investment opportunities that, at any moment, might require a reassessment of priorities. Project portfolio management techniques provide managers with a tool for weighing up the strategic value of each project, both in the short and long term.

Project objectives should be very clear; therefore it is possible to measure the value of the output compared to the cost of the effort that is being used to produce that output. Resource scheduling and cost management techniques aim to keep a track not only of what is spent and what is planned, but also of what is completed. Project management methods require that the information concerning work accomplishment be made available to the project's managers. Management controls the resources allocated to the project, but this control is not always delegated to the project's managers and the project's managers therefore cannot be held fully responsible for the results.

Projects are about satisfying needs

'Every unsatisfied need is a new opportunity.'

The aim of a project is usually to introduce something new which the world wants. The desired result can be measured and progressively achieved, within the quality process.

Functional analysis and value analysis are techniques that are built on a detailed and thorough evaluation of a complex requirement. The object of functional analysis is to identify every dimension of the requirement and assess the relative weight of each dimension within the composite requirement. Value analysis aims to attach a value to each dimension so that value engineering can ensure that the costs incurred are proportional to value obtained. In the final analysis, successful developers often seem to have an intuitive feel for the market and an understanding for the needs of the times.

Projects are about focus and commitment

'The ability to block out the unnecessary puts the goal within reach.'

A project concentrates means and energy in a tightly focused, intense and deliberate effort.

Projects are not about diffuse and random evolution.

Projects are intrinsically motivating. The project organization and rewards system must take into account that people are often prepared to commit huge amounts of time and energy to reach the target. Project methodologies stress the importance of assigning clear responsibility to tasks so that performance can be assessed and rewarded. Configuration management and scope management ensure that the project does not lose sight of the goal.

Projects are about autonomy

'Every year more and more people will be self-employed.'

Charles Handy

A project represents a break with the past. It succeeds by superseding and destroying something which existed before. A project is a new order of things, which can only survive if it is not suffocated by that which exists already.

Projects provide a fabulous opportunity for improvement and renewal. There is no need to carry the baggage of past failures, because each project is a new situation with a new constellation of skills and resources. A high-performing project team will set its own standards, and define its own internal reward systems. For the project to succeed in its own right, the project team must be freed from the constraints of systems and procedures designed for other purposes.

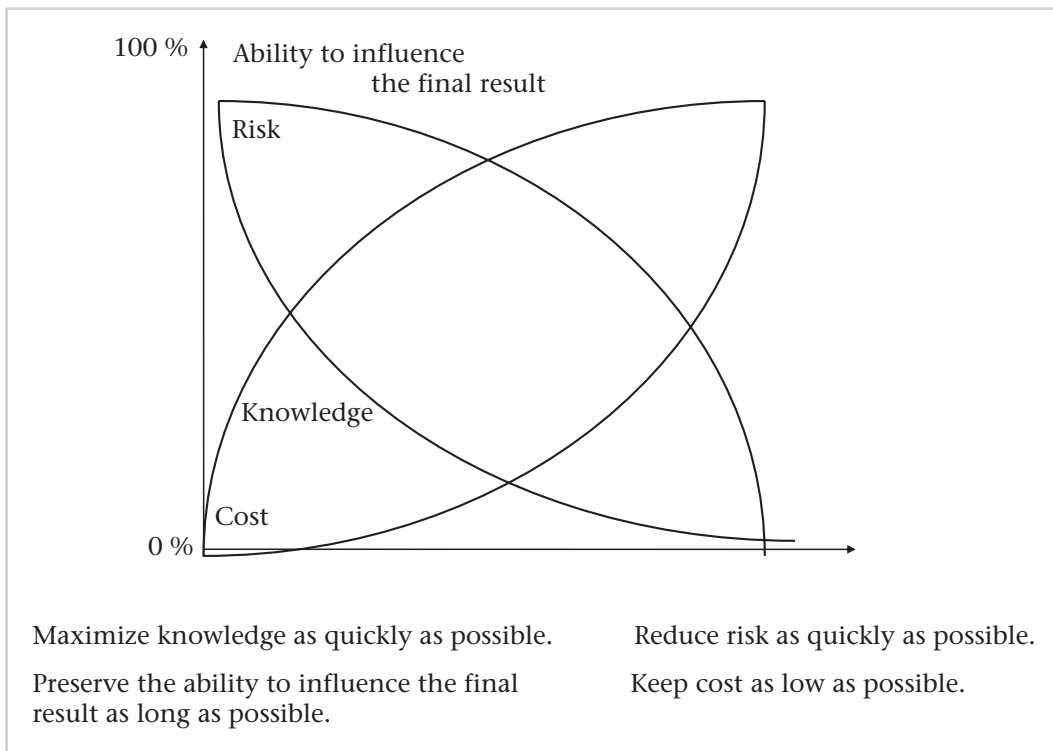
Projects are about transience

'You think you understand the situation, but what you don't understand is that the situation just changed.'

A project is a one-off unique endeavour which relies on a temporary social and behavioural context.

Even where project management methods and systems have already been defined there will inevitably be some readjustment as the project gets underway and progresses. This presents a triple challenge. The new product is being built while, in parallel, the project management methods and culture are being defined. Normalized project management methodologies aim to define some ground rules to ease the strains of project start-up.

The project management challenge can be expressed as shown in the diagram opposite.



APPROACHES TO PROJECT MANAGEMENT

Management, and project management in particular, is a paradox. What works in one instance, produces the opposite result in another situation. For example:

- Companies are constantly told that they should listen to their customers. But a software company which implements all the improvement requests proposed by its increasingly sophisticated customer base may end up producing a product that is too complicated to interest new customers. Furthermore, the successful products of the future have not yet been invented. There is no perceived need and there are not yet customers for these products.
- A large bureaucratic organization wishes to introduce management by projects as a way of galvanizing its staff and injecting them with entrepreneurial spirit. At the same time, a small laboratory, recognizing the need to improve coordination between the members of its young research team, decides to implement proven project management techniques.

Incremental, radical or fundamental research and development projects

In the first example above, designing for existing customers and designing for new customers are quite different things. Nor would the method be the same. In fact this illustrates the difference between an incremental development project and a radical development project. The aim of an incremental project is to improve on an existing product or process. A radical development project seeks to replace the existing product with a completely new product or product range. Beyond this, fundamental research is about imagining products which have never existed, either for the company or for the world.

Strategic and tactical project management requirements

In the second example, the large company has a strategic requirement for project management, which will be an instrument to promote cultural change. As part of the change, people's behaviour and skill sets will evolve. The small laboratory has a tactical and operational requirement for tools, methods and systems. As a result, it hopes to become more efficient and increase its ability to cooperate.

Large or small projects

In general, on large projects there are more participants, more contractors and more levels of reporting. At the apex of the project organization structure there is little direct control over the project's resources. Work packages are defined and are awarded to contractors on a fixed-price basis. Visibility is discontinuous and depends on the milestones and the project review meetings. On a much smaller scale, the team is the project. At this level, a hands-on team leader has day-to-day contact with the team, who can be praised, cajoled, encouraged, coaxed and otherwise directly influenced. Coaching is possible at the micro-level. Visionary leadership or administrative control is the only option at the macro-level.

Creative, problem-solving or operational projects

A creative team requires the freedom to invent, to discover and to explore alternatives. The creative process goes through stages such as preparation, incubation, illumination, verification and application. It requires tenacious and independent thinkers.

A problem-solving team operates in a more structured situation. The team members need to trust each other. The first stage is to thoroughly analyze the existing causes of dissatisfaction. Each potential solution can be evaluated for cost and technical feasibility. The chosen solution addresses many of the dimensions of the problem and is methodically tested and validated before acceptance.

An operational project is almost production management. Examples are plant maintenance and satellite launching. The task takes place frequently enough for tight operational standards to be applied. Clarity of communication, clear lines of reporting and accuracy are of vital importance. The stakes are high, as failure has severe negative consequences. The best example of an operational project is a military operation.

High technology or low technology

High-technology projects put the emphasis on systems or process analysis. Prototyping, testing and quality management techniques set out to ensure that the final deliverables converge with the real business requirement. Low-technology projects are more likely to concentrate on resource management, good productivity and well-managed communications.

Local, national or international projects

Projects which have a wide geographical spread face problems associated with distance and communication. The extra dimension which raises the stakes is the question of different values and cultures. This often obliges the members of a project to confront issues outside their previous experience and go beyond the scope of what is usually required in their working environment.

LEARNING TECHNIQUES

The learning team

A management game has a great deal in common with a project. People learn as a team when they share a common experience. The team accepts the challenge and works together in a context where there is an absence of hierarchy. There is a definite beginning and an end with a clearly defined objective. Above all, everyone should learn something and the activity should be fun.

Should working on projects be fun? One thing is certain. If companies wish to retain their competencies on the inside, then they have to offer more than payment in return for loyalty. The most highly skilled staff are looking for an environment in which they can enhance their knowledge and experience, while at the same time improving their quality of life by enjoying themselves.

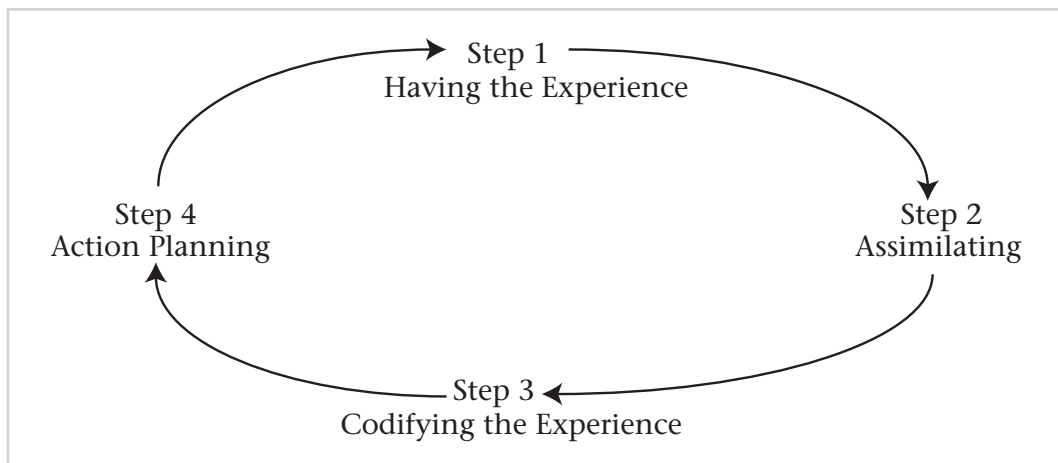
Projects offer a marvellous opportunity to learn because they give rise to a whole series of spontaneous situations which would not necessarily occur under any other circumstance. This is also the intention with these exercises and activities in this volume. People who work on projects are part of the world's population of change agents. But change agents need tools and techniques, as well as charisma, stories and the gift of expression, in order to persuade people of the validity and the legitimacy of change.

Learning from experience

People cannot learn about the changing world just by reading, listening or watching television. Learning is heightened if the experience is powerful and memorable, either positively or negatively. Learning is not a spectator sport. In order to evolve, it is essential to participate fully in the experience. People learn by doing, but in different ways.

Kolb, Fry, Mumford and Honey have described the process of learning from experience thus (see also the diagram overleaf):

- *Activists* learn the most during the first step. They are people who are always seeking action and live for the moment.
- *Reflectors* learn by thinking about the experience. They are quieter people, who need time to reflect and to draw their own conclusions.



- *Theorists* learn when they can give form to the experience. They are cerebral people, who like to structure information into a series of steps, or rules.
- *Pragmatists* learn when things are clear and well-defined. These are the people who look for a clear set of guidelines which they can apply directly on the job.

Learning styles

Any ‘experiential learning’ exercise must take into account the different ways in which people learn. People perceive information in different ways. They have preferences for audio, visual or physical styles of communication:

- *Audio* people learn through oral channels. They are talkative and remember what was discussed.
- *Visual* people learn through seeing. They like to watch and to read, and remember what was seen.
- *Physical* people learn through actions and contact. They have a preference for physical activity and remember what was done.

Although there are tests and techniques which help to detect people’s preferred style of learning (for example, listening to the type of vocabulary that people employ), the important message for a trainer is that these preferences do exist and that a training course should stimulate the audio, visual and physical receptors. For example, an anecdote or a discussion will appeal to the audio people, a diagram or an article to read will appeal to the visual people, and a manual or writing activity will connect with the physical people. The training course should include quality material which is pleasant to listen to, look at and touch.

People also process information in different ways. Some people are more rational in their thinking, and others are more intuitive. This is sometimes termed left-brain and right-brain orientation. At the same time, whilst some prefer to reason in a logical sequential fashion, others are more creative and diffuse. Once again, the trainer should take this into account by proposing exercises which stimulate both kinds of thinking.

Learning steps

Learning can only take place when people's minds are conditioned to accept new information. This is largely a matter of atmosphere, availability and environment. First, people must open their minds and accept that they need to acquire new knowledge. This stage is called *awareness*. A conscious decision must be made: 'I need to learn this.' Hours of training time is often spent merely convincing people that the old knowledge no longer has the same validity and that the new learning is legitimate and necessary. This can be done by exposing people to information in a form which makes it convincing and interesting.

The second stage is *cognitive*. The person actively seeks new information, and this information is explored, structured and formulated to generate new knowledge, a new view of the world. This stage is often facilitated by the teacher, who feeds the information to the learner. However, it is more important to build the desire to learn than to spoonfeed the learner with information.

Once people have started to assimilate the new knowledge, they are in a position to develop their skills. This is the *behavioural* stage when the new knowledge can begin to be applied. However, the learner is still a novice, and the new skills are by no means natural or automatic. The novice requires the freedom to make mistakes and to learn from experience.

The fourth stage is the *performance* stage where the learners have integrated the new skills into their behaviour. The new skills increase the level of performance, the autonomy and speed at which decisions can be taken and the person's confidence. Moving from stage three to stage four can take years of practice.

Learning by projects

Learning through projects presents us with another paradox: although projects are a great way to learn new skills, learning to participate on projects may not be so easy. This is because each project is a one-off experience and therefore, by definition, a new experience. Learning to deal with new experiences presents a special kind of challenge. Also, projects are not repetitive tasks or actions. They can last many weeks or months. Life is too short to gain all the necessary experience.

There are several solutions to this conundrum: one is to offer the opportunity to participate in short-duration projects or workshops which accelerate the acquisition of experience; a second solution is to help people learn from the experience of others by regularly exchanging ideas, discussions and case studies; a third solution is to help people acquire the ability to use their experiences more effectively by improving their ability to learn.

PROJECT META-SKILLS

For various reasons, project management skills have been identified as one of the key management competencies for the twenty-first century. This has

important consequences not only for organizations, but also for individuals and teams:

- *Organizations* must now face up to the 'logic of change'. The fact is that their rate of improvement is the overwhelming factor contributing to their success.
- *Individuals* are now required to assume complete responsibility for their own future. The company can no longer provide a protected environment. Only those who can prove that they can meet a fixed objective, expressed in time, cost and quality, will be guaranteed work.
- *Teams* will perform future work in a collaborative network, not necessarily in the same place or at the same time. Enhanced value will be generated essentially at the points of synergy between complementary skills, which supposes a cross-functional and cross-disciplinary way of working.

Learning tools for developing project management skills must address the needs of these three conditions. If it were possible to define a universal set of competencies for project management, then project management would no longer be the path for seeking significant advantage over one's competitors. It would be a qualified profession replete with coded patterns of knowledge, entrance qualifications and corporate governance.

The professional project management associations have sought to define common sets of skills and a certification programme. Nevertheless, there is no other area which is so driven by case history and experience. And, since each case is unique and each project specific, the project management domain continues to encompass new experience and skills.

More recently, there have been several attempts to define a common set of 'meta-skills' which can help organizations, teams and individuals prepare themselves for projects and equip themselves for their own situation. In the specific context of the first two volumes of this second edition of *Training for Project Management*, a set of the 'meta-skills' have been grouped into the following parts:

Volume 1 – Skills and Principles

- I Project management principles
- II Setting objectives and assessing requirements
- III Creativity and problem solving
- IV Communication, negotiation and coordination
- V Motivation, teamwork and leadership

Volume 2 – Methods and Techniques

- I Value analysis, risk assessment and project optimization
- II Planning and estimating
- III Measuring progress, testing and validation

IV Managing priorities and organizational objectives

V Integrating project management skills

The above skill categories are about as generic as I can make them. Many sub-skills will appear in one or more of the above. The skills matrix (p. 22) shows where these sub-skills can be found among the exercises. The activities and exercise grid (p. 23) groups the exercises according to the meta-skill domain and indicates the nature of each exercise.

It would be possible to map these headings on to approaches such as the PMBOK (Project Management Body of Knowledge), which is the basis for certification of project managers by the Project Management Institute in the USA. In the UK, people may look for elements defined in the PRINCE methodology, (which is especially appropriate for managing administrative and software projects) or in the ISO standards on managing projects; in France for aspects recommended by AFNOR or the Bureau des Normes. In addition there are many proprietary and industry- or institution-specific methodologies. All of these tend to apply to large-scale projects employing many subcontractors.

I believe that the above classification of skills is suitable for a diverse range of projects ranging from, for example, improving the quality control process for the fabrication of a marine pressure cooker, to introducing a new examination marking system in a nation's schools, to decommissioning a space station. In other words, the skills apply equally to the public or private sector, product/process/culture, creation/ improvement/operational, tactical/strategic, large/medium/small, technological/non-technological, local/national/international, land/sea/air/and so on.

HOW TO USE THE ACTIVITIES AND EXERCISES

Nature of the activities and exercises

There are four main types of activities and exercises in this manual:

1. *Group activities* which develop teamworking skills (and only work when carried out in a group). These include 'micro-projects' which are small, intensive, practical tasks designed to create a sensation of working and living in a project on a much accelerated timescale.
2. *Group exercises* which are based on a questionnaire or a discussion where different points of view can be aired and explored. These exercises encourage synergistic and complementary thinking.
3. *Individual or group tasks* addressing one or more of the most well-known project management techniques.
4. *Brain-teasers and thinking exercises* which may be done either in a group or individually and aim to stimulate new ways of thinking about project management issues and techniques.

In line with the times, the collection is biased towards activities and exercises that encourage innovative, but disciplined, thinking patterns. The project manager is presented as an independent-minded, empowered and charismatic person – someone who, focused on a desirable future, manages people and resources to deliver results.

Purpose of the activities and exercises

The activities and exercises are designed for people who wish to develop project management skills and who recognize the need for participative learning instruments. One way of using the manual is as a complement to a training course in managing by projects. This will supply the active and participative element that is often missing from training courses and can make an otherwise interesting subject like project management seem dry and uninspired.

Learning does not just take place on intensive and dedicated training courses. The manual includes many exercises that can be presented in isolation to develop thinking and awareness in a given area, or to explain and promote a methodology. The micro-project activities are particularly effective for team-building and for focusing everyone's minds on the task ahead by giving them a shared experience which can become a metaphor for successful project work.

The manual may also be a useful tool for internal or external consultants who need all the help they can get in championing change, coaching teams and individuals, and guiding organizations towards working by projects. Consultants have an almost inexhaustible requirement for case histories, anecdotes and stimulating stories. This manual condenses accumulated technique and know-how from the project management universe into bite-sized chunks of 'learning-by-thinking', ranging from 30 minutes to 3 hours in duration.

How to make best use of the activities and exercises

The activities and exercises try to cover as much of the project management field as possible. They are entirely modular. There are no cross-references, sequences of exercises or indispensable overhead slides. Many of the exercises and activities will stimulate ideas for new exercises. It is assumed that users of the activities and exercises will understand the project management principles before using the material.

Project management instructors must practise what they preach, and, for this reason, there are exercises which help to discern learning requirements and objectives. This is especially important in a field of activity which is host to such a vast body of varied knowledge and experience.

Likewise, at the end of a course, some idea of performance can be obtained by using exercises which encourage the participants to review their learning and confirm their understanding of the main learning messages.

When constructing a course, the overall theme must be developed in line with the requirements of the situation. The activities and exercises can

be fitted in accordingly. This is better than building a course around the available material. It is quite acceptable, and even desirable, to change the learning method so long as the guiding objectives are maintained. It is not acceptable to go completely off-track only to discover an area where there are lots of interesting activities and exercises.

Considerable effort has been made to strike a balance in the selection of the subject-matter for the two volumes. The final interpretation reflects my preference for innovative and unbureaucratic projects. However, for experienced project managers seeking coherence with their own expectations about the project management domain, the skills matrix (p. 22) maps the part headings of the two volumes on to familiar subject areas encountered elsewhere.

Inevitably there are gaps in the subject matter on offer. The field is too vast for it to be otherwise. The emphasis has been placed on methods and techniques which are specific to the field of project management – analysis, planning, scheduling, estimating, measuring progress and promoting managing by projects - rather than those areas that fall within the general sphere of management activities.

Important areas such as planning and estimating are covered by more than one exercise, so there is a choice. Other techniques, such as functional analysis, risk analysis, project portfolio management and running a project review meeting, are covered by a single exercise which aims to provide a sound methodology base. Almost all the exercises can stand alone without any extra material, so long as the trainer has a sufficient understanding of the principles and the methodologies described to be able to summarize the main learning messages.

It is always better to concentrate on a few key learning messages and to sow the seeds of each learner's interest, rather than to try to steamroller through every topic in the book. In other words, allow the learners to learn how to learn from their experiences. Once their interest is stimulated, the only way for them to master their skills is through continued practice. Realistically, this can only be obtained by experience and by iteration.

Iterative experience and simulation

Micro-projects give participants an opportunity to practise integrated project management skills. Only by repetitive experience do these skills become automatic. This still leaves an important residue of skills which can only be anchored by hard experience. Project management simulations are another way of speeding up the learning process. Simulations are based on an interplay between the evolving parameters (systemics) of a project. They can even model, in a surprisingly realistic fashion, the social and psychological dimensions of projects.

A project management simulation can be built by modelling the key decision points in a typical company project. A series of scenarios based on significant in-house material are integrated into one trainer driven 'story-line.' In each scenario or iteration, decisions are taken which influence the project parameters. These parameters then become the inputs for subsequent scenarios.

SKILLS MATRIX

1.	Project management principles	6.	Measuring progress, testing and validation
2.	Setting objectives and assessing requirements	7.	Communication, negotiation and coordination.
3.	Creativity and problem solving	8.	Motivation, teamwork and leadership
4.	Value analysis, risk assessment and project optimization	9.	Managing priorities and long-term objectives
5.	Planning and estimating	10.	Integrating project management skills

Skill	Meta-skill	1	2	3	4	5	6	7	8	9	10
Principles and definitions		■									■
Defining project scope			■					■		■	
Defining the business objectives			■	■				■	■	■	
Defining the work breakdown structure			■			■					■
Defining the organization structure			■					■		■	■
Defining the master schedule			■			■					■
Defining activities and constraints						■					■
Estimating resource requirements and costs						■					■
Resource scheduling and optimization					■	■					■
Risk evaluation and reduction				■	■	■					■
Performance reporting						■		■			■
Variance analysis								■			■
Project forecasting								■			■
Change order and problem management				■	■			■			■
Configuration management			■	■	■	■		■		■	■
Quality management			■	■	■	■		■		■	■
Procurement management					■	■	■	■		■	■
Contracts management					■	■	■	■		■	■
Human resource management								■	■	■	■
Communication management								■	■	■	■
Cost management			■		■	■	■				■
Time management			■		■	■	■				■
Scope management			■		■	■	■				■
Culture, values and diversity								■	■	■	■
Project reviews and progress meetings							■		■	■	■
Managing project politics and strategy		■	■					■	■	■	■
Capitalizing and recycling project experience		■						■	■	■	■
Project audits and evaluations		■	■				■	■			■
Project start-up		■		■		■		■		■	■
Project close-out		■					■	■		■	■
Matrix management		■	■					■	■	■	■
Project portfolio management			■					■		■	■
Project management software			■		■						■

ACTIVITY AND EXERCISE SKILLS GRID

A	Teamwork activities	S	Synergy exercises
M	Methodology exercises	B	Thinking exercises and brain-teasers

Project management principles		A	S	M	B
My personal projects	1		■		
Seven skills: learning objectives	2		■		
Blueprint for project management	3	■			
Requirements analysis	4		■		
Jigsaw puzzle	5	■			
Course evaluation	6			■	
Memory game	7				■
Setting objectives and assessing requirements					
Project dossier	8			■	
Meta-plan for project start-up	9			■	
Good and bad objectives	10		■		
Work breakdown structures	11			■	
Domino tower	12	■			
My best shot	13				■
Tree structure	14			■	
Creativity and problem solving					
Left brain/right brain	15				■
Ten left-brain teasers	16				■
Ten right-brain teasers	17				■
Ten enigmas	18	■			
A whirl through the kitchen	19	■			
Morphological analysis	20			■	
Pipe dreams	21	■			
Practising empathy	22			■	
Communication, negotiation and coordination					
Office move communications plan	23			■	
Ten reasons to leave things vague	24		■		
Five Bayes-type negotiating situations	25	■			
Listening hard	26		■		
'Prose' project progress meeting	27			■	
Communicards	28				■
Crystal-clear instructions	29	■			
Handling objections	30				■
Motivation, teamwork and leadership					
Project leadership skills	31		■		
Projects and motivation	32		■		
Excellence in teamwork	33		■		
Personal styles assessment	34		■		
Leadership styles assessment	35		■		
Secondary styles	36		■		
Core team circles	37				■
Team observation	38			■	
Teamwork charter	39	■			