Project management —

Part 3: Guide to the management of business related project risk

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Committees responsible for this British Standard

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Contents

Foreword

This British Standard has been prepared by Technical Committee MS/2.

It is a part of a series of standards that consists of:

    — Part 1: Project Management — Guide to project management[1];

    — Part 2: Project Management — Vocabulary[2];

    — Part 3: Project Management — Guide to the management of business related project risk.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 21 and a back cover.

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[1] This was originally published as BS 6079:1996.

[2] In the course of preparation.

Introduction

Risk management is a core process within any business or organization regardless of size, activity or sector. Individuals and organizations can lose substantial sums of money as a result of not paying sufficient attention to the identification and management of threats to their goals and to the projects they commission. Similarly, full advantage cannot be taken of potentially beneficial opportunities arising in the course of their activities if these are not recognized in good time. Risk management is therefore as much about looking ahead to identify further opportunities as it is about avoiding or mitigating losses. On a wider level, efficient and effective management of risk can make a significant contribution to the economic and general welfare of society, as well as that of the businesses and projects directly concerned.

Although it is often suggested that formal risk management does not begin until the first actual risk assessment has taken place, risks are rarely ignored when initial plans are made, or decisions taken, to proceed with projects. It is simply that it is rare for *all* risks to be identified and taken into account *systematically* in the early stages of planning. It is well known that managers and their teams generally know what can go wrong and what worthwhile opportunities might occur. Without the benefit of systematic risk analysis however, it is not always possible for them to exploit their knowledge to the full. Even when an analysis is undertaken, a team will not always maintain and update it. Equally, sometimes when risks are foreseen, they are dismissed on the grounds that "it couldn't happen here". Risk assessment should therefore be seen as part of a continuous review process conducted throughout the life of each project. In this way, the many risks to the business that occur as a consequence of the projects it undertakes, can be identified and actively managed.

The benefits of systematic risk identification and risk management include:

— more realistic business and project planning;

— actions being implemented in time to be effective;

— greater certainty of achieving business goals and project objectives;

— appreciation of, and readiness to, exploit all beneficial opportunities;

— improved loss control;

— improved control of project and business costs;

— increased flexibility as a result of understanding all options and their associated risks;

— greater control over innovation and business development;

— fewer costly surprises through effective and transparent contingency planning.

This standard describes a process for identifying, assessing, and controlling risk within a broad framework. The main features of this process are illustrated in Figure 1. The risk management process described in this standard is applicable for each aspect of the business activity focus at each level of decision making.

Projects are the principal means by which a business moves forward. In order to manage risk effectively, the business, project, or sub-project goals need to be clearly identified. This is because it is only in relation to an organization's or individual's specified goals that risk arises. Confusion over project objectives is itself a major cause of project failure. Managing business related project risk involves taking account of business risks that affect its projects and project risks that affect the business. Within any project there are also inherent risks to the project itself, and to its sub-projects.

A vital part in clarifying goals and assessing risk is the identification of project and business stakeholders. The guidance in this standard highlights the importance of stakeholder analysis and suggests that it is integrated into the risk management process. Unless the stakeholders are identified and understood at an early stage the true extent of the management task and the source of much risk can go unrecognized. Identifying stakeholders also helps define the relationship between the business and its environment and the context in which its projects will be carried out. Not all stakeholders are easily recognizable and there can be many more organizations with influence and vested interests than is readily acknowledged. Taking stakeholders into account can ensure that planning is much more "viewpoint oriented".

Annexes A to E are informative and give background information for a fuller understanding of associated risk management factors.

Annex A describes the importance of effective communication within risk management.

Annex B gives an overview of management tools that can be used to provide an analytical framework.

Annex C describes the significant aspects of risk perception which can impede risk management.

Annex D describes the principles involved in stakeholder analysis.

Annex E gives a listing of some common types of business risk.

What is at risk and why?

What (and where) are the risks?

What is known about them?

How important are they?

What should be done about them?

Secondary risks

CONTEXT
Business and project objectives
Projects in the context of the business
Business and project boundaries

RISK IDENTIFICATION
Sources of risk
What are the risks?
How do they arise?
Groupings and associations

RISK ANALYSIS
Characteristics
Classification
Estimates of likelihood
Potential consequences

RISK EVALUATION
Set criteria
Decide ranking
Select priorities

RISK TREATMENT
Identify options
Evaluate options
Plan treatment measures
Assess secondary risks
Allocate responsibilities
Implement treatment

Maintain database

Communicate and explain

Monitor effectiveness of process

Review objectives, decisions and assumptions

Update plans

Figure 1 — The risk management process

1 Scope

This standard gives guidance on the identification and control of business related risks encountered when undertaking projects. It is applicable to a wide spectrum of project organizations operating in the industrial, commercial and public or voluntary sectors. It is written for project sponsors and project managers, either or both of whom are almost always responsible to higher levels of authority for one or more projects of various types and sizes.

It is intended that its application will be proportional to the circumstances and needs of the particular organization.

This standard offers generic guidance only and it is not suitable for certification or contractual purposes. It is not intended as a substitute for specific standards that address risk assessment in distinct applications, such as health and safety, or areas of technological risk.

NOTE   This standard advises that risk management is treated as an integral part of good management practice. Risk management is an iterative process consisting of steps that enable continual improvement in decision making. Its effective use depends on the experience and judgement of the practitioners applying the guidance, and not simply on routinely following the steps outlined.

2 Terms and definitions

For the purposes of this British Standard the following terms and definitions apply.

2.1
residual risk

risk remaining after risk treatment measures have been taken

2.2
risk

uncertainty inherent in plans and the possibility of something happening (i.e. a contingency) that can affect the prospects of achieving business or project goals

NOTE   Such contingencies could make the result more or less satisfactory.

2.3
risk analysis

systematic use of available information to:
— characterize the risks;
— determine how often the specified events could occur;
— judge the magnitude of their likely consequences

2.4
risk assessment

overall process of risk analysis and risk evaluation

2.5
risk consequence

effect on the interests and goals of those at risk if a risk event happens or a risky situation materializes

2.6
risk evaluation

process used to decide risk management priorities by evaluating and comparing the level of risk against predetermined standards, target risk levels or other criteria

2.7
risk identification

determination of what could pose a risk

2.8
risk impact

a measure of risk consequence

2.9
risk management

systematic application of policies, procedures, methods, and practices to the tasks of identifying, analysing, evaluating, treating, and monitoring risk

2.10
risk sharing

spreading of risk by sharing it with others

NOTE   This is also referred to as "risk transfer".

2.11
risk treatment

selection and implementation of appropriate options for dealing with risk

2.12
secondary risk

risk arising from the risk treatment process

2.13
stakeholder

individual, group or organization having a vested interest or influence on the business or its projects

2.14
stakeholder analysis

process for identifying stakeholders, their interests and influences

3 The business related project risk management model

3.1 General

The model outlined in this guide is shaped by two generic perspectives that can be applied to any kind of business or project. These are as follows:

a) defining the relationships between the businesses and its projects;

b) modelling the decision making processes associated with activities at different levels within either the business or project.

(Sub-projects often exist within larger projects, some of which can be described as business initiatives but which nonetheless have the same general characteristics.)

The effects of decisions in all parts of the business and at all levels within the business and its projects can be far reaching and should not be considered in isolation. Good communication between each level of a business and between the business and its projects is essential. Annex A gives guidance on the factors that can play a part in an effective communication strategy.

3.2 The relationship between businesses and projects

Businesses operate in an external environment from which they can derive key opportunities and also experience constraints. Sources include other businesses and organizations; markets; governments; regulatory bodies; the legislative framework; the financial system; and society at large.

Any business takes inputs from its external environment, and acts on those inputs to produce goods or services, along with other outputs, such as profits, or pollution, which are then returned to the same environment. The nature and extent of these outputs will influence the future of the business. Projects should be viewed in exactly the same way as businesses, because the business or businesses that set up a project are significant elements of that project's external environment. Similarly, a large project can consist of several sub-projects, and this larger project then provides the external environment for its sub-projects.

The model, shown in Figure 2, shows the nature of business and project relationships relevant to understanding how to manage business related project risks.

Three types of relationships can be identified as follows.

a) Businesses can set up projects in which the inputs and outputs are maintained wholly within the business boundary.

EXAMPLE
A project that trains staff to undertake new jobs can be carried out by a team from the organization's training department. Project inputs (including risks to the project from the business), and outputs (including risks to the business from the project), are mostly retained within the business. Risks that can arise from the functioning of the project should also be considered as outputs in this context, and will be wholly retained within the business.

b) Businesses can set up projects that are partly within and partly outside the business boundary.

EXAMPLE
An illustration is where one business contracts with another for the supply of parts required by the first business. Risks from this type of relationship are born directly, to varying degrees, by both parties to the relationship, and indirectly by other parties, such as insurers.

c) Collaborative or partnership projects can be set up by two or more parties from which they individually and jointly expect to receive benefits. Here also, project risks are also shared in various ways between the parties involved.

A project can itself be composed of several sub-projects, wholly or partly within the initial project or business.

EXAMPLE
Construction work could be divided between separate plastering, electrical, and carpentry sub-projects. Software production could be divided between teams (sub-projects) responsible for different modules. A sub-project could also be initiated to manage a particular risk. Each project, sub-project (and sub-sub-project, and so on), is at risk from the associated business, project, (and sub-project, respectively) that established it initially and which contributes inputs to it. The sub-projects, and projects, also produce outputs, both desired and risky for the associated projects and businesses.

Figure 2 — The relationships between businesses, projects, and sub-projects
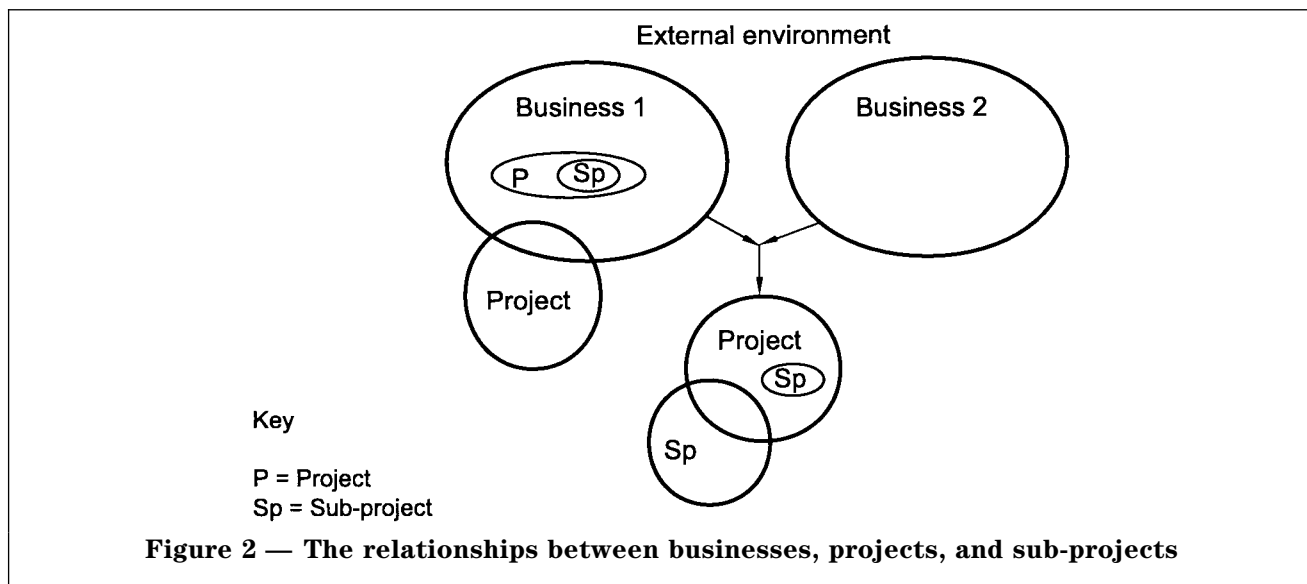
3.3 Levels of decision making for risk management

Decision making is an activity concerned with attaining certain goals. It should proceed in the context of goal setting, ranging from activity to identify goals, through to action/s to accomplish the goals. Risk management decision making takes place at three levels:

— strategic;

— tactical; and

— operational.

In the context of this standard, the use and meaning of this terminology reflects normal usage. However, the terms are more specifically applied within this standard at all three levels of decision making, i.e. at business, project and sub-project levels.

These levels generally correspond to long, medium, and short-term decision making activities and each can pose risks for the others. The business related project risk management model emphasizes that the three decision making levels not only occur within the business but are also found within projects and sub-projects. For example, strategic direction of the project is the province of the business sponsor, much as the senior management of an organization set strategy for the organization as a whole.

Table 1 gives an overview of the levels of decision making. Table 2 gives typical examples of those who usually take responsibility for the different types of decision. The three types of decision making are described in **3.4** to **3.7**. Table 3 gives an overview of the relationship between the focus of decisions made and the different levels of decision making.

3.4 Strategic decision making

Goals are set by strategic level decision making. Once goals have been established, strategic decision making should focus on the environment and broad principles of the tasks required to achieve a goal. Strategic decision making should also identify the means for reaching the goal, and any constraints that could hinder progress. It is at this level that decisions can be taken to modify old goals, or adopt new goals, or to change the business or project in order to attain the goals set.

Strategic decision making sets the basic framework within which tactical decision making operates. The scope of strategic decision making is very wide, and influenced strongly by choices made by decision makers at this level. Choices of strategic decision makers are wide-ranging and decisions can have far-reaching and sometimes unintentional consequences for subsequent activities and the way projects are conducted. In general, strategic decisions should be concerned with the longer term. Strategic decisions relating to projects can sometimes be taken far in advance of their implementation, by which time circumstances could have changed markedly. The risks associated with this type of decision making will not always become apparent until well into the future. Strategic decisions should therefore be reviewed on a regular basis.

3.5 Tactical decision making

Tactical decision making bridges the gap between strategic and operational decisions. It is concerned with the broad implementation of strategic level decisions. Since these can only be indicative, tactical decision making should be concerned with the medium term and choices of approach and method within the framework set at the strategic level. The scope of tactical decision making is narrower, and, the time frame, financial responsibilities, and scope for goal setting and policymaking are more restricted.

3.6 Operational decision making

Operational decision making, should have the narrowest focus and should take place within the framework and constraints established by tactical decision makers. Operational decision making is more likely to be routinized, and decision makers should follow rules and procedures closely concentrating on the shorter term.

Table 1 — Decision making levels

Decision making level	Examples of decision making
Strategic	Establishing/confirming goals, means, constraints, key risks, stakeholders and setting in context for tactical and sometimes operational decisions for each activity/project.
Tactical	Choosing how to deploy the most appropriate means for attaining goals and managing tactical risks within the restraints set at strategic level.
Operational	Implementing tactical choices and managing operational risks.

Table 2 — Examples of decision makers

Decision making	For the business	For the project	For the sub-project
Strategic	Non executive and executive senior management	Project sponsor	Project manager
Tactical	Middle management	Project manager	Sub-project management
Operational	Operations manager	Project team and suppliers	Sub-project team and suppliers

Table 3 — The relationship between decision making focus, and decision making levels in the context of risk management

Decision making type	Focus of decision making		
	For the business	For the project	For the sub-project
Strategic decision making **(long term goals)**	Project initiation and preliminary risk analyses for the business and project. Establishes risk management goals and processes, looking at business and project. Sets context, systems, principles for risk management process. Can contribute to changes in overall corporate policies and objectives.	Clarifies project goals and priorities. Identifies project risks in the light of received project goals. Carries out preliminary risk analysis for project goals and project process. Provides feedback to business level on potential business level risks identified. Transfers risks concerning the project environment to business decision makers. Establishes project risk management process.	Clarifies sub-project goals and priorities. Identifies sub-project risks. Carries out preliminary risk analysis for the sub-project. Transfers potentially unforeseen or new risks identified to project level. Establishes sub-project risk management process.
Tactical decision making **(medium term goals)**	Sets policy for risk management planning process – risk analyses, evaluation and treatment.	Carries out risk analyses, evaluation and develops treatment plans and options. Identifies and evaluates risks of risk management process. Feeds back to strategic project level all new or altered risks or strategic project risks.	Analyses, evaluates and develops treatment plans for sub-project risks. Identified any consequent risks. Feeds back to sub-project strategic level any potential modifications to risks. Transfers upwards new or modified strategic sub-project risks.
Operational decision making **(short term goals)**	Establishes relevant committees, processes, etc. Commits resources and makes go/no-go decisions.	Implements risk management treatments. Identifies risks arising from this; feeds back to higher level. Transfers upwards new or modified tactical risks.	Implements sub-project risk treatment. Identifies any consequent risks. Feeds back risk analyses to tactical level. Transfers upwards any new or modified tactical risks.

3.7 Combining business focus and decision making levels

In order to facilitate the identification and management of business related project risks it is useful to combine the business activity focus with the decision making levels perspective. This approach should recognize that the three levels of decision making occur at *each* of the focus levels – business, project, and sub-project. The implications for risk management activities are indicated in Figure 3. (Some aspects of the risk management process noted in Figure 3 are described in clause **4**.)

Decision making at any level should take account of risks emanating from flawed decision making at higher and lower levels, if risk is to be effectively managed.

4 Undertaking risk management

4.1 General

There are two broad phases to the risk management process as follows.

a) The first phase concentrates on defining the scope of risk to be managed and on risk identification. This can be compared to problem framing activity.

b) The second deals with assessing and managing risk, and is equivalent to problem solving.

Nonetheless, issues can arise during problem solving that require a return to problem-framing activities. A rigid distinction should not be made between the phases as the process of risk management will often involve the iterative retracing of steps.

Effective problem framing is critical to all business decision making and problem solving. Yet in risk management these activities are sometimes given scant attention or even ignored altogether. Instead, emphasis is sometimes put on risk analysis and risk treatment without first putting the work in context and being certain as to what or who could be at risk. If problems are not correctly identified, problem solving is likely to be misdirected. Problem framing is therefore critical to effective risk management.

Annex B gives an overview of various methods of risk management and analysis tools. It is not exhaustive but highlights the key features of each method.

Consideration should be given to undertaking separate risk management exercises where the scope of the risks is cross-functional as long as the risks are subsequently integrated; for example, risks concerning project delivery, project performance, safety, environmental safeguards, corporate liability in respect of projects and human resources. Both phases of risk management and the steps within each phase, should be accomplished for each of the business, project, and sub-project levels.

The basic structure of the process is described in **4.2**.

4.2 Identification of risks and risk management scope

4.2.1 *General*

The steps and activities within this phase are presented in a schematic form for ease of description. It should be noted that identifying risks and defining the full scope of risk management activity is a creative task, which should, as far as possible, involve *all* those likely to be affected by the decisions reached. Its effectiveness is dependent on the skills and experience of those involved, and the extent to which they are able to handle some of the constraints on management decision making, in particular those due to risk perception (see annex C for background information).

The risk identification process should be systematic. Attempts to compress the process are likely to limit the ability to identify risks effectively. It is advisable to deal separately with risk identification, followed by risk assessment and treatment, although eventually both will run concurrently.

The steps that should be considered at the project, and sub-project levels are broadly similar, but can differ in detail. However, the steps that should be considered at the business level differ from those at the other two levels, and are described separately, as follows. For the business level, the newly identified risks (threats or opportunities) that might affect the business or the project (or both) should be considered as significant. See Figure 3.

For project and sub-project, the goals identified at these levels that either require decisions to be made at the higher level or that pose risks which cannot be dealt with effectively at these levels, should be considered significant. See Figure 4.

The focus of the first set of activities should be to ensure clarity and understanding of, and agreement on, the full set of goals that the business, project, or sub-project have to meet.

These steps are important because:

— risk management at each decision making level takes place in the context of goals and other constraints established by the level above (project goals are initially established at the business level);

— failure to establish or communicate clear goals and project objectives is itself a common source of business related project risk;

— the various features of the business, project, or sub-project environment are important to the risk management process;

— without a clear view of the full range of business goals and project objectives, risk identification is severely constrained and could be misleading.

Establish project goals

Do project goals fit business goals? ——► No ——► Review

Yes

Establish project scope and boundaries

Have goals changed? ——————► Yes ——►

No

Develop risk management strategy

Have goals been significantly affected? ——► Yes ——►

No

Implement risk management strategy

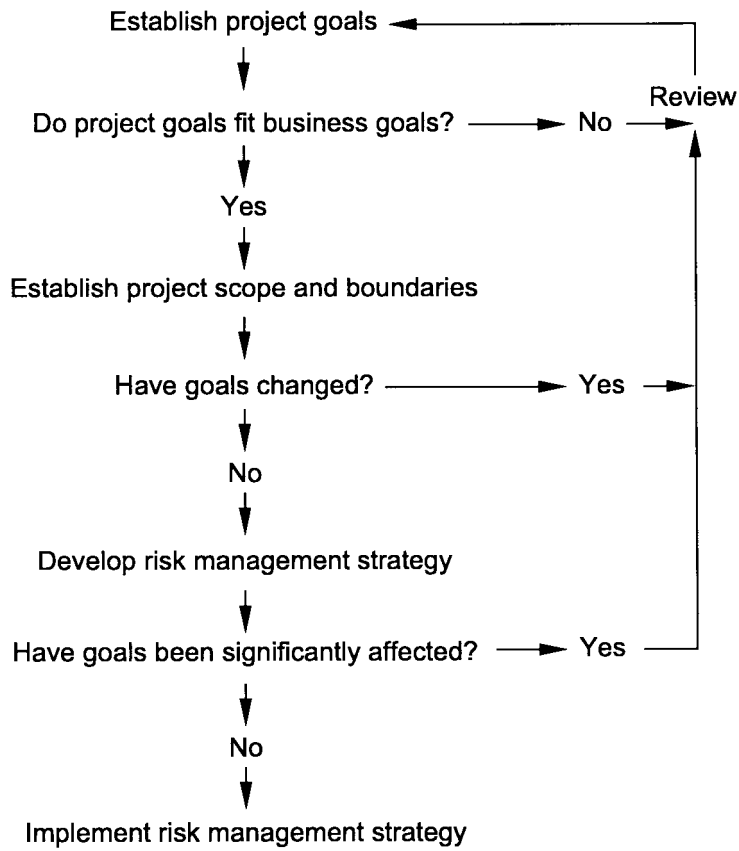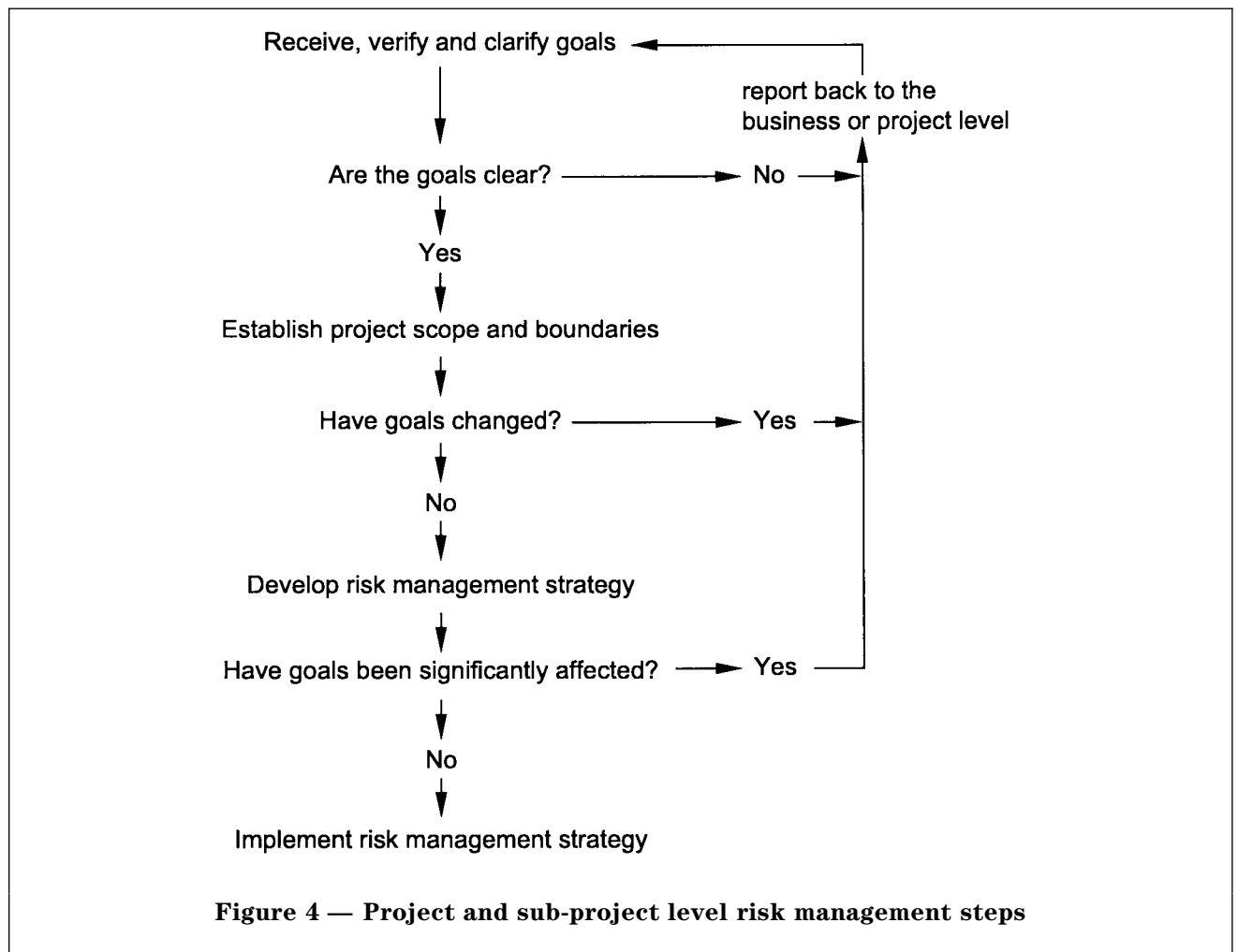**Figure 3 — Business level risk management steps**

Figure 4 — Project and sub-project level risk management steps

4.2.2 *Business level goal setting*

At the business level, primary goals should be:

— those of the overall business; and

— those of the project which the business is sponsoring or participating in.

It is important that project goals fit with those of the business in order to avoid either the business or project threatening the success of the other. Business and project goals should also fit with the overall business objectives and policies, established at the business level.

Business goals and the fit of the project goals can sometimes initially seem unclear or uncertain. However, the fit can be confirmed, and precision enhanced, as project boundaries and scope are established and as an overall risk management strategy is developed.

Goals and project scope and boundaries can be identified by seeking answers to the questions such as the following.

— In whose interests is the project being initiated?

— Who are the stakeholders?

— Who will benefit from the successful completion of the project?

— What constitutes success; what constitutes failure?

— What is the attractiveness of the project to the investment decision maker and other relevant stakeholders?

— What are the goals of the project?

These questions can also be addressed as part of a much wider project review involving such techniques as stakeholder analysis (see annex D). Stakeholder analysis helps managers establish an understanding of the full range of individuals and groups that could have an effect on a business and its projects. The technique also enables the most important stakeholders to be identified especially those whose interests should be taken into account if the project is to be successful.

Once goals have been established, the context or environment in which they will have to be achieved can be identified. This is important because it establishes the high level or large scale sources of constraint or threat (as well as opportunity), both for the business and its projects.

At the business level the context includes, for example, the financial, legislative, political, social, competitive and cultural environments in which the business (and therefore the project) is carried out. It includes other businesses, competitors and collaborators, and other groups such as residents, communities, and so on, who could hinder or facilitate the project's goals, and therefore constitute sources of risk to the business.

On completion of a stakeholder analysis, it could be apparent that existing goals have to be modified and additional goals have to be met in order to complete the project successfully. Should this be the case, it will be necessary to review the project's fit with the business goals.

The complete set of goals for a business in connection with a project consists of:

a) initial goals identified by the business;

b) other goals identified through stakeholder analysis and other techniques; and

c) other goals identified as a result of risk assessment.

Some goals identified as part of stakeholder analysis or risk management could turn out to be either more important than the goals originally set by the business or too risky to pursue. Once the full extent of goals and related risks has been established, then the risk management strategy is completed. For the business level, this will then necessitate decisions being taken about whether to handle some risks at that level, and which risks to pass down to the project level or share with other organizations.

4.2.3 *Project and sub-project goal/objective setting*

At the project and sub-project levels, the full set of goals to be met should be established and reviewed in the same way as at the business level. That is, through use of a variety of techniques to clarify goals, scope and boundaries, and confirmation of overall project or sub-project goals following an initial risk assessment.

At the project and sub-project levels, the primary goals should be those set by the level above (i.e. business, or project, respectively) but others will be added as a result of detailed planning at those levels. Decisions made at project (or sub-project) level can bring in other stakeholders not previously considered at higher activity focus levels.

Some stakeholders will only come into prominence at the project level as a result of decisions taken by project managers. For example, environmental

activists could be part of the total business environment, but only achieve the status of project stakeholder if the project manager decides to do something that creates an interest for them. In this way, the external environment of the organization can be brought directly into play as a source of risk through decisions made at project level, independently of the decisions made at business level. Situations like this should prompt a review of business and project goals to include those relating to managing this new group of stakeholders.

The final set of goals for a project (or sub-project) should thus consist of goals handed to them, goals identified as a result of stakeholder analysis and other project planning and review techniques and modifications to the goals as a result of the risk assessment. Project (and sub-project) managers should then distinguish between goals and related risks for which they can be responsible, and those (if any) that cannot be managed at their level.

Managers at each level of authority should be given the means to manage the risks they identify. If this is not possible, a system for passing information about those risks upwards or downwards through the project hierarchy to the appropriate level of management, should be put into operation. Responsibility for dealing with individual risks should rest with the management and decision making level most suited and capable of handling it.

The relative emphasis of each step in the process is likely to vary with the level in the business/project at which it is carried out. At the business, and higher project levels, the emphasis is likely to be on the earlier stages, ensuring clarity of objectives, and broad understanding of potential opportunities and threats to business and/or project. Lower down the decision making tree, the emphasis is likely to be on implementing the risk management strategy. Nevertheless, scope should be allowed (even in these phases) for communicating potentially unforeseen threats or opportunities upwards from sub-project to project, and from project to business levels.

Once business, project and sub-project managers have completed these initial steps for their respective levels of responsibility, they should proceed to implement the risk management strategy at their level.

4.3 Risk identification and strategy

4.3.1 *Risk model clarification*

Risk identification should focus first on individual risks. Nonetheless, to make an effective assessment of overall business related project risk requires an idea of how specific risks relate to each other and to the desired goals and an understanding of the probable common or underlying causes of risk (if any). Annex E gives a listing of some common examples of business and project risk.

Once risks have been identified, managers should clarify and make explicit their understanding of the ways in which the risks might affect the goals. This should include assessing all significant assumptions relating to the identification, analysis and overall assessment of the risk. For example, an assumption could have been made that certain risks can be considered independently of each other. If the risks are truly independent, this assumption will not undermine the subsequent risk assessment or invalidate decisions on how to treat the risk. If, on the other hand, the risks are inter-related and there are underlying or common causes, the presence or magnitude of one risk could affect the presence or magnitude of another. Decisions made on the basis of flawed assumptions or estimates will themselves pose risks.

Effective risk modelling in this way requires an understanding of causes and causal relationships between possible events or processes themselves, and between those events or processes, and the desired goals. One outcome of risk modelling can be the discovery that several risks share a common cause, or are related in such a way that management of those risks is simplified. Treatment can then be directed to the common cause and as a consequence will usually be more cost effective than picking off individual risks one at a time.

The main outputs from this phase should include setting up a risk register or a database that lists and describes all identified risks and records decisions made concerning their assessment and treatment. Risks should be listed with details of their characteristics, including their ranked importance, any quantitative indicators, and finally risk treatment plans. Risk registers can be more or less detailed and play an essential role in risk management as a primary document of record.

The main outcome of the phase should be a clear understanding of the risk model and accompanying assumptions on the part of the business and project managers, together with other key stakeholders directly involved in managing the project. This forms the basis on which development of an initial risk management strategy can proceed.

The risk management strategy should cover the overall approach and principles of risk management to be adopted by the business, and include decisions about those risks to be handled by the project managers. The risk management strategy itself can affect overall goals, or cause other goals to be given attention as a result of consequential risks arising from the treatment of primary risks. Some goals could be too risky to pursue and could be dropped. Managers also need to ensure that the fit between these goals, and the overall project and business goals continues to be acceptable.

4.3.2 *Risk analysis*

A risk analysis should be made to establish the likelihood and potential consequences of the individual risks or sets of risks previously identified. A risk evaluation should then be made to determine which risks take the highest priority, which risks require further (and possibly more detailed) studies and which risks need less attention.

All risks should be assessed on two levels:

a) the likelihood of their occurrence; and

b) the potential consequences for the business and projects.

Whilst the objectives of risk analysis are easy to state in principle, in practice obtaining adequate information, and analysing it, is difficult. Sources of information on risk likelihood and consequence could include the following:

— records and other sources of historical data;

— relevant experience;

— reviews of research into project success and failure;

— experiments with prototypes;

— market testing and research;

— application of behavioural, financial, economic, engineering and/or other relevant models;

— use of specialist and/or external expertise.

Techniques for information gathering vary, but should always fit the characteristics of the data to be collected. Techniques include interviews, self-completion questionnaires, team workshops, focus groups, library searches and translation of historical data into meaningful information for the present.

Risk analysis can be conducted by both qualitative and quantitative methods. The type of analysis depends on the nature and quality of data available. A qualitative assessment should use words or descriptive scales to describe the combined likelihood and consequences of each risk or set of risks. These scales can be developed and adjusted to suit different qualities of data, and analysis requirements.

Table 4 illustrates the kind of analysis possible at this level.

A classification system like the one used in Table 4 should be used with care as it requires clear understanding and agreement on the part of those analysing the risks if it is to be useful. Classification of risks will also depend on assessment of existing measures and procedures for managing them. This form of classification can be applied to both threats and to opportunities.

Table 4 — Basic qualitative analysis

Likelihood of risk	Degree of risk impact		
	Minimal	Moderate	Significant
Likely	Medium	High	High
Possible	Low	Medium	High
Unlikely	Low	Low	Medium

Even where reliable data is available, qualitative analysis should still be conducted first, with the object of getting a broad feel for the relative likelihood and impact of risks. Once a framework is established, some form of quantitative risk analyses can be appropriate. Quantitative analysis can sometimes provide a more detailed assessment using numerical values given to likelihood and impact, often expressed as probabilities. To what degree quantitative analysis is appropriate depends on the nature and quality of the data available for particular risks, the nature of the project, potential consequences, and whether analyses can provide additional useful information. It is often overlooked that in conducting quantitative analyses, subjective decisions and estimates, which could be incorrect or involve inaccurate assumptions, are necessary for the process. The past is seldom a good predictor of the future and numerical estimates emerging from quantitative risk analysis should be used with care – to inform but not decide.

It can be appropriate to employ quantitative analysis for the more significant risks, especially when there is doubt over the initial assessment. However, where risks are themselves combinations of other risks, or are likely to be affected by other risks, quantitative methods can be difficult to apply with any certainty as to the value of the analysis. If the analysis is undertaken at an early stage it is sometimes possible to minimize risk at very little cost. Where this is possible, risk evaluation is more likely to depend on judgement regarding the seriousness of the risk consequences than on likelihood of occurrence. Risk assessment is unlikely to be straightforward. However, any attempt to assess risk as a basis for decision making will increase the chances of a successful outcome.

Whether analysis is conducted qualitatively or quantitatively the resulting information should provide the basis for evaluating the risks. It could be that all that is required is that risks are categorized as high, medium, or low priority. Those that fall into the low category can then, depending on the judgement of the managers and other stakeholders concerned, be set aside for the time being as not requiring further attention. In doing this, care should be taken not to set aside risks that might act in combination with other risks, or could be affected by other risks. Risks set aside at one point in the overall risk management process should be re-examined if new information or changing circumstances suggest that this might be necessary.

All risks and supporting information arising from risk analysis should be compiled in the form of a register. Risk registers should serve as a document of record and be regularly updated.

4.3.3 *Risk evaluation*

The purpose of risk evaluation should first be to establish whether there are risks that could seriously damage the business or project, and which could be untreatable in the light of previously defined criteria. If this proves to be the case, project goals and criteria should then be reviewed. Second, the process of risk evaluation should result in a prioritized list of treatable risks for further consideration. A scheme for evaluating risks is illustrated in Figure 5.

The first step in risk evaluation should be to classify both threats and opportunities into three broad categories.

a) Threats can be classed as unacceptable in any circumstances, where there are catastrophic consequences for the business or project or where they are unacceptable on other grounds, such as excessive treatment costs that far outweigh the benefits. Ideally, these risks should have been identified in early business level studies.

b) Threats that are obviously negligible or otherwise insignificant should be recorded and set aside from further consideration, although it will be necessary to re-evaluate them at regular intervals.

c) Threats are classed as acceptable if they are deemed worthwhile and can be managed within acceptable limits.

Opportunities should be classified according to whether they are critical, desirable or negligible.

d) Critical opportunities, (likely to have been identified in early business level studies), are those that could significantly enhance the value of a project to the business.

e) Desirable opportunities are those that, if occurring, facilitate achievement of project goals to a level greater than the minimum specified.

f) The third group of opportunities contains those that will have a negligible effect on the project. They too should be recorded, and can be set aside from further consideration at this point. It is sometimes necessary to re-evaluate them at a later stage.

Figure 5 — Scheme for evaluating risks
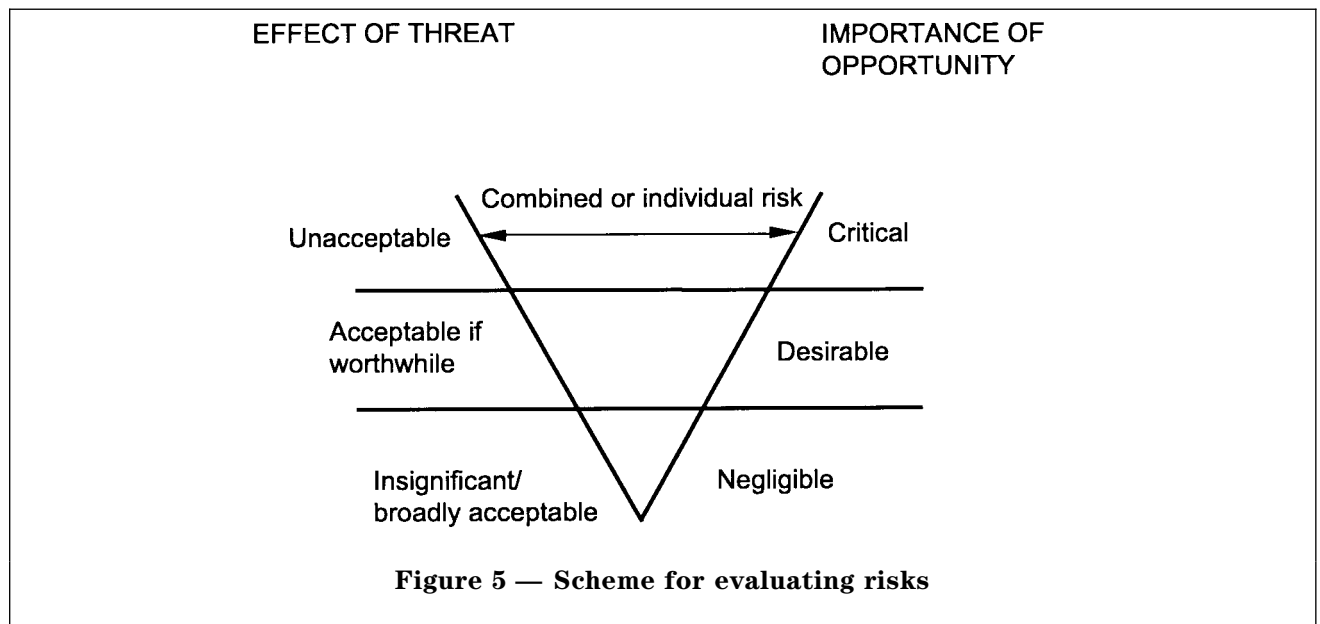
All risks other than the negligible and insignificant should be subjected to further analysis and evaluation. The aim should be to confirm or amend the initial categorization. It could be that some unacceptable or critical risks are actually found to be acceptable, or desirable. Conversely, further examination could reveal that some acceptable or desirable risks are unacceptable or critical.

Risks that are classified as unacceptable should be reviewed to establish whether they are treatable and if so, whether it is worth doing so. If they are not treatable, it could be necessary to review the criteria for treating risks or the goals with which they are particularly associated. In extreme cases a project will have to be cancelled or abandoned as a result of identifying an intolerable risk. Treatable risks – i.e. risks that are tolerable, or desirable – can be analysed further to decide on appropriate forms and levels of treatment.

4.3.4 *Risk treatment*

The risk treatment process should involve identifying and evaluating a significant range of options for treating risks, and preparing and implementing risk management plans. For both threats and opportunities the first step should be to decide whether special treatment is necessary, or whether they can be treated in the course of normal management procedures and activity. The treatment of threats involves considering counter measures.

Table 5 contains a summary of counter measures that can be adopted to minimize threats.

Table 5 — Counter measures

Measure	Summary
Eliminating or avoiding	Changing or abandoning goals specifically associated with the risk in question, or choosing alternative approaches or processes that make what was previously a risk no longer relevant.
Risk sharing	Sharing risks in part or in full with another stakeholder who could be involved solely to facilitate risk treatment, e.g. an insurer.
Reducing the possibility	Changing project approach, identifying causal links between threat and impact, or causes of threats, and intervening to mitigate occurrence, acting to reduce the threat.
Reducing the consequences	Developing contingency plans for responding to the threat if it occurs, even if other steps have been taken to minimize the risk.

Treatment of opportunities involves considering measures to ensure their occurrence. Table 6 contains a summary of measures that can be adopted to increase the likelihood of an opportunity occurring. These can include any or all of the following.

Table 6 — Opportunities

Measure	Summary
Facilitating	Choosing project approach accordingly; enhancing other beneficial stakeholders' outcomes.
Involving facilitators	Involving stakeholders who can help facilitate occurrence of the opportunity.
Enhancing likelihood	Changing project approach; examining causal links between opportunity and project.
Enhancing consequences	Developing plans for taking full advantage of an opportunity if it occurs.

Any treatment measure should be assessed in terms of the following:

— its cost compared with the anticipated benefits of treating the risk;

— the kind of actions involved;

— its effectiveness in containing the risk or enhancing an opportunity;

— any secondary risk associated with the action. This is to check that the counter-measure itself, does not have any unforeseen consequences, particularly ones that could pose a greater risk than that which the treatment is designed to minimize. This is especially important when pursuing opportunities.

These measures should then be compared to the risk assessment to decide which actions are appropriate, given the level of the risk. If new stakeholders are to be involved as a result of treatment decisions, their interests should be integrated with the previous analyses.

For each risk to be treated, other than those which are to be avoided altogether, indicators of likelihood of occurrence should be identified. These can then be monitored as part of the risk treatment plans.

4.3.5 *Implementation*

Following the identification of risk treatment measures and risk indicators, a risk management plan should be formulated. This should be agreed by the managers concerned, and communicated to other significant stakeholders. Ideally, plans for dealing with risk should be incorporated in the general business or project management plan. Sufficient resources should then be allocated to implement the agreed actions.

The nature of the plan should be dictated by the characteristics of the risks and the treatment designed to address the risk. A distinction should be made between:

— preventive counter measures built into the current activities of the business; and project; and

— mitigation measures which are put in place but which will not be operationalized unless the risk arises.

Preventive counter measures might, for example, involve a decision to use a tried method rather than an innovative approach about which there is less certainty as to outcome. Mitigation includes, for example, insuring against loss or failure. Where insurance is chosen, it should provide for sufficient funds to restore the status quo as well as to complete the project as originally intended.

All risk management, especially treatment measures, should be monitored for performance so that appropriate counter measures or facilitative actions can be implemented should the risk management strategy prove inadequate. Possible methods of review include performance evaluation, audits, and inspections. This will allow ongoing feedback on which assessment and treatment activities are most effective.

Communication between managers implementing the treatment measures, and those whose goals are at risk is essential throughout the implementation of the risk management plan (see annex A). In parallel with this ongoing communication, there should be:

— regular monitoring of resource usage against the risk management plan;

— monitoring of the agreed risk indicators;

— monitoring of the risks so that they can be seen to fall within the previously expected limits.

Re-evaluation of the risks and the search for new ones should take place on a regular basis.

4.4 Managing the process

This subclause draws attention to some issues in the process of managing business related project risk.

Four key steps in the effective management of business related project risk management are:

— developing the organization's policy for risk management;

— establishing the organizational infrastructure;

— establishing a programme for managing risk at organizational, cross-organizational, project and sub-project levels;

— monitoring and reviewing the effectiveness of organization's management of risk.

Risk managers should involve all key members of the business and its projects in the process of risk identification, analysis, and management. If this doesn't happen, information and ideas held by other people will not always be understood or accepted by management. Risk management can be significantly enhanced when there is a better understanding, on the part of those supporting them, of the situations faced by those taking "risky" decisions as part of their job. The risk manager should take account of the following factors.

a) Duplication and overlap of functions and tasks can make a reliable system out of less reliable parts. This is partly because more than one perspective is brought to bear on a problem and the associated risks.

b) A culture of risk management needs to be developed and encouraged throughout the business, and fed through into its projects. This works by encouraging everyone, especially managers, to continuously consider and monitor risk including that arising from their own decision making and actions.

c) Training and simulations (exploration of "what if" scenarios) can heighten risk awareness and responsiveness.

d) High levels of communication of plans and intentions and appropriate levels of involvement enhance understanding. Clear lines of communication among team members are also important.

e) Elements of the "learning organization" approach, in particular a willingness to learn from mistakes (and to avoid allocating blame) contribute to awareness and to a willingness to raise potential risks for consideration. For these reasons an incremental approach to business and project development is less risky.

f) A clear hierarchy of responsibility and leadership, within which senior members set the framework of tasks for those lower in the hierarchy. Within this framework, decision making is decentralized to permit prompt and flexible responses to local conditions.

The management of risk can usefully be treated as a sub-process of the business or project. Similarly, the setting up and successful implementation of a risk management strategy can be treated as a project. From this perspective, the management guidelines set out in BS 6079-1 can be applied to the management of risk within any business or related project. There are however, some additional points that can usefully be emphasized in the particular context of managing the risk management process itself.

Risk management should be integrated fully with business and project management. This advice is aimed at meeting one of the shortcomings of the functional (staff and line) approach to managing, namely, that if something is someone else's responsibility, then people act as if that responsibility will, or has, been met. For risk, if there is a separate manager for the risk management function, other people will tend to assume that person or department has done all that is necessary to manage the risk.

At the same time, if there is not a specialist co-ordinator or manager, there is a risk that people will assume that someone else is taking care of risks that they do not themselves directly identify and manage themselves.

There is clearly a need to balance functional centralization, (in order to ensure an overview and that overall risk management is actually carried out) with an appropriate level of decentralization (to ensure individuals and groups actively manage their own risks).

Annex A (informative)

Communication in risk management

Effective communication about risks is a critical factor in risk management. Poor communication, whether in general or about risks, can in itself, be a significant risk to business and project management effectiveness. Managers therefore, always have to bear these two considerations in mind when communicating in the context of risk management.

Achieving effective communication of risk is a complex process requiring attention to a large number of organizational and technical processes. This annex draws attention to some important factors that should be attended to.

The reasons for communicating vary greatly from ordering or instructing someone to do something on the basis of managerial authority, to seeking to educate and develop understanding. Before attending to the more technical aspects of communicating, managers should therefore decide on the purpose or combination of purposes that communicating with particular stakeholders is designed to achieve. Only then can an appropriate communication strategy, that maximizes effectiveness and minimizes risk, be developed.

The communications strategy should cover the three key aspects of the communication process as follows:

a) sending of messages to other stakeholders by the business and project managers;

b) receipt of messages from other stakeholders; and

c) independent communication amongst stakeholders themselves.

All these can affect the project itself, and the process of business and project risk management. The communications strategy, and management of communications, should be integrated with the overall risk management process, and should take account of risk perception issues (see annex C). The communications strategy should be developed in tandem with the strategy for managing stakeholder relationships (see annex D).

Managers concerned with the business and project, and the management of associated risks, have direct control over sending messages to other stakeholders. They also have an important degree of control over how they receive messages. Attention should be given to sending appropriate messages, and ensuring that messages received are interpreted correctly. Both communications to stakeholders, and stakeholders' perceptions of how managers received their communications, can affect communication among stakeholders themselves. Care should be taken that this does not develop in ways that threaten the business or project.

Managers should also bear in mind that communication in the context of business and project risk management will not be just about risks, but also about anything else stakeholders feel the need to exchange messages on. The way in which these messages are sent and received can have an effect on overall project risk itself as communication about risk influences risk perception. This is why there needs to be integration between business and project risk management, and the management and development of the communication strategy.

Care should be taken to express any message using words and images that the target audience can understand and using a medium with which they are comfortable.

When sending messages, it is important to pay attention to how the communication is made. The words in a communication contribute only a small part of what is received. Non-verbal communication also occurs, and this can strongly influence the meaning that the recipient gives to the message. Non-verbal communication factors vary according to how the communication is being made. In face-to-face communication, important non-verbal factors include body language (facial expression, dress), the use of space, and the timing of communication. Communication timing also affects non-face-to-face communication. In this context, other factors such as the physical appearance of a written document, or the nature of language used, also affect how the message is received.

Communicating within an organization is affected by the structures of the organization. An organizational chart is a diagram of the formal lines of communication. This could be relatively simple for a single organization. Where projects involve more than one business, the organization chart for a project could be quite complex. It is important to ensure a fit between the formal and informal communications structures within a project and with the business sponsor, and the needs of the communications strategy.

Emphasis has been placed in these guidelines on the need for upward communication of information about risks perceived to be beyond the handling capacity of those at that level of activity. It is important that formal structures do not hinder this process, otherwise the risks might go unrecognized or emerge later than necessary or desirable. Upward communication can be hindered by other factors, such as subordinates' fear of blame, or fear that higher managers will not listen. This results in ineffective or inaccurate upward communication. It is vital to effective risk management to ensure that good upward communication does take place.

Communication also takes place along other channels, often informal ones outside the control of managers. Effective communication management requires an appreciation of these channels, what they are, and how they work. These are likely to be different in every situation. Informal channels can also help, or hinder, the overall communication process and do much to encourage risk identification.

Managers typically spend more of their time receiving than sending messages. The process of listening is therefore also critical to effective communication, although it is usually taken for granted. Listening effectively is about actively decoding and interpreting messages, and is different in quality from merely hearing or reading superficially. In order to listen effectively, managers should pay close attention to how they are interpreting a message, whether there might be alternative interpretations, and what the sender might actually be trying to communicate.

Annex B (informative)

Business and risk management tools and techniques

B.1 General

This annex contains two lists. **B.2** contains a selection of business strategy analysis tools that can be used in conjunction with stakeholder analysis to aid risk management in the context of the business, project, and sub-project relationships. The list in **B.3** outlines major risk management and analysis tools and techniques.

B.2 A selection of business strategy techniques that support management decision making and planning

B.2.1 *Decision conferencing*

This is based on decision analysis, and considers options and their relative utilities, and is used extensively for strategic questions about resource allocation. It is designed for group use, and usually makes use of computer based tools. A process facilitator is required.

B.2.2 *SAST — strategic assumption surfacing and testing*

SAST attempts to explore and bring to the surface, underlying assumptions of management control systems and actions. Facilitation is required.

B.2.3 *SODA — strategic options development and analysis*

This has been developed from psychology and social psychology as a negotiating method and uses a real-time interactive computer based support system. It is designed for use in groups, and is very facilitator dependent.

B.2.4 *SSM — soft systems methodology*

This soft-systems methodology is a systematic thinking process for tackling situations where problems and issues can at first be unclear, or where there is uncertainty about precise objectives and actions. It is regarded as appropriate for any type and level of problem identification and problem solving activity. A facilitator is useful, though not essential.

B.2.5 *Strategic choice*

This was originally developed for public sector planning issues, and is based on the need to manage uncertainty about values, environment, and the inter-relationship between issues. It is designed for use in groups. Strategic choice requires a strong facilitator although it can be used by a group facilitating itself.

B.2.6 *Systems dynamic modelling*

This is based on control system theory. It uses a computer program to provide feedback, and can be used in group situations. It requires a facilitator.

B.3 Risk management and analysis tools

B.3.1 *Assumptions analysis*

Assumptions analysis is a process designed to formally record and assess the assumptions underlying identified areas of uncertainty. This process principally involves the scrutiny of statements of belief concerning future outcomes and an assessment of their stability and significance to the project. This will result in a list of identified project risks which require further action.

B.3.2 *Brainstorming*

A process of group identification and discussion of risks which is mediated by a facilitator. Discussion is kept as open as possible by discouraging criticism. Once identified, possible risks are discussed constructively and those risks thought worthy of further analysis can be assigned to a risk "owner". Skilled and purposeful facilitation of this process is essential.

B.3.3 *Checklists*

Checklists contain questions on specific areas of the project to allow identification of risk, often based on past project experience within an organization. Checklists should be kept flexible enough to allow changes in the format as project experience informs practice. The advantage of checklists is that they can be structured to rapidly identify sources of risk. They can, however, be overly prescriptive and overlook risks which are not based on past project performance.

B.3.4 *Criticality analysis*

Often used in conjunction with Monte Carlo Simulation, criticality analysis identifies which activities could become most critical if not effectively managed. Tasks are assigned a value of between zero and 100 % according to their potential to affect the duration of the project. Further statistical analyses can identify which activities are most likely to introduce the most uncertainty to the project.

B.3.5 *Cumulative frequency plots (S curves)*

Cumulative frequency plots are often used to represent the likelihood of certain milestones achieving targets and are often used in determining bid prices and project budgets. The plotting of these "S" shaped curves can be used to quantify the interaction of the likelihood of certain events and their cumulative effect upon the project as a whole.

B.3.6 *Decision analysis*

Decision analysis is a method used to determine optional strategies and choose between alternative courses of action. It often utilizes the expected monetary value (EMV) method. This allows the calculation and selection of the best yielding alternatives in relation to the organization's objectives in undertaking the project.

B.3.7 *Delphi technique*

Structured method of consulting a group of experts on project risks and their outcomes. This process is usually conducted by a chairperson who structures the consultation so that opinions are first collected independently and then circulated amongst the group until it is felt that a consensus has been achieved.

B.3.8 *Expert interviews*

Interviewing technical experts is often used to identify and assess probable risks in the project. Interviews can be relatively structured or unstructured but should be systematically recorded. Interviews can sometimes be the only way that information can be elicited where group sessions are impractical or inappropriate.

B.3.9 *Event tree analysis*

A tool for representing the sequence of possible outcomes following the occurrence of a specified initial event. Event trees show the various combinations of events and the ways in which the chain of events can be broken. They permit the calculation of the probability of different outcomes from other known probabilities.

B.3.10 *Fault tree analysis*

A deductive method of working backwards from a "top event" resulting in system failure. FTA works by consecutively analysing the previous functional system. These chains of causation are then represented, using conventional symbols, as a fault tree. These can be analysed in either a qualitative or quantitative fashion. As these fault trees are often complex, quantification can depend on sophisticated mathematical formulae.

B.3.11 *HAZOP study*

Hazard and operability (HAZOP) methods were originally developed for use in the chemical industry but are equally appropriate for other process plants. It is a procedure for systematically identifying hazards and operability problems throughout the whole production process and it often proceeds through the following stages. First, a full description of the plant is undertaken, including the intended design conditions. Secondly, each part of the process is reviewed to discover how deviation from planned performance can occur. Finally, a detailed assessment of how these deviations can result in either hazards or operability problems is specified. HAZOP studies undertaken in the design stage can result in avoidance of some risks through project re-design.

B.3.12 *Influence diagrams*

Influence diagrams are used to represent chains of causation between events and decisions, usually depicted as nodes. These are then evaluated according to assessments of probability and can involve computer simulation of complex relationships.

B.3.13 *Monte Carlo simulation*

This method is a process of quantitative simulation of possible outcomes through generating values and weights for each possible outcome. This computer-generated simulation results in a probability simulation of possible model outcomes which can then be used by the project management to evaluate risks.

B.3.14 *Prompt lists*

Prompt lists are created in order to ensure that a broad range of categories of project risk are examined in the risk identification process. Prompt lists will identify headings appropriate to each project in which risks will be explored. Some might begin by working through activities while others concentrate on aspects of the project common throughout the activities. These can be a useful focus of attention during a brainstorming session.

B.3.15 *Risk registers and databases*

This comprises a document or database which lists all identified risks along with other useful information, which can be used for the management of those risks. Risks are listed with information about their characteristics, including their ranked importance, any quantitative indicators, and eventually risk treatment plans. Risk registers can be more or less detailed and often play an essential role in risk management.

B.3.16 *Sensitivity analysis*

Sensitivity analysis is a form of quantitative modelling which allows combinations of "what if" scenarios to be explored. The analysis identifies those elements of the project which most effect the outcomes. Sensitivity analysis can be performed through spreadsheet software and the results represented, for example, in the form of "tornado charts", "spider plots" or "risk return graphs" for ease of interpretation.

Annex C (informative)

Risk perception

C.1 General

Perception relates to how we see things and situations, and is a critical factor in risk management because the way in which we do this affects our decision making, largely through causing us to make assumptions that might not always be accurate. In risk management, the aim should be to achieve as thorough and as objective an assessment of a situation as possible. However, pure objectivity and rational behaviour is usually impossible because of the ways in which we perceive risk. Understanding this helps managers to devise ways of controlling the risks that arise from the limits on our ability to be objective.

Risk perception issues can be considered under three headings – individual perception, group perception, and how perception influences stakeholder relationships.

C.2 Individual risk perception

Perception of risk by individuals is highly subjective, and perceptions of risk vary with a number of factors related to the individual, and the circumstances under which the risk is being perceived. Among the most important factors are the following.

a) **Familiarity and understanding**

People tend to underestimate risks associated with things or events that are familiar to them, or that they feel they understand. Experts often underestimate risk, while the general public overestimate the risks from the same thing. People who play football, or engage in adventure sports, have a fair idea of the risks they run. Others however, underestimate the risk of injury in football, and overestimate the risk from sports like hang gliding, or rock climbing.

b) **Relative place in space**

Things or events people perceive as being physically near to them are often seen as posing greater risk than those far away. There can be some more objective truth in this, but in reality what is shaping people's perceptions is the distance, not an actual evaluation of actual risk.

c) **Relative place in time**

As with space, things occurring soon are seen as inherently more risky, or as incurring risks that need attending to without delay. On the other hand, things seen as occurring at a more distant time are not always given sufficient attention. Managers do not always recognize long range planning as worthwhile and so give tomorrow's urgent problem more attention. This can happen even when the benefits of concentrating on the longer term, rather than becoming involved in minor issues of the day, are obvious.

d) **Degree of personal control**

If someone feels they are controlling some thing or event, their perception of the risks involves diminishes. Car drivers underestimate the risks from their driving, while car passengers and others not in control of the situation, but dependent on someone else being in control, overestimate the risks.

e) **Presentation of things or events**

The way in which things are presented to the decision maker has been shown to influence perception of the kind of risk, and level of risk, involved. If things are presented in a positive manner, there is a tendency to overestimate opportunity, and underestimate threat. Conversely, if things or events are presented in a negative light, there is a tendency to overestimate threat.

This has another side – the way in which individuals present things or events to themselves affects how they perceive the risks involved. A manager familiar with technical issues will generally overlook, or downplay, issues of risk arising from human factors or behaviour. Subconsciously, we look for risks we can manage, or benefit from, and overlook others because of the way we perceive the problem in the first place.

f) **Perceived importance**

If people feel something is important, for example, a decision, an outcome, or both, they tend to overestimate the risks involved, regardless of the probability or likelihood of occurrence. This can happen with perceived threats, or opportunities.

Since a) to f) all feed through into risk management, it is important to take them into account if risk management is to proceed as effectively and as objectively as possible. It is vital to be aware of our own perceptual limitations, as well as those of others, and to take remedial steps to check our perceptions and understanding of risk in different situations.

C.3 Perception by groups

There are two kinds of behaviour in groups that affect risk perception and identification.

Where the group is composed of like-minded individuals, who perhaps know each other well, and there is a high level of group synergy, the group can begin to act too well from the perspective of objective risk identification. This happens because the individuals in the group assume too much about a situation, and, because they all make the same assumptions, no one notices. Psychologists have called this kind of behaviour "group-think", and have shown it to be responsible for a number of near and actual disasters.

The second kind of group behaviour that can pose a risk occurs when members of a group begin to exaggerate the problem or situation without justification. They can do this for a variety of reasons, such as wanting to be seen as eager and willing by important members of the group. Since others in the groups can also have similar motives, the problem can easily be exacerbated. Objective risk assessments can be lost in all this and someone who attempts to be more objective can find themselves labelled as "negative".

The two kinds of group behaviour can act together, with obvious adverse consequences for any attempts at an objective risk perception.

C.4 Risk perception and stakeholder relationships

The way we perceive something not only affects our decision making. It also affects what we expect is likely to happen, and what we desire. It is particularly important to take account of expectations and perceptions of desirable outcomes, when considering relationships with stakeholders.

When business and project managers assess risks for treatment, they should be aware that other stakeholders will not always make the same assessment. They can identify different risks, and in addition, they can place different values and priorities on the risk to be managed, and the way in which it should be managed. This follows from consideration of individual and group factors affecting perception of risk. If their assessment differs from that of the project managers, then they will also have different expectations about when and how that risk is to be managed. If those expectations are not met, then the stakeholder relationship to the project can change significantly.

The consequences for business related project risk management are that if stakeholders' perceptions of particular risks are not properly taken into account in project risk management decisions, managers can incur stakeholders' hostility to the project.

C.5 Implications for risk management

In general, the consequences of perceptual problems and issues are potentially negative (threats, rather than opportunities), and hence require particular attention in order to deflect, inhibit, and overcome.

The risk posed by perceptual biases to risk identification can be managed by seeking a variety of perspectives on an issue. Multi-functional teams, and cross-functional groups have been found useful. It can also be important to ensure that teams are not too "comfortable" as a result of having worked together well in the past. Introduction of newcomers can help to minimize the possibility of "groupthink". However, teams require effective management to ensure that newcomers' contributions are not excluded. Including outsiders who have little to lose or gain from involvement in the project or the business can also help the objectivity of the risk identification and management processes.

How stakeholders perceive project risks can be influenced in various ways, ranging from communication, to participation in the project. Engaging in these kinds of activity can also pose further risks. Experts can be challenged by others with opposing viewpoints, and the fact that there is no expert consensus on a particular issue will then be exposed. Project managers should assess this risk alongside the potential of threats from failing to meet stakeholders' expectations.

Annex D (informative)
Stakeholder analysis

Stakeholder analysis has been found to be particularly useful in risk management and as a general support to management decision making. Traditional risk management tools and techniques do not encourage attention to the human and organizational factors affecting business and projects although it is widely accepted that these factors are major sources of risk. Understanding risk perception (see annex C) is one way to begin to handle these factors. Stakeholder analysis is another.

Stakeholders are all those individuals, groups, and organizations, including business and project teams, who have an interest in the business or project, in terms of processes, outcomes, or both. Because they have this interest, they can be affected by the business and its projects, or can wish to exert an influence. Whatever the nature of their interest, the existence of that interest means that they are a potential source of risk to the project and perhaps to the business.

It is not up to business or project managers to define who has an interest, or what that interest is. Interests are defined by individuals and groups themselves, and if a stakeholder feels that they have an interest, they can pose a risk to the project.

Stakeholder analysis helps risk management in four main ways:

— identification of risks and risk sources;

— identification of the wider business and project boundaries;

— identification of the wider business goals and project objectives;

— identification of the relationships between different types of risk.

The more a manager knows about the business or its projects, the more they are able to identify potential risk factors. Many risk factors stem from the expectations and perceptions that different project stakeholders have of the project. Understanding who stakeholders are, and what their perceptions and interests are, enables business and project managers to identify potential areas of conflict, approaches to roles and responsibilities, and attitudes to risk and performance.

It is not enough to identify stakeholders who are part of the business or project organization. Other important stakeholders can lie outside those inner boundaries. They can therefore be difficult to understand, control, or influence. But if they are in a position to pose risks to the business or project, attempts should be made to include them in the risk analysis. Failure to do so increases the likelihood of overlooking significant causes of risk, and imposes unrealistic limits on stakeholder and risk analysis.

If a project's stakeholders are identified, this also provides an indication of project boundaries, and objectives that have to be fulfilled in order to reach the project goals. Project boundaries extend beyond the business or businesses concerned to include all relevant stakeholders. In this way, it is possible to gain a fuller appreciation of the potential scope of risks associated with the project than would be achieved by limiting concern to a narrower set of activities. Identifying other stakeholders draws attention to objectives the project has to achieve in order to reach the intended goals.

Finally, stakeholder analysis is a tool in total risk identification. Many different types of risks, such as financial, technical, strategic, and so on, can be traced to the behaviour and decision making of stakeholders. Stakeholder identification and analysis enables managers to develop strategies for handling relationships with particular stakeholders or groups of stakeholders on particular issues. The strategy towards stakeholders should aim to minimize the threat they could pose to the business project, and maximize any opportunity they could provide. This process should also be linked to the risk communication strategy (annex A). To develop this strategy can require understanding of any conflicts of interest between stakeholders, including those close to the project, as well as those further away. It also requires understanding of relationships between stakeholders that can be built upon, and decisions about relevant types and appropriate levels of stakeholder participation at different stages of the project. Stakeholder analysis should be undertaken at the beginning of a project, and reviewed whenever major changes are made, or new stakeholders involved or identified. On occasions it can be risky to share stakeholder analysis too publicly, and the extent of involvement of stakeholders in this analysis has to be judged at the time.

Annex E (informative)

Common examples of business and project risk

E.1 General

The following subclauses list some of the most common types of business and project related risk that can occur in association with a business and its projects. It should be noted that the listing is not comprehensive.

E.2 Human factors

The following list notes the major human resource issues that are associated with business risk:
— management competence;
— corporate policies;
— management practices;
— poor leadership;
— inadequate authority;
— poor staff selection procedures;
— lack of clarity over roles and responsibilities;
— vested interests;
— perceptual errors regarding risk;
— individual or group interests;
— personality clashes.

E.3 Political/societal

The following list notes some of the external factors (stemming from government, regulation and society) that can affect risk in business:
— unexpected regulatory controls or licensing requirements;
— changes in tax or tariff structure;
— nationalization;

— change of government;
— war and disorder;
— failure to obtain appropriate approval (e.g. planning consent);
— higher than anticipated compensation costs.

E.4 Environmental

The following list notes the physical environmental factors that can affect business risk:
— natural disasters (earthquake, floods, landslides etc.);
— storms/tempests;
— pollution incidents;
— aircraft/ship/vehicle collisions.

E.5 Legal

The following list notes the major legal considerations that can affect business risk:
— unforeseen inclusion of contingent liabilities;
— loss of intellectual property rights;
— failure to achieve satisfactory contractual arrangements.

E.6 Economic/financial

The following list notes the major economic considerations that can affect business risk:
— exchange rate fluctuation;
— interest rate instability;
— inflation;
— shortage of working capital;
— failure to meet revenue targets.

E.7 Commercial

The following list notes the major commercial considerations that can affect business risk:
— under performance to specification;
— management under performance;
— collapse of contractors;
— insolvency of promoter;
— failure of suppliers to meet contracts (quality or quantity or timescales);
— cost and time over-runs;
— failure of plant and machinery;
— insufficient capital revenues;
— market fluctuations;
— fraud;
— increased costs of revenue collection.

E.8 Technical/operational

The following list notes the major technical considerations that can affect business risk:
— inadequate design;
— professional negligence;
— human error/incompetence;
— structural failure;
— operation lifetime lower than expected;
— residual value of assets lower than expected;
— dismantling/decommissioning costs;
— safety;
— performance failure;
— residual maintenance problems.

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