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RISK

Project risks can be predictable or completely unforeseeable. They might be caused by the physical elements or they could be political, economic, commercial, technical or operational in origin. Freak events have been known to disrupt projects, such as the unexpected discovery of important archaeological remains or the decision by a few members of a rare protected species to establish their family home on what should have been the site of a new project. The potential effects of risks range from trivial inconvenience to project disaster. Project risk management (and much of mainstream project management) is concerned with attempting to identify all the foreseeable risks, assessing the chance and severity of those risks, and then deciding what might be done to reduce their possible impact on the project or avoid them altogether.

A risk event that occurs late in a project can be more costly in terms of time and money than a similar event nearer the start of the project. That is because as time passes there will be a greater value of work in progress and higher sunk costs at risk of loss or damage. Risks can occur at any stage in a project. Some are associated with particular tasks and others originate from outside the project and can manifest themselves without warning. For very large projects it might be necessary to appoint a risk manager, who can devote all or most of his or her time to ensuring that a comprehensive risk strategy is put in place and then reviewed from time to time throughout the project to ensure that it remains valid.

Risks are unforeseen (and often unforeseeable) events that can result in a change of project plans or even total project failure. Risks events can occur in any kind of project and they can range from the ‘accident waiting to happen’ variety to the most unexpected and bizarre. Management change and IT projects seem to be particularly prone to risk of failure, with huge losses of money. With this vast breeding ground for possible risk events it is apparent that the risk manager’s ﬁrst problem is to identify the risks that might affect his or her project. Checklists, which grow in size and value as companies gain more project experience, are a good starting point for listing the foreseeable risks. Studying the history of similar projects can also highlight possible problems and help the project manager to learn from the mistakes and experiences of others. Brainstorming is an effective technique for considering many aspects of risks. A brainstorming meeting of key staff is a particularly productive method for identifying all the possible risks along with many of the improbable ones. Much depends on how the brainstorming session is conducted.

Once identiﬁed and listed, risks can be ranked according to the probability of their occurrence and the severity of the impact if they should occur. This process will eliminate the most improbable risks arising from brainstorming, but it should bring to the fore those risk events that are most likely to happen or which would have the greatest impact on the project. Risk analysis can be qualitative or quantitative.

Qualitative risk analysis involves considering each risk in a purely descriptive way, to imagine various characteristics of the risk and the effect that it might have on the project. Fault-tree analysis and Ishikawa ﬁshbone diagrams are methods commonly used by reliability and safety engineers to analyse faults in design and construction. Failure mode and effect analysis has also been imported into project risk management from reliability and quality engineering, but this method is possibly more helpful because it starts by considering possible risk events (failure modes) and then proceeds to predict all their possible effects. Risk classiﬁcation matrices: As with failure mode and effect analysis, this again is a qualitative method, in which no attempt is made to evaluate any risk numerically. Each risk item is considered for its likelihood of occurrence (chance) and for the relative scale of the impact on the project should it occur.

Quantitative risk analysis goes at least one stage further than qualitative analysis by attempting to quantify the outcome of a risk event or to attach a numerical score to the risk according to its perceived claim for preventive or mitigating action. Quantitative analysis methods attempt to assign numerical values to risks and their possible effects. They often examine the probable impact on project time and costs. Alternatively, the evaluation process can produce a ranking number for every identiﬁed risk. Ranking numbers denote the priority that a risk should claim for management attention and expenditure on preventative measures.

When all the known risks have been listed, assessed and ranked it is time to consider what might be done about them. That process requires that all potential risks be listed in a risk register. The risk register should be reviewed and updated regularly throughout the life of the project. It is advisable to use the computer to sort the risks according to their ranking, with the highest ranked risks placed at the top.

When all the known risks have been identiﬁed, assessed, ranked and registered it is time to consider what might be done about them; Avoid the risk, take precautions to prevent or mitigate risk impact, accept, share, limit and transfer the risk.

The ﬁnancial impact of many risks can be offset by insuring against them. The client pays the insurance company a premium for this service, and the insurer might itself choose to spread the risk by sharing it with one or more other insurance companies.

Some risk events can have such a potential impact on a project that special crisis management contingency plans must be made. Such contingency plans can extend to projects that would need to be set up specially and rapidly to deal with the sudden crisis for example in areas that are particularly liable to epidemic diseases, famine, ﬂooding, hurricanes, earthquakes or other natural disasters.; organisation, Contingency planning, Tabletop and other exercises.

PROJECT ORGANIZATION STRUCTURES

It should be obvious that, if all the project objectives are to be achieved, the people, communications, jobs and resources must be properly organized. But the form which that organization should take might not be so obvious. Every company has its own ideas about how to organize itself and its work. It is highly probable that if three companies doing similar work could be compared, three different organization structures would be found. Further, all three companies might be equally successful (or equally unsuccessful), implying that it is not always possible to say with any degree of conﬁdence that there is one best organization solution.

An effective organization will have clear lines of authority and every member of the project will know what he or she is expected to do to make the project a success. This is part of the management communication framework needed to motivate all the staff employed. A well-motivated group can be a joy to work with. A badly informed group, with vague responsibilities and ambiguous levels of status and authority, is likely to be poorly motivated, slow to achieve results, costly to run and extremely frustrating to work with.

The complement of good management communications is the provision of adequate feedback paths through and across the organization. These facilitate cooperation and coordination. They allow progress to be monitored and difﬁculties to be reported back to executive management. They should also give all participants access to the relevant experts for advice or instruction on technical and commercial difﬁculties.

It is not possible to discuss organizational structures in any depth of detail without the aid of charts (or ‘organigrams’ as they are often unfortunately known). No organigram can adequately depict all the nuances and politics of a particular organization, but we all need to understand, as far as possible, the meanings of the charts that we encounter during our working lives.

The subject of project management organization can be introduced conveniently by considering the historical development of a small company. Engineering projects, in common with most other customer-funded projects, are partly cyclical in nature. When conﬂict arises or when people refuse to cooperate with the project manager or with each other, lack of authority can make the project manager’s job very difﬁcult, causing great demands on his or her skills in dealing with people. If all else fails, the project manager must be able to call on the support of the company’s senior management so that they can exert their authority or take other action to resolve the problem.

It is, of course, possible to arrange things differently from the matrix options described above. A complete workgroup or team can be created for each project as a self-contained unit with the project manager placed at its head. The project manager is given direct line authority over the team and is responsible not only for planning, progress and work allocation but also for all technical aspects of the project. A mistake sometimes made is to show all company functions, whatever their purpose, as part of the project team or lying within the project boundaries in a matrix. This error is seen even in well-respected textbooks. Functions such as accounting, marketing, human resources, facilities management and general administration, although they might provide essential support to projects, are not usually involved directly in performing scheduled project tasks. There are exceptions, especially for management projects.

Consider a company which is about to embark upon a project for the ﬁrst time. A competent project manager is available, but this ﬁrm has never had to handle a complex project before and now has to set up the most suitable organization. Project teams have the advantage that they can each be directed to a single purpose: the successful completion of one project. A team can be completely autonomous. It is provided with and relies upon its own resources. There is no clash of priorities resulting from a clamour of different projects in competition for common (shared) resources.

Unless a project is very big, the individual specialist subgroups set up to perform all the varied activities within the project team will be too small to allow sufﬁcient ﬂexibility of labour and other resources. Any project of signiﬁcant size will probably have more than one project manager. These can usually be found spread throughout the overall project organization on the staffs of the customer, important subcontractors and the manufacturers of some specially purchased goods and equipment. Whenever a company sells a project to a customer, that customer will probably wish to monitor progress in order to be assured that there is every chance of the work being completed in accordance with the contract. There is often more than one project contractor, especially in projects involving construction work. In multi-contractor projects it is probable that one contractor would be nominated by the project customer (the project owner) as the main or the managing contractor, with overall project responsibility to the owner for managing or coordinating all the other contractors and subcontractors. Sometimes the customer will seek the services of an independent professional project manager, to oversee the project in return for a management fee. This role is often undertaken by specialist companies or by professional partnerships and individuals (such as consulting engineers or architects).

For very large projects several companies might agree to combine their resources and share the technical problems, expense and risk by forming a consortium or joint venture company. This approach will add yet another complication to the organization and at least one more project manager. For any complex project, apart from the obvious need to deﬁne responsibilities and all the contractual details, it is vital that the lines of communication between all the parties are clearly established and speciﬁed. It is not unusual to ﬁnd projects where the participants are separated by international borders and thousands of miles. The volume of information for a large project, whether in the form of drawings, other technical documents, commercial correspondence, queries, and even hotel and travel arrangements can be mind-boggling.