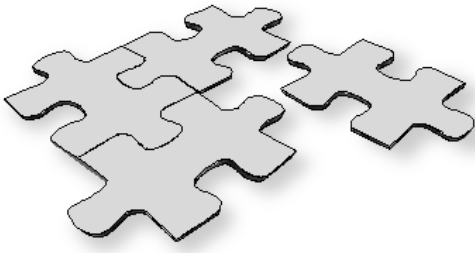




■ ■ ■ Emerald's Risk Analysis Process

Do you really know your exposure on the projects for which you are committed?



EMERALD'S RISK IDENTIFICATION AND MANAGEMENT PROGRAM

We bring together our expertise in Project Management, IT and Strategic Management to offer a package of training, mentoring and execution of Project Risk Management. This enables a corporation's project risk to be quantified, managed and mitigated while leaving a complete audit trail.

THE CHALLENGE

No matter how much effort is put into planning and scheduling, projects rarely come in on time and on budget. A major study conducted by the Construction Owners Association of Alberta showed that very large capital projects in Alberta had an average 19% cost growth and 17% schedule growth¹.

Normal scheduling and estimating techniques use single values for cost and schedule input (known as deterministic values) whereas in reality, everything has varying degrees of uncertainty. When disruptive events such as fire or work stoppages happen they have serious impacts on the project, but these events are rarely modeled in a deterministic plan. Every risk and uncertainty will have a cost and schedule impact and cannot be managed without understanding the cumulative impact of all risks to the project. However, the likelihood of all the impacts occurring at the same time is extremely rare, so it is not just a matter of adding up the impacts of every risk.

The critical path of the project rarely follows a fixed logic path but changes throughout the life of the project because of circumstances such as bad weather, project delays, failure to pass tests, or external economic parameters. With all these variables, it is not surprising that the probability of achieving the deterministic project targets for dates and costs are usually less than 10%. For companies who have committed to major projects and portfolios, this is unacceptable and puts them in a high risk financial position.

THE SOLUTION

Emerald understands the problem and can help you build the control procedures to manage your project risks. Working with your Risk Manager and project team, the five stages (13 steps²) of the Risk Process are:

Stage 1 (Steps 1-4): Evaluation of the Project Execution Plan

- The execution plan is normally in the form of tasks in a CPM schedule together with financial data and estimates which may or may not be incorporated into that schedule. This typically involves verification of the logic relationships and task durations in the schedule, as well as quantities of resources, their rates and all costs. This step should take place regardless of whether or not a risk process is in place.

Stage 2 (Steps 5-8): Identify the uncertainties and risk events that the project faces

- We review uncertainty and risk in the project by looking at the Project Risk Register and discussion with the project team.
- We conduct highly targeted and carefully structured interviews of stakeholders who could affect the risks.
- We generate a risk register, which is the start of the risk audit trail. This trail will lead from these initial interviews right through to the projection of the final risk values.
- A qualitative analysis of the initial results will frequently identify many as acceptable and/or requiring no further action, but the remaining ones will be ranked for quantitative management.

¹ The Alberta Report – COAA Major Projects Benchmarking Study, February 2009

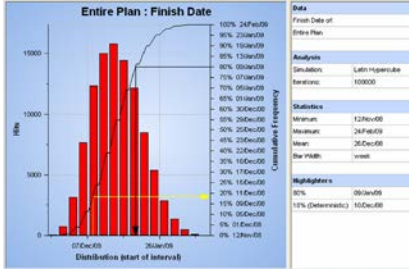
² Risk Management Services by Emerald Associates –

www.emerald-associates.com/services/avoid-/manage-risk/risk-management.html



Are your contingency allowances based on analysis or just a guess?

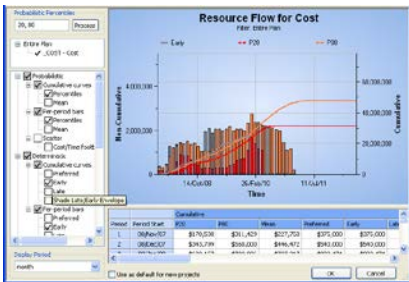
Oracle Primavera is a powerful tool for quantitatively analysing risk.



The result is not a specific value for each variable but rather a range of possible values, each with its probability of occurrence.



Tornado plots enable rapid identification of key risk drivers.



Interactive analysis tools help the user understand the results and do what-if analysis of mitigation strategies

Stage 3 (Steps 8-10): Model the risks and Project Execution Plan in the risk software

- Data will be modeled in **Oracle Primavera Risk Analysis (OPRA)** software, an innovative tool for which Emerald is also an authorized trainer. This will involve uncertainties in duration, costs, resource usage, and resource rates. It may also involve branching logic and probabilistic tasks, in order to represent weather uncertainty, test failures and many other eventualities.
- OPRA is unique in that it looks at the cumulative schedule impacts of the risks and therefore the cost impacts of those risks, something no spreadsheet based tool can do.

Stage 4 (Step 11): Run iterative analyses and mitigation strategies until all risks are understood and an acceptable cost and schedule risk window is obtained.

- We run a series of analyses with various risk event scenarios to determine the probabilistic outcomes (i.e. the costs, resources, durations, etc.).
- Each of these analyses involves simulating the model several thousand times with random choices of all uncertain variables until convergence of results occurs. This is the Monte Carlo Analysis. The result is not a specific value for each variable but rather a range of possible values, each with its probability of occurrence.
- Once the initial analysis is performed, various mitigation strategies are introduced into the model and it is re-run. Since mitigation usually comes at a cost, this is an iterative process of tuning the project, with strategic management input, until the risk window is acceptable.

Stage 5 (Step 12): Generate probabilistic financial reports and modify the Project Execution Plan

- The final model is then used to generate probabilistic financial reports to determine contingency allowances and the Project Execution Plan is modified to reflect the final risk model.
- An internal control system will typically provide for periodic revisiting and updating the risk model with consequent revision of the project execution plan.

BENEFITS OF RISK ANALYSIS

The recent COAA Major Projects Benchmarking Study found that "Implementation of Project Risk Assessment is shown to significantly reduce project cost growth".¹

A proper Risk Analysis Process will help manage large CAPEX projects for several reasons:

- It reliably identifies the financial risks to which the company is exposed and understands their impacts on the project.
- It helps mitigate the risks in the execution plan in order to bring them within acceptable limits and manage them in a cost efficient way.
- It leaves an audit trail that can demonstrate the exercise of due diligence in corporate stewardship