

MANDREL

The Risk-Based Costing Tool

If you know exactly what is going to happen, and exactly how much everything is going to cost, you don't need Mandrel.

Most of us aren't so lucky.



Projects have a nasty habit of exceeding their budgets.

Very often, this occurs not because of poor management but because the budget itself was insufficient.

Insufficient budgets typically result from a failure to make allowance for uncertainty and risk.

Mandrel: a tool used to support workpieces while they are being machined or shaped.

Accurate and timely costing is a necessity for any business. Mandrel software is the tool which supports the costing process.

Mandrel is a costing tool designed to deal with uncertainty and risk

There are basically two types of cost uncertainty:

Quantity uncertainty - how much will it cost to do the things you know about?

Scope uncertainty - what exactly needs to be done? where are the risks?

When you insert a cost such as \$10,000 into a spreadsheet, you often only mean 'approximately \$10,000'. Problem is, there is no easy way to say this - until now! With Mandrel you can make it very clear that this is an initial estimate only, to be revisited later.

Mandrel lets you:

- capture uncertainties in costs such as labor, materials and subcontracts
- capture scope uncertainty and risk by assigning probabilities to expenditures
- track costs as a function of time
- show bottom-line costs, cost variances and risk exposures

The difference between a successful project and a failed project is often the difference between an accurate and reliable cost estimate and a vague, unreliable estimate.

If you can't track risk and uncertainty, it's hard to tell the reliability of your estimate.

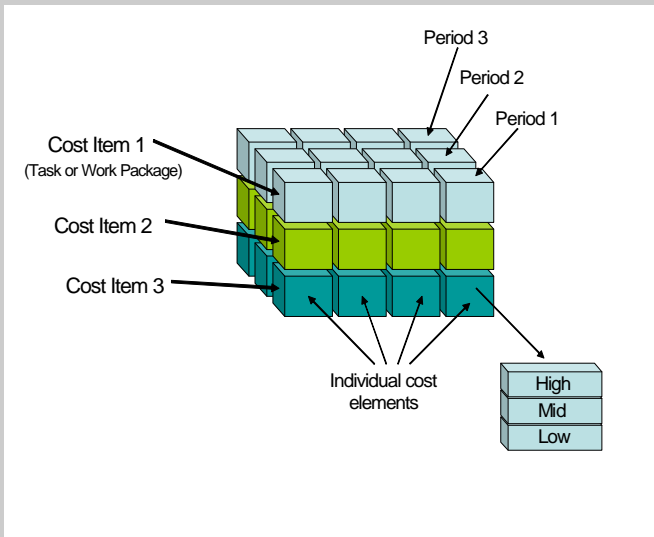
As a bonus, Mandrel also handles extended risk analysis, price lists, taxes, currencies, cash flow predictions, audit trails of changes, Monte Carlo setup, and a lot more besides.

COST STRUCTURES

Mandrel provides a 3-D cost structure. Costs are broken down into cost items, typically representing individual tasks in a work breakdown structure, and each cost item can be broken down into cost elements. Each cost element can then optionally be broken down into separate time periods. You can use this, for example, to build cash flow predictions into your costing.

Each cost value is stored within Mandrel as three separate data elements: high-, mid- and low-range. If you know the cost value exactly, these three will be the same, but if you don't they can be used to capture the uncertainty limits of the cost.

Uncertainty limits can be specified as high/mid/low values or as base + contingency values.



WORK BREAKDOWN STRUCTURES

Developing, and if necessary re-using, work breakdown structures is made easy in Mandrel. You can add, move and delete items. If you move or delete items, Mandrel automatically re-numbers everything so that there are no gaps or duplications in the numbering. You can also close items so that no further changes can be made to them.

You can search for items. You can display the entire WBS or only a limited subset of it.

Risks

Mandrel allows you to integrate risks smoothly and seamlessly into your work breakdown structure. The illustration shows several risks, in red, as a part of a work breakdown structure.

Level	Task Name	Sub-task	Sub-sub-task	Sub-sub-sub-task	Sub-sub-sub-sub-task
1	Systems Engineering	1.1 Top-level design	1.1.1 Hardware systems	1.1.2 Software systems	
2	Hardware Design	2.1 Body and chassis	2.1.1 Design	2.1.2 Prototype construction	2.1.3 Prototype testing
		2.2 Powertrain		2.2.1	2.2.2
		2.3 Powertrain control		2.3.1 Integration engineering	2.3.1.1 Test rig
3	Software Design	3.1 Operating system			
		3.2 Command processing		3.2.1 Systems engineering	

RISKS

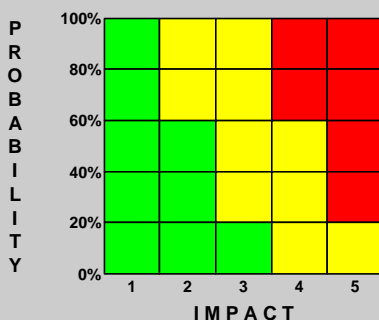
Mandrel defines a risk as any cost item or task with a probability of less than 1.

All risks can have associated cost impacts. In addition, risks can have multiple, user-definable impacts such as schedule, safety, quality, and so on.

You can use a risk matrix of any size form 2x2 to 10x10, and you can define your own matrix configuration. Mandrel's risk assessment system will provide you with a clear and consistent assessment for each risk.

Risk Exposure

Mandrel's weighted cost method will provide you with an unambiguous indication of your level of risk exposure for the project as a whole.



Reports

COST REGISTER

You will probably want a standard spreadsheet-style cost report:

Cost Item #	Cost Item Name	Direct Costs	Base Cost	Contingency	Cost Total	Tax on Cost Total	Cost Total With Tax
1.	SYSTEMS ENGINEERING						
1.1	Top-level design						
1.1.1	Hardware systems	\$10,000	\$10,000	\$1,000	\$11,000	\$1,650	\$12,650
1.1.2	Software systems						
1.2	Test planning						
1. Subtotal:		\$10,000	\$10,000	\$1,000	\$11,000	\$1,650	\$12,650
2.	HARDWARE DESIGN						
2.1	Body and chassis	\$1,000	\$1,000	\$0	\$1,000	\$0	\$1,000
2.1.1	Design	\$50,348	\$140,998	\$24,198	\$165,196	\$17,888	\$183,084
2.1.2	Prototype construction	\$5,000	\$44,640	\$6,503	\$51,143	\$5,114	\$56,257
2.1.3	Prototype testing	\$12,500	\$101,086	\$25,465	\$126,551	\$12,655	\$139,206
2.1.3.1	Structural test	\$109,000	\$150,085	\$13,630	\$163,715	\$6,371	\$170,086
2.1.3.2	Environmental testing	\$129,000	\$214,731	\$14,683	\$229,413	\$12,941	\$242,355
2.1.3.2.1	EMC testing	\$25,000	\$36,537	\$3,077	\$39,614	\$0	\$39,614
2.1.3.2.2	Thermal vacuum	\$30,000	\$49,711	\$1,844	\$51,555	\$0	\$51,555
2. Subtotal:		\$361,848	\$738,787	\$89,399	\$828,186	\$54,970	\$883,156
Total:		\$371,848	\$748,787	\$90,399	\$839,186	\$56,620	\$895,806

but with Mandrel you can show whatever data you want, however you want. The Report Designer lets you pick and choose the fields and the data items that you want to show and format them however you want.

COST ITEM REPORT

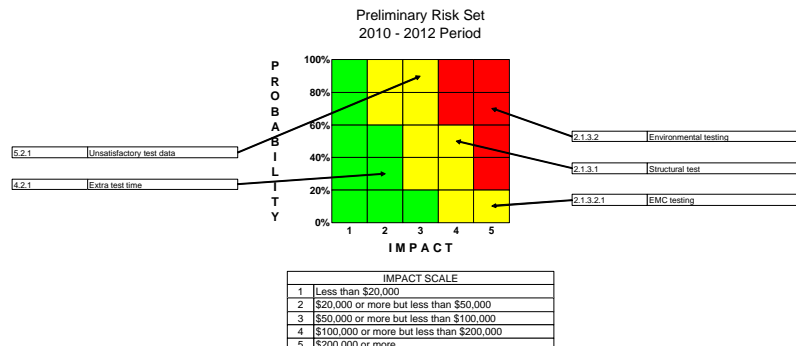
Individual tasks can often have enough data associated with them that you need to be able to report on them individually. Mandrel does this for you at the click of a mouse.

If you don't like the content or layout shown here, the Report Designer lets you design your own report.

XYZ Corporation					
Project: ABC	Cost Item #: 4.2	Cost Item Name: Subsystem integration			
Task Manager: John Doe	Responsible Organization: Engineering	Last Update: 13-Oct-2009 Rev #: 1			
COST ITEM DESCRIPTION: Integration of all the individual subsystems into a complete working system. It is assumed that each subsystem will have been completed and tested by this stage, so the purpose of this task is to resolve any ambiguities and inconsistencies in the interfaces between them.		COMMENTS: 13-Oct-2009: Subsystem interfaces were originally designed to specification ICD-2341-05, but have since been revised to the latest standard, ICD-2341-08B. This spec was originally introduced to make integration more efficient, but the changeover may have resulted in some inconsistencies which will need to be sorted out. This has been reflected in the costs for this task.			
Test jigs		\$15,000 +20%	13-Oct-2009		
Senior Engineer	75 +10% hours @ \$101.47	\$7,610 +10%	was: Senior Engineer: 50 hours +10% plus GST		
Junior Engineer	100 +20% hours @ \$84.66	\$8,466 +20%	is: Senior Engineer: 75 hours +10% plus GST		
Senior Technician	150 +10% hours @ \$93.25	\$13,988 +10%	Sr. Eng. hours increased to allow for possible interface changes to accommodate ICD-2341-08B		
Technician	150 +20% hours @ \$78.49	\$11,774 +20%	13-Oct-2009: Test jigs: \$15,000 +20% plus GST, PST Senior Engineer: 50 hours +10% plus GST Junior Engineer: 100 hours +20% plus GST Senior Technician: 150 hours +10% plus GST Technician: 150 hours +20% plus GST		
Total Cost:		\$56,837 +16.2%			
#	ACTION	PRIORITY	ACTIONEE	DUE	COMMENTS
1	Obtain better data for the design and hence the cost of the test jigs	Normal	Jim Brown	13-Oct-2009	Reasonably detailed information on this is not going to be available until at least 6 months after project start, so the jig costs will have to be considered provisional until this time.
2	Ensure that no changes will be made to ICD-2341-08B before integration takes place, since this is a major cost effect.	Urgent	John Doe	13-Oct-2009	

RISK MATRIX

Mandrel can deal not only with cost-related risks but also with non-cost risks such as schedule, health & safety, etc. You can show all of these risks on a risk matrix. Like all Mandrel reports, you can modify it to suit your particular requirements using the Report Designer.

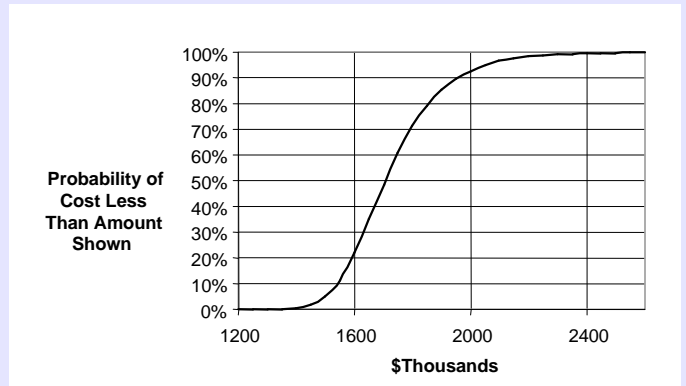


MONTE CARLO ANALYSIS

Mandrel provides a front-end to Palisade Corp. *@Risk* Monte Carlo analysis software. Monte Carlo is a powerful tool for determining such things as the probability of cost overruns based on your cost uncertainties. However, setting up an analysis can be a difficult and lengthy process. Mandrel automates this process, thus making Monte Carlo analysis much more easily available to you.

Mandrel gives you access to Monte Carlo distributions that are almost impossible to use otherwise, such as open-ended lognormal distributions which are used to describe highly uncertain tasks.

You must have *@Risk for Excel* on your system before you can make use of this facility. Once you do, the Mandrel Monte Carlo tool will enable you to set up an *@Risk* analysis in a fraction of the time that it would otherwise take.



DOCUMENTING AND AUDITING COST DECISIONS

The reasons for setting a cost at a particular level, or indeed having that cost item at all, can often be lost. Without this information, large parts of the budget have to be taken on trust.

Mandrel provides a fully integrated documentation capability with each cost item. You can, for example, add the relevant section of a technical specification to the documentation for each cost item, or add the calculations used to arrive at a particular cost.

Cost estimates often change during the life cycle of a project. It can be useful, from a project management viewpoint, to know when and by how much these changes occurred. Mandrel maintains a full, documentable audit trail of all changes.

IDENTIFICATION FIELDS

You often need to be able to associate tasks or cost items with a particular organization or person, or with a required completion date or priority level.

Mandrel provides several user-definable *Identification Fields* for this purpose. Typical examples of their use would be *Task Manager*, *Responsible Organization*, or *Date Required*. You can display these fields in reports and you can also use them to select cost items for reports, for example by showing only those items which have a particular task manager.

ACTIONS

Developing cost estimates is rarely a simple process. Information is often required from a number of sources inside and outside your organization. The action item capability within Mandrel provides a convenient means of capturing the need for such information and communicating it.

Each cost item can have several action items associated with it. Each action item can itself capture ongoing information besides the original action, and can therefore record the action's progress. Action item reports can be generated to show and highlight the status of one or more cost items.

Actions Editor

Help [OK] [Cancel]

Cost Item # 2.1.2
Cost Item Name Prototype construction
Action # 1

ACTION
Obtain quotes from several vendors for the structural metalwork for the prototype

ACTIONEE
Alice Schwartz

STATUS
 Open
 Ongoing
 On hold
 Closed

DUE DATE
26-Nov-2009

PRIORITY
 Normal
 Urgent
 Critical

COMMENTS
ABC Corp. have promised us a response by Nov 26, but are very busy at the moment and may not be able to meet this date. However, they are probably the best people for the job. Should we wait for their bid or go ahead without them?

