

Using Risk Management to Better Forecast Project Costs

“the cost risk lifecycle model...”

Dan Patterson, PhD, PMP
Pertmaster VP

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Agenda

1. Introduction to Pertmaster
2. Cost Risk Types
3. RLM (Risk Lifecycle Model)

About Pertmaster

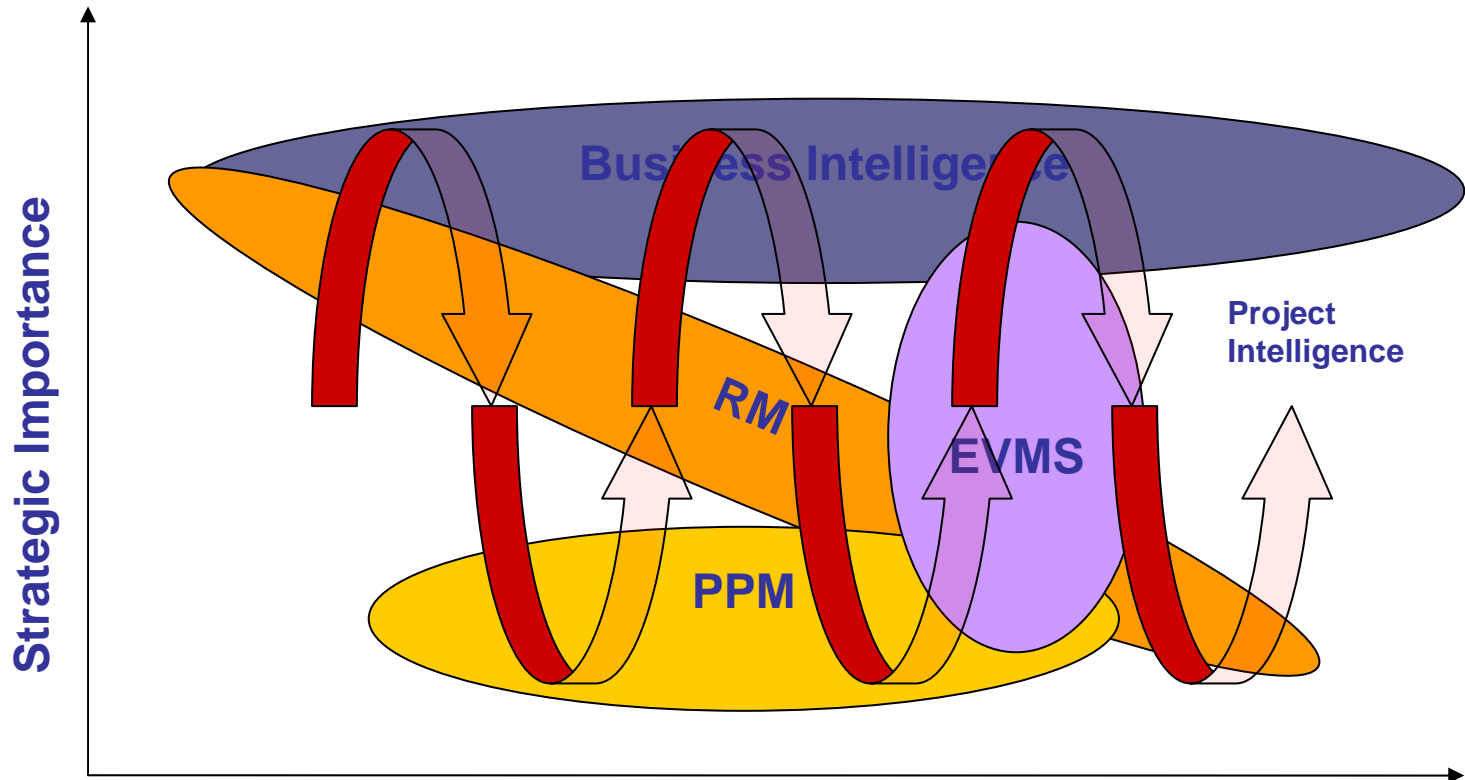
- Specialists in project risk intelligence software
 - Faithful to project schedules
 - Full RM system
 - 20 year history
- Global presence
 - Houston & London, sales, training & support centres
 - Network of 30+ resellers & partners
- Established user base
 - 6000+ implementations
- Vision: “Improved decision making through project intelligence”
 - “PI arena is largely focussed on project-led companies with a strong focus on Risk Management”
 - “Attracting users from PPM, BI and Risk & Compliance”

Deloitte.

Technology Fast 500
EMEA



Pertmaster & Project Intelligence



Phase I **Phase II** **Phase III** **Phase IV** **Phase V**
Opportunity Selection Planning Execution Operations

Project Intelligence = Information flow + analytical Interpretation

Cost Risk Types

“Simple Cost Estimates”

- Model
 - Cost line items
 - Pre-award phase
- Limitations
 - Not linked to a schedule
 - WAG estimates
- Provides
 - Capital investment estimate

“Schedule-based Estimates”

- Model
 - Costs based on resources
 - Uncertainty of units and rates
 - Partly schedule driven
- Limitations
 - Requires cost-loaded schedule
- Provides
 - Detailed project cash-flow

The Pain...

- Both methods historically divorced
 - Lack of information consistency
 - Re-work common
- Resource loaded schedules still a rarity
 - Cost estimates not linked to cost-loaded schedules
 - Cost spreading is complex
- **New risk methodology is emerging to resolve this... (PI)**

The Solution: RLM (Risk Lifecycle Methodology)

- Closely tied to stage gate cycle
- Bridges gap between two risk techniques
 - *Qualitative*: Risk register analysis
 - *Quantitative*: Monte Carlo simulation
- Focus on combining cost risk approaches
 - Capital investment
 - Project cashflow

Project Phases & Varying Levels of Risk

Phase 1	Phase 2	Phase 3	Sanction	Phase 4	Phase 5
Opportunity (e.g. oil field)	Alternative Selection (rig A/B/C, own, lease)	FEED Front End Engineering Design		Execution Detailed Engineering & Procurement	Operations
WAG	-15% to +30% estimate	+/-10% Estimate		+/-3% Estimate	No estimate uncertainty
High estimate uncertainty, little known about risk events				Low degree of estimate uncertainty, main source of risk is discrete risk events	
Market/ investment risk analysis	Capital investment risk analysis	Schedule-based cost risk analysis		Risk event/register analysis	Risk event monitoring

Phase I & II

Alternate Candidate Analysis & Selection

- Simple Cost Estimate
- Link to ERP/external cost systems/XLS
- High degree of estimate uncertainty
- Optional probability modeling
- Nothing to do with a project schedule!!!

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Type a question for help

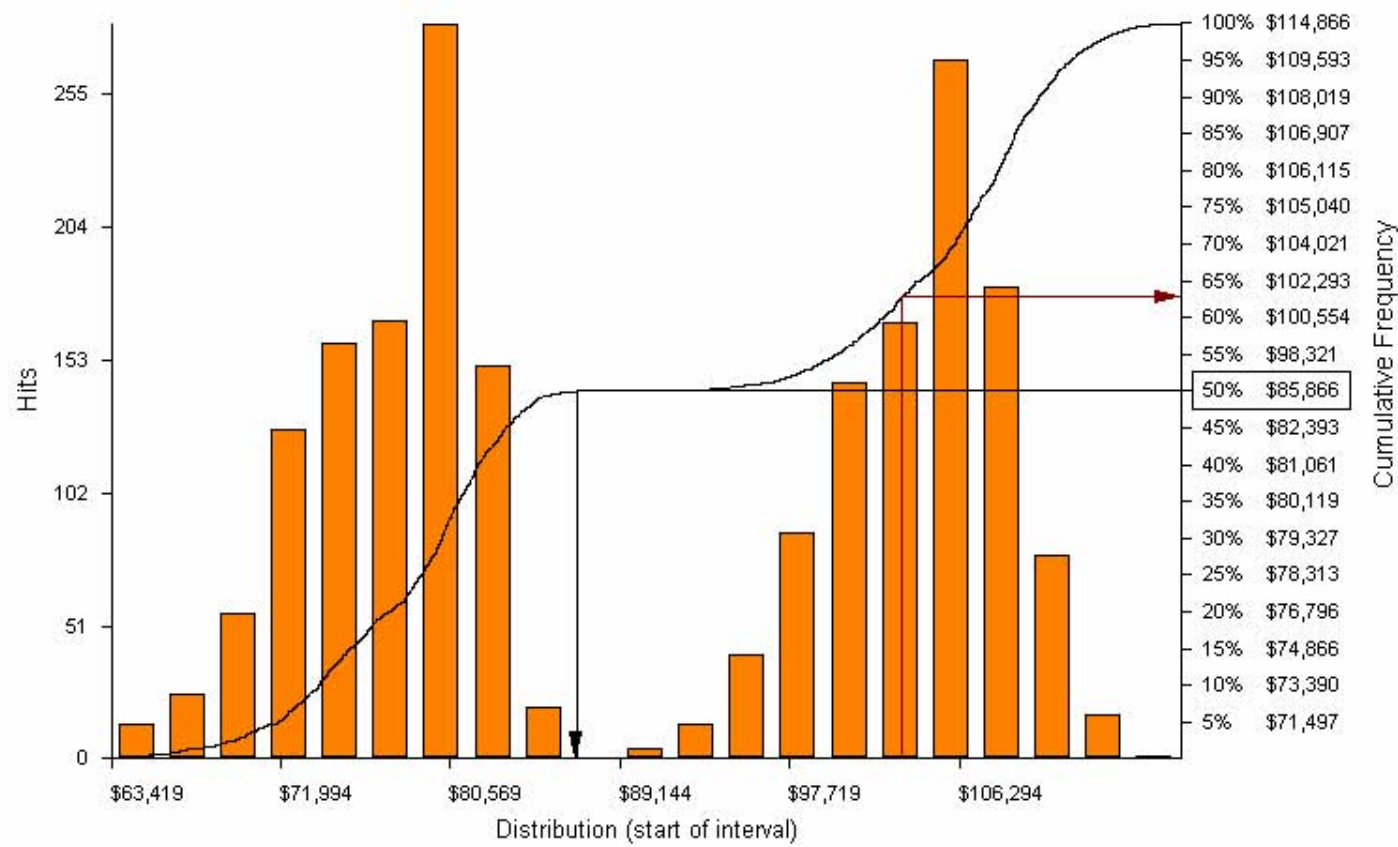
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Reply with Changes... End Review...

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	150	Initiate	100	\$4,500	\$5,000	\$6,250	0							
2	120	Design					28,000.00							
3	160	Initial Design	100	\$9,000	\$10,000	\$12,500	10,000.00							
4	170	Prototype A	100	\$2,250	\$2,500	\$3,125	2,500.00							
5	180	Prototype B	75	\$4,050	\$4,500	\$5,625	4,500.00							
6	190	Detailed Design A	100	\$3,600	\$4,000	\$5,000	4,000.00							
7	200	Detailed Design B	75	\$6,300	\$7,000	\$8,750	7,000.00							
8	130	Build					22,500.00							
9	210	Wiring	100	\$3,150	\$3,500	\$4,375	3,500.00							
10	230	Structural	100	\$13,500	\$15,000	\$18,750	15,000.00							
11	220	Finishes	100	\$3,600	\$4,000	\$5,000	4,000.00							
12	240	Testing					6,000.00							
13	250	QA	100	\$4,500	\$6,000	\$6,500	6,000.00							
14	140	Operate					45,000.00							
15	260	Phase I	100	\$20,000	\$20,000	\$25,000	20,000.00							
16	270	Phase II	50	\$25,000	\$25,000	\$31,250	25,000.00							
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Entire Plan : Cost



Analysis

Iterations: 2000

Statistics

Mean: \$90,880

Selected Confidence

50%: \$85,866
 Deterministic Cost: \$101,500
 Probability: 63%

Cumulative Frequency

Pertmaster Ltd

Demo: Simple Cost Estimate



Phase III

“Front End Engineering Design”

- Schedule-based cost risk analysis
- Estimate uncertainty still dominant
- Cost-loaded schedule required
- Linking cost estimates to detailed schedule is bottleneck
- **Unique risk loading technique ...**

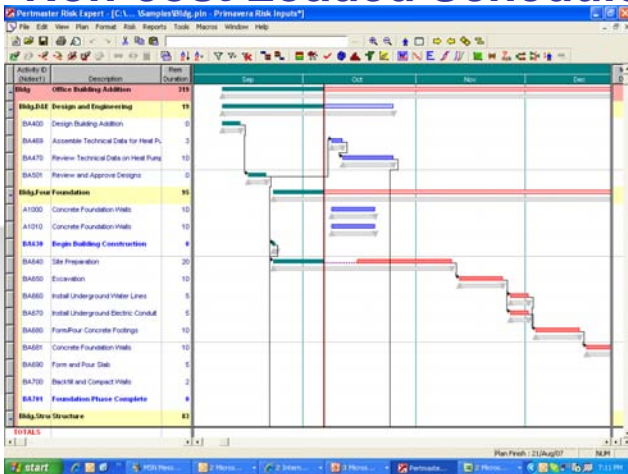
Phase III

Initial Cost Estimate

Microsoft Excel - CostEstimate.xls

Cost ID	Cost Description	Cost Type	Total cost	Loading	Min (%)	Likely (%)	Max (%)
LAB	Welders	Labor	23,000.00	Daily			
LAB2	Plumbers	Labor	48,000.00	Daily			
PIPES	Spacer Subs	Materials	10,000.00	Spread	95.00%	100.00%	110.00%
STEEL	Retainer Valves	Materials	12,500.00	Spread	90.00%	100.00%	120.00%
WIDGETS	Control valves	Materials	64,000.00	Front	80.00%	100.00%	140.00%
CRANES	THRT Adaptor	NonLabor	12,324.00	Daily			
BARGES	Shipping Baskets	NonLabor	21,343.00	Spread	93.00%	100.00%	123.00%
PEN1	Penalties	Expenses	1,000.00	Back	99.00%	100.00%	105.00%

Non-cost Loaded Schedule



Microsoft Excel - CostEstimate.xls

Cost ID	LAB	LAB2	PIPES	STEEL	EXCAVATO	OPERATOR	BARGES	PE
Cost	£23,000.00	£48,000.00	£10,000.00	£12,500.00	£64,000.00	£12,324.00	£21,343.00	£1,000.00
Remaining	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Name	Description	Duration	Start	Remaining
PROJECT	Office Building Addition	319	07/10/2006	1.00%
WBS.305E	Design and Engineering	19	07/10/2006	
BA400	Design Building Addition	0	08/09/2006	
BA469	Assemble Technical Data	3	09/10/2006	1.00%
BA470	Review Technical Data on	10	12/10/2006	
BA501	Review and Approve Desig	5	16/09/2006	
WBS.305E	Foundation	95	07/10/2006	
A1000	Concrete Foundation Wall	10	09/10/2006	2.00%
A1010	Concrete Foundation Wall	10	09/10/2006	10.00%
BA630	Begin Building Constructi	0	23/09/2006	2.00%
BA640	Site Preparation	20	16/10/2006	10.00%
BA650	Excavation	10	13/11/2006	22.00%
BA660	Install Underground Water	5	27/11/2006	10.00%
BA670	Install Underground Electr	5	27/11/2006	10.00%
BA680	Form/Pour Concrete Foot	10	04/12/2006	22.00%
BA681	Concrete Foundation Wall	10	18/12/2006	10.00%
BA690	Form and Pour Slab	5	01/01/2007	2.00%
BA700	Backfill and Compact Wal	2	08/01/2007	10.00%
BA701	Foundation Phase Comple	0	10/01/2007	2.00%
WBS.305E	Structure	83	10/01/2007	2.00%
WBS.306I	Mechanical/Electrical Syst	296	26/10/2006	5.00%
WBS.306E	Exterior Finishes	230	07/10/2006	9.00%
WBS.306I	Interior Finishes	317	09/10/2006	5.00%

	B	C	D	E	F	G	H	I	J	K	L	
1	C:\Documents and Settings\rusty.PERTMASTER\My Documents\My Plans\Bldg.pln											
2												
3				Cost ID	LAB	LAB2	PIPES	STEEL	EXCAVATO	OPERATOR	BARGES	PE
4				Cost	£23,000.00	£48,000.00	£10,000.00	£12,500.00	£64,000.00	£12,324.00	£21,343.00	£1
5				Remaining	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5				Remaining	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
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12	BA501	Review and Approve Desig	0	16/09/2006					6.00%			
13	WBS.305E	Foundation	95	07/10/2006	2.00%		2.00%					
14	A1000	Concrete Foundation Wall	10	09/10/2006		10.00%	2.00%					
15	A1010	Concrete Foundation Wall	10	09/10/2006	2.00%	10.00%	2.00%					
16	BA630	Begin Building Constructic	0	23/09/2006	2.00%	10.00%	2.00%					
17	BA640	Site Preparation	20	16/10/2006		10.00%	2.00%					
18	BA650	Excavation	10	13/11/2006	22.00%		2.00%					
19	BA660	Install Underground Water	5	27/11/2006		10.00%	2.00%					
20	BA670	Install Underground Electri	5	27/11/2006		10.00%	2.00%					
21	BA680	Form/Pour Concrete Footi	10	04/12/2006	22.00%	10.00%	2.00%					
22	BA681	Concrete Foundation Wall	10	18/12/2006		10.00%	2.00%					
23	BA690	Form and Pour Slab	5	01/01/2007		10.00%	2.00%					
24	BA700	Backfill and Compact Wal	2	08/01/2007		10.00%	2.00%					
25	BA701	Foundation Phase Comple	0	10/01/2007			2.00%					
26	WBS.306C	Structure	83	10/01/2007			2.00%					
34	WBS.3061	Mechanical/Electrical Syste	296	26/10/2006			2.00%		5.00%			
56	WBS.3062	Exterior Finishes	230	07/10/2006					8.00%			
72	WBS.3063	Interior Finishes	317	09/10/2006					5.00%			
95												
96												
97												



Risk Analysis Options

General

Analyse for iterations.

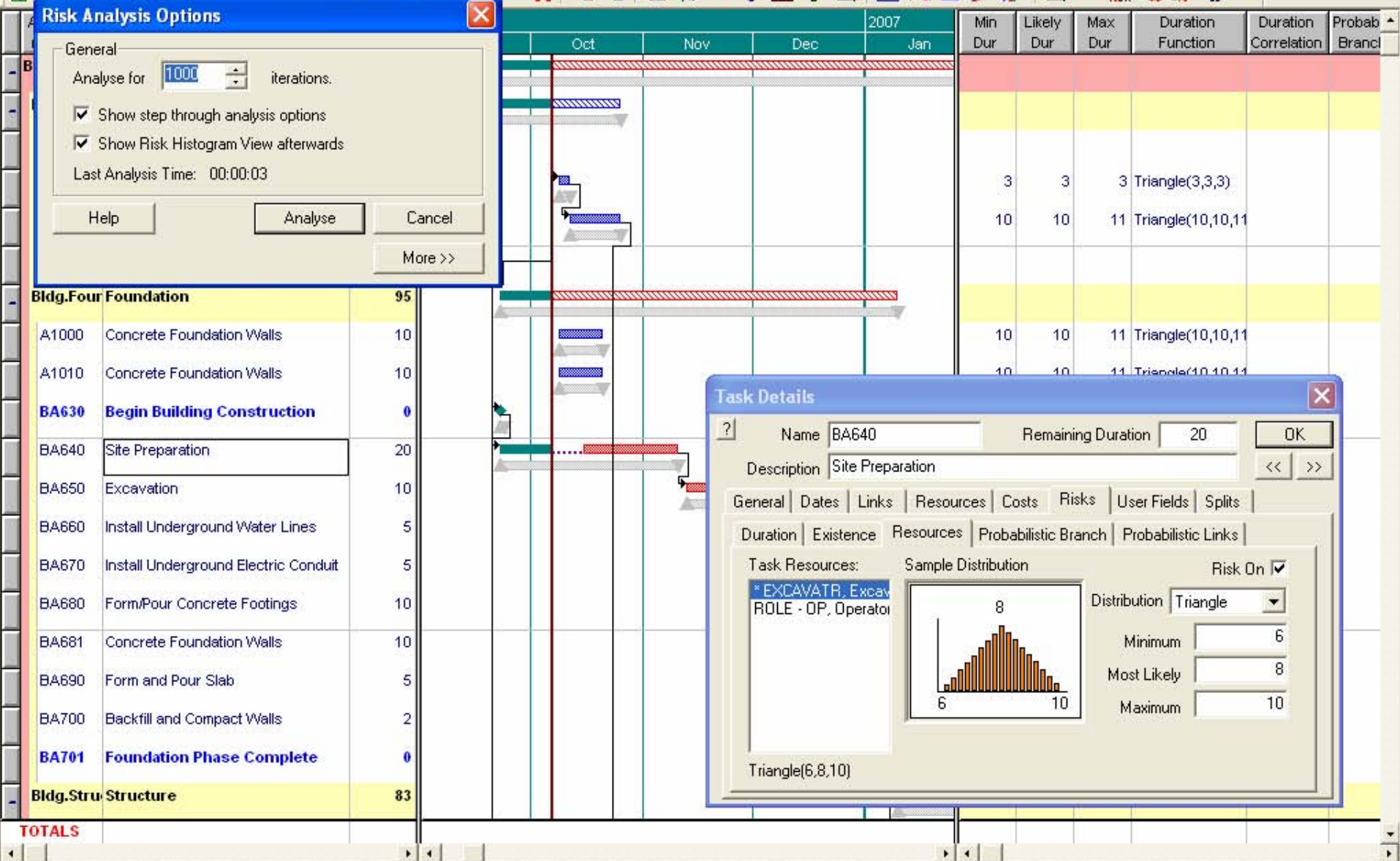
Show step through analysis options

Show Risk Histogram View afterwards

Last Analysis Time: 00:00:03

Help Analyse Cancel

More >>



Task Details

Name: BA640 Remaining Duration: 20

Description: Site Preparation

General Dates Links Resources Costs Risks User Fields Splits

Duration Existence Resources Probabilistic Branch Probabilistic Links

Task Resources: EXCAVATR, Excav ROLE - OP, Operator

Sample Distribution Risk On

Distribution: Triangle

Minimum: 6 Most Likely: 8 Maximum: 10

Triangle(6,8,10)

Demo 2: Schedule-Based Cost Risk Analysis



Phases IV/V

Execution & Operations

- Little estimate uncertainty
- Risk events higher importance
 - Append previous model
- **Unique qualitative/quantitative cost risk**

Demo 3: Risk Register



Talk to us at our Booth



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- ✓ Oil & Gas/EPC
- ✓ Government/Federal
- ✓ Manufacturing
- ✓ IT
- ✓ Construction