

estimate

estimate • analyze • plan • control

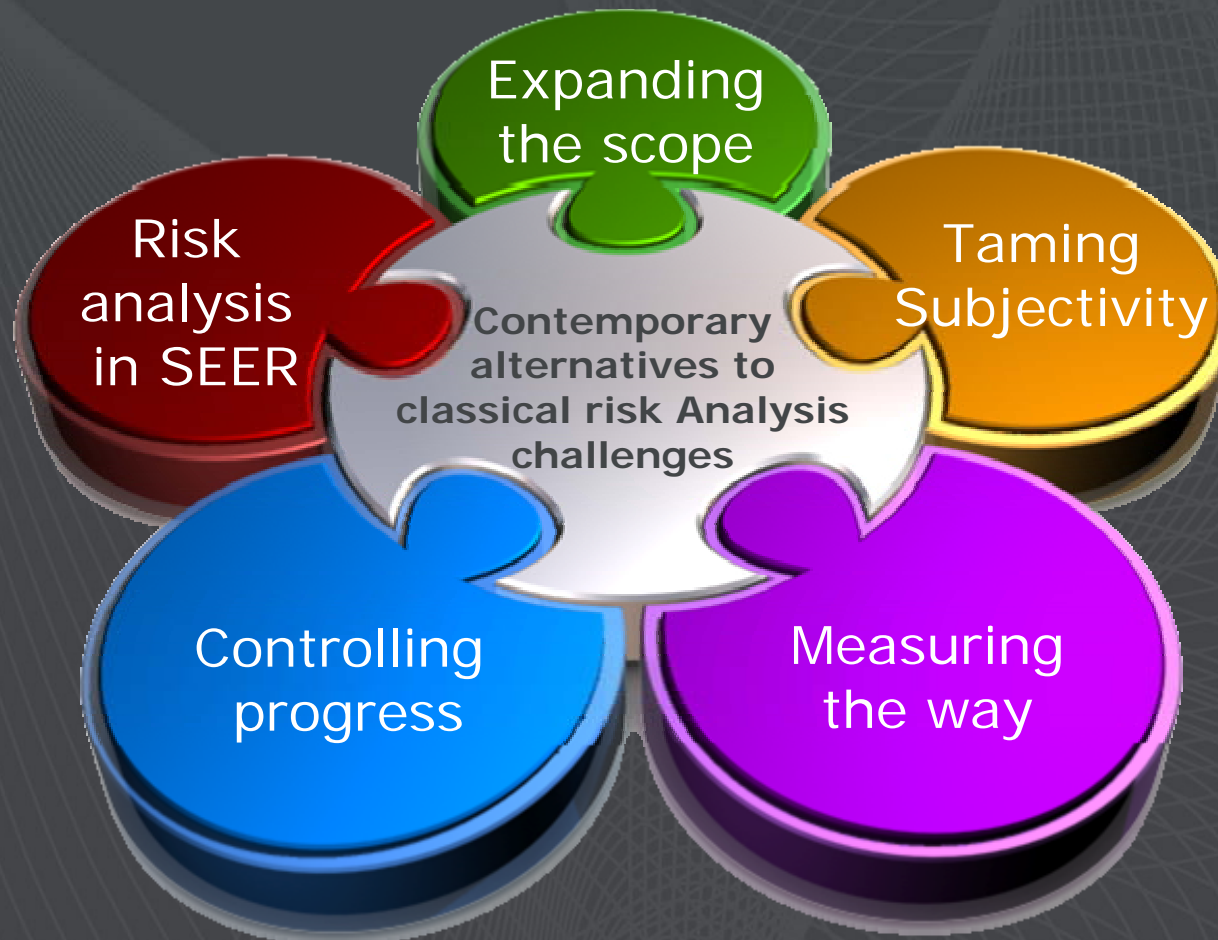
Contemporary alternatives to classical risk analysis challenges

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Contemporary alternatives to classical risk analysis challenges



Contemporary alternatives to classical risk analysis challenges



Risk Analysis in SEER



- Galorath is meeting this challenge in two ways:
 - Working with SEER users to fully exploit SEER's embedded risk analysis capability
 - Developing interface modules to leading edge COTS risk analysis tools



Define Uncertainty

Simulate outcomes

Correlate Variables

Risk Analysis in SEER

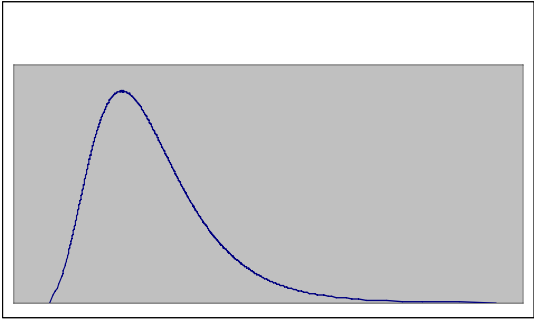
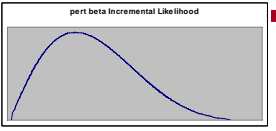
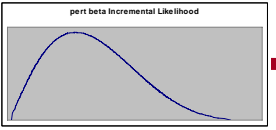
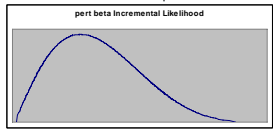


Project WBS

- ERP Example - GKO Console System Implementation Release
 - 1.1 Core Portal Services
 - 1.1.1 Core Portal Services Release A
 - 1.1.1.1 SAP Release A
 - 1.1.1.2 Portal Development - Portlets
 - 1.1.1.3 Portal Development - Remote Function Calls to SBW
 - 1.1.1.4 Portal Development - Java Service Enhancements
 - 1.1.1.5 RICE Components
 - 1.1.1.6 RICE SAP Enhancements
 - 1.1.2 Core Portal Services Release B
 - 1.1.2.1 SAP Release B
 - 1.1.2.2 Portal Development - Portlets
 - 1.1.2.3 Portal Development - Remote Function Calls to SBW
 - 1.1.2.4 Portal Development - Java Service Enhancements
 - 1.1.2.5 RICE Components
 - 1.1.2.6 RICE SAP Enhancements
 - 1.1.3 Core Portal Services Release C
 - 1.1.3.1 SAP Release C
 - 1.1.3.2 SAP Pre-existing Configuration Modifications
 - 1.1.3.3 Portal Development - Portlets
 - 1.1.3.4 Portal Development - Remote Function Calls to SBW
 - 1.1.3.5 Portal Development - Java Service Enhancements
 - 1.1.3.6 RICE Components
 - 1.1.3.7 RICE SAP Enhancements
 - 1.2 Console
 - 1.2.1 Console Release 1
 - 1.2.1.1 Rules Repository
 - 1.2.1.1.1 Custom
 - 1.2.1.1.2 COTS
 - 1.2.1.2 Rules Execution
 - 1.2.1.2.1 Custom
 - 1.2.1.2.2 COTS
 - 1.2.1.3 Analysis Server
 - 1.2.1.4 Database
 - 1.2.2 Console Release 2
 - 1.2.2.1 AI Server
 - 1.2.2.1.1 Custom
 - 1.2.2.1.2 COTS
 - 1.2.2.2 Data Connections
 - 1.2.2.3 Consolidate Platform Targets
 - 1.2.2.3.1 COTS
 - 1.2.3 Console Release 3
 - 1.2.3.1 Decision Filter
 - 1.2.3.1.1 Custom
 - 1.2.3.1.2 COTS
 - 1.2.3.2 Risk Management
 - 1.2.3.2.1 Custom
 - 1.2.3.2.2 COTS
 - 1.2.3.3 Data Connections

Parameters - Program: Tactical Simulation

- LINES (Classic)			
New Lines of Code	26,000	30,000	36,000
- Pre-exists, not designed for reuse	1,725	5,775	16,050
Pre-existing lines of code	70,000	70,000	70,000
Lines to be deleted in pre-exstg	40,000	40,000	40,000
Redesign required	5.00%	10.00%	40.00%
Reimplementation required	1.00%	5.00%	10.00%
Retest required	10.00%	40.00%	100.00%
+ Pre-exists, designed for reuse	n	n	n



Outputs

Monte Carlo Simulation

Inputs (Pert Beta)

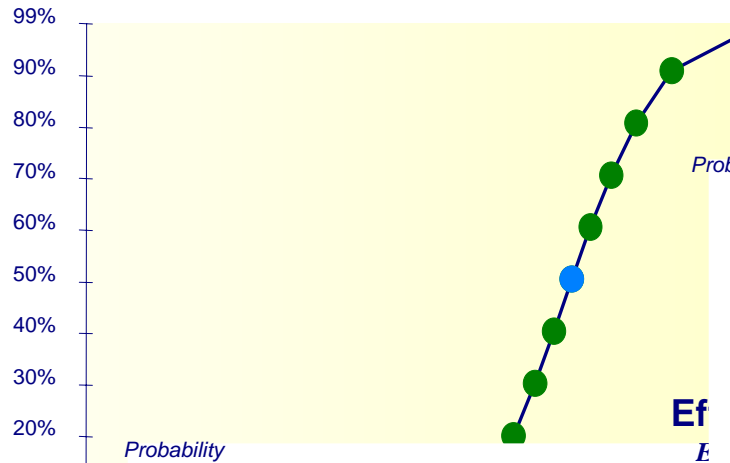


Risk Analysis in SEER

Schedule Probability

Example Application 1

Probability



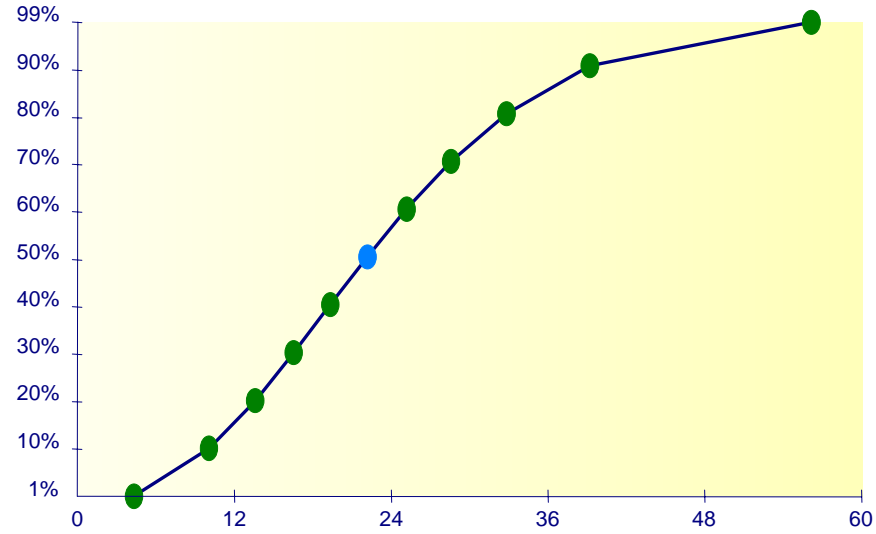
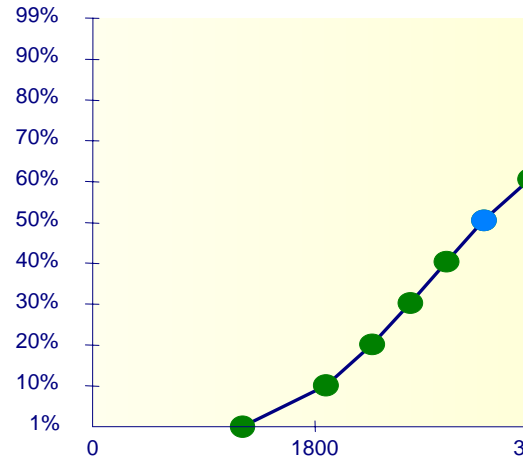
Defects Probability

Example Application 1

Probability

E_f
 E

Probability



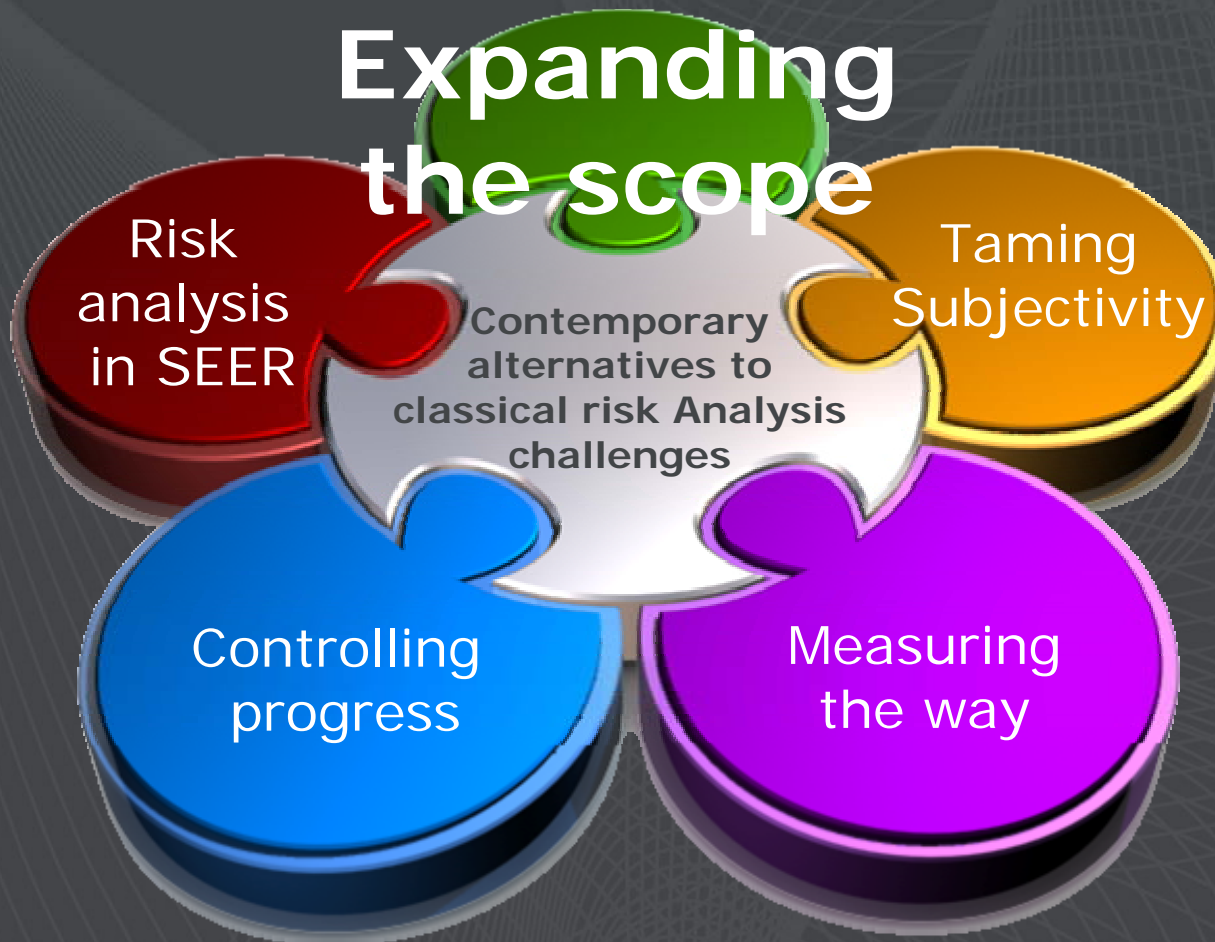
Defects (count)

0 1800 3600 5400 7200 9000

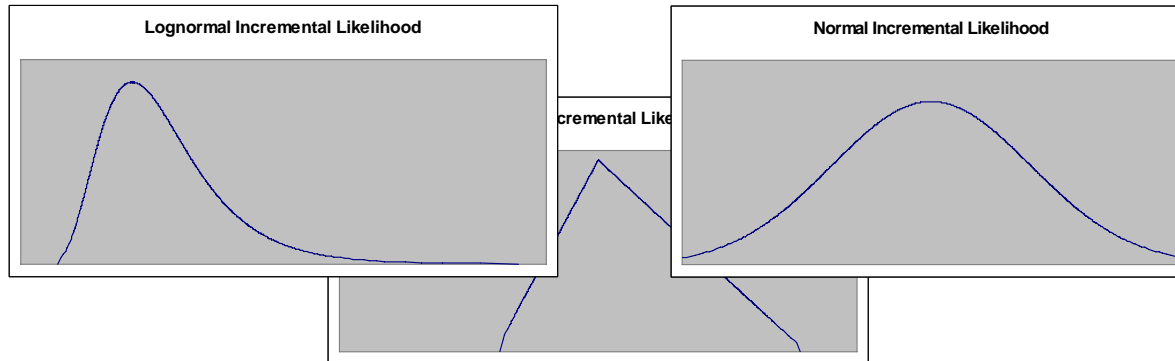
Effort (person-hours)

Contemporary alternatives to classical risk analysis challenges

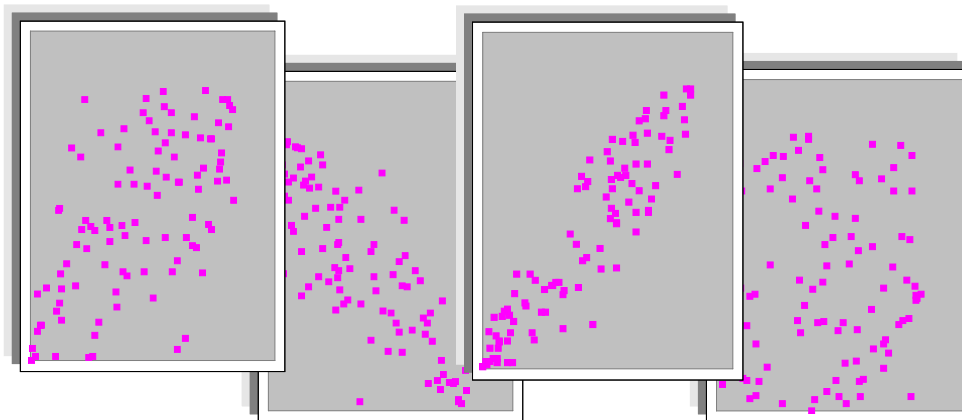
Expanding the scope



Expanding the scope



Distributions



Correlation



Expanding the scope

- Interface for SEER for Software & SEER for Hardware
- Use MS Excel as interfacing environment
 - Load parameter setting into Excel
 - Least, Most, Highest
 - Maintain model WBS structure
 - Could be several thousand lines deep
 - Reformat into Crystal Ball (CB) input format
 - Select distribution curve
 - Default will be either lognormal or triangular
 - User definable
 - Based on Least/Most/Highest values
 - CB Monte Carlo run stepwise
 - Each iteration results drives a unique SEER run
 - Cost estimate captured
 - CB triggered to run next iteration
 - Cycle until simulation is complete



Expanding the scope

Assumption Cells
Import New SEER-H Inputs

Rerun Risk Analysis on currently imported SEER-H data:
Rerun Analysis

Work Element Name	Type	Outline Number	Parameter Name	Least	Likely	Most
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Weight	4131	5362.705555	6800
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Volume	522	599.8939573	696
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Percent Aluminum/Malleable Metal	0.5	0.648386228	0.8
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Percent Composite	0.2	0.311301379	0.4
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Complexity of Form	4	4.502332505	7
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Complexity of Fit	4	7.237639606	8
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Construction Process	4	7.169698302	8
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	New Design	0.45	0.53484194	0.6
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Developer Capability & Experience	10	10.86257854	13
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Development Tools & Practices	10	12.29877455	13
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Requirements Volatility	6	8.399737979	13
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Production Experience	4	9.179557972	12
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Spares Lead Time (hours)	60	76.5969691	100
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Packing/Shipping	1.1	1.226856208	1.3
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Remove & Replace Time (hours)	1.5	3.558504591	6
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Condemnation Rate(L1)	0.01	0.020468828	0.03
Aerodynamic Wing Surface	Mechanical/Structural	1.1.1	Condemnation Rate(L2)	0	0.004588102	0.01



Expanding the scope

Results

Import New SEER-H Inputs

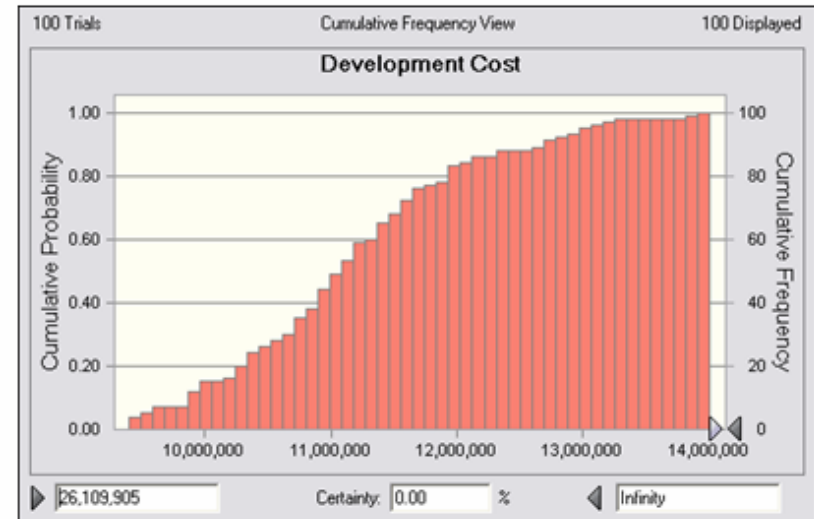
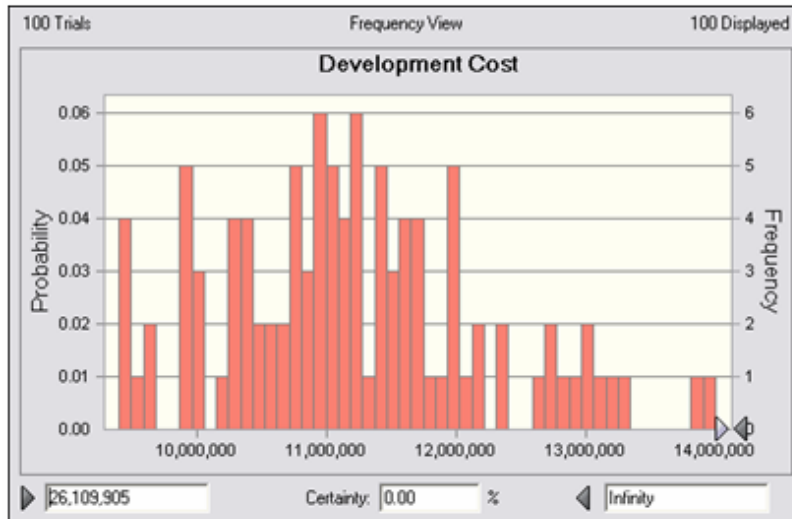
Define New Assumptions and Run Risk Analysis on currently imported SEER-H data:

Redefine Assumptions

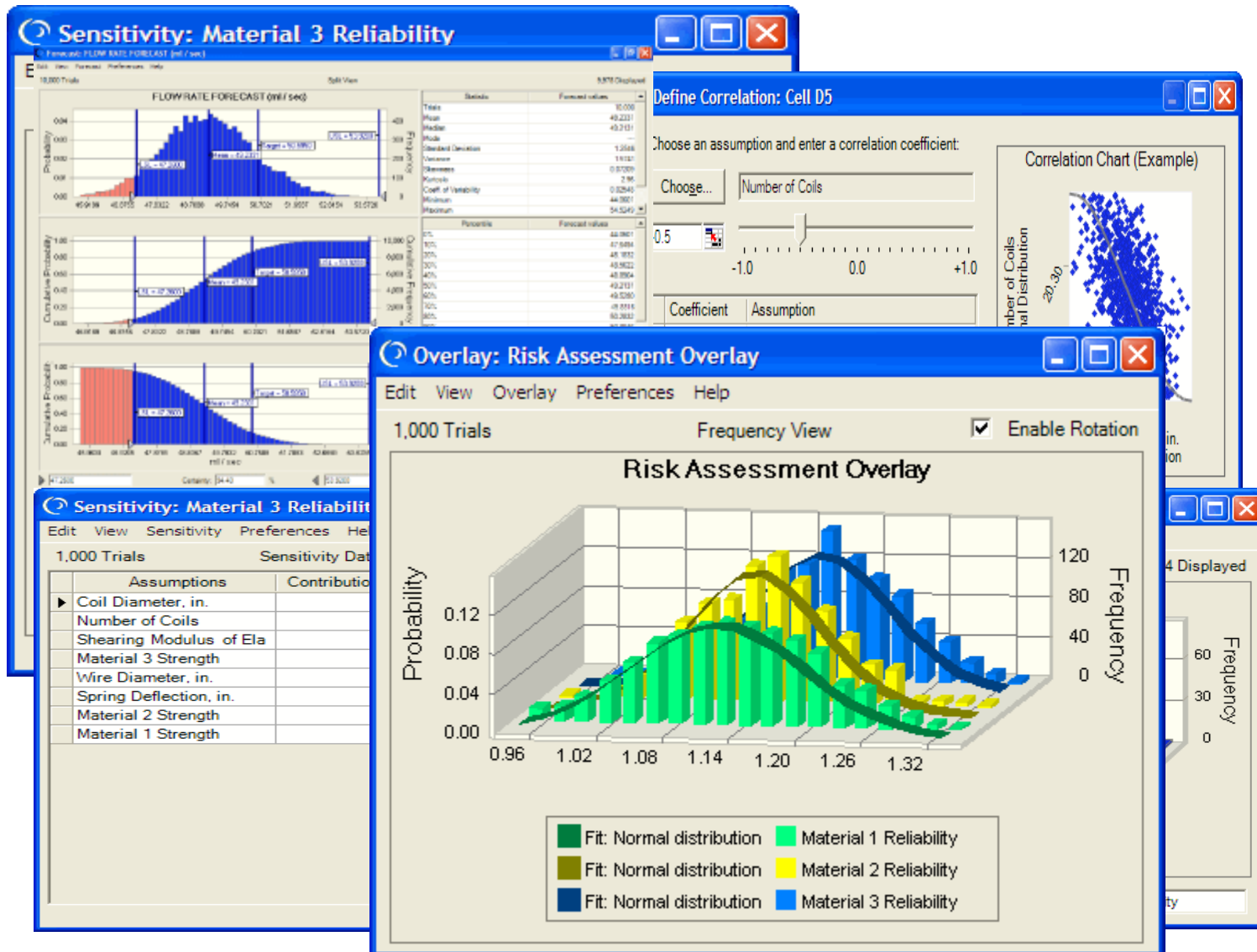
SEER-H Output Values	
Development Cost	11,350,971
Production Cost	53,472,374
Total Equipment Support Cost	944,395
Total System Level Cost	-
APUC	891,206
Total Cost	65,767,740

Initial SEER-H Output Values	
Development Cost	26,109,905
Production Cost	74,121,394
Total Equipment Support Cost	2,973,757
Total System Level Cost	-
APUC	1,235,357
Total Cost	103,205,056

Expected Values	
Development Cost	11,200,796
Production Cost	53,680,265
Total Equipment Support Cost	1,032,284
Total System Level Cost	-
APUC	894,671
Total Cost	65,913,344



Expanding the scope



The screenshot displays the SEER software interface with several overlapping windows:

- Sensitivity: Material 3 Reliability**: Shows a histogram of flow rate forecasts and a table of sensitivity data.
- Define Correlation: Cell D5**: A dialog box for defining a correlation coefficient for the 'Number of Coils' assumption, with a slider set to 0.5 and a 'Correlation Chart (Example)' showing a scatter plot.
- Overlay: Risk Assessment Overlay**: A 3D bar chart showing the probability distribution of flow rate forecasts, with three normal distribution fits overlaid for Material 1 Reliability (green), Material 2 Reliability (yellow), and Material 3 Reliability (blue).

Sensitivity: Material 3 Reliability - Sensitivity Data Table

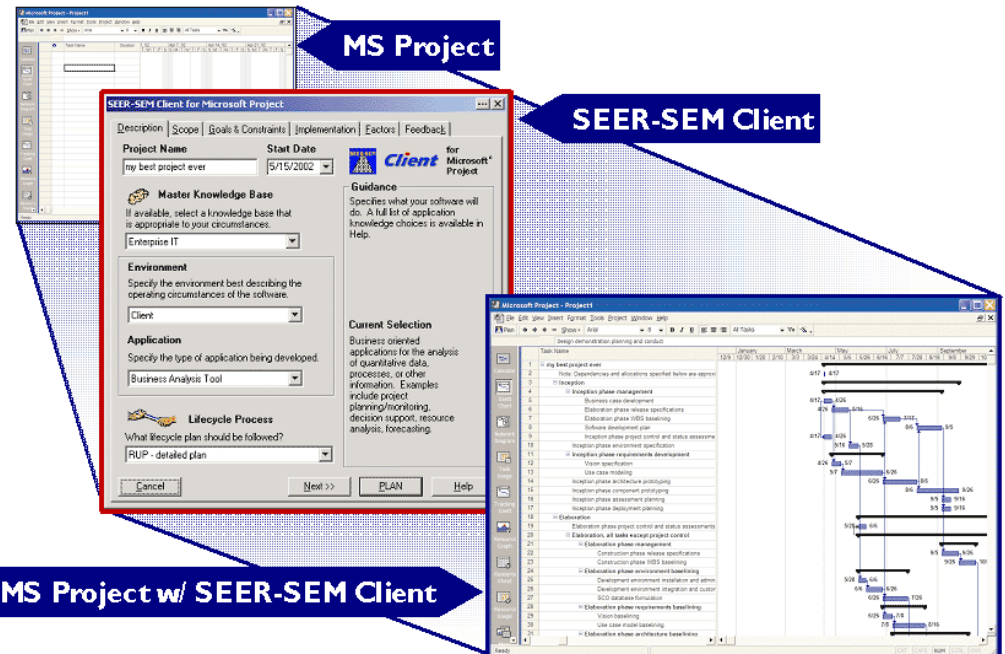
Assumptions	Contribution
Coil Diameter, in.	
Number of Coils	
Shearing Modulus of Ela	
Material 3 Strength	
Wire Diameter, in.	
Spring Deflection, in.	
Material 2 Strength	
Material 1 Strength	

Overlay: Risk Assessment Overlay - Legend

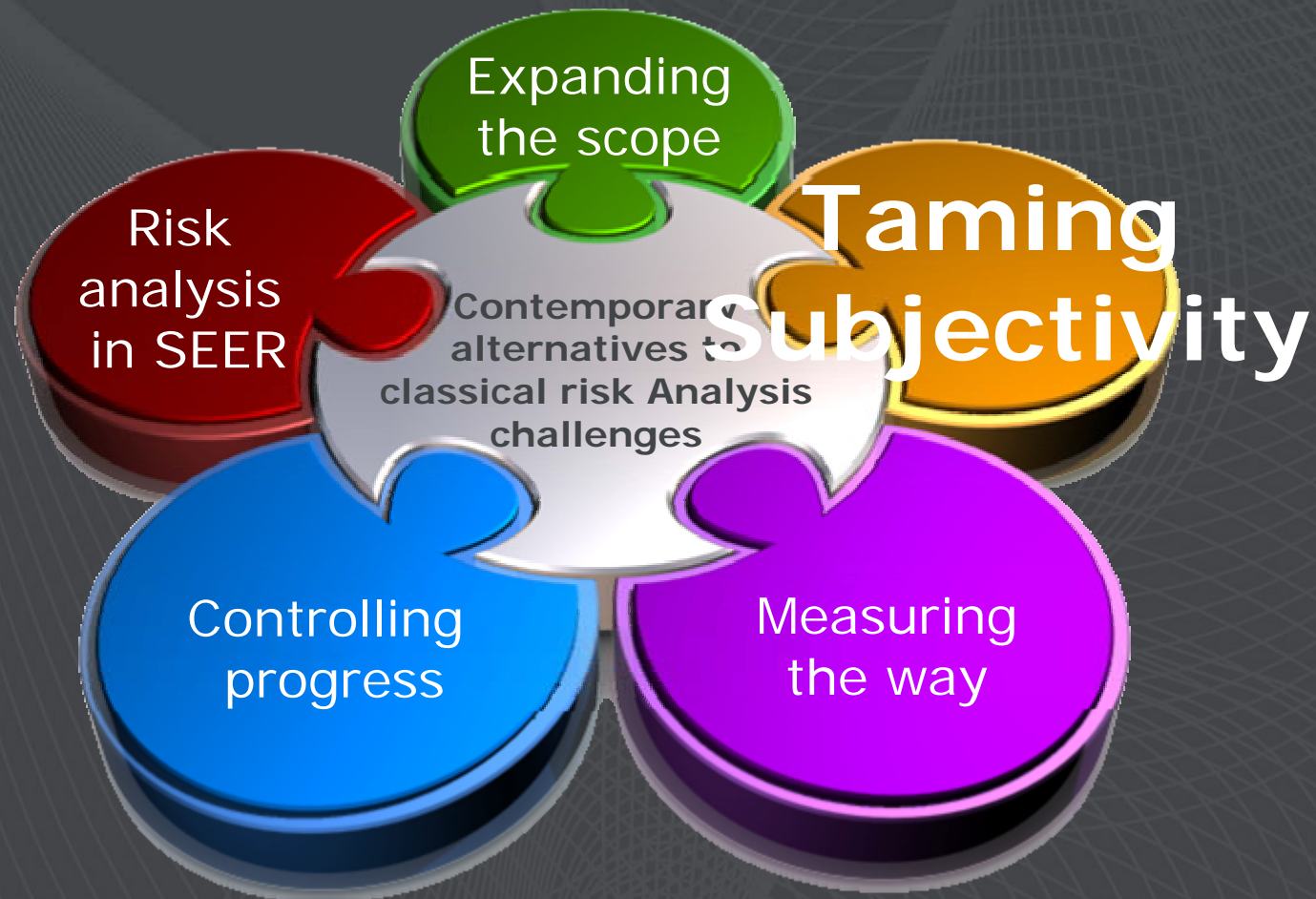
- Fit: Normal distribution (Green) - Material 1 Reliability
- Fit: Normal distribution (Yellow) - Material 2 Reliability
- Fit: Normal distribution (Blue) - Material 3 Reliability

Expanding the scope

- From SEER to Project
 - Automatically constructs complete project plan
 - Reflects your development methodology-dependencies
- Create custom life cycle templates.
- Customize labor categories reflecting your organizations
 - Task assignments to departments
 - Labor categories
- Accurately plan staff allocation for a project.

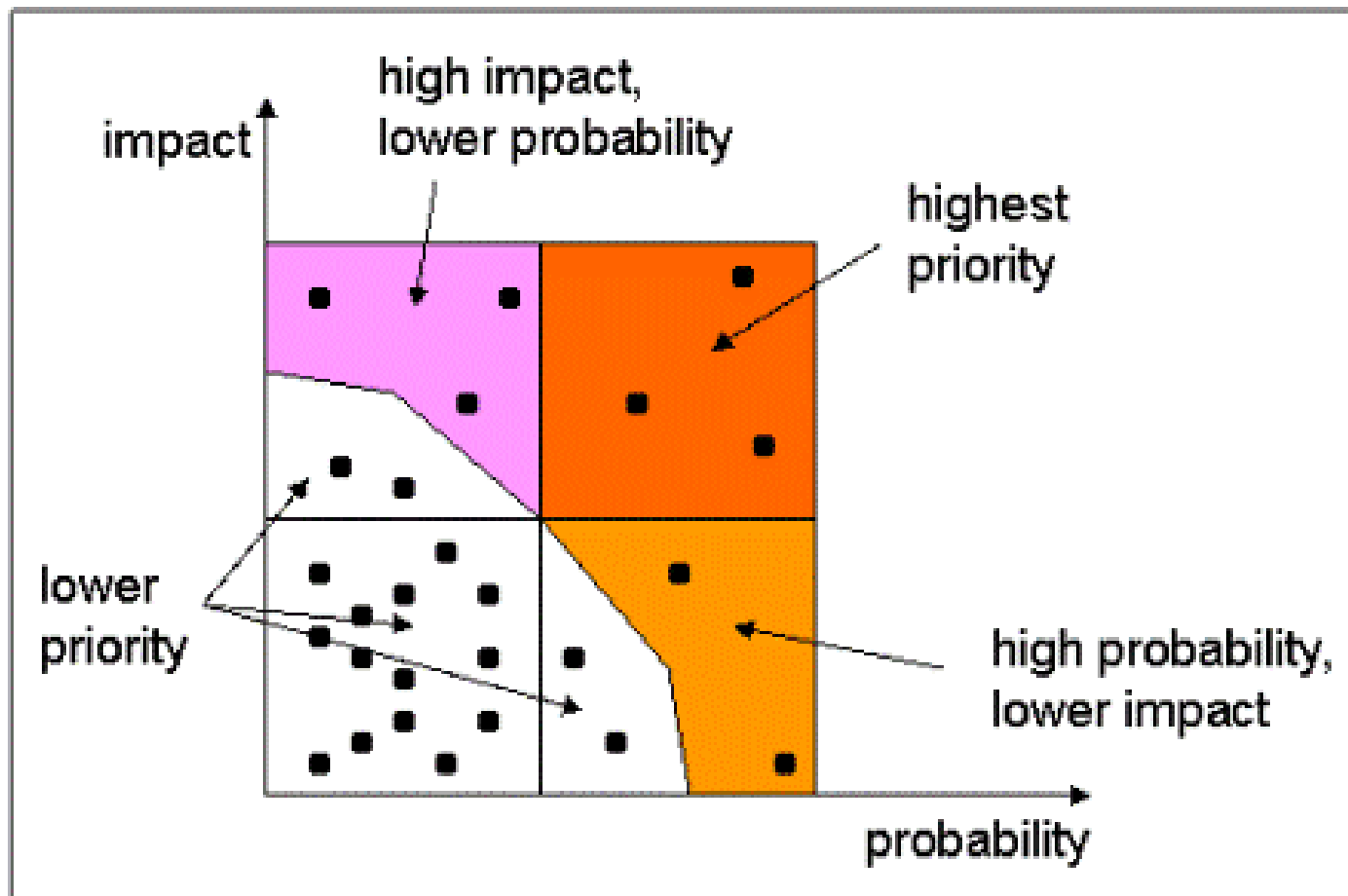


Contemporary alternatives to classical risk analysis challenges

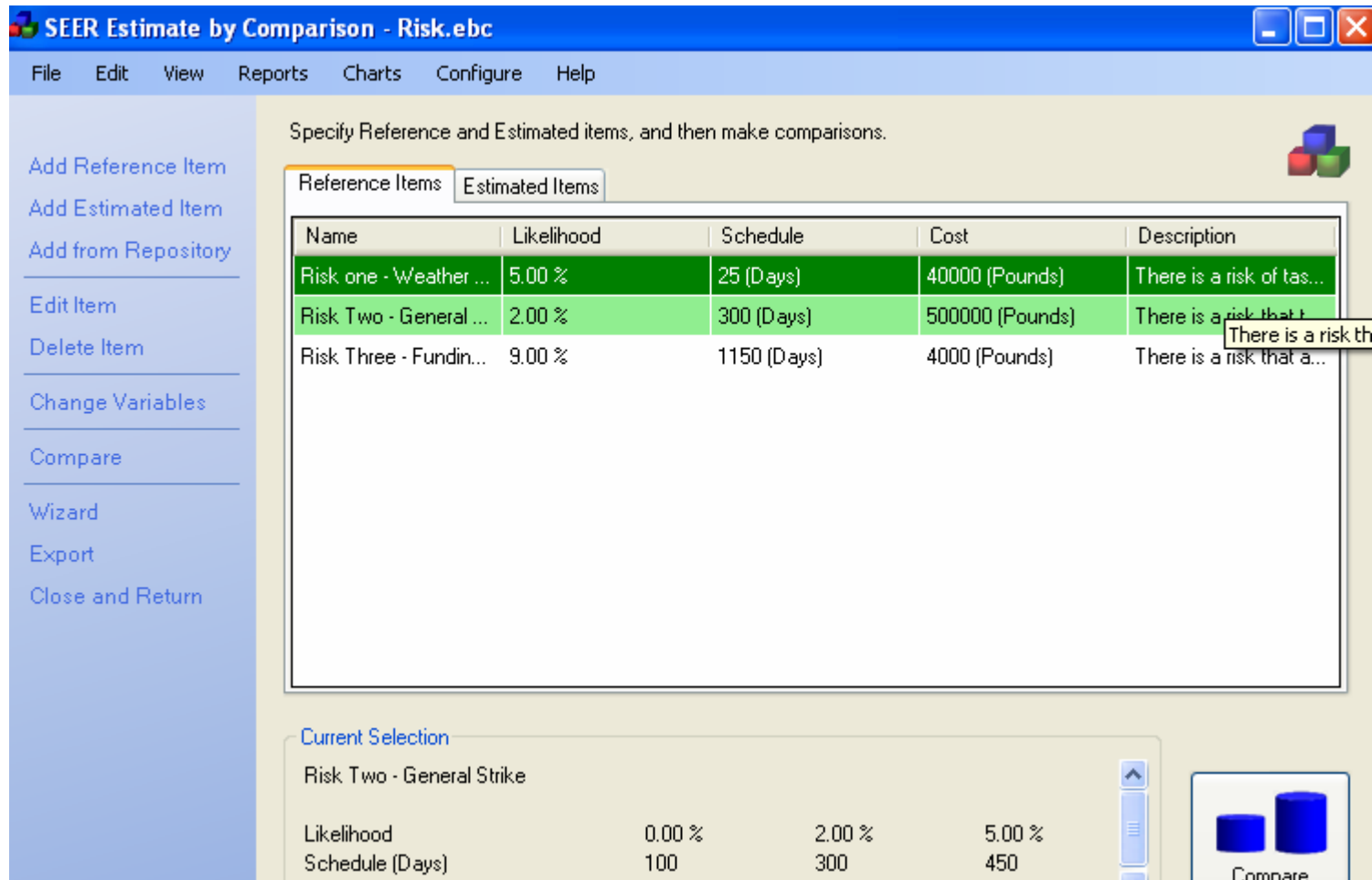


Taming Subjectivity

- Risk Exposure



Taming Subjectivity



SEER Estimate by Comparison - Risk.ebc

File Edit View Reports Charts Configure Help

Specify Reference and Estimated items, and then make comparisons.

Reference Items Estimated Items

Name	Likelihood	Schedule	Cost	Description
Risk one - Weather ...	5.00 %	25 (Days)	40000 (Pounds)	There is a risk of tas...
Risk Two - General ...	2.00 %	300 (Days)	500000 (Pounds)	There is a risk that t...
Risk Three - Fundin...	9.00 %	1150 (Days)	4000 (Pounds)	There is a risk that a...

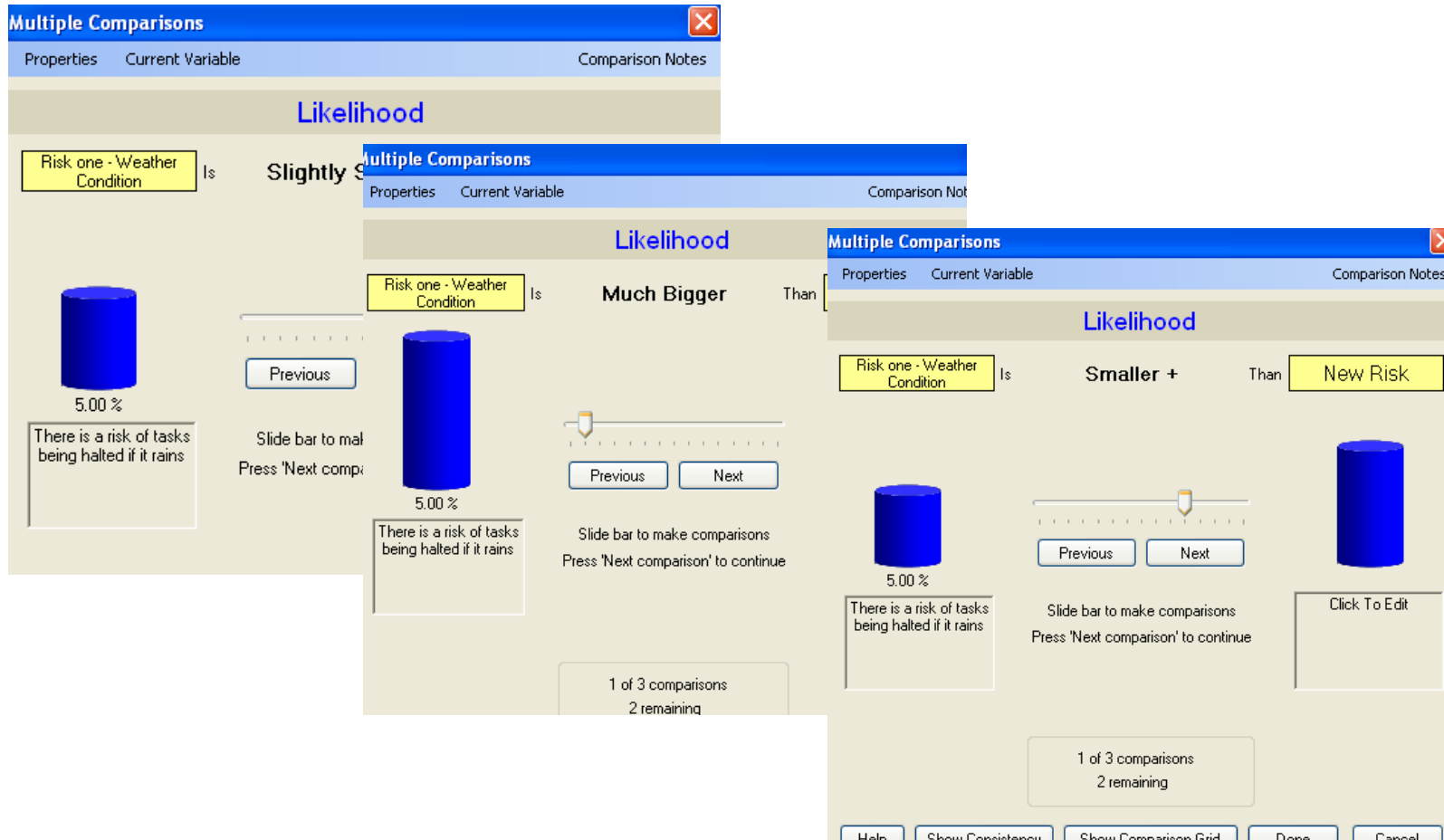
Current Selection

Risk Two - General Strike

Likelihood	0.00 %	2.00 %	5.00 %
Schedule (Days)	100	300	450

Compare

Taming Subjectivity



The image displays three overlapping screenshots of the SEER software interface, illustrating the process of comparing risks. Each screenshot shows a 'Multiple Comparisons' dialog box with tabs for 'Properties', 'Current Variable', and 'Comparison Notes'. The 'Likelihood' section is active in all three.

- Top Screenshot:** Shows a comparison between 'Risk one - Weather Condition' and 'New Risk'. The relationship is 'Slightly Smaller'. A blue cylinder represents 5.00% likelihood. A text box states: 'There is a risk of tasks being halted if it rains'. A 'Previous' button is visible.
- Middle Screenshot:** Shows the same 'Risk one - Weather Condition' compared to 'New Risk', but the relationship is 'Much Bigger Than'. A blue cylinder represents 5.00% likelihood. A text box states: 'There is a risk of tasks being halted if it rains'. 'Previous' and 'Next' buttons are visible. A status bar at the bottom indicates '1 of 3 comparisons 2 remaining'.
- Bottom Screenshot:** Shows the same 'Risk one - Weather Condition' compared to 'New Risk', with the relationship 'Smaller + Than'. A blue cylinder represents 5.00% likelihood. A text box states: 'There is a risk of tasks being halted if it rains'. A 'Click To Edit' button is visible. A status bar at the bottom indicates '1 of 3 comparisons 2 remaining'. At the very bottom, buttons for 'Help', 'Show Consistency', 'Show Comparison Grid', 'Done', and 'Cancel' are visible.



Taming Subjectivity

SEER Estimate by Comparison - Risk.etc

File Edit View Reports Charts Configure Help

Specify Reference and Estimated items, and then make comparisons.

Reference Items Estimated Items

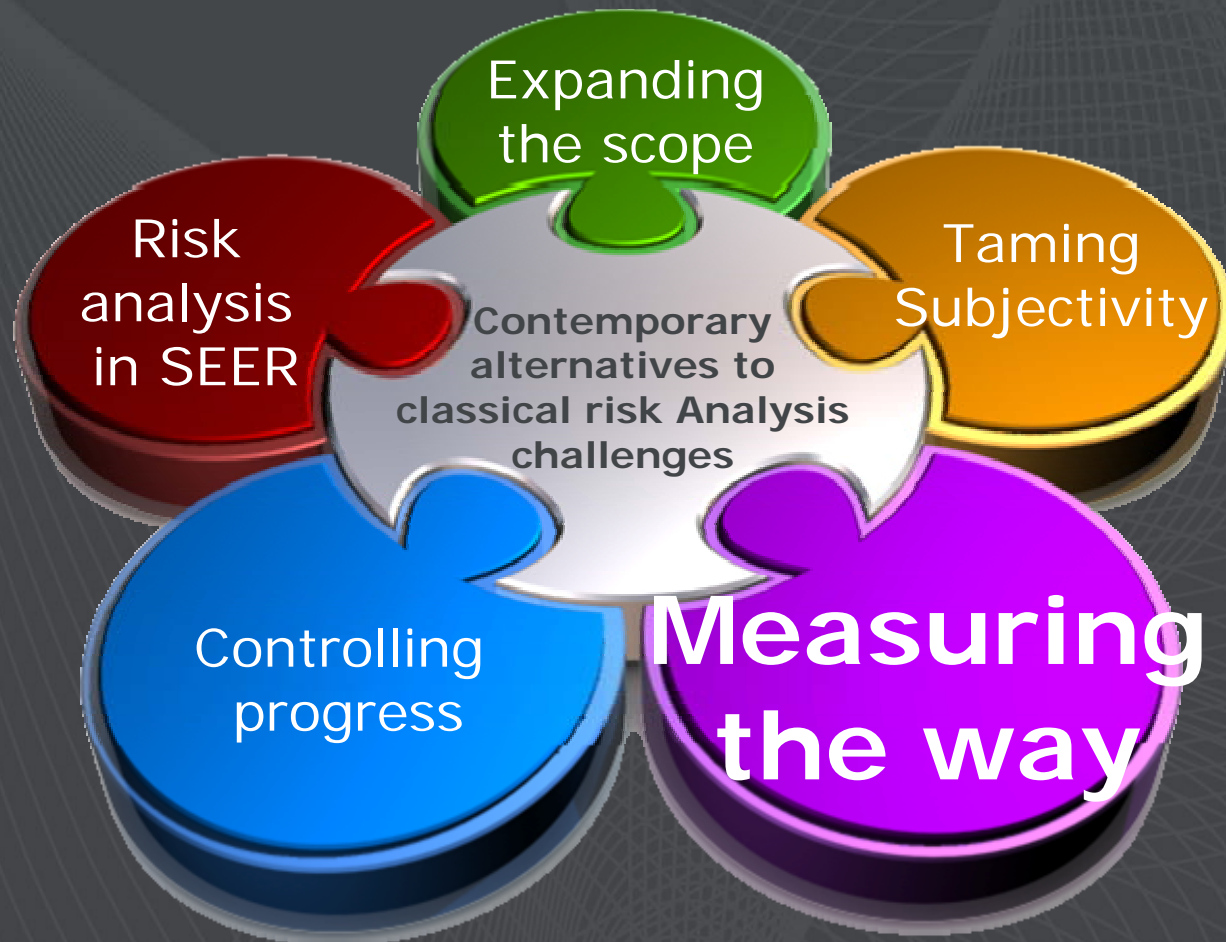
Name	Likelihood	Schedule	Cost	Description
New Risk	5.48 %	231 (Days)	50357 (Pounds)	

Current Selection

New Risk				
Likelihood	5.07 %	5.48 %	6.06 %	
Schedule (Days)	231	231	231	
Cost (Pounds)	50357	50357	50357	

Compare

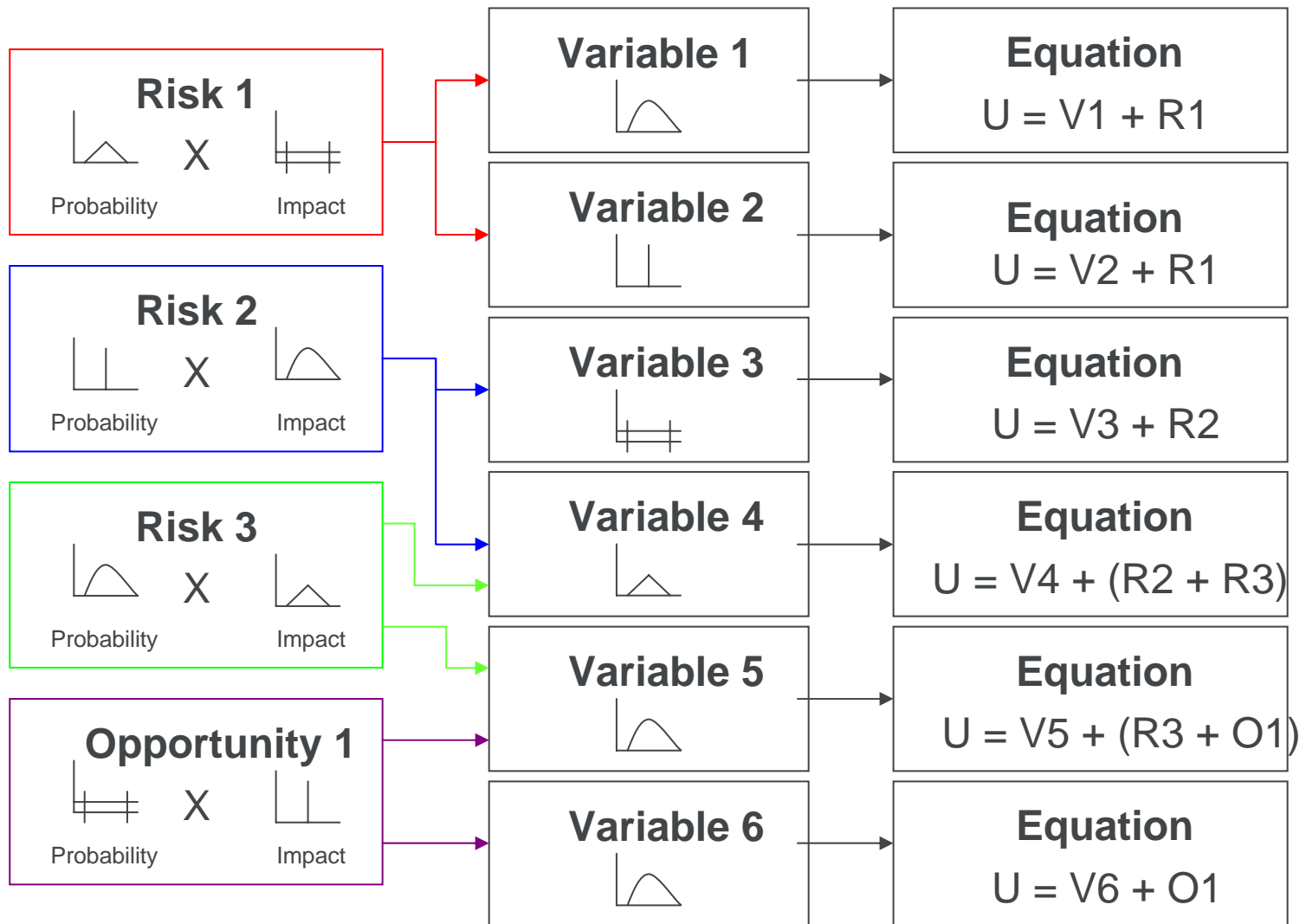
Contemporary alternatives to classical risk analysis challenges



Measuring the way



Measuring the way



Risk Register

Base Estimate

Contingency Estimate



Measuring the way








84
200
230
91
200
412
230
1447

Deterministic

Measuring the way

84
200
230
91
200
412
230
1447

Deterministic

Min	ML	Max	Dist
71	84	196	
116	200	456	
230		596	
71	91	196	
	200		
196	412	596	
	230		

Variability



Measuring the way

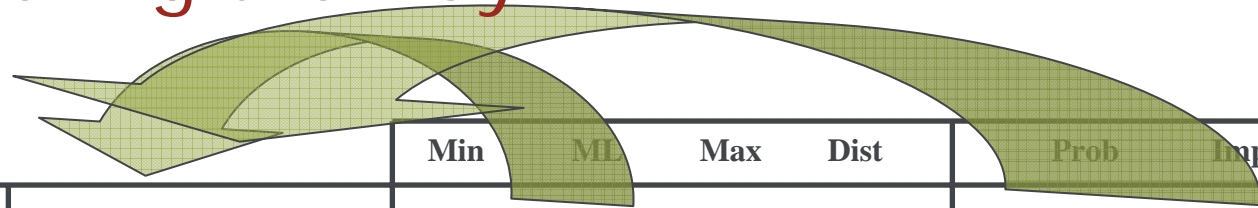
84
200
230
91
200
412
230
1447












Deterministic

Min	ML	Max	Dist	Prob	Imp.	Dist
71	84	196		R1 16 %	8	
116	200	456		R2 10%	6 15 110	
230		596		R3 5%	6 7 11	
71	91	196		R4 19%	1 27 211	
	200			O1 6 %	60 80 115	
196	412	596		O2 10%	26 96	
	230			O3 22 %	10 55 90	

Variability + Risks / Opportunity

Measuring the way



		Min	ME	Max	Dist	Prob	Imp.	Dist
84	80 + 0 = 80	71	84	196		R1 16 %	8	
200		116	200	456		R2 10%	6 15 110	
230		230		596		R3 5%	6 7 11	
91		71	91	196		R4 19%	1 27 211	
200			200			O1 6 %	60 80 115	
412		196	412	596		O2 10%	26 96	
230			230			O3 22 %	10 55 90	
1447								

Deterministic Uncertainty = Variability + Risks / Opportunity












Measuring the way

		Min	ML	Max	Dist	Prob	Imp.	Dist
84	80 + 0 = 80	71	84	196	∩	R1 16 %	8	
200		116	200	456	∧	R2 10%	6 15 110	∩
230		230		596	∩	R3 5%	6 7 11	∧
91		71	91	196	∧	R4 19%	1 27 211	∧
200			200			O1 6 %	60 80 115	∧
412	408 + (40 - 34) = 414	196	412	596	∧	O2 10%	26 96	∩
230			230			O3 22 %	10 55 90	∧
1447								

Deterministic + Uncertainty = Variability + Risks / Opportunity



Measuring the way

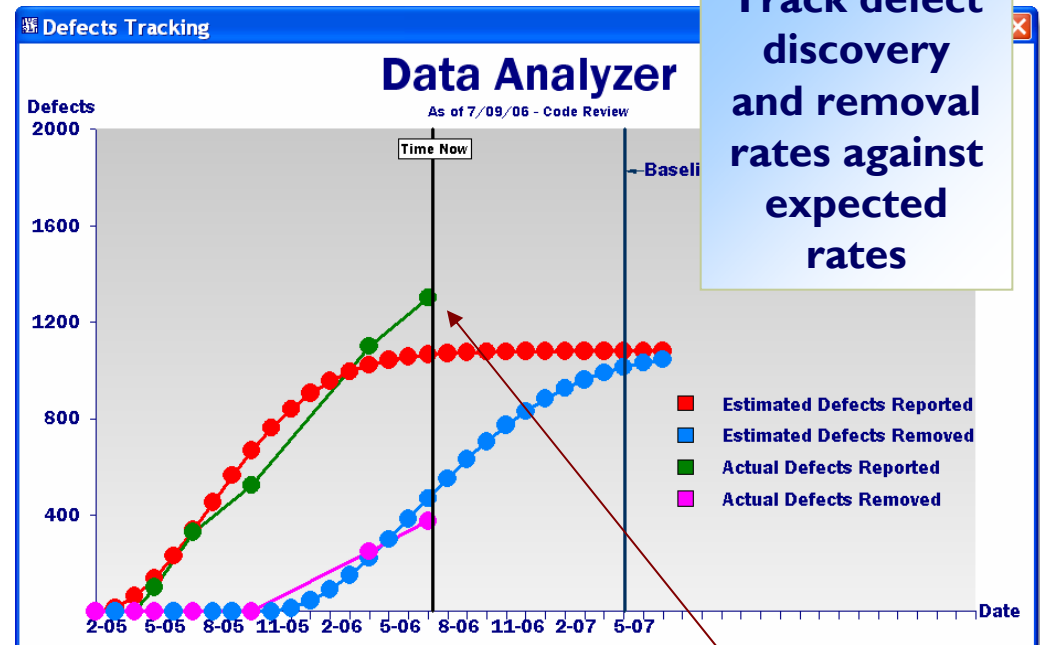
		Min	ML	Max	Dist	Prob	Imp.	Dist
84	$80 + 0 = 80$	71	84	196		R1 16 %	8	
200	$206 + (0 - 30) = 176$	116	200	456		R2 10%	6 15 110	
230	$400 + (8 - 0) = 408$	230		596		R3 5%	6 7 11	
91	$102 + (-2) = 100$	71	91	196		R4 19%	1 27 211	
200	$200 + (9 - 50) = 159$		200			O1 6 %	60 80 115	
412	$408 + (40 - 34) = 414$	196	412	596		O2 10%	26 96	
230	$230 + (8 + 7) = 245$		230			O3 22 %	10 55 90	
1447	1582							

Deterministic Uncertainty = Variability + Risks / Opportunity

Contemporary alternatives to classical risk analysis challenges



Controlling Progress



Health & Status Indicator					
	Schedule Variance	Time Variance	Cost Variance	Size Growth	Defects
Data Analyzer	WORSE	WORSE	WORSE	WORSE	WORSE

Controlling Progress

