Quantitative Risk Analysis for the Real World

Enterprise Perspective

Mahendra Nath,
ANZ, Regional Sales Manager

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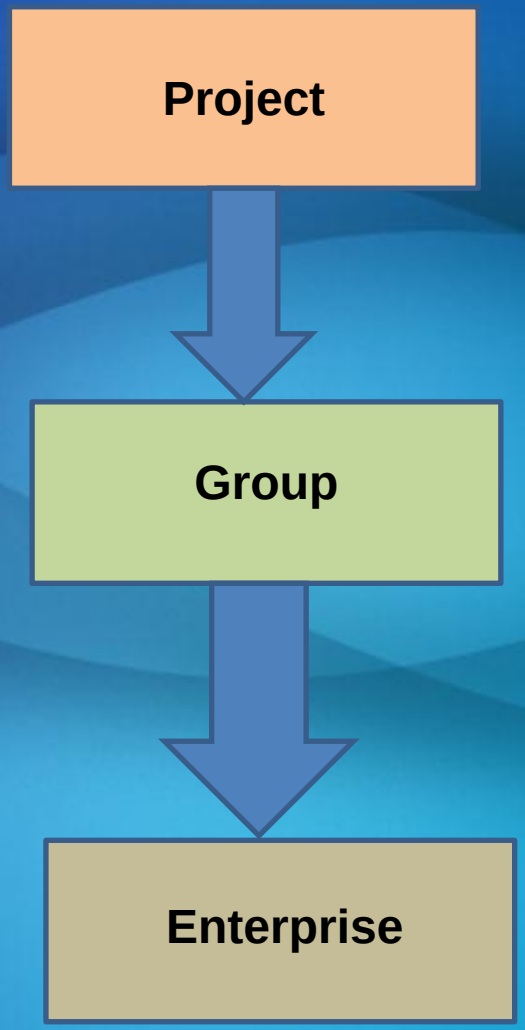
Risk always creates compounded effect across any organisation.



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Palisade Corporation

- Over **250,000 Users Worldwide**
- Over **2000 Companies in ANZ**
- Taught at Top 20 University programs around the world
- Used by **93% of Fortune 100 Companies**

» **Founded 1984**, Headquartered in **Ithaca, New York**

» **Offices**

» London, Sydney, Rio de Janeiro, and Tokyo.

» **Clients**

» **IBM, Procter & Gamble, AT&T, Microsoft, Ford, GE**

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Palisade Customers

Palisade Customers – Oil/Gas/Mining

Palisade Customers – Finance & Insurance

1 RISK

2 Qualitative & Quantitative RISK

3 RISK Management

4 Real-time RISK Management

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RISK is relevant only if affects your revenue, cost, brand, future directly or indirectly and most importantly your top line growth / sustainability

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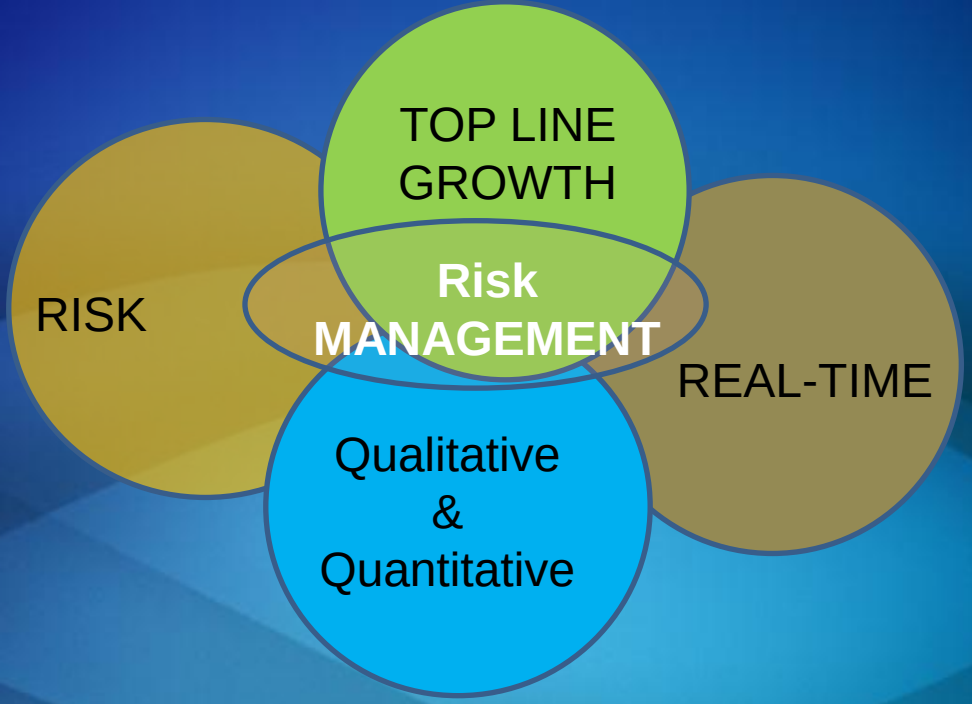

PRAGMATIC THINKING

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What is RISK

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Risk stops you from meeting your target

Risk is always financial in nature

Note: Brand/Reputation, Environmental, Project, Fraud and plethora of risk translates to direct or indirect financial loss irrespective of whether you are a state government body or public limited company.

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Why do you Communicate Risk ?
How do you Communicate Risk ?

- Enterprise
- Group
- Division
- Project - Internal/External
- Team

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What is Qualitative & Quantitative RISK

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Qualitative Risk Thinking

ISO 31000:2009
Generic guidelines –

Design, Implementation & Maintenance of Risk Management processes throughout an organization.

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Static Management Systems Approach – outcome of Qualitative Thinking

Processes and Procedures used to ensure that an organization can fulfill all tasks to achieve objectives…!

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Static Paper Based Thinking & Reporting of Risk

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Future >>>Uncertainty >>>Risk

ISO 31000, 2009 – Risk Management

"the effect of uncertainty on objectives" .

NOTE: Quantitative Risk is the only known form of risk analysis that allows you to measure uncertainty

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2 Main Perspectives on Risk

Quantitative Type –
Data is Hard, Rigorous, Credible & Scientific.

Qualitative Type –
Data is Sensitive, Nuanced, Detailed, & Contextual.

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Fundamental Distinction

Data is ‘Quantitative’ if it is Numerical

and

Data is ‘Qualitative’ if it is not.

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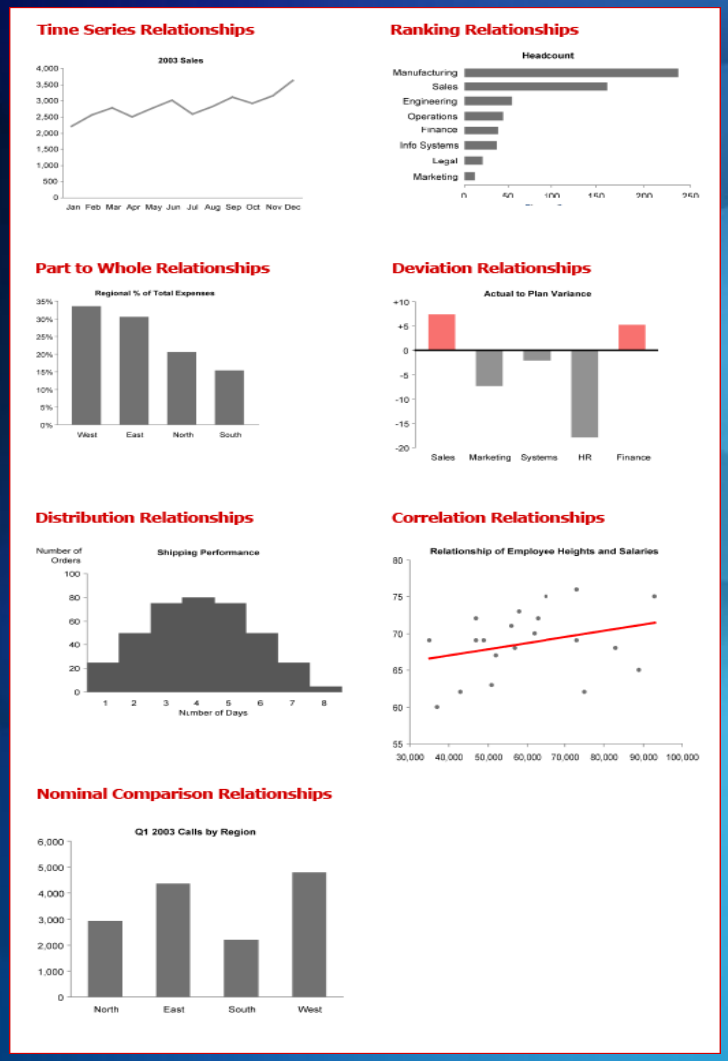
Fundamental Differences in Reporting



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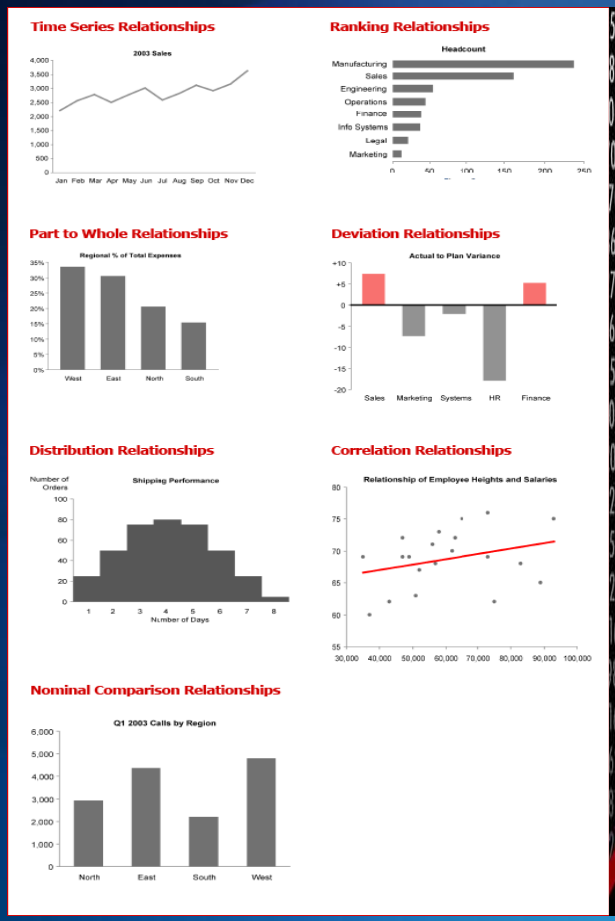
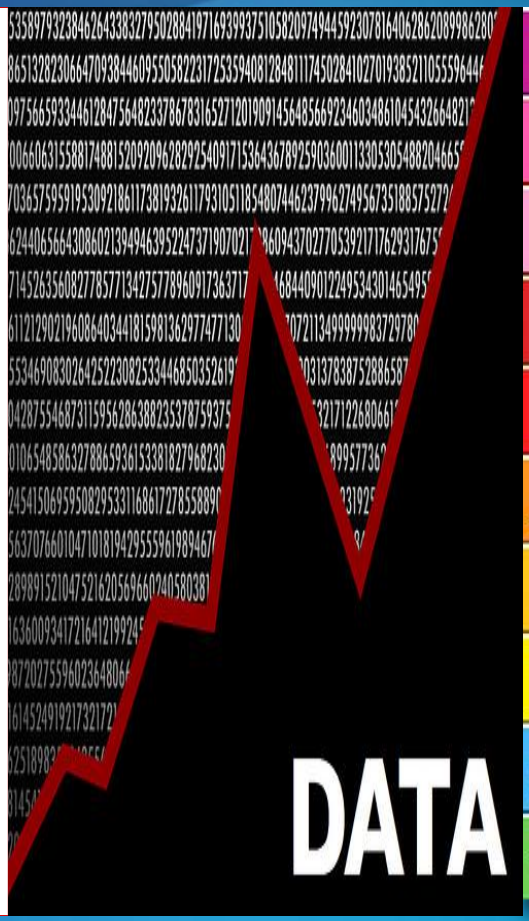
Fundamental Inter-relation

- All Quantitative data is based upon "qualitative judgments"
- All Qualitative data can be described and manipulated numerically (Quantitative).

Note: This "inter-relation" is the epicenter of sophisticated risk management thinking.

Qualitative & Quantitative - Dynamic Solution





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RISK Management

Traditional Risk Management Steps

Step 1 - Risk Framework

Step 2 - Qualitative Risk Register

Step 3 - Quantitative Risk Analysis

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Step 3 –

Quantitative Risk Analysis – Why ?

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Adding Insight to Enable Better Decisions

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Introducing “The Power of Probability with Monte Carlo simulation”

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Monte Carlo – Why ?

1. What are the chances my project will finish on time?
2. What are my risk inter-dependencies ?
3. What is the likelihood my project will finish under budget?
4. How much contingency do I really need?

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What is Monte Carlo Simulation?

» A sophisticated & proven computational technique used to determine the probability of different outcomes by running multiple trial runs, called simulations…….Infinite Outcomes !

» Used Globally across every know Industry vertical.

» http://www.palisade.com/cases/

Quantitative Risk Analysis ?
Monte Carlo Simulation ?
@ Risk ?

» @RISK (software) lets you analyze data that contains uncertainty using Monte Carlo Simulation.....proven method for "Quantitative Risk Analysis"

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Applications of @Risk

- If you can Model your problem in Excel then you can use @Risk for all your risk analysis

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Why @RISK?

» Monte Carlo simulation, shows you scenarios that *might* occur, rather than a single “best guess”

» Also *likelihood* of different outcomes occurring

» To plan better Strategies, Mitigation Plans, Contingencies….

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Why @RISK?

- To understand Contingency at granular level.

- ❑ Probability of Occurrence Vs Single occurrence
- ❑ How many times can this risk occur during the operation?

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Product Demo

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Result in @RISK

» Let's take a look at what @RISK can show you after running a Monte Carlo simulation on a project cost model…….

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Learn @RISK in 5 mins

» Learn @Risk in 5 minutes - http://www.palisade.com/QuickStart/EN/RISK/

» If you know Excel you already know @Risk

» @Risk is used by 93% of Fortune 100.

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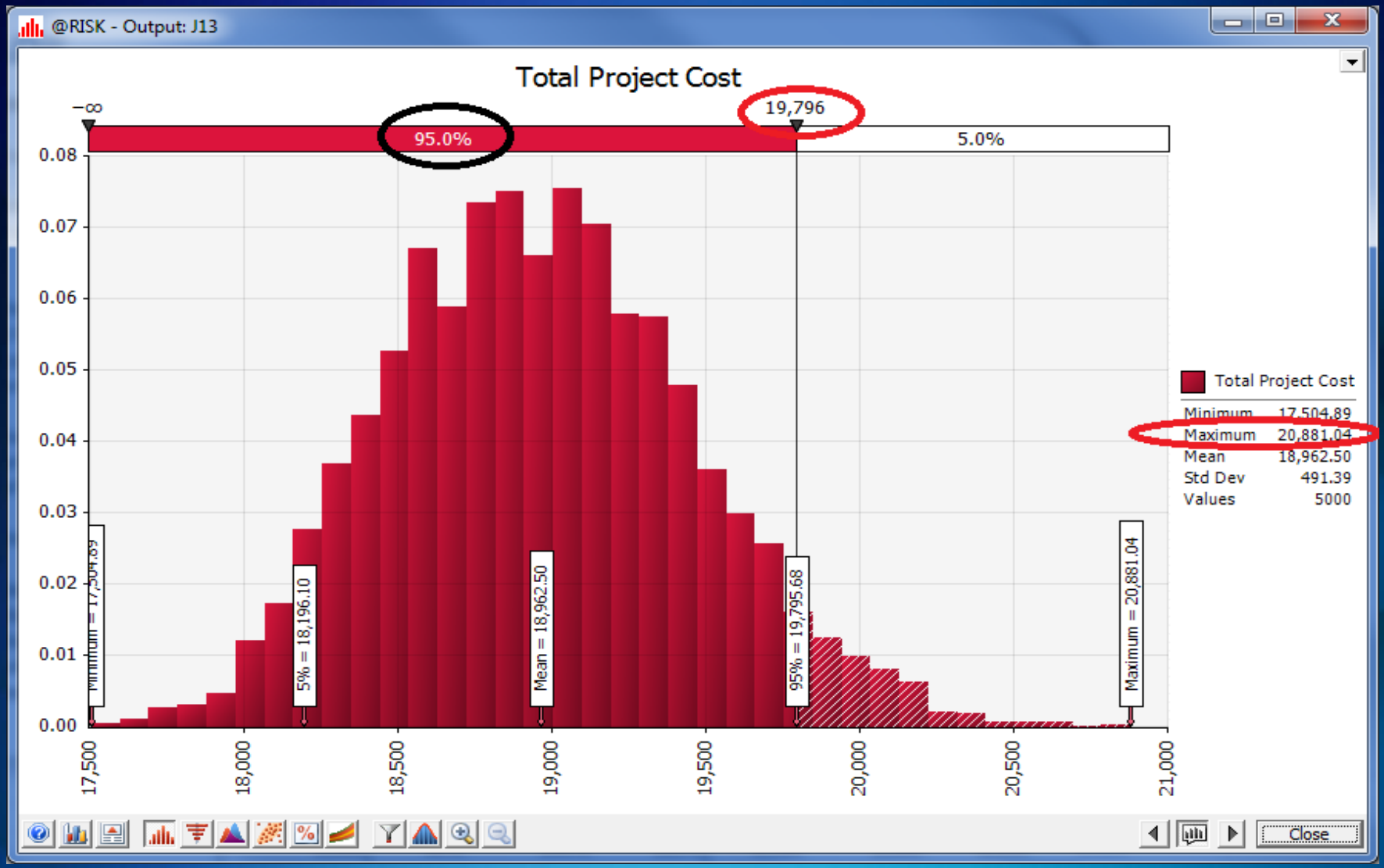

Shows a 95% probability of cost less than $19,796

Shows a maximum project cost of $20,881

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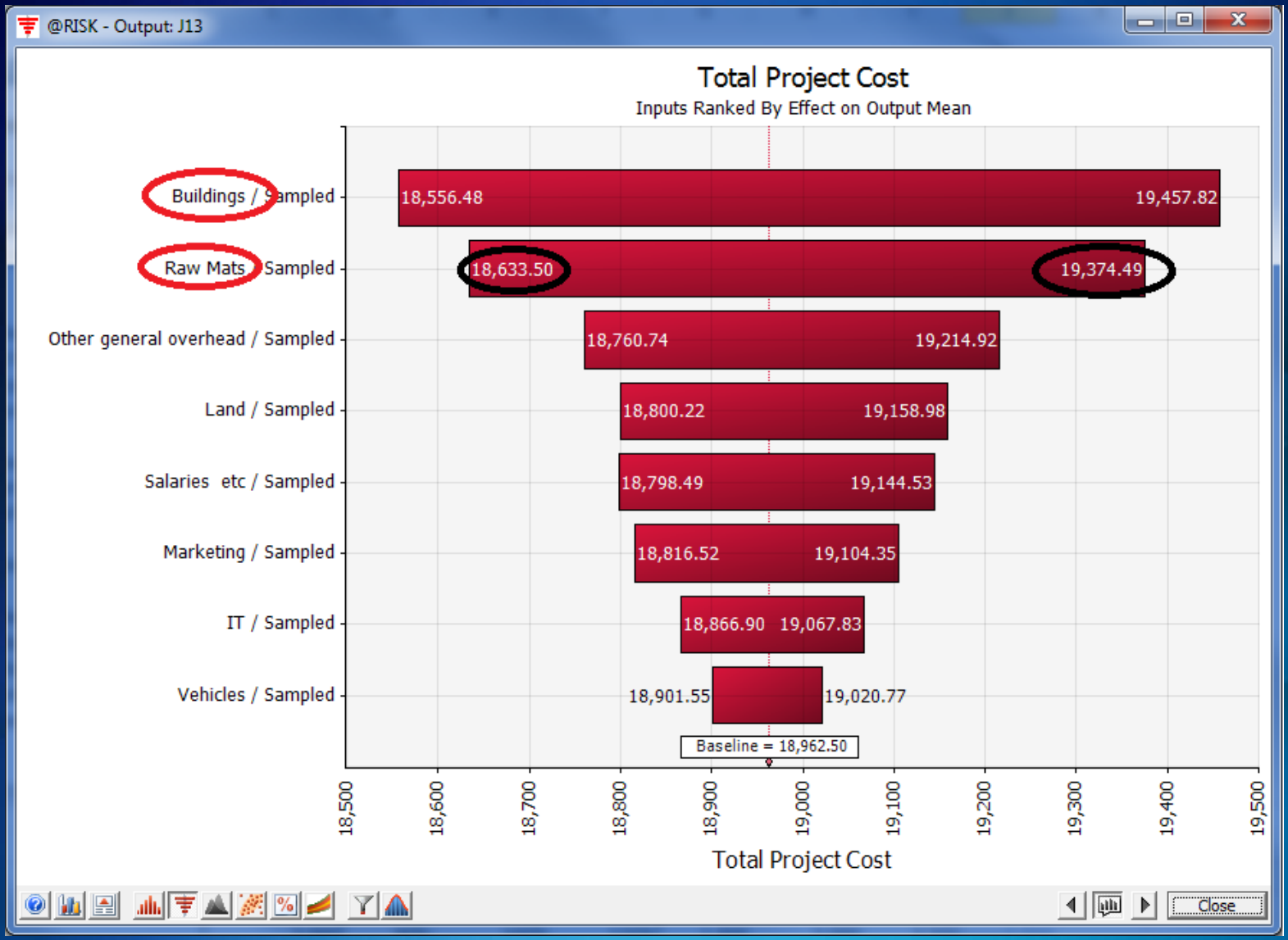

» Shows ranked factors driving higher project costs, like building and raw materials.

» Shows that, for instance, Project Cost varied from $18,633 to $19,374 as Raw Materials changed.

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Benefits of @RISK

» You may need 99% confidence that the project cost will be under $19,800.

» Now you know where to focus on reducing costs to achieve that, such as “building and material costs”.

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Benefits of @RISK

» Knowing the max cost is $21,000 helps plan contingencies with high level of “Insight”

» Try different strategies and simulate again to compare & re-think outcomes

» Allows to plan ahead – sophisticated decisions

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@Risk Software

- *Add-in to Microsoft Excel*
- *Works with existing Excel Models*
- *Provides "Quantitative Risk Analysis" in Excel*
- *Behaves like native Excel*
- *User Friendly – Only Excel skills required*

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Applications of @Risk

- Real Options Analysis
- Discounted Cash Flow Analysis
- Value – At –Risk
- Portfolio Optimization
- Cost Estimating – Project Risk
- Six Sigma & Quality Analysis
- Product Life Cycle Analysis
- Supply Chain Distribution

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.....Great.....but we do not like Excel !

....You can still utilize sophisticated Risk Analytics

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Client Brief

1. We want a sophisticated tool that tracks and allows us to mitigate RISK across the entire lifecycle of project.

2. We do not want to learn a new software or complex qualitative or quantitative risk methodology or analytics

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Dynamic Solution

Good risk management also means two way communication with those affected, and continually monitoring what is going on……NZ Society for Risk Management

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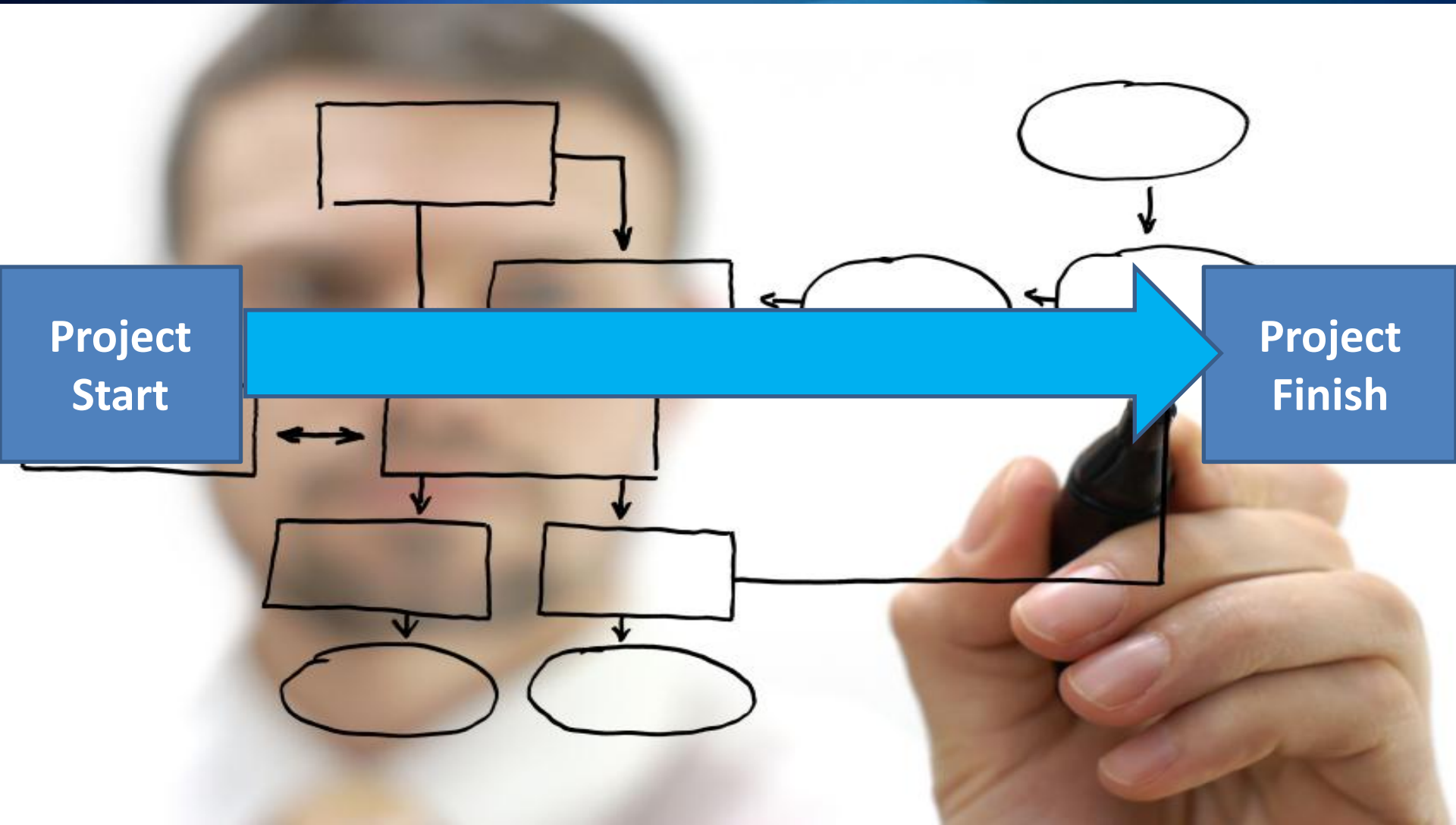
Real-time Risk Solution for problems



Real-time RISK Management

Theory

Forecasted Profit/Top Line/Revenue >>>Real-time Risk Management>>>Project lifecycle

Practice

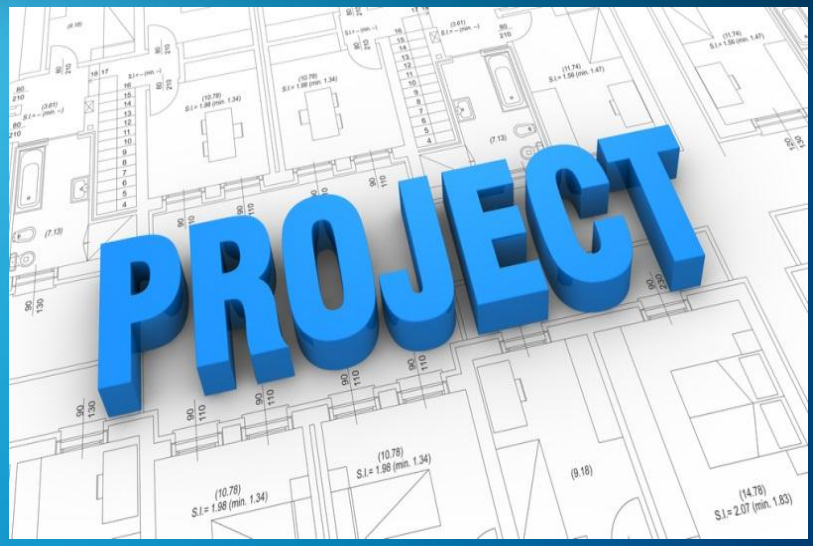
Real-time Integration>>>SILOS and PROCESSES >>>Mitigate Risks >>>Project Lifecycle.

Solution Thinking:

1 We want real-time Risk Profile

2 Track Mitigation Steps in real-time

3 Live Risk Updates & Reports



Real-Time Solution aligned to Top Line Growth.

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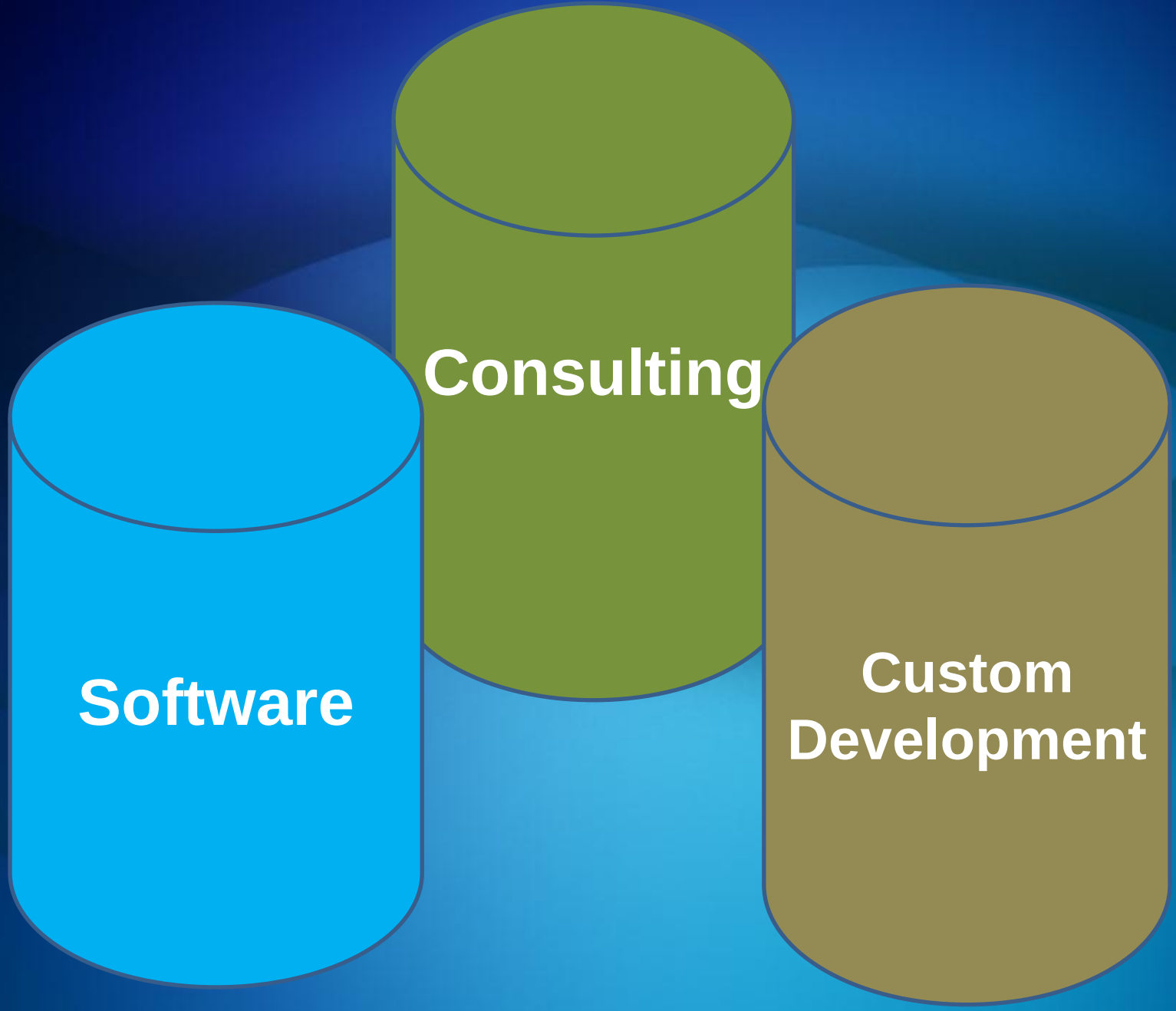

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Solution

- Incorporate Monte Carlo Risk Analysis into a User-friendly, Qualitative Interface
- Produce tailored Reports and Charts
- Standardize use of Risk Management
- No need for users to learn “New Software”

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Is Risk Management an I T Project ?

No software in the world can THINK for you !

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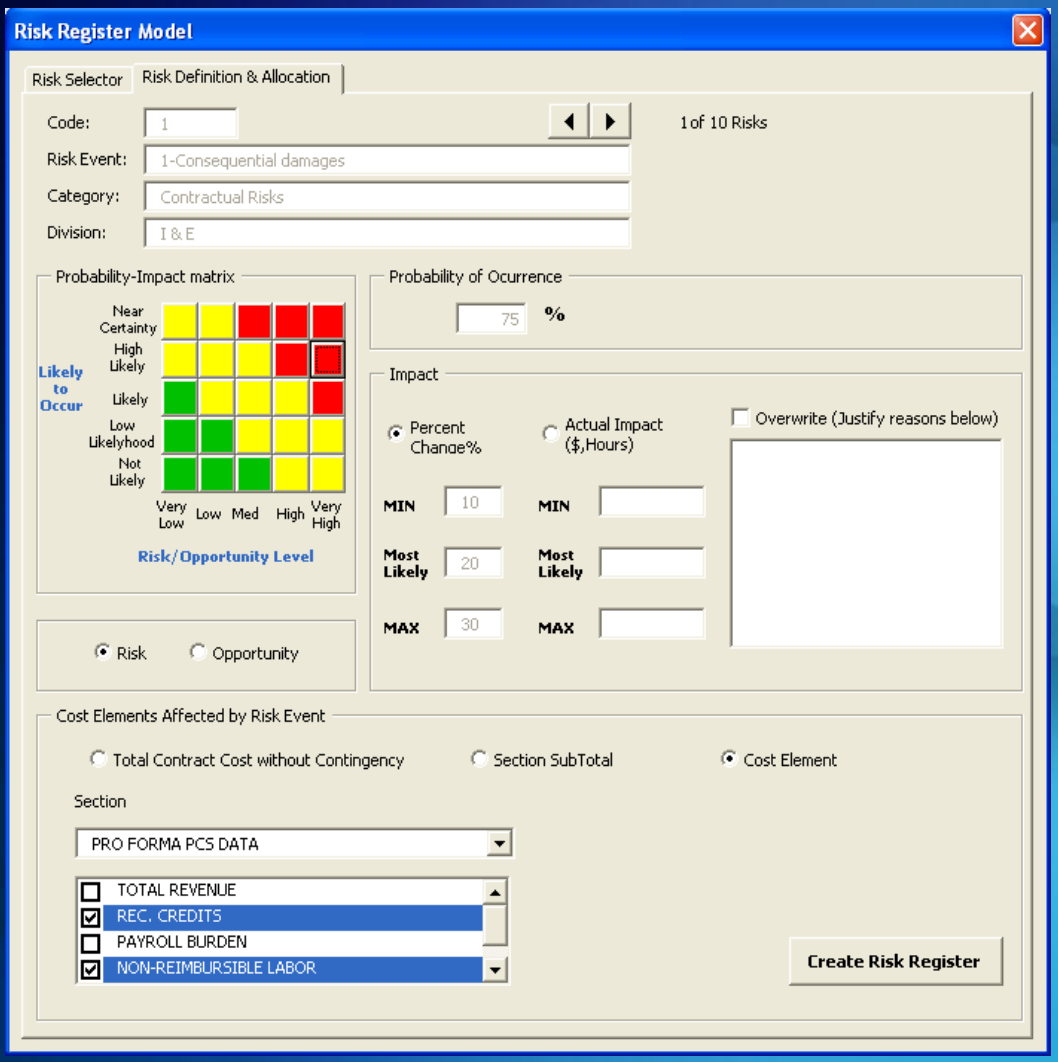
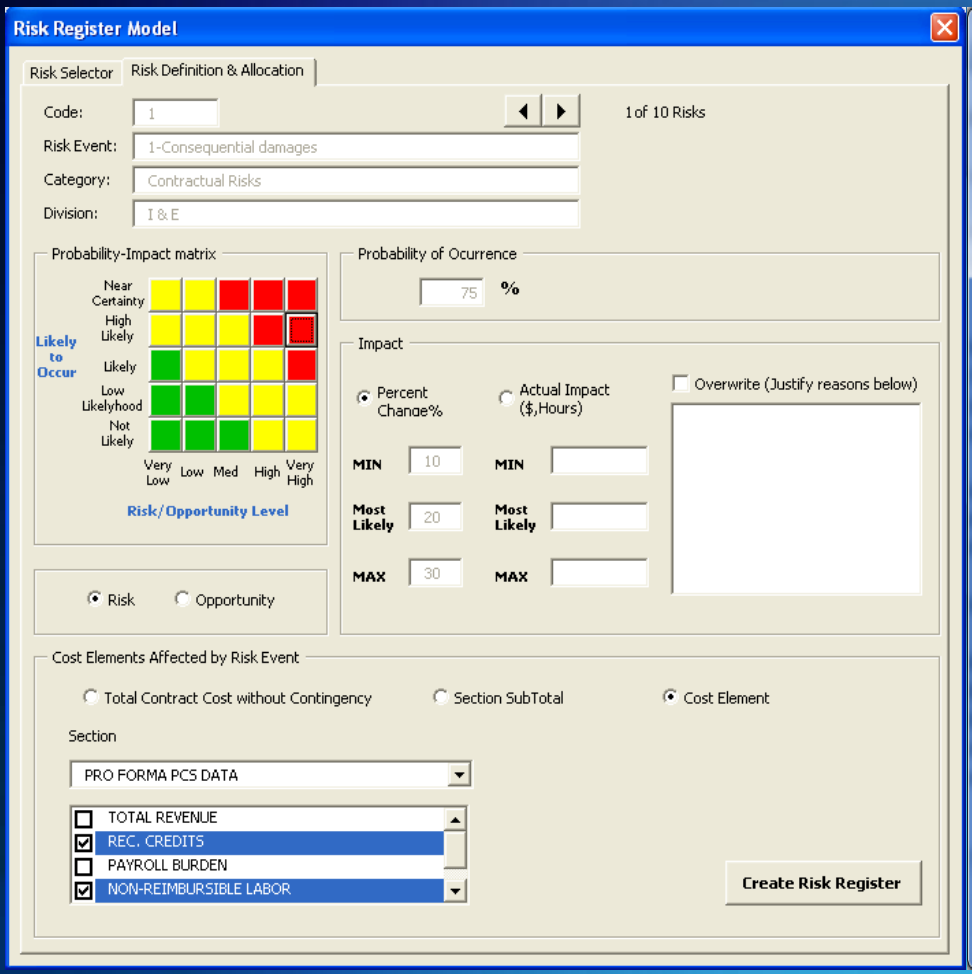
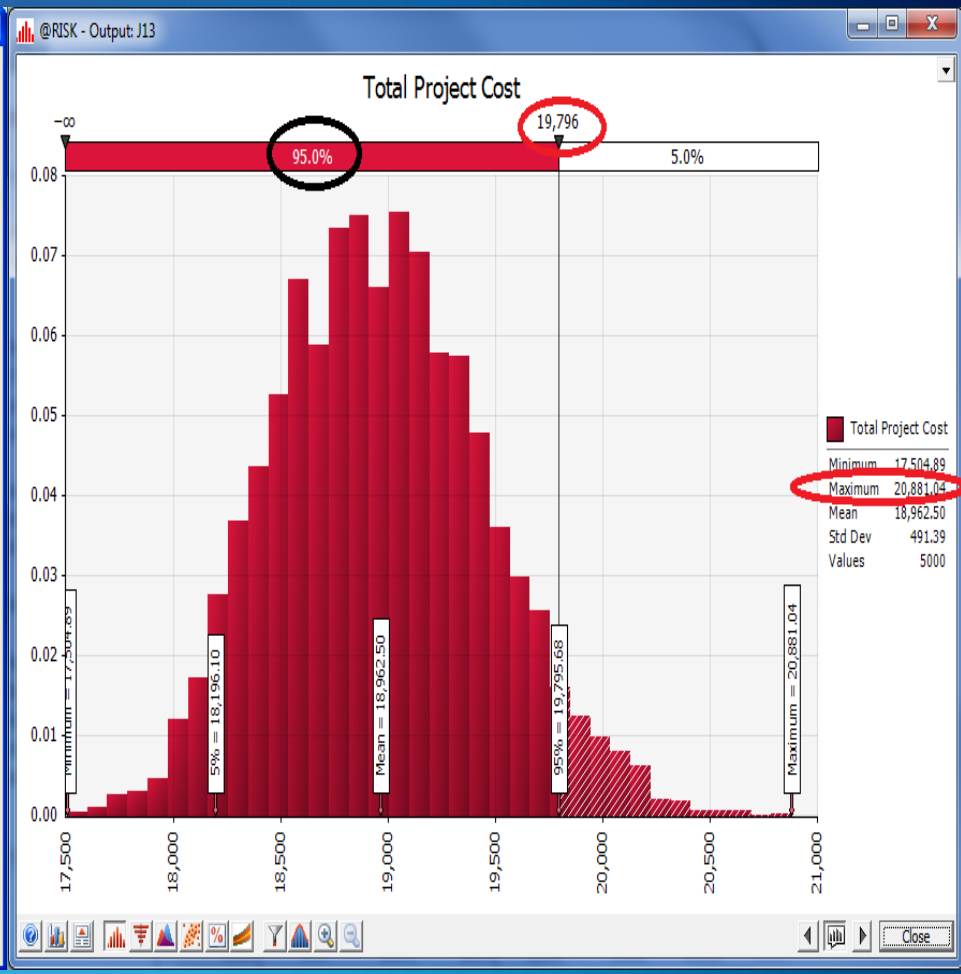
Front End



Qualitative

Front End & Back End

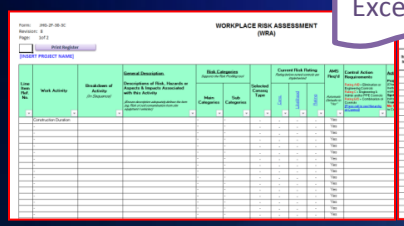




Qualitative & Quantitative

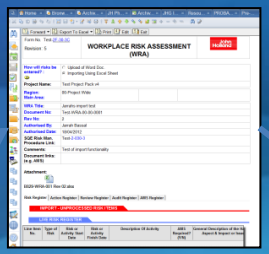
Risk Management - Enterprise Problem

Desired future

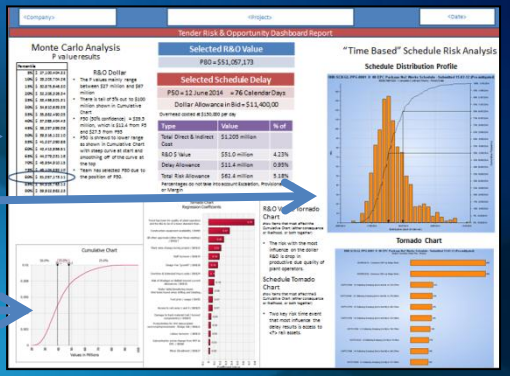


SQE Workplace Risk Assessment

Project Risk Register (all risks)

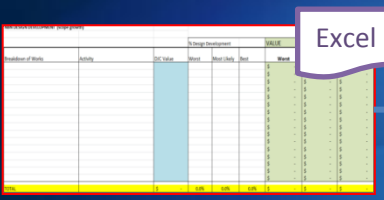


Automatic data transfer

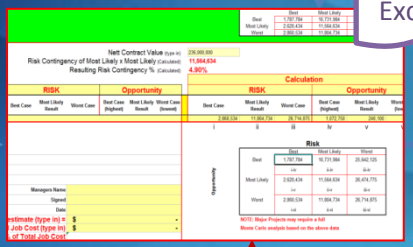


R&O Reporting Dashboard

Estimate Uncertainty

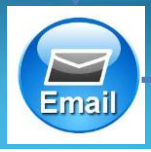


Design Development Scope Growth

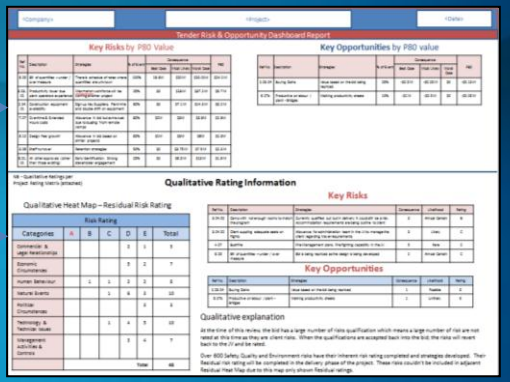


R&O Register (Nine Square & Probabilistic)

Data file emailed or saved in Folder

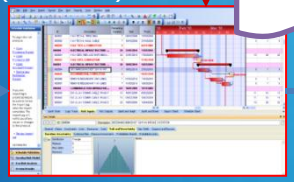


Data Warehouse

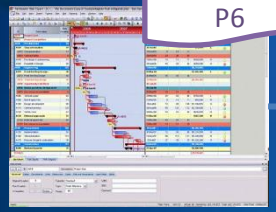


R&O Reporting Dashboard

Time based Risk Events (Discrete)



OPRA Schedule Risk Analysis



Automatic data transfer

Schedule Uncertainty is entered into P6

Automatic data transfer

All "Blue Arrows" represent automated steps

Palisade - End to End Solution Steps

Software>>Consulting>>Custom Development

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Software

Mighty River Power Genesis Energy Solid Energy New Zealand

Beca Carter Hollings Transfield Worley OMV New Zealand Limited

Ngai Tahu Holdings Corporation SINCLAIR KNIGHT MERZ

Train Champions & Model Owners

*** Desktop & Network Version**

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Consulting

Risk Register >> Stochastic Register >>Model

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Custom Development

Integration

We can integrate sophisticated analytics at back end to offer “User Friendly” interface for non-excel users.

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Custom Development

- Platform options
  - Excel Add-in
  - .Net technology: Windows or Web-based application
  - RDK allows deployments outside of Excel (.NET) that can be integrated with ERP systems
- Interconnection with major databases
- Fully customizable
- Low time-to-market
  - Prototype-and-release
  - Iterative, evolving approach

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Integration with ERP

» **Select Asset Management**

- Australia-based financial customer
- High complexity tool for Portfolio Management
- Involved direct and bidirectional connection with financial assets databases of the customer

SELECT
ASSET MANAGEMENT

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Integration with ERP

» MethodWare

- Integration with its Enterprise Risk Assessor (ERA) software
  - Its suite is also a GRC
  - This is an Enterprise Risk Management software
    - Risk Register : Operational
- New Zealand based company

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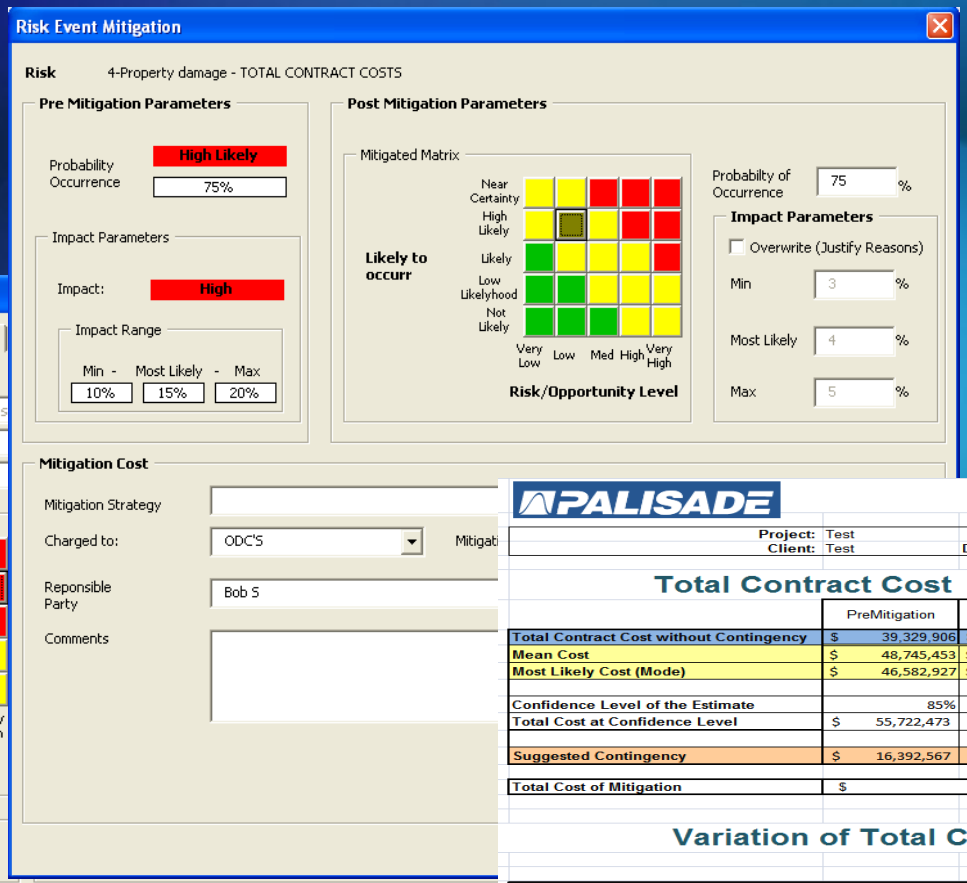
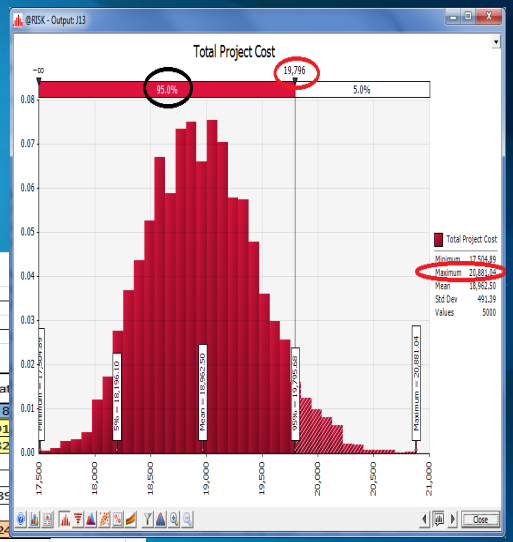
Risk Register, Event Mitigation, Variation in Total Contract Cost & Risk Output





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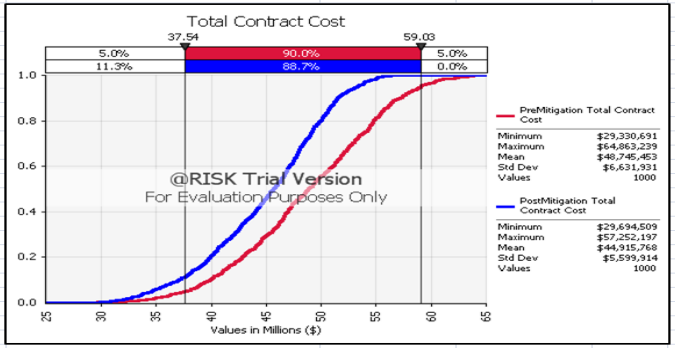
Project: Test
Client: Test
Date:

Total Contract Cost

	PreMitigation	PostMitigat
Total Contract Cost without Contingency	$ 39,329,906	$ 39,18
Mean Cost	$ 48,745,453	$ 44,91
Most Likely Cost (Mode)	$ 46,582,927	$ 47,82
Confidence Level of the Estimate	85%	
Total Cost at Confidence Level	$ 55,722,473	$ 50,68
Suggested Contingency	$ 16,392,567	$ 11,52
Total Cost of Mitigation	$	20,000

Variation of Total Cost



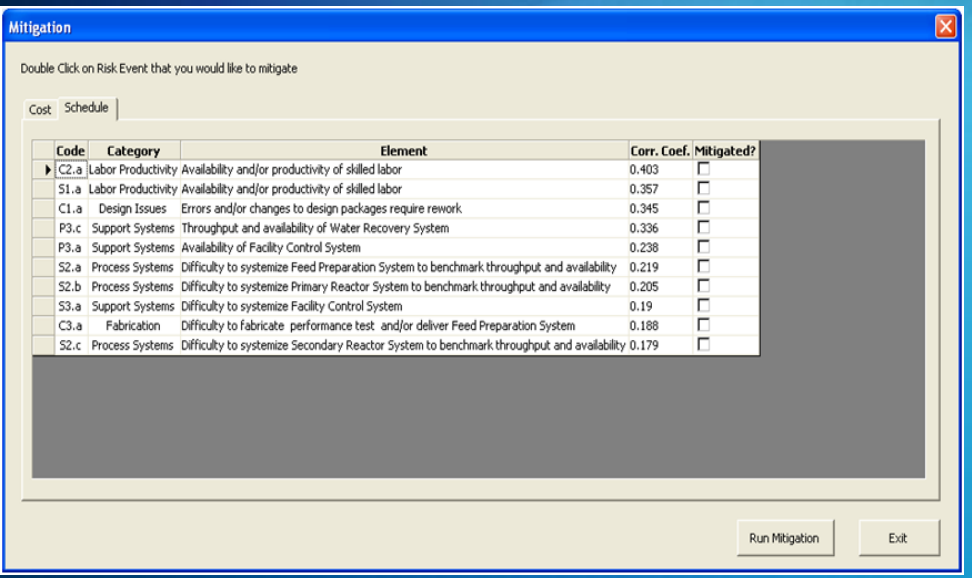
Interpretation of Results: Discussion

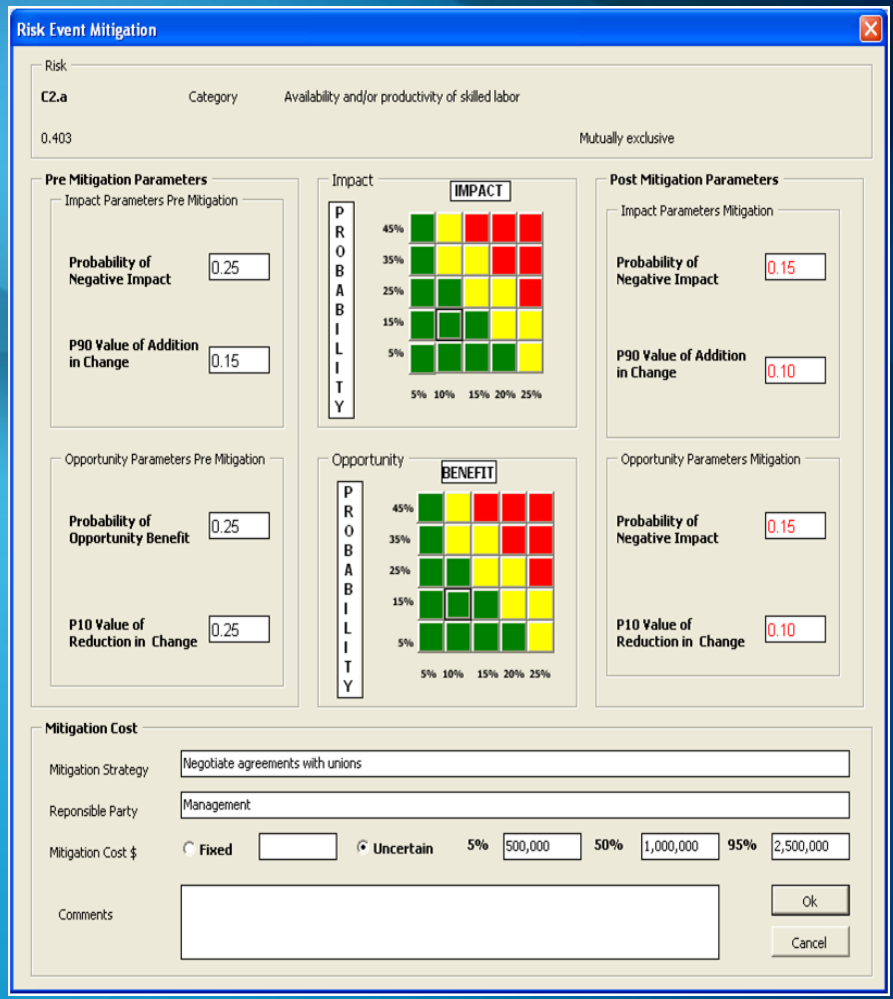
» **Allowance for contingency**

- Select confidence level appropriate with risk tolerance
- Subtract deterministic cost from cost at confidence level

» **Prioritize risk mitigations**

- Evaluate most serious risks
- Price mitigation measures
- Rerun mitigated scenario
- Analyze cost *vs.* benefit





» Cost Estimation

- In this example, @RISK is used for cost risk analysis and estimation.
- The application prompts the user for a three-point estimate for each cost item in the project as a way to recognize uncertainty in these cost elements.
- A risk register is created using a simply colored grid interface. Next, because in real life costs are seldom independent of each other, the user is able to set up correlations between related cost elements.
- Finally, the user can define external risk events that will affect the total cost of the project.
- After entering this information, the application runs an @RISK simulation and presents results in tables and graphs. The results can be used to identify risk drivers and map out mitigation strategies.

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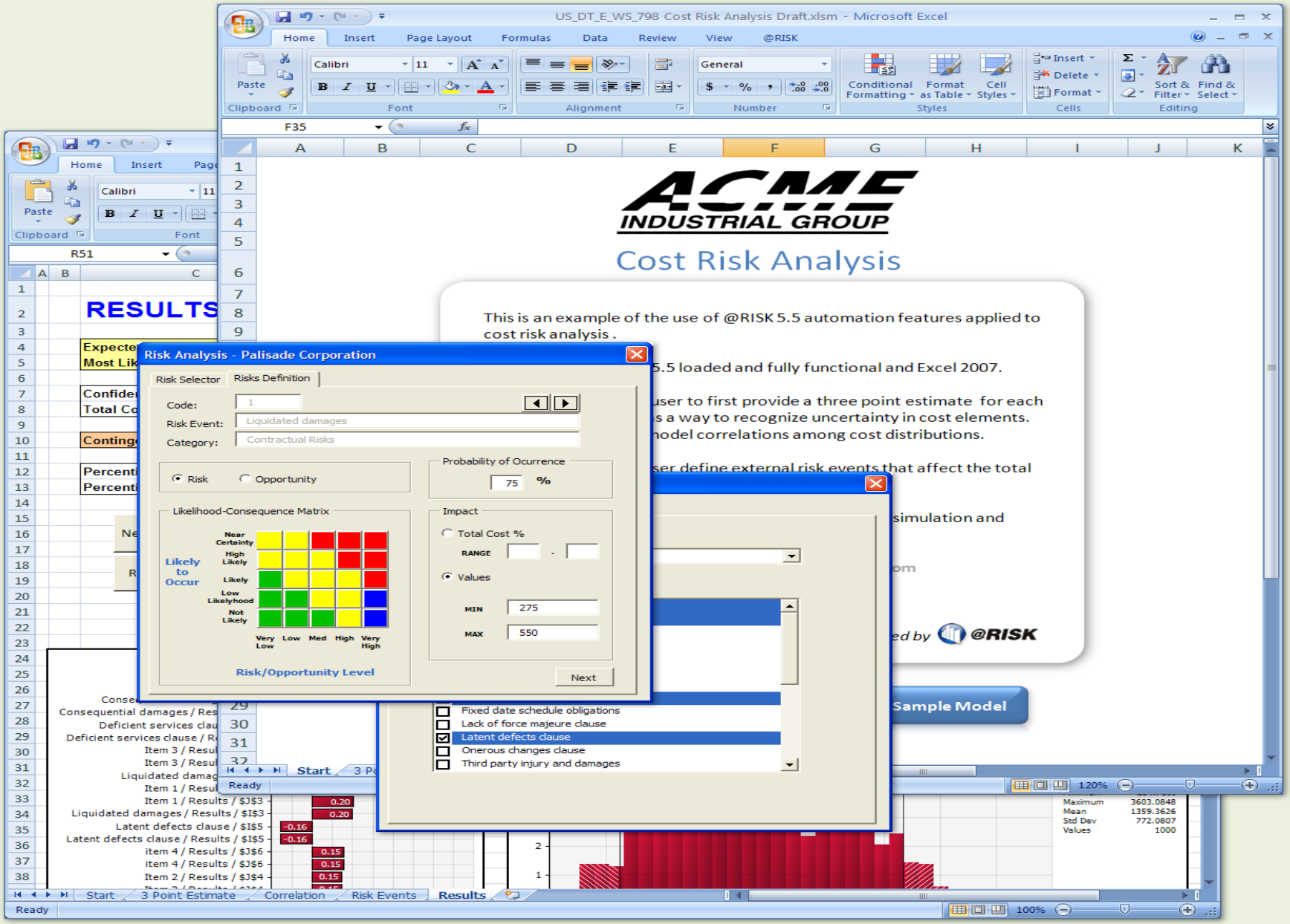
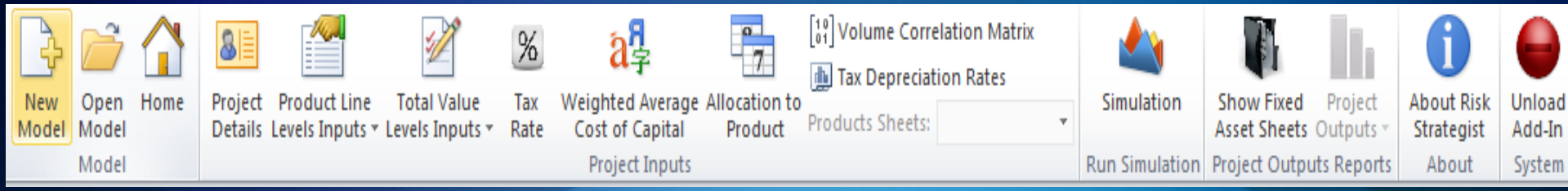
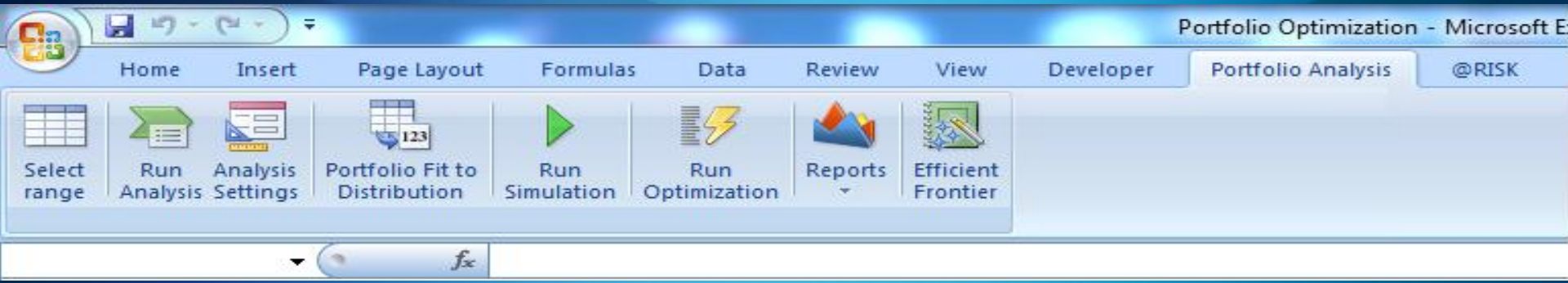
Cost Estimation Model - Risk Management



Client Specific Ribbon





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Custom Development

Question everything until you can integrate Qualitative & Quantitative Risk and align with your TARGET !

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