

# Hands-on: Optimization

Presented by  
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# Optimization

- Finding the best solution to a problem which has many solutions
- Adjusting allocations to arrive at the best arrangement, calculated by an objective function
- Stochastic v. deterministic conditions
- Variation and “noise”

# About Evolver

- Adds Genetic Algorithm Optimization to Excel
- What Evolver accomplishes:
  - Optimizes unknowns for a given decision
  - Deterministic Optimization
- How Evolver accomplishes this:
  - Specify desired outcome (max, min, target)
  - Specify constraints you know exist for key inputs
  - Identify solving method

# About RISKOptimizer

- Adds Genetic Algorithm Optimization to Monte Carlo simulation to Excel
- What RISKOptimizer accomplishes:
  - Optimizes under uncertainty for a given decision
  - Stochastic optimization
- How RISKOptimizer accomplishes this:
  - Specify desired outcome (max, min, target)
  - Specify variation you know exist for key inputs
  - Identify solving method

# Using RISKOptimizer: The Steps

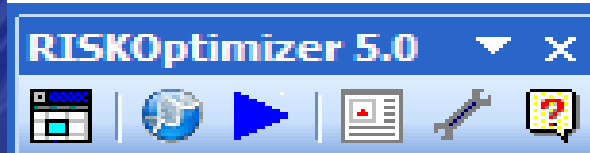
- Begin with an @RISK type Model
- Define the Bottom-Line
- Identify and Quantify the Adjustable Cells
- Add Constraints
- Set Up the Software to Run
- Run the Optimization
- Review Results

# RISKOptimizer: Interface



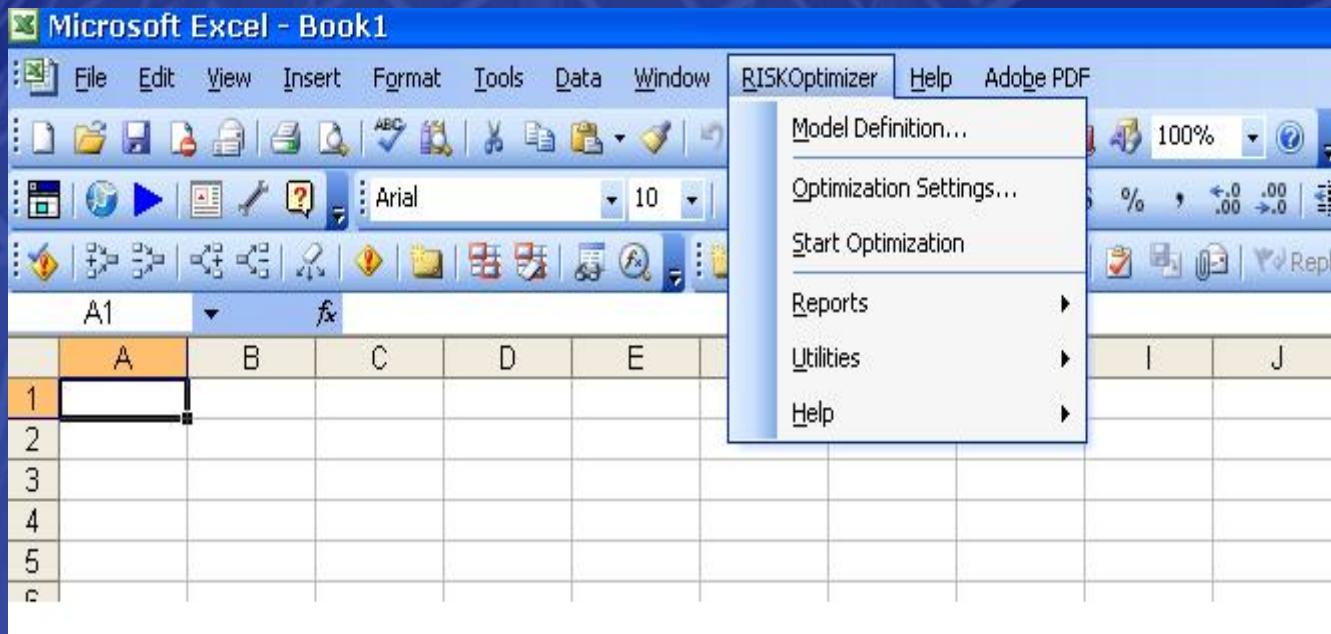
- Toolbar
- Menu
- Define Model
- Simulation Settings
- Optimization Settings
- Run-time Window
- Results

# Toolbar in Excel 2003

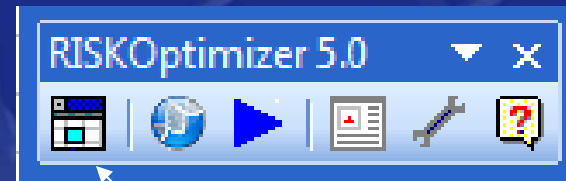


- Model
- Optimization Settings
- Start Optimization
- Reports
- Utilities
- Help

# Menu in Excel



# RISKO Model



RISKOptimizer - Model

Optimization Goal:

Cell:

Statistic:

Adjustable Cell Ranges

Minimum	Range	Maximum	Values

Add...  
Delete  
Group

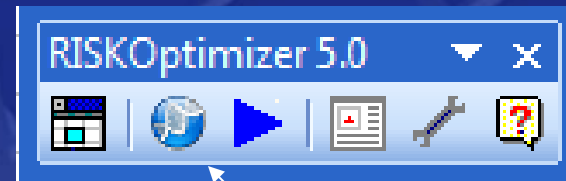
Constraints

Description	Formula	Type

Add...  
Edit...  
Delete

OK Cancel

# RISKO Settings



RISKO Optimizer - Optimization Settings

General | Runtime | View | Macros

Optimization Parameters

Population Size: 50

Random Number Generator Seed: Automatic

Sampling

Sampling Type: Latin Hypercube

Use Same Random Number Generator Seed Each Simulation

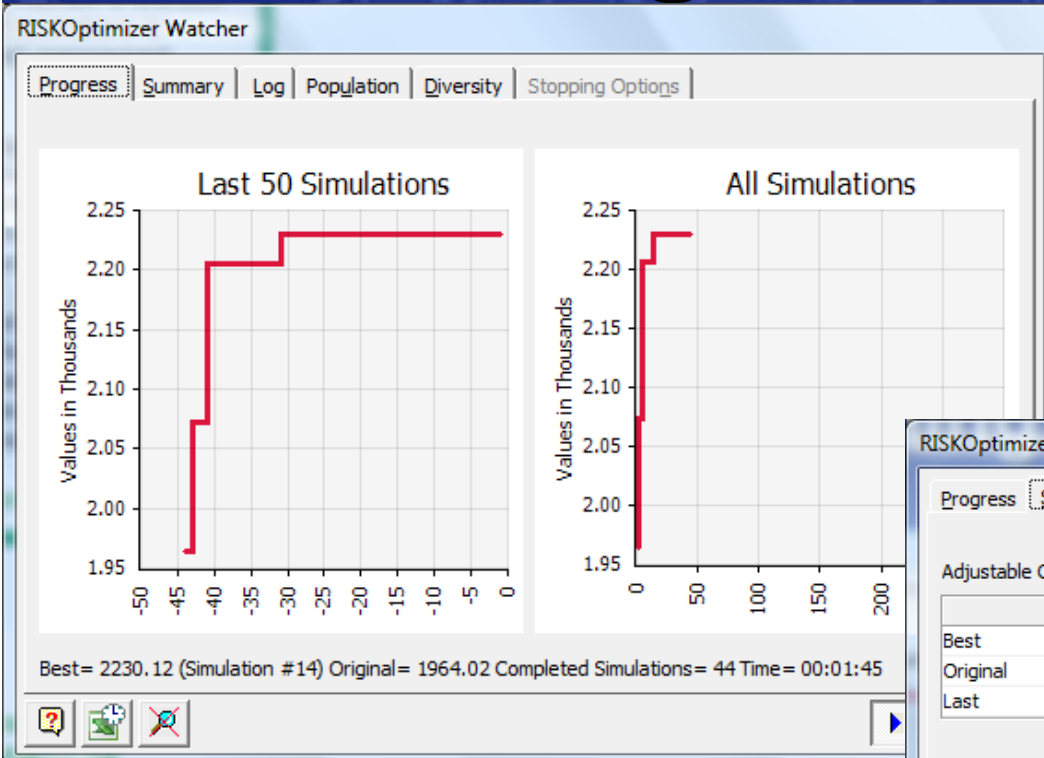
When a Simulation is Not Running, Distributions Return

Random Values (Monte Carlo)

Static Values: Expected Values

OK Cancel

# Running RISKOptimizer



RISKOptimizer Watcher

Progress | Summary | Log | Population | Diversity | Stopping Options

Adjustable Cell Values

	Simul.	Result	C14	C15
Best	14	2230.12	26	.4145
Original	1	1964.02	19	.3
Last	75	2205.11	25	.5222

Adjustable Cell Group Settings

Group Shown: C14 {Max Reservations Accepted}

Crossover Rate: .5

Mutation Rate: .1

Mutation Rate is Auto-selected: no

# Optimization Applications

- Supply chain management
- Pricing strategy
- Marketing strategy
- Capital planning
- Transportation
- Site location
- Quality management
- Personnel management
- Operating structure

# Solving Methods in RISKOptimizer

- Recipe – independently adjusted inputs
  - Budget – subject to the constraint of a constant total
- Order – sequence modeling
  - Project – with precedence
- Grouping – categories of variables
  - Schedule – by time blocks

# RISKOptimizer Results

- Summary sheet
  - Original values and best values
  - Characteristics of optimization
- Log of simulation solutions
  - Statistics of simulations
  - Target value of optimization objective

# Exercise: Portfolio Selection

- Find ideal investment mix given history
- Maximize mean return
- Reduce volatility
- Considerations:
  - Correlation
  - Fitted distributions
  - Constraints

# Sources of help

- On-line tutorials
- Help menu within the software
- Software manuals (PDF)
- Palisade web-site [www.palisade.com](http://www.palisade.com)
- Helpdesk: <http://helpdesk.palisade.com/>
- Forum: <http://forums.palisade.com/>
- Web encyclopedia [www.wikipedia.com](http://www.wikipedia.com)
- Your Regional Sales Manager(s)
- Palisade Training and Consulting Services