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Estimating Project Value: The Expected Value of Success (EVS) and the Expected Value for the Portfolio (EVP)

by

Glenn R. Koller

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The Problem

It is NOT primarily about the math –

It IS primarily about changing behaviors

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The Problem

We have a problem!

In most businesses, we design for success.

We plan on success.

However, sometimes projects we expect to be successful are not.

Therefore, the value of our portfolio is NOT the sum of our promised successes.

This leads to trouble!

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Simple example of the meaning of EVS and EVP

To introduce the EVS and EVP concepts, we will use the admittedly oversimplified example of a portfolio of 10 dimes. Later, we will see how these values relate to an actual project in a business.

PORTFOLIO OF 10 INDEPENDENT PROJECTS

Flip the dime = execute the project.

"Heads" – get 10 pennies; "tails" – get nothing

50% chance of failure ("tails") for each project

Value of success (EVS) for each project = 10 pennies

Each dime's contribution to the portfolio (EVP) = 5 cents. Portfolio value = 50 cents

THIS IS NOT ROCKET SCIENCE, BUT....

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Requires Big Changes – Application of Risk Processes Part of a Solution

It is a Menagerie

From the "outside," it is easy to view a corporation as a single entity: "Company X does it this way…" or "Company Y handles that problem like this…" However, when you get the "inside" view, you realize that, just for example, an energy corporation is composed of many separate disciplines with potentially their own viewpoints and processes:

Finance
Commercial
Trading
Engineering
Logistics
Security
Health & Safety
Environmental
Drilling

Planning
Marketing
Pipeline
Exploration
Production
LNG
Chemicals
Mining
Refining

R&D
Acquisitions
DR&R
Retail
Solar
Lubricants
Gas & Power
and many more

Contrast Finance and H&S.

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Risk/Uncertainty - Impact on Value

Risk/Uncertainty – The Journey

Where most industries are	Where they would like to be
Inconsistent reviews of risk/uncertainty	Clear, consistent, and PRACTICAL guidance for recognizing, capturing, and quantifying risk/ uncertainty
Inconsistent application of risk/uncertainty impact on project value	Provide PRACTICAL and CONSISTENT means for impacting project value with risks/uncertainties (ranges, failure modes, etc.) and for risk management
Value of projects represented by a single (i.e., deterministic) measure.	Generate, when appropriate, two probabilistic measures of project value – an Expected Value of Success (EVS) and an Expected Value for the Portfolio (EVP)
Corp. behaviors that need to change with regard to consistently recognising, capturing, quantifying, and applying risk/uncertainty	Behavioral change •On the part of business-unit personnel and others, perceived sanction to openly and fully explore parameter ranges and, more importantly, failure modes for projects • Decision makers who ask for, understand, and apply risk/uncertainty-weighted measures of value

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Risk/Uncertainty - Impact on Value How/What Most industries Could Change

"Boiled down" version of a TYPICAL risk/uncertainty/valuation process

Perform research on markets, demographics, suppliers, regulations, etc.

Create economic model that incorporates these considerations & others

Convene risk/uncertainty meeting(s) at which:
1. **Major risks/uncertainties are discussed & listed**
2. **Impacts of specific risks such as schedule slip are evaluated**
3. **R/Us ranked in some manner (Boston Sq., etc.)**
4. **Mitigation plans created & responsibilities assigned**

Ranges for uncertainties & chances of abject failure are inconsistently used to impact project value

Revamped risk/uncertainty/valuation process

Recognize that most projects can have multiple representations of value – the Expected Value of Success (EVS) and the Expected Value for the Portfolio (EVP)

Consistently apply uncertainty ranges and chances of abject failure to impact appropriate project values

Work to mitigate risks so that EVS and EVP values begin to converge and enact consistent risk tracking/ management process

Risk/Uncertainty - Impact on Value

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EXAMPLES

2 EXAMPLES

Ex. 1 – Go/No-go decision on Chemical Plant construction based on NPV

Ex. 2 – Production shortfalls and meeting the promise – first-year production from the Chemical Plant

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Risk/Uncertainty - Impact on Value

Example #1– NPV Implementation

Example problem: Build a new chemical plant – <u>NPV Example</u>

HIGH-LEVEL MAJOR STEPS
(**This is a <u>fictitious</u> chemical plant**)

Agree on what constitutes a "go" – in this case, **a positive NPV**

Agree on go/no-go parameters

Discuss & assign uncertainties to pertinent parameters

Apply uncertainties and generate fully-uncertainty-impacted "go" NPV value (EVS)

If failure modes are pertinent, apply all and generate fully-risked NPV value (EVP). <u>If there are no failure modes, then EVS = EVP.</u>

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Risk/Uncertainty - Impact on Value

Example #1 – NPV Implementation

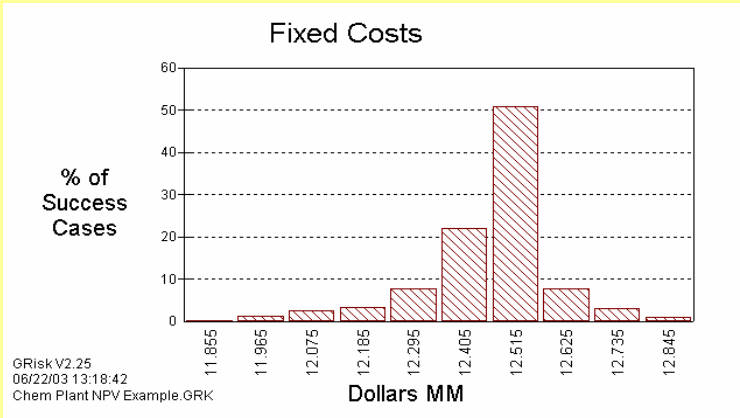
Example problem: Build a new chemical plant – NPV Example

Uncertainties

We are uncertain about many of the parameters in this project. Just a few are:

	Minimum	M.L.	Maximum
Plant Capacity (Tonnes/Yr.)	180,000	200,000	220,000
CAPEX Yr. 1 (MM$/Yr)	48	50	52
CAPEX Yr. 2 (MM$/Yr.)	45	48.9	50
Fixed Costs (MM$/Yr.)	11.8	12.5	12.9

Each of these parameters, and more, would be represented by a distribution that expresses our uncertainty. The distribution for Fixed Costs only is shown here.



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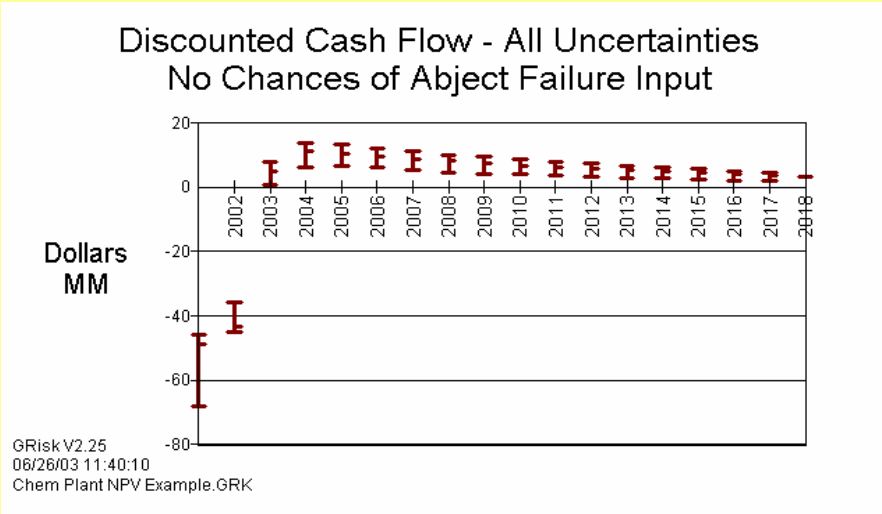
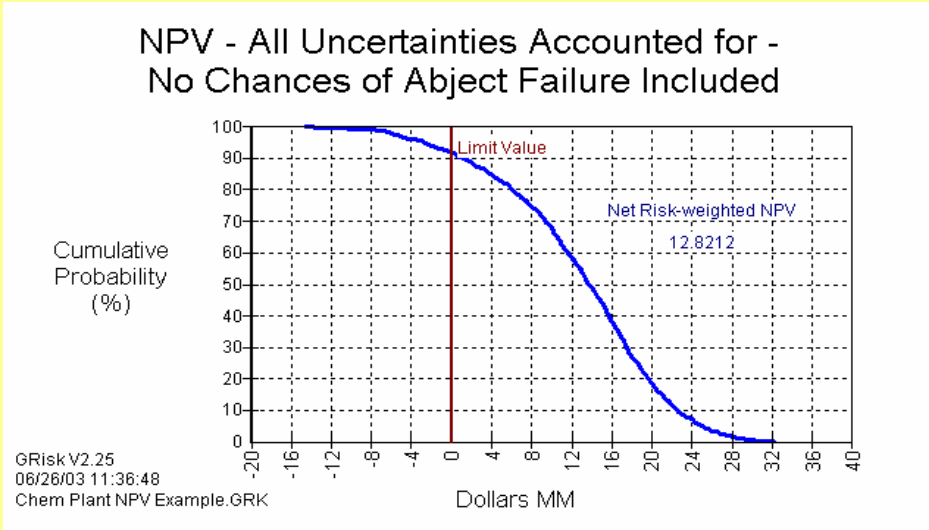
Example #1 – NPV Implementation

Example problem: Build a new chemical plant – <u>NPV Example</u>

Our probabilistic cash flows are converted to NPV. Note that the mean NPV is about +12.8 – a "go" case.





Note that this NPV curve "goes negative." **There is about a 10% chance that this project will exhibit a "no-go" NPV** (i.e., negative NPV).

Now, if there are any "no-go" input parameters (chances of abject failure), we should apply them.

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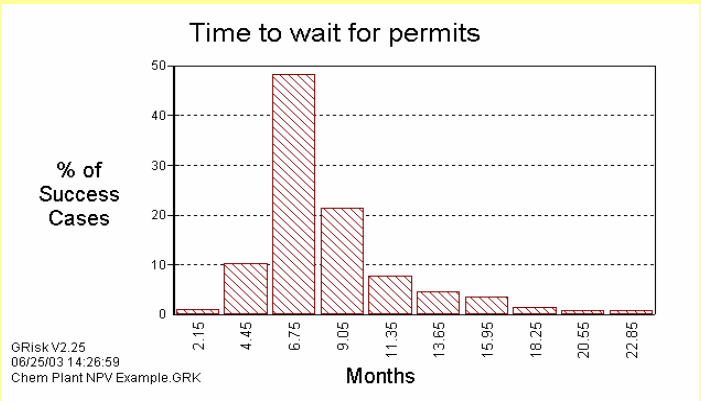
Risk/Uncertainty - Impact on Value

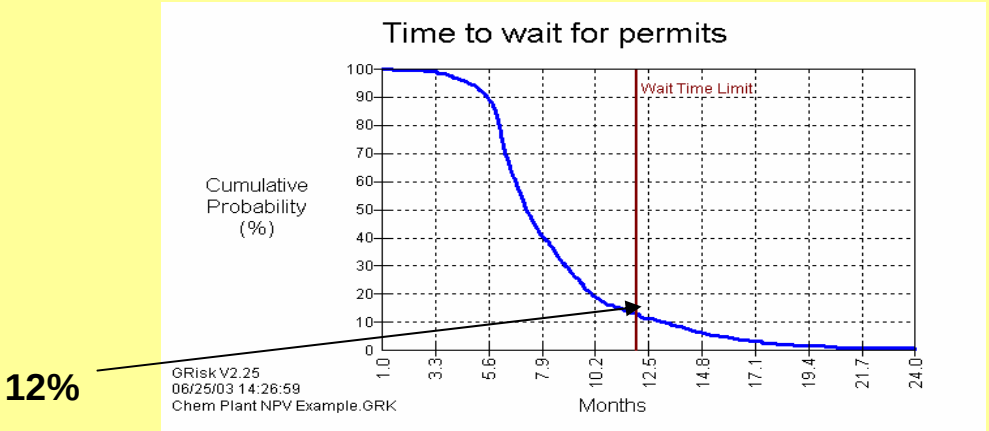
Example #1 – NPV Implementation

Example problem: Build a new chemical plant – <u>NPV Example</u>

<u>No-go Factors</u>

The project might fail if we have to wait, while experiencing significant spend, more than 1 year for permits (competition will beat us to the market). According to the agreed-upon distribution of wait time below, there is about a **12% chance** that the **wait time will be unacceptably long**.





12%

In addition, we believe that there is about a **20% of war** starting sometime during early project life.

The impacts of these chances of abject failure will be separately applied.

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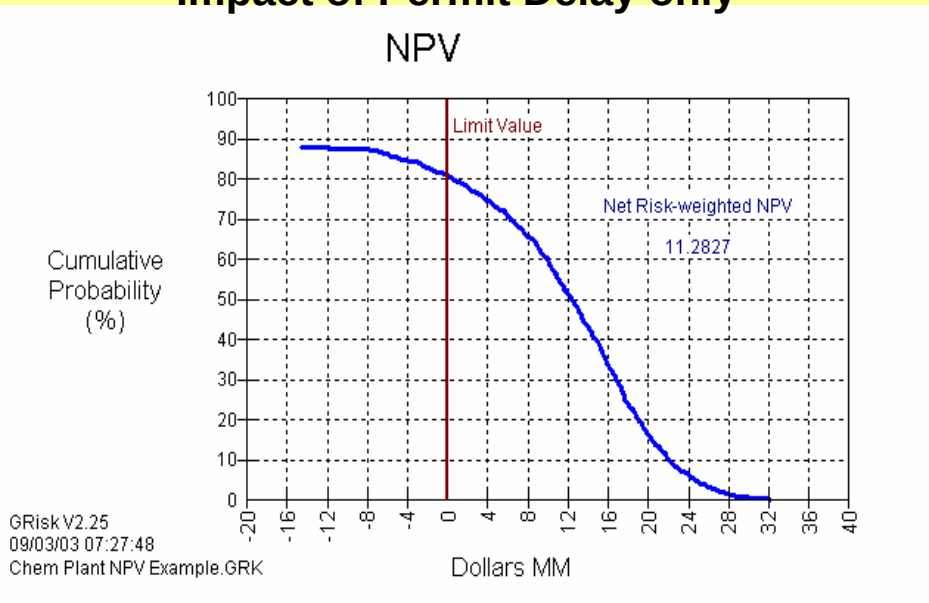
Risk/Uncertainty - Impact on Value

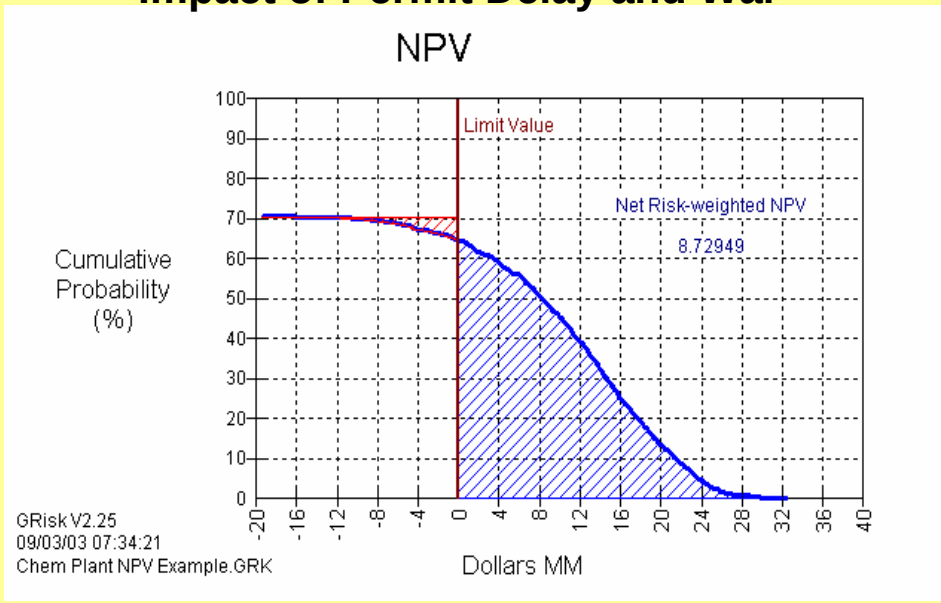
Example #1 – NPV Implementation

Example problem: Build a new chemical plant – NPV Example

Impact of Permit Delay only



Impact of Permit Delay and War



Cumulative Impact ↓

"Go" NPV (MM$)	**12.8 EVS NPV**
Impact of unacceptable wait	**11.3**
Impact of war	**8.7 EVP NPV**

The EVP NPV ($8.7 MM) is the number that contributes to corporate "roll-up" pronouncements.

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Risk/Uncertainty - Impact on Value

Example #1 – NPV Implementation

Example problem: Build a new chemical plant – <u>NPV Example</u>

How this drives performance:

1. We now realize our shortcomings and the probability of achieving success – however we have defined it.

2. Because we have reflected the uncertainties and chances of abject failure in our estimate of project value, we know just how short of the mark we are likely to be. This can be translated into a real sense of urgency.

3. Because we now recognise our uncertainties and potential failure modes, we can begin to plan mitigative actions and steps that will augment our less-than-successful value.

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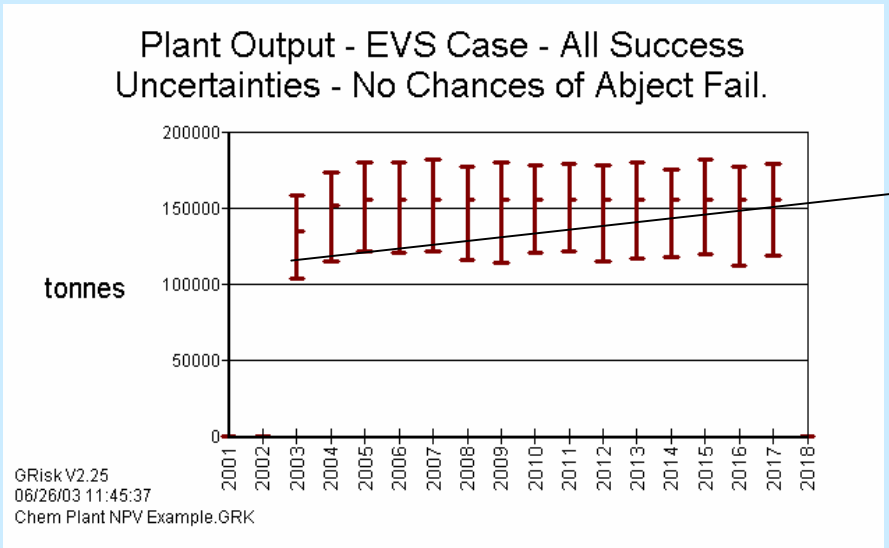
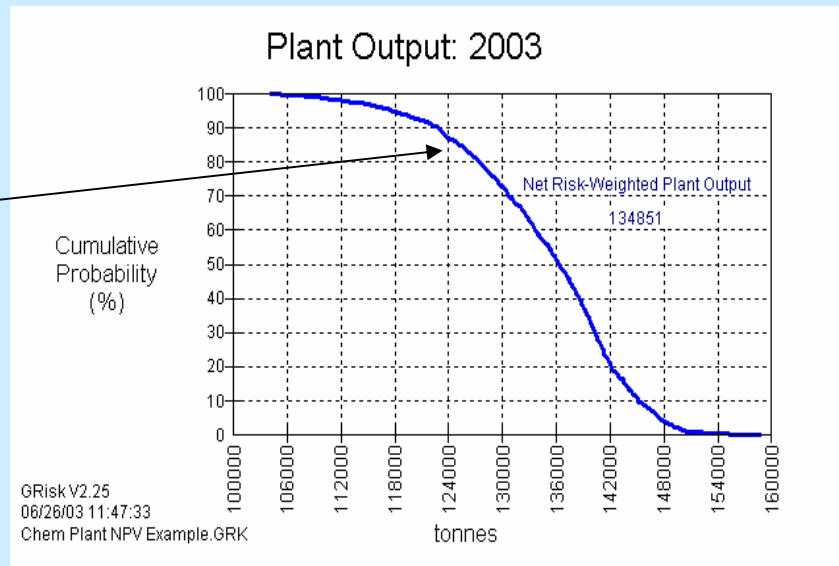
Risk/Uncertainty - Impact on Value

Example #2 – Meeting the Promise

Example problem: Build a new chemical plant – <u>Meeting the promise</u>

As the BUL, we have made a Chemical-X-production promise for our first year of production (2003). According to the plots below, accounting for all success-range uncertainties, our mean 2003 production is about 135,000 tonnes. We make 2003 logistical plans, etc. for this amount.





But what do we promise? On a fully risk-weighted basis, what should this project contribute to the corporate Chemical X total?

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Risk/Uncertainty - Impact on Value

Example #2 – Meeting-the-Promise

Example problem: Build a new chemical plant – <u>Meeting the promise</u>

Additional chance of abject failure – getting bugs out of new technology

- Might delay 2003 production for as little as a few weeks, most likely for about 6 months, but it can be envisioned to be more than a year – representing a small (10%) chance of abject failure for 2003 delivery
- Not enough to "kill" the project or significantly impact the 20-year-long NPV calculation

Cumulative Impact →

2003 Production (Tonnes)	**135,000**	**EVS**
Impact of short Tech. production delay	**120,700**	
Combined impact of permits and war	**86,300**	**EVP**

We sign shipping contracts, make logistical plans, etc. based upon the EVS (135,000) value. The contribution of this plant to the 2003 Chemical X corporate portfolio is the EVP value.

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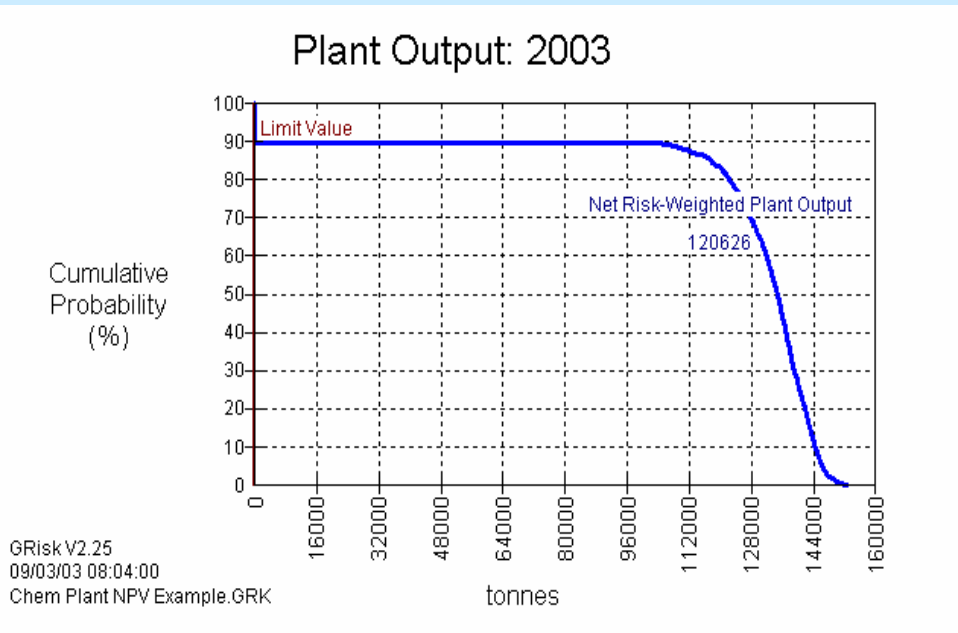
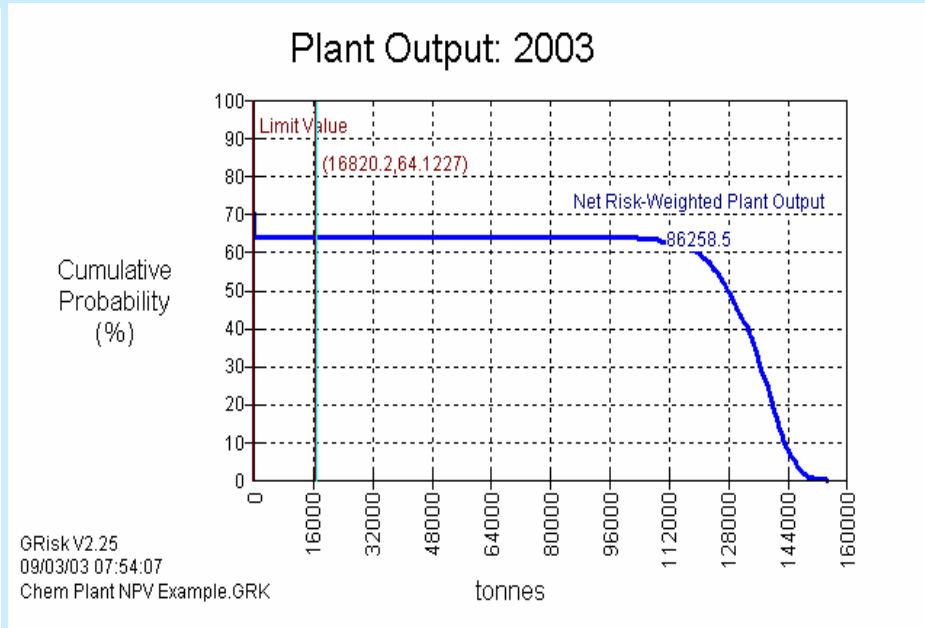
Example #2 – Meeting-the-Promise

Example problem: Build a new chemical plant – <u>Meeting the promise</u>

Impact of short Tech. production delay only



Impact of Tech. delay, Permits, and War



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Risk/Uncertainty - Impact on Value

Example #2 – Meeting-the-Promise

Example problem: Build a new chemical plant – <u>Meeting the promise</u>

How this drives performance:

1. We investigate the permitting process and begin to take steps that will help to ensure that permit-grant times are acceptable.

2. We begin to do what we can to lessen the impact of war on our facilities including building offshore, building relationships with various political factions, etc.

3. To offset the probability of technical delays, we encourage our colleagues in the U.K. to build a small demo facility in an existing production plant.

...and other steps.

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Risk/Uncertainty - Impact on Value

Example #2 – Meeting-the-Promise

Challenges:

1. To sanction the exploration of ranges and of failure

2. To provide tools and training so that we can consistently impact project value with a holistic set of risks/uncertainties

3. To get decision makers to request ranges and fully-risk-weighted values

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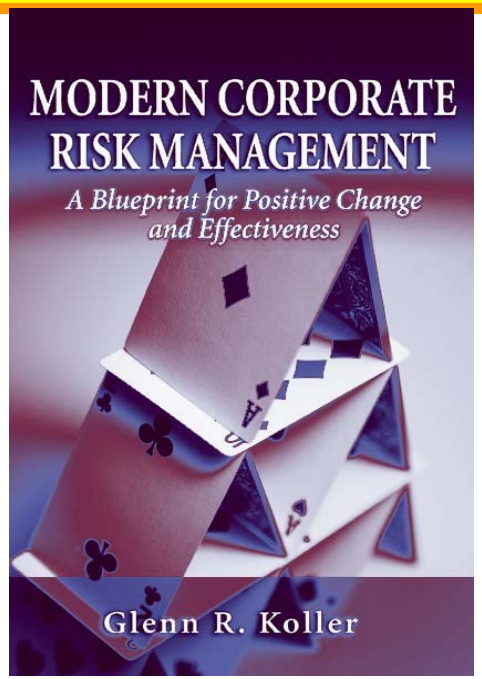
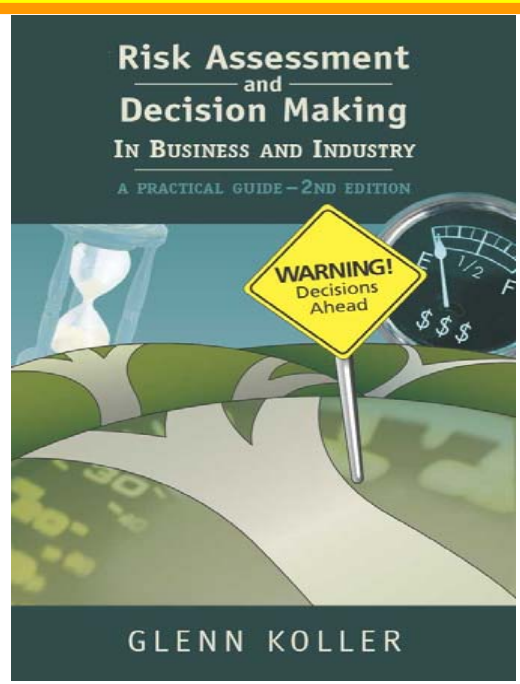
Risk/Uncertainty - Impact on Value

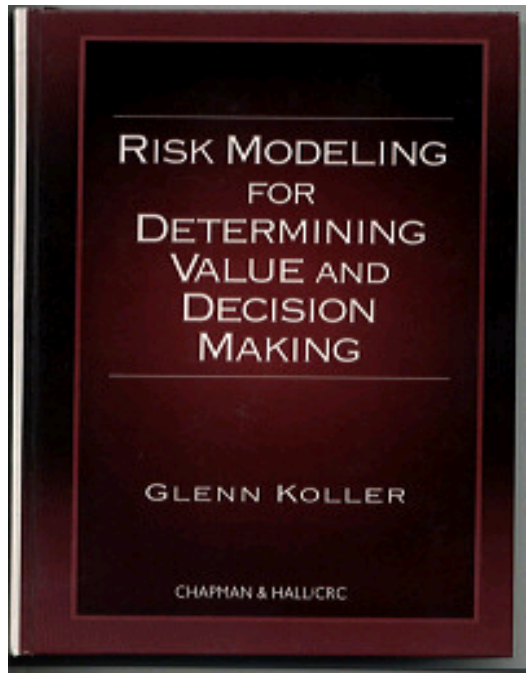
Example #2 – Meeting-the-Promise

Do you have similar challenges in your business?

Can you think of uncertainties and chances of abject failure for your business?







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