Risk Analysis

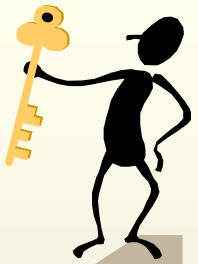
Qualitative

Quantitative

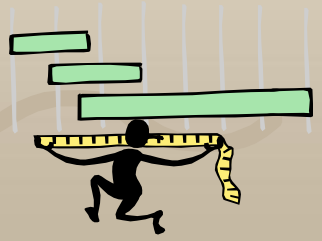
Four Phase Approach

1. Identification

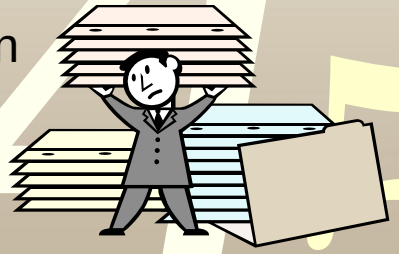
3. Response



2. Assessment



4. Documentation



Review Risk Identification

- Classify the types of project risks by primary source rather that effects
- Those are:
  - External, but unpredictable
  - External predictable, but uncertain
  - Internal – non-technical
  - Technical
  - Legal

Review Risk Identification

- Document reviews
- Brainstorming
- Interviews
- SWOT
- Checklists
- Assumptions

- Diagramming
  - Shows influences
  - Time order of events
  - Variables and their relationships with each other

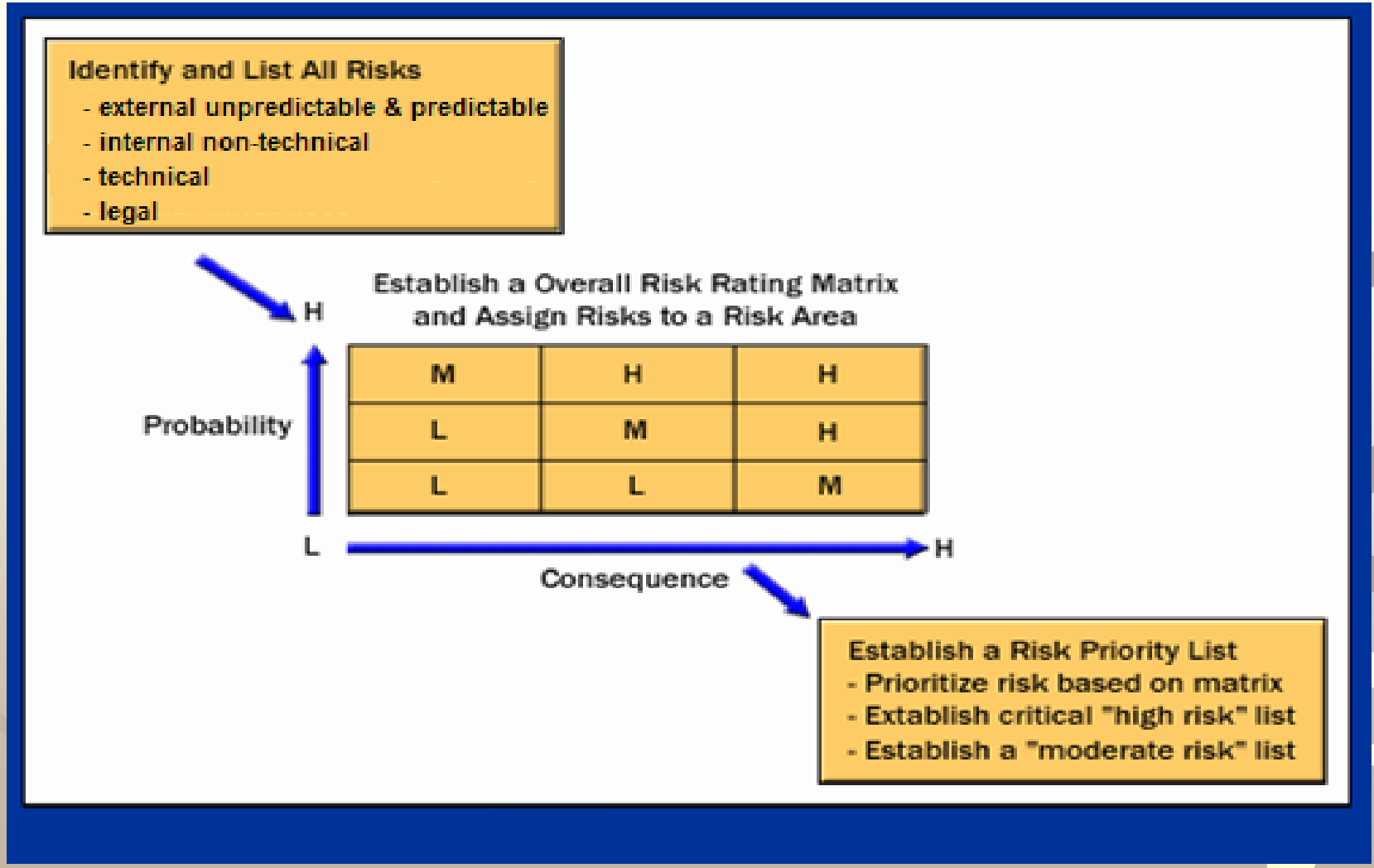
General Ways to Analyze Risk

- Probability:
  - Percentages (5%, 25%, 75%, etc.)
  - Low, Medium, High
  - 1 - 5
- Severity:
  - Estimated cost to recover
  - Estimated schedule impact
  - Low, medium, high
  - 1 - 5

Probability/impact matrix (risk factors)

- Using probability/impact to create impact charter
- Numbers represent the overall risk of specific events upon the probability of occurring and consequences to the project if they do happen
- To address the identified risks adequately

Risk Assessment



Risk Register

The Risk List

- Rank
- Risk name
- Enabling event
- Triggering event
- Probability
- Severity
- Status/notes

CURRENT STATUS																				
PRIORITY																				
EST. COMPLETION DATE																				
ASSIGNED TO																				
REMEDY ACTION																				
HOW OCCURRENCE DETECTED																				
PREVENTION STRATEGY																				
DIFFICULTY TO DETECT	L																			
	M																			
	H																			
IMPACT	L																			
	M																			
	H																			
OCCURRENCE PROBABILITY	L																			
	M																			
	H																			
RISK FACTOR		CATEGORY:							CATEGORY:							CATEGORY:				
ITEM NO.																				

The Risk Register Example

0011

Risk Register

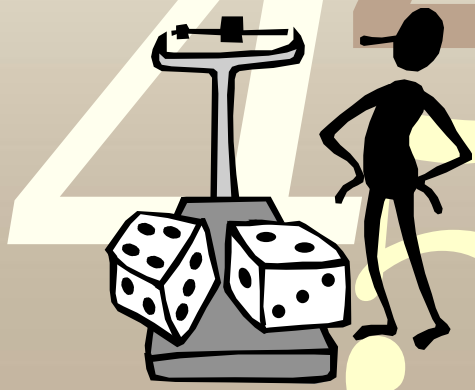
Risk Id	Risks	Current Risk			Status	Owner	Raised	Mitigation Strategies	Residual Risk		
		Likelihood	Impact	Severity					Likelihood	Impact	Severity
Category 1: Project selection and Project finance											
RP-01	Financial attraction of project to investors	4	4	16	Open		01-march	• Data collection • Information of financial capability of investor • Giving them assurance of tremendous future return.	4	3	12
RP-02	Availability of finance	3	4	12	Open		03-march	• Own resources • Commitment with financial institution • Exclusive management of investor.	3	3	9
RP-03	Level of demand for project	3	3	9	Open		08-march	• Making possibility and identification of low cost and best quality material. • Eradication of extra expenses from petty balance.	2	3	6
RP-04	Land acquisition (site availability)	3	3	9	Open		13-march	• Making feasibilities • Analysis and interpretation of feasibilities. • Possession and legal obligation of land.	2	2	4
RP-05	_ High finance costs	2	2	4	Open		15-march	• Lowering operational expenses and transportation expenses • Proper management of current expenses.	1	2	2

Qualitative Risk Analysis
Quantitative Risk Analysis

Qualitative Analysis

Define: - Descriptive

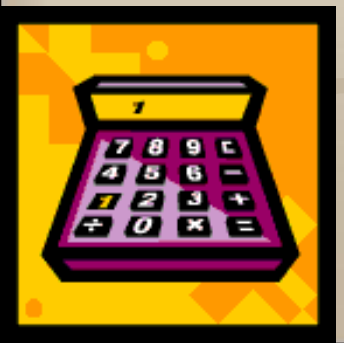
Qualitative risk analysis is a process of assessing the **probability/likelihood** and **consequence/impact** of identified risks using ordinal or cardinal scales.



Quantitative Analysis

Define: - Mathematical definition

Quantitative risk analysis is a risk analysis technique that uses **a single number** to portray the risk associated with a particular event.



Ordinal verses Cardinal

- **Ordinal numbers** are numbers used to denote the position in an ordered sequence: first, second, third, fourth, etc.,
- **Cardinal numbers** is the name given to number words that are used for quantity (*one*, *two*, *three*) these say "how many there are": one, two, three, four, etc.

Ordinal Scales

How would you rate the service of our staff?

Excellent - Very good - Good - Fair - Poor

Here we have no idea how much better nor can we even be sure that two respondents have the same understanding of what constitutes "good service" and therefore, whether they really differ in their opinion about its quality.

Cardinal Scales

- A number scale, where a number such as 3 or 11 or 412, is used to indicate quantity but not order.
- Cardinal risk scales reflect actual numerical differences. Any mathematical operations performed on results from cardinal scales or calibrated ordinal scales, can provide accurate information for risk ratings.

Typical Risk Impact Scales

Ordinal Scale (example)	Very Low	Low	Moderate	High	Very High
Cardinal Scale (example)	0.05	0.1	0.2	0.4	0.8
Cost	Insignificant cost increase	< 5% cost increase	5-10% cost increase	10-20% cost increase	> 20% cost increase
Schedule	Insignificant schedule slippage	< 5% schedule slippage	5-10% schedule slippage	10-20% schedule slippage	> 20% schedule slippage
Scope	Scope decrease barely noticeable	Minor areas of scope are affected	Major areas of scope are affected	Scope reduction unacceptable to the client	Project end item is effectively useless
Quality	Quality degradation barely noticeable	Only very demanding applications are affected	Quality reduction requires client approval	Quality reduction unacceptable to the client	Project end item is effectively unusable

0011

Objective vs. Subjective

42

Understanding

Subjective Information - affected by a particular state of mind; results from the feelings of the subject emphasizing the ideas, thoughts or feelings of a person not just rigidly reflecting reality

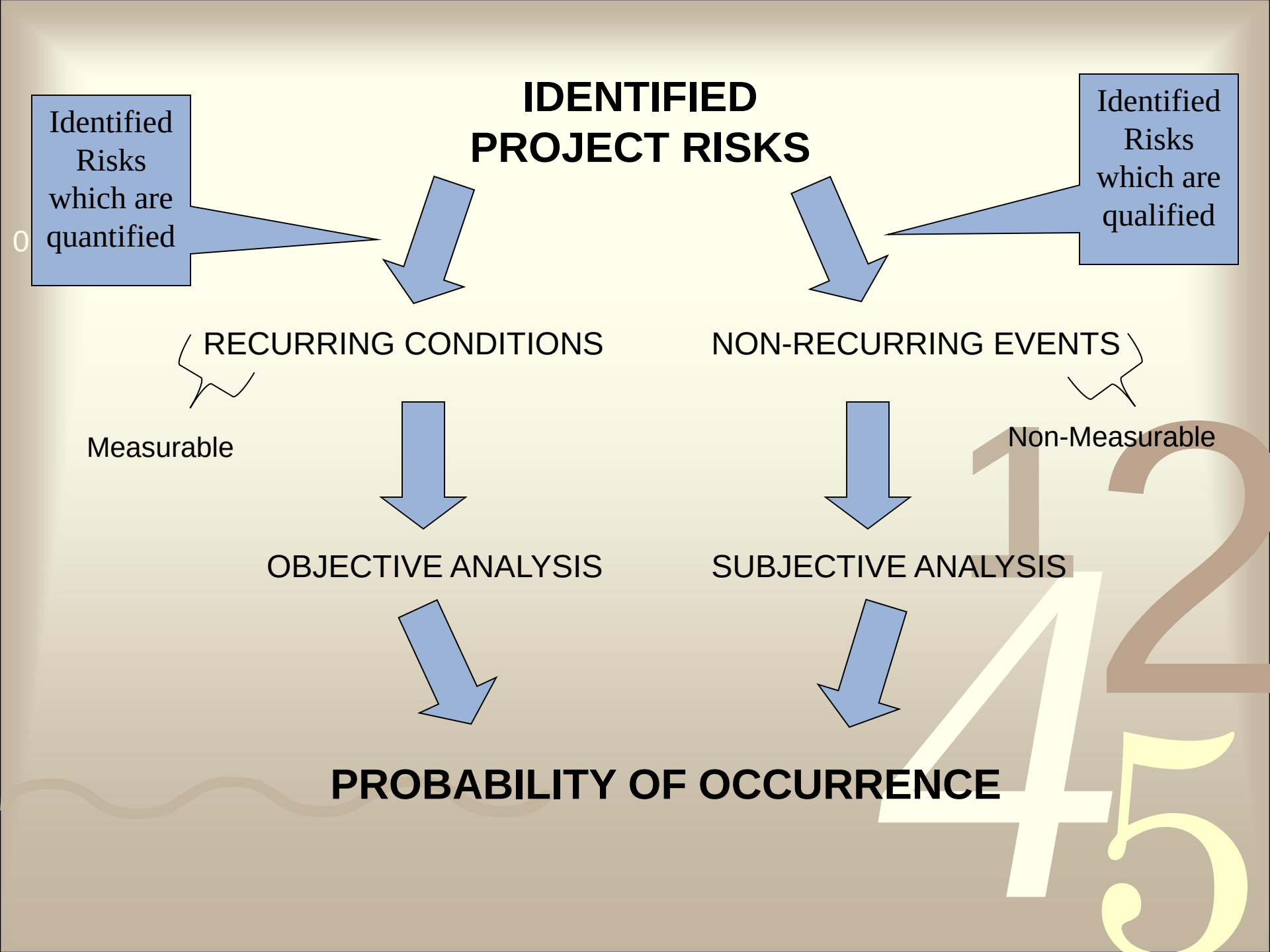
Expert's opinions

Goal	Andy	Alice	James	Peter	Mean	Std Div.
Improve development team productivity	1	5	3	2	2.75	1.7078
Provide tiered product pricing	3	4	1	3	2.75	1.2583
Increase the size of the sales team	4	3	4	4	3.75	0.5
Respond rapidly to customer feedback	2	2	2	5	2.75	1.5
Other	5		5			

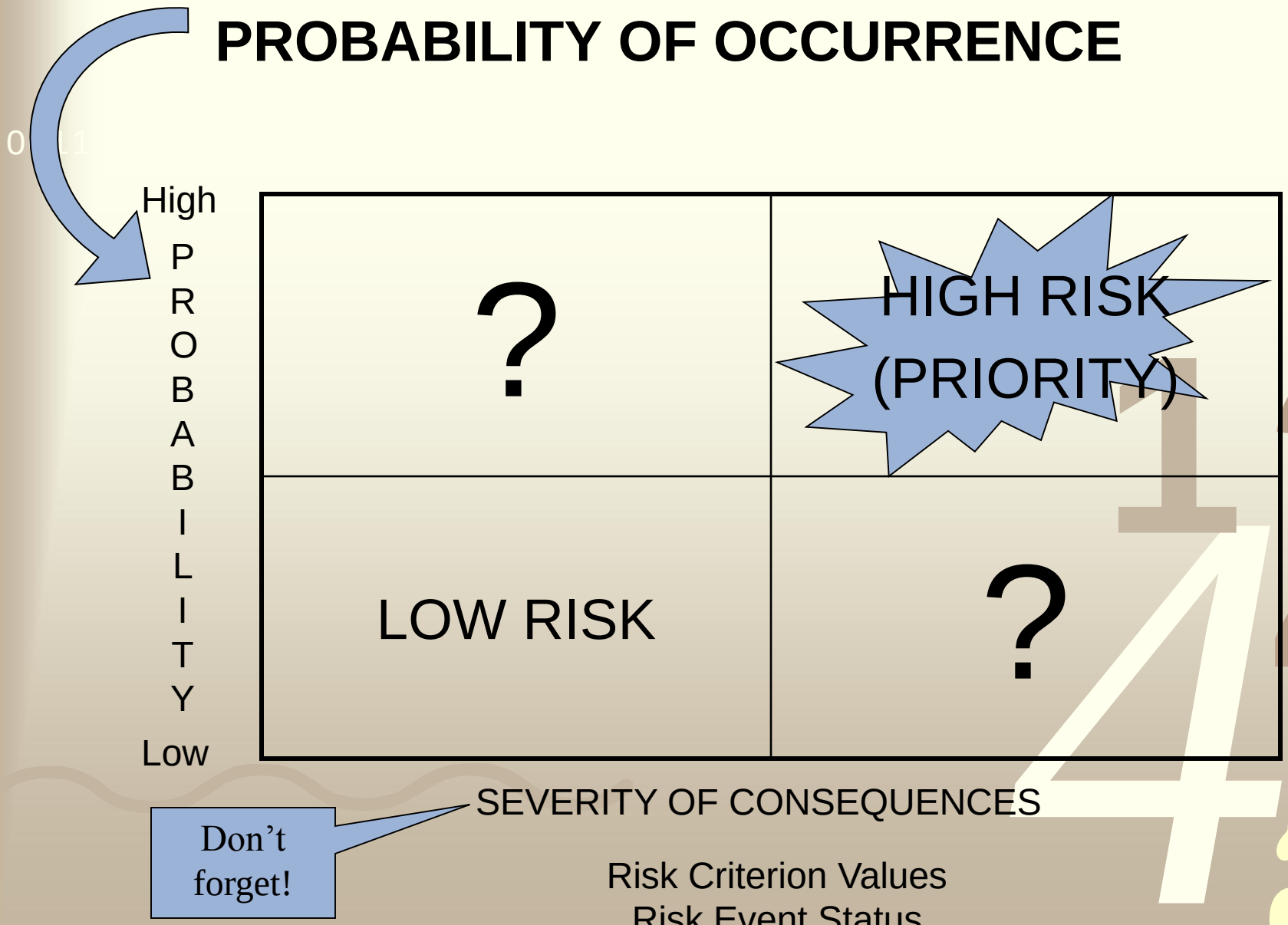
Understanding

Objective Information - without bias or prejudice; detached; impersonal;

Objective research has no agenda. It reports facts which are substantiated.


IDENTIFIED PROJECT RISKS
Identified Risks which are quantified
Identified Risks which are qualified
RECURRING CONDITIONS
NON-RECURRING EVENTS
Measurable
Non-Measurable
OBJECTIVE ANALYSIS
SUBJECTIVE ANALYSIS
PROBABILITY OF OCCURRENCE

PROBABILITY OF OCCURRENCE



If a “RISK” is going to occur, without a doubt, with a certainty!!!

IT is not a RISK!

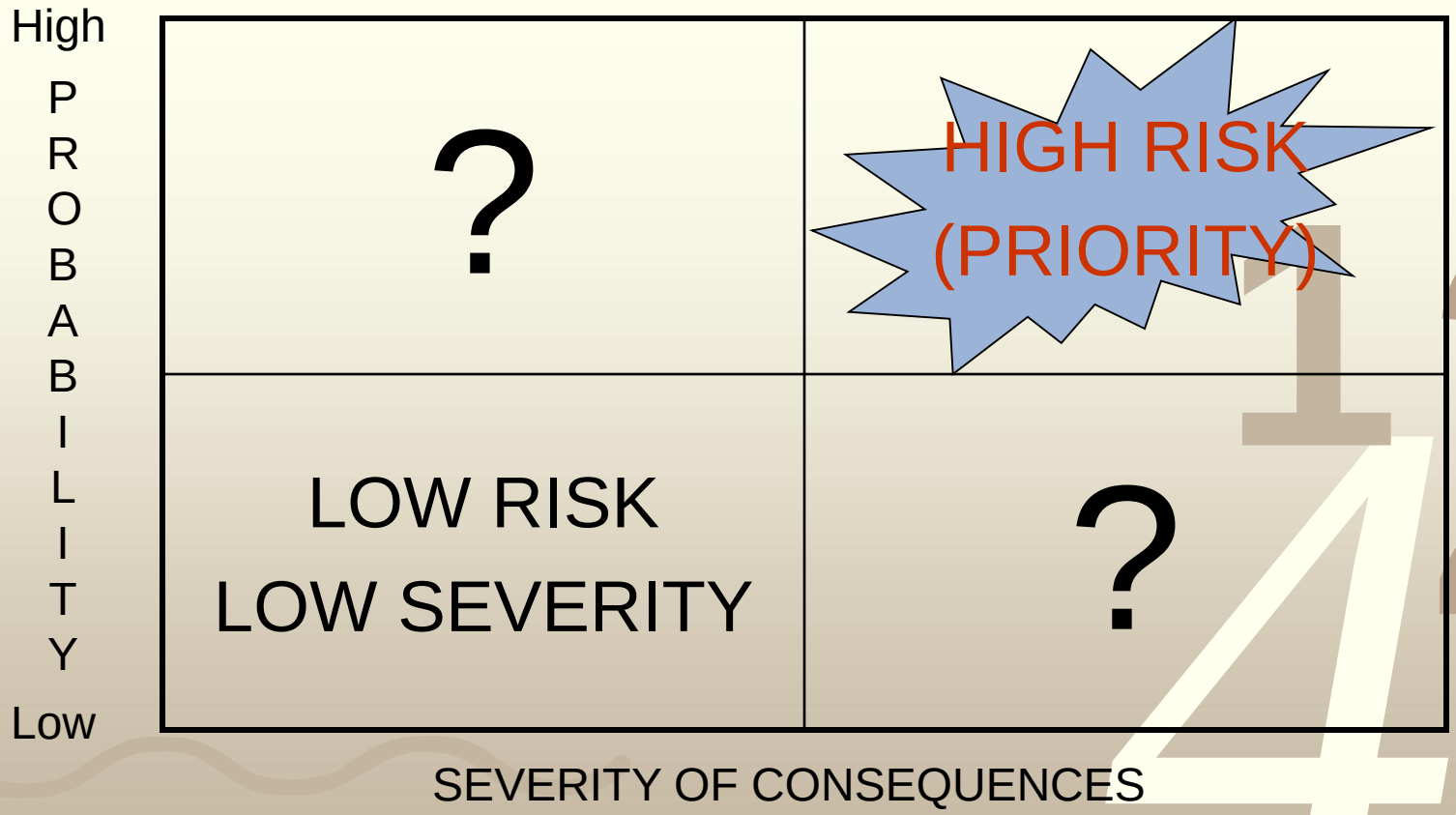
It is a FACT!

Plan for it!!!!

Building a PROBABILITY MATRIX

Then ask based on the probability and the severity what is my priority?

Establish the Probability Scale

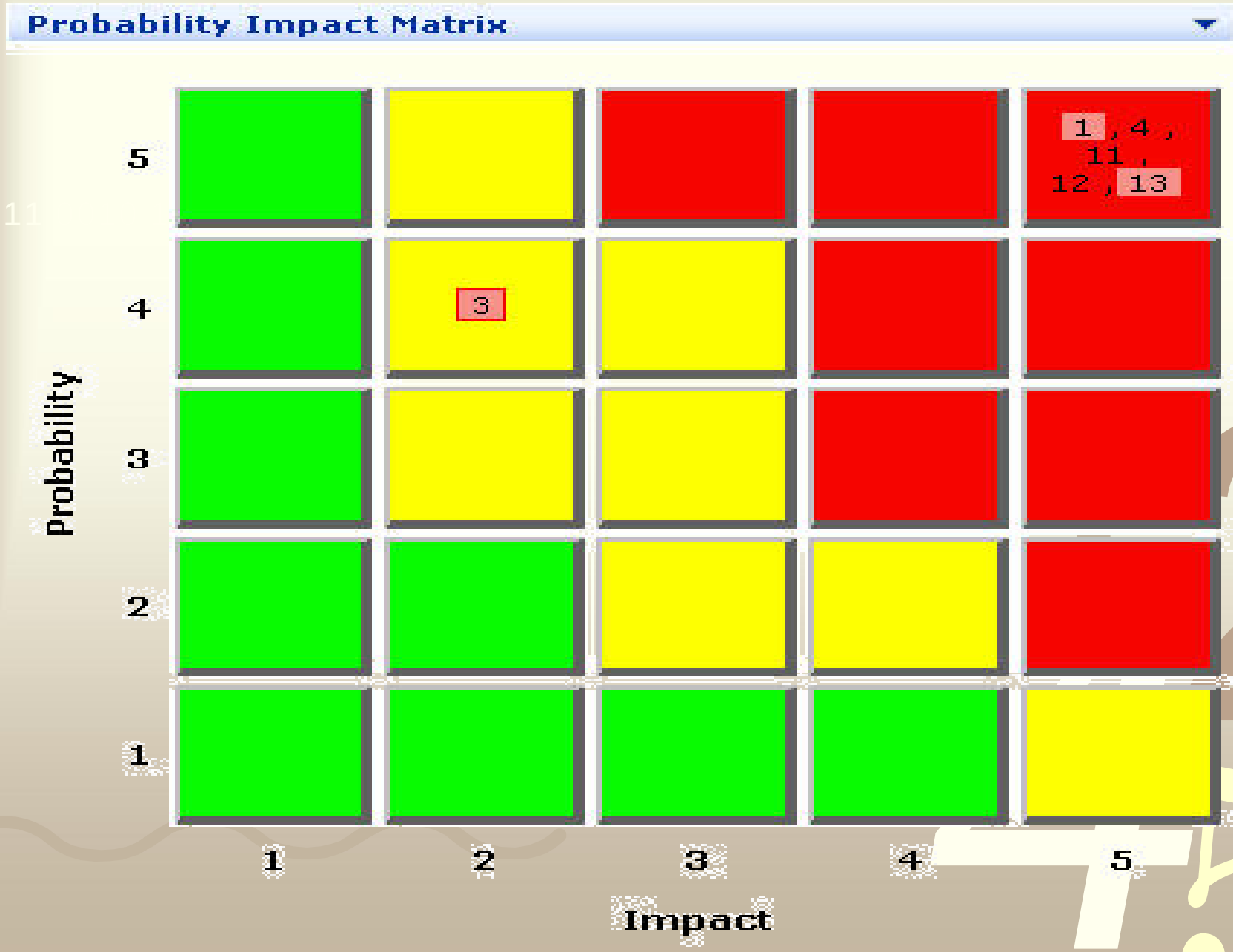


Establish the Severity Scale

Risk Event Status

- Is a criterion a value or ranking?
- Equals Risk probability times Amount at stake (expected value)

Note: a low probability and a high severity can still cost you – Why?


Probability Impact Matrix
5
4
3
2
1
Probability
1 , 4 , 11 , 12 , 13
3
1
2
3
4
5
Impact

Common Technologies used in Quantitative Risk Analysis

Decision Tree

- A graphical representation of a decision making methodology that compares the values/costs of different scenarios in terms of expected values based on probability. The values arrived at are for comparative purposes only.

Expected Value

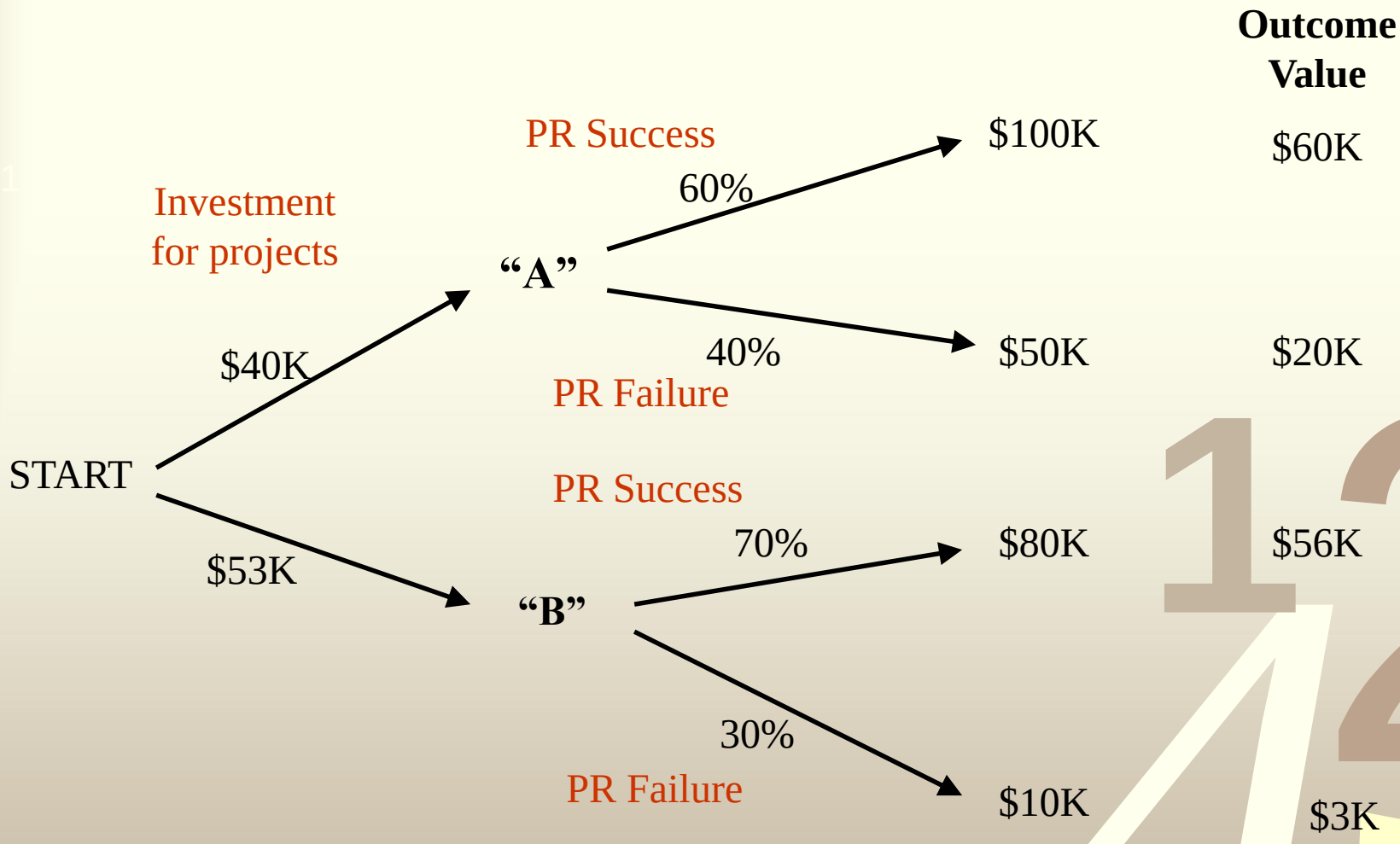
0011

Review:

In probability theory the **expected value** (or **mathematical expectation**) of a random variable is the sum of the probability of each possible outcome of the experiment multiplied by its payoff ("value"). Thus, it represents the average amount one "expects" as the outcome of the random trial when identical odds are repeated many times.

42

Expected Monetary Value Example



Risk Prioritization

- Order the risks in terms of decreasing exposure then select a cutoff point
  - Above the cutoff will be taken care of, e.g., top 10 risks
- The cutoff should be based on the number of risks and the levels of exposure
  - Focus on high-exposure risks
  - Don’t manage too many at once

Outputs of Risk Analysis

Qualitative Analysis Outputs

- Risk register (updates)
  - Relative ranking or priority list of project risks
  - Risks grouped by categories
  - List of risks requiring response in the near-term
  - List of risks for additional analysis and response
  - Watchlists of low priority risks
  - Trends in qualitative risk analysis results

Quantitative Analysis Outputs

- Risk register (updates)
  - ***Probabilistic analysis of the project***: potential project schedule and cost outcomes
  - ***Probability of achieving cost and time objectives***: e.g., likelihood of achieving the cost estimate of $x million
  - ***Prioritized list of quantified risks***
  - ***Trends in quantitative risk analysis results***

Asset Assessment

- An asset is an inverse risk
  - A positive impact instead of a negative impact

Typical Software Project Assets

- People
  - Motivation and morals
  - Teamwork
  - Skill alignment
  - Environment
- Domain expertise
  - Previous experience
  - Existing systems and documentation
- Processes
  - Established, well understood
  - Effective in the problem spaces
- Technology
  - Well known, stable

Asset Probability, Severity, and prioritization

- Probability
  - How likely are we to lose this opportunity if we don't do anything about it?
- Severity
  - How big would be the missed opportunity be?
- Use the same scales as for risks then prioritize the same way

Questions?

My head hurts…