NATURAL SPI

Optimizing Risk Management

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Optimizing Risk Management

Level 3 Risk Practices

Prepare for Risk Management — RSKM SG1

Identify and Analyze Risks — RSKM SG2

Identify Project Risks — PP SP2.2

Establish Budget and Schedule — PP SP2.1

Mitigate Risks — RSKM SG3

Monitor Project Risks — PMC SP13

Collect Improvement Information — RSKM GP3.2

Establish the Budget & Schedule

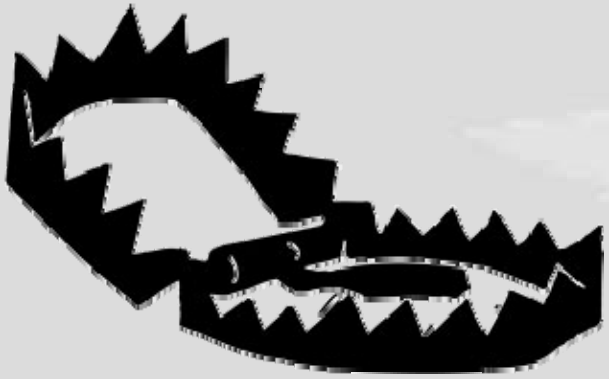
For each risk, multiply its impact times its probability, to get it's exposure

Add them all together to estimate a buffer or reserve

- Do this for effort
- Do this for duration
- Do this for costs

You could be falling into a trap!

Avoiding a Statistical Trap



Common Risk Planning Buffer Calculation

$$B = SUM(r_i * p_i)$$

Where:

r_i = impact of risk(i), i = 1 to n

p_i = probability of risk(i), between 0 and 1.0

B = total risk buffer estimated for any dimension of impact:

- cost
- duration
- effort, etc.

The Problem

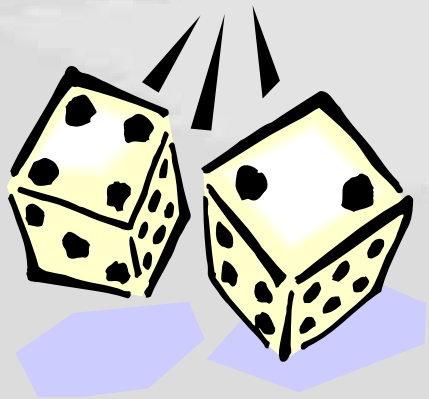
Based on $B = SUM(r_i * p_i)$

HALF of your projects will be late!

Big Questions

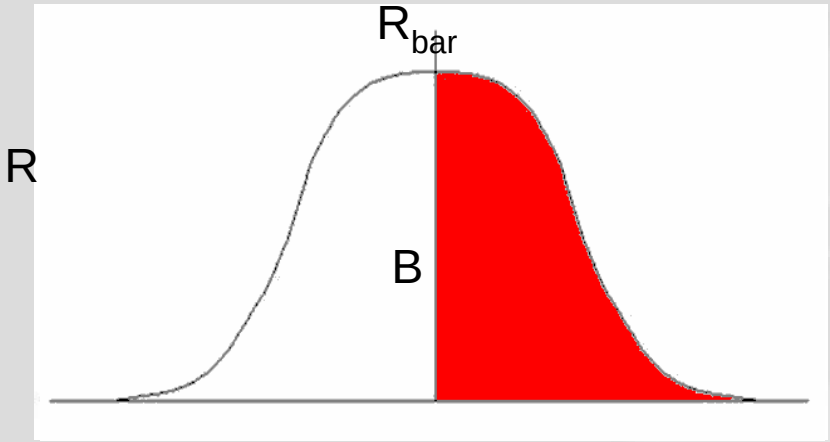
Would you start a project knowing there was a 50 percent chance it will be late based on risks alone?

Would your customers accept having 50% of their projects being late?



Why the Problem?

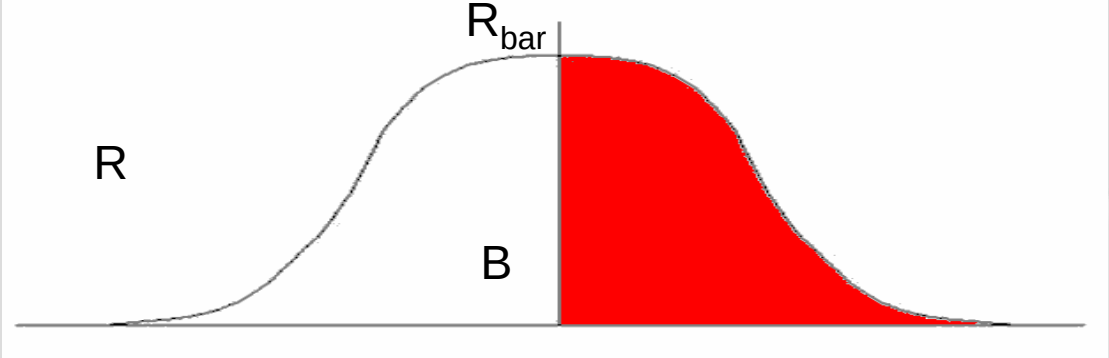
The random variable to reflect the risk outcomes has a distribution that looks like this:



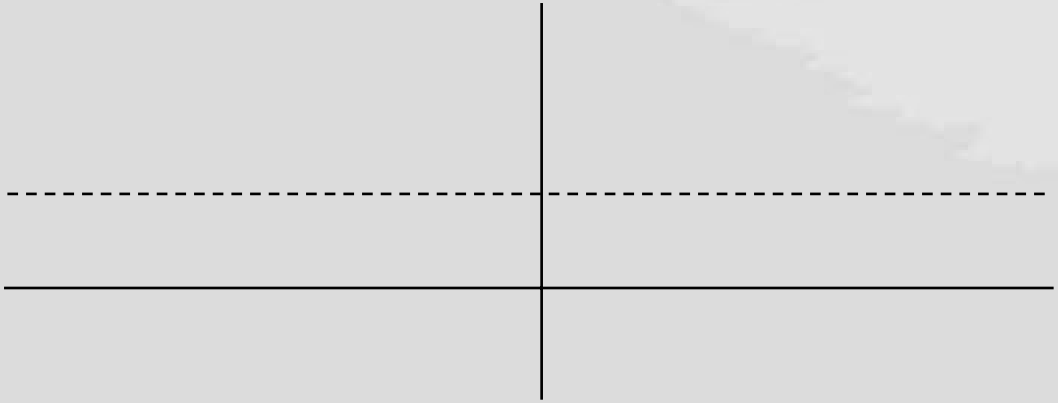
The buffer to protect the project from these risks, B, is commonly set to the expected value for the sum of manifested risks, R_{bar}.

But, 50% of the outcomes will be greater than B.

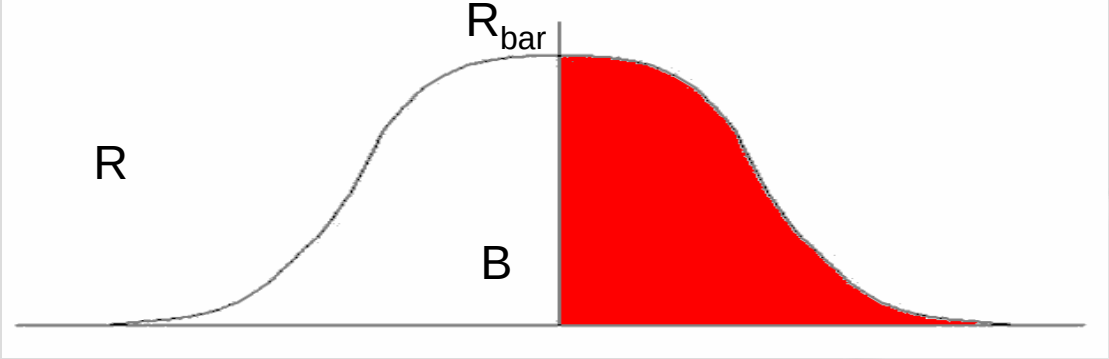
On the Average You Will Break Even



Assuming that the value of dollars or days to the left of B is the same of the units to the right.



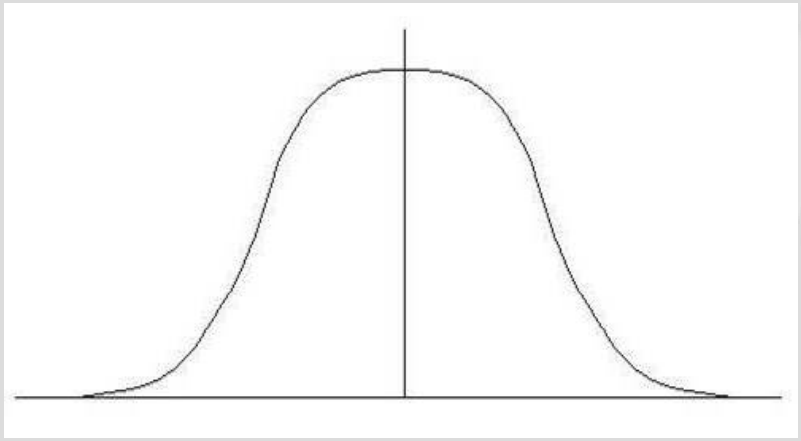
But, the Assumption Does Not Always Hold



Dollars/days/units of estimate to the RIGHT of B can be much more expensive than units to the LEFT.

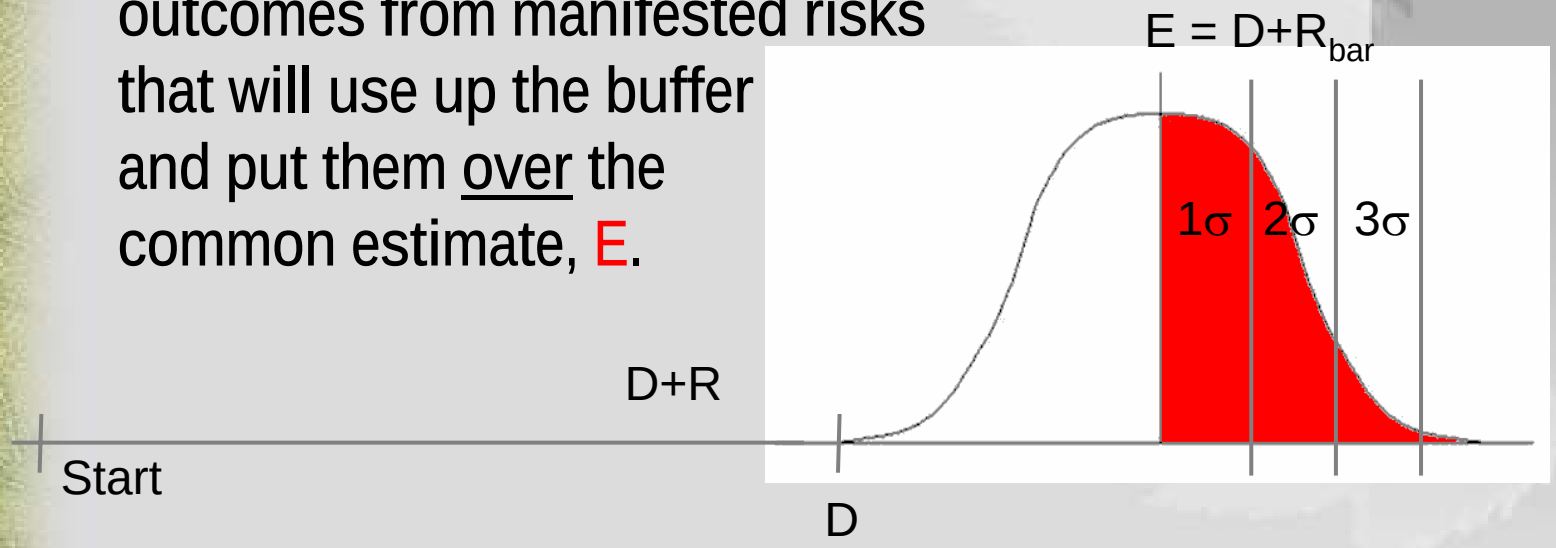
Central Limit Theorem to the Rescue

The Central Limit Theorem of statistics says that the sums of random variables tend to become approximately normal, i.e. they follow a Gaussian Curve.



How big should buffers be?

Applying this distribution to real projects with duration D means that half the projects will experience outcomes from manifested risks that will use up the buffer and put them over the common estimate, E.



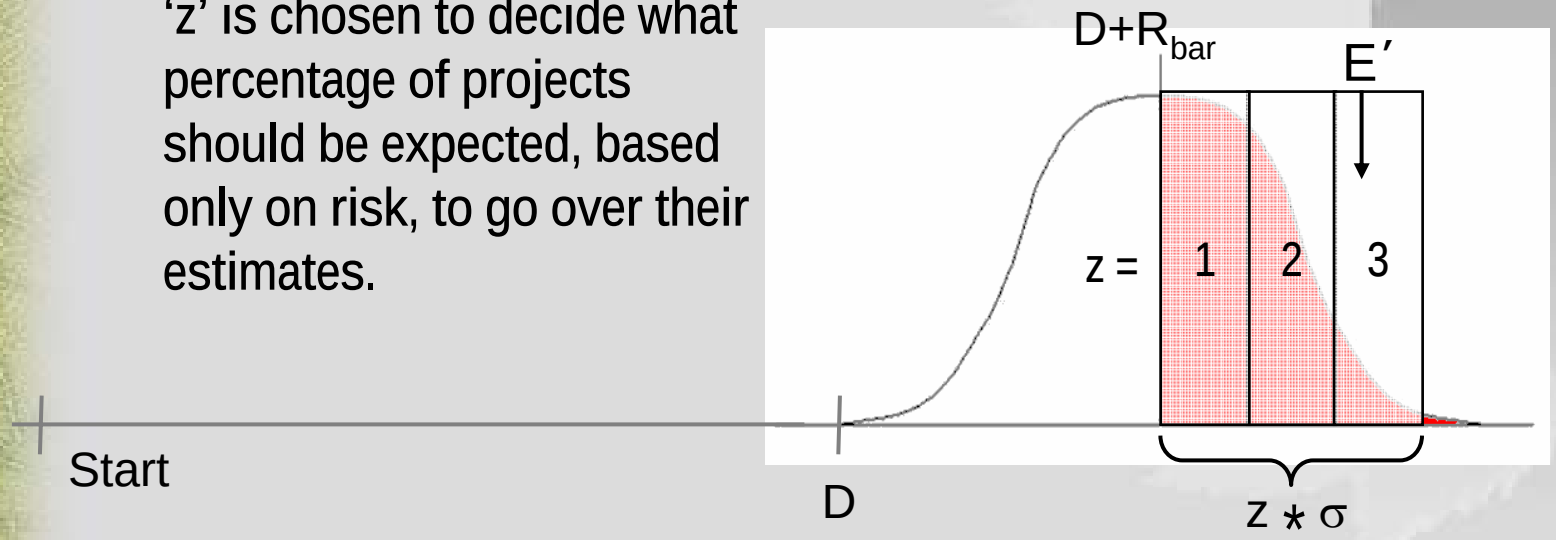
We can estimate the standard deviation from the binomial nature of our risks: $\sigma = SQRT(SUM(r_i * p_i)/n)$.

Choosing the Buffer

And use our estimate to calculate a new buffer, B′, and new Estimate,

$E' = D + B' = D + R_{bar} + (z * \sigma)$

'z' is chosen to decide what percentage of projects should be expected, based only on risk, to go over their estimates.



Choose your ‘z’

Select a standard value for ‘z’ to use to calculate risk buffers.

z = 0

will give you the protection you have now.

z = 2.0

will give you risk buffers to protect 97.72% of projects

(or phases of projects).

Only 2.28% would be expected to exceed their buffer.

z	% expected to be over
0.0	50.00%
0.5	30.85%
1.0	15.87%
1.5	6.68%
2.0	2.28%
2.5	0.62%
3.0	0.13%
3.5	0.02%

Using the New Buffer

The duration of projects will not increase.

The costs of projects will not increase.

Customers will not pay more or wait longer for projects.

Because…

Not all of risk buffers will be consumed! Some will. But, many won't.

Customers will actually find that you are early and under-budget (or late and over-budget) according to the 'z' factor that you chose.

Benefits

You will not over-promise.
You will not under-deliver.

You won't have to charge more.
You will just have to apologize less.

Improving Risk Management

How Do We Improve Risk Management?

- Learn more about risks:
  - estimate better
  - plan better
- Increase what we remember about problems and risks
- Leverage lessons learned
- Do all this systematically

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Risk Magic!

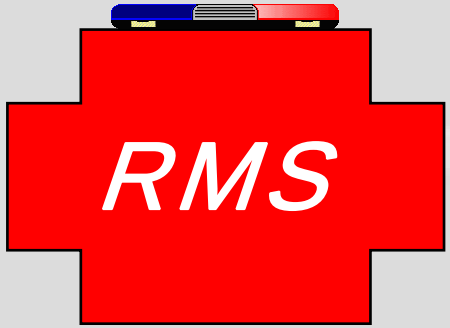
PMC SP13

Monitor Project Risks

RSKM GP3.2

Collect Improvement Information

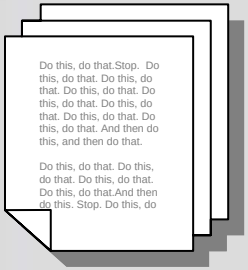
A Risk Management System



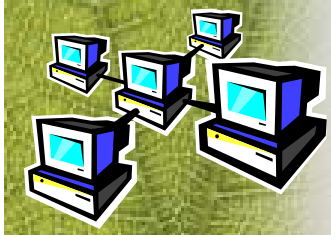
Elements of a System

People: trained and assigned with responsibilities to operate and maintain the system

Technology: tools make it easier to operate the system. If people find activities too difficult they will not be done well



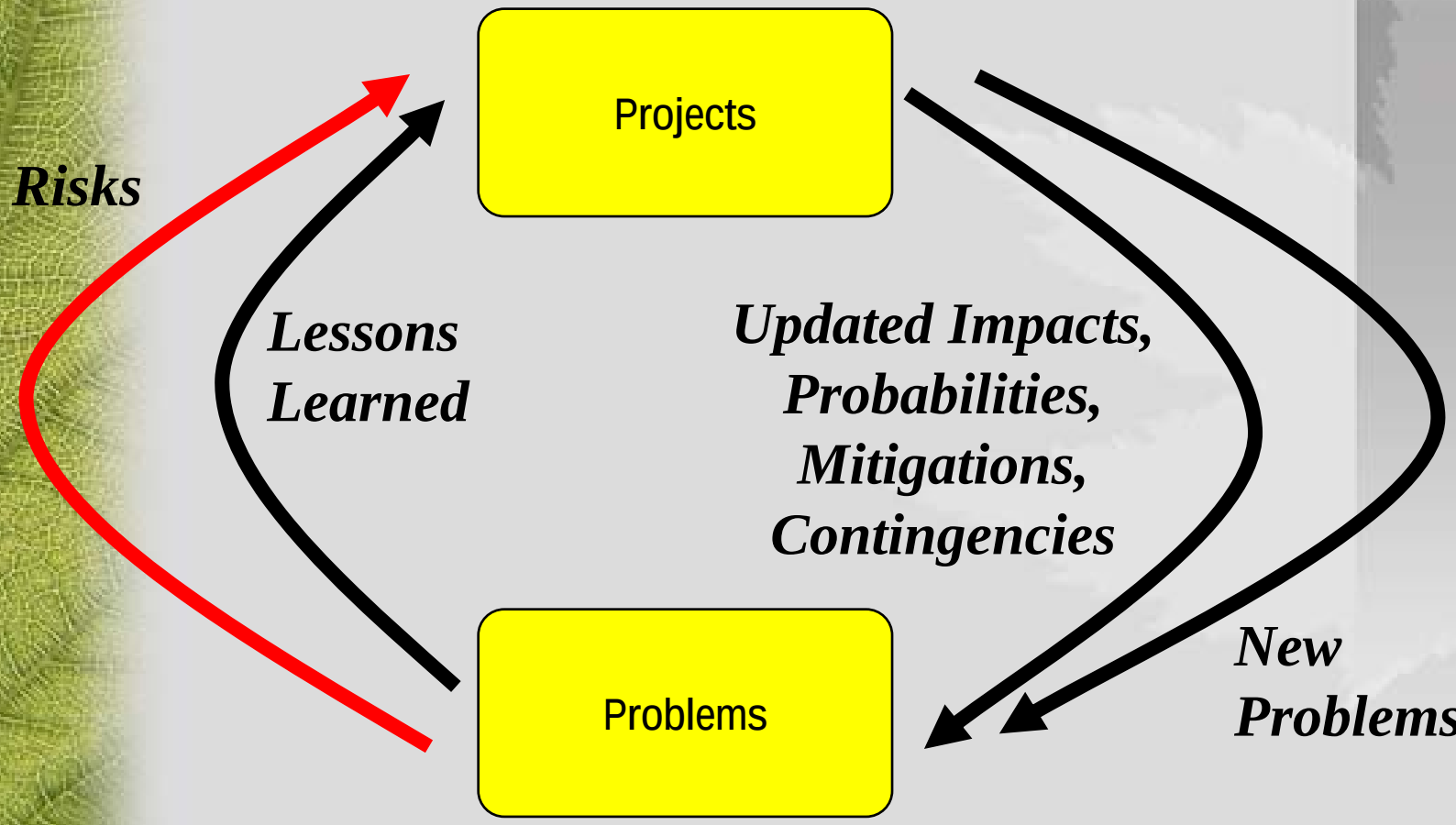
Processes: defined and available to guide activities and contribute to greater effectiveness, efficiency, and quality



RMS Components

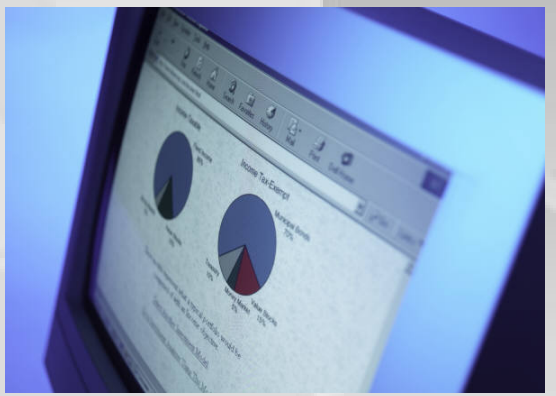
- People, training, support, responsibilities, stakeholders, monitoring and supervision of risk management
- Database of problems and risks with historical occurrences and supporting information
- Mechanism to collect data on problems, risks, and lessons learned on the success and costs of mitigations and contingency plans
- Processes, policies and plans defined to guide and give consistency to risk management activities

Projects Have Problems

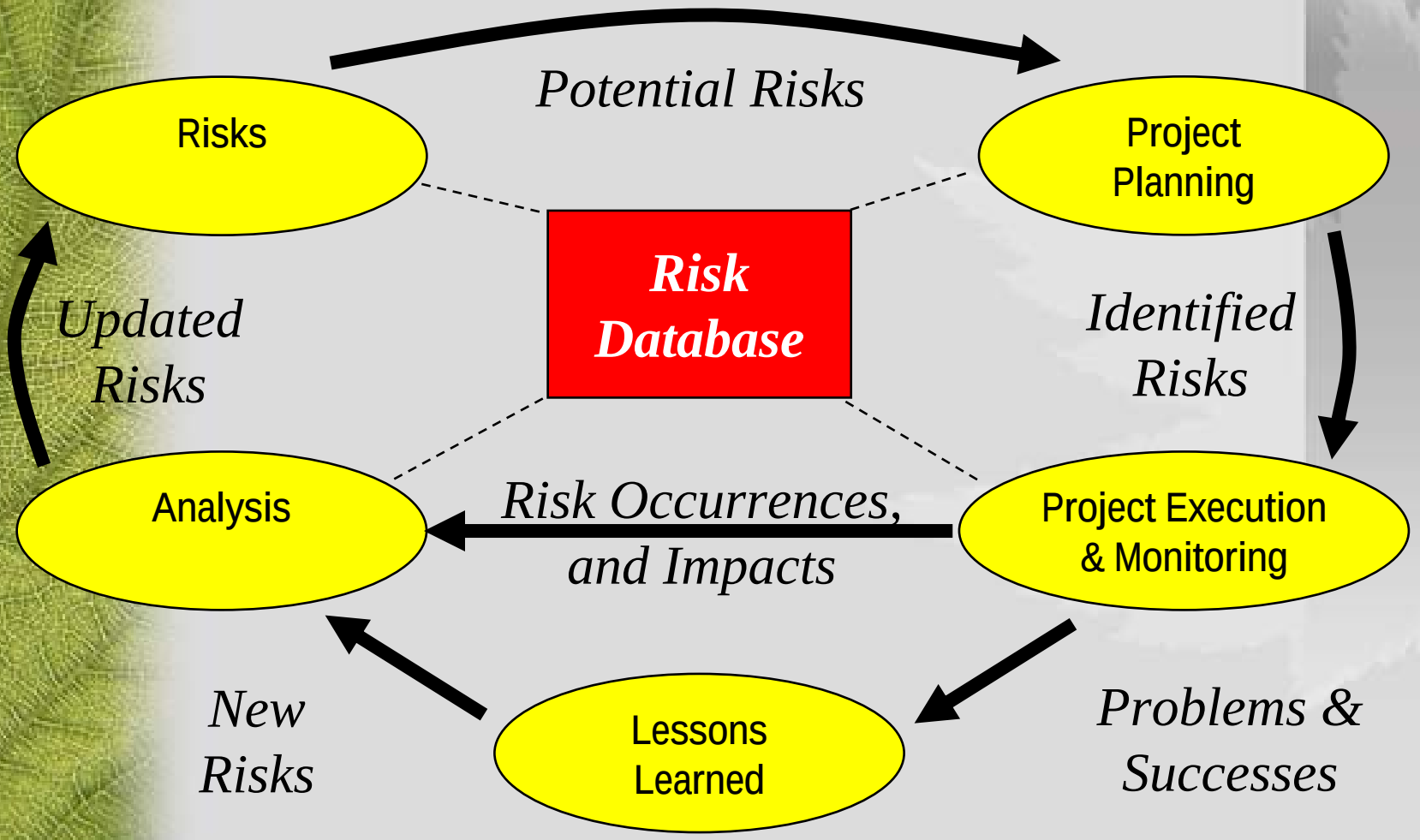


Learning About Risks

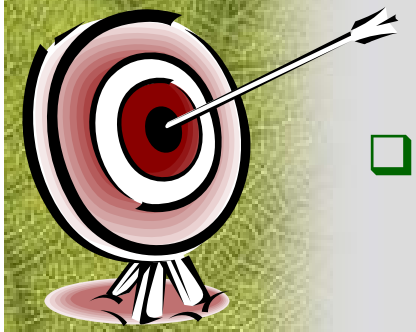
- Risk parameters and attributes
- Actual risk impacts
- Actual risk historical probabilities
- Mitigation plan successes
- Contingency plan successes



Risk Management System



Risk Management System Goals



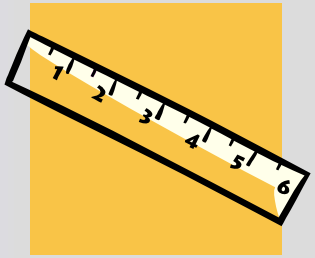
- Improve accuracy of risk parameters and contingency buffers
- Improve identification of risks
- Improve mitigation of risks and effectiveness of contingency plans
- Reduce the impact of risks on project objectives

Goal Confirming Questions

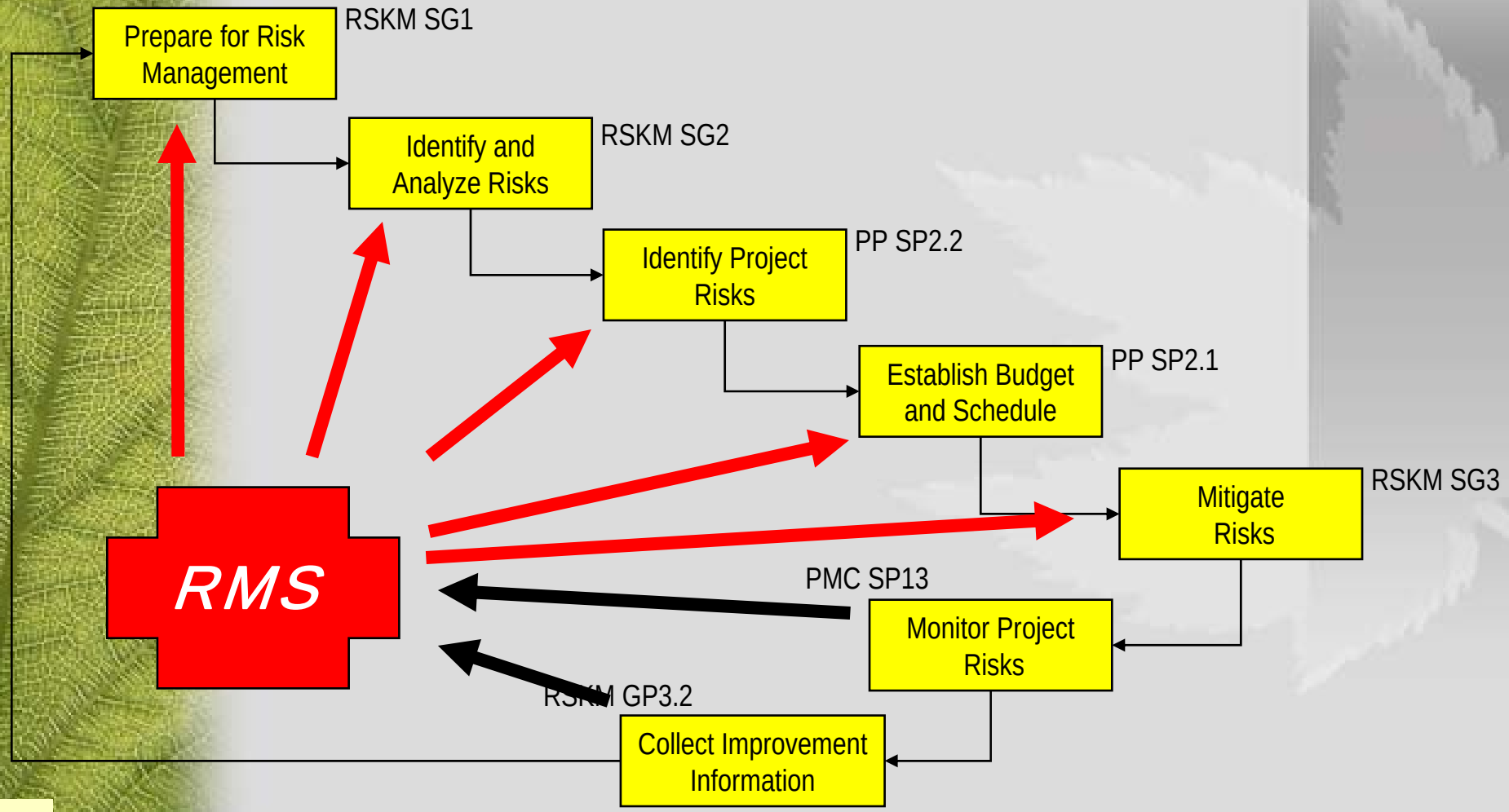
- How stable are risk parameters?
- How accurate are risk estimates of probability and impact?
- How often are projects surprised by new risks and problems?
- How effective are mitigation and contingency plans?

Goal Revealing Measures

- Risk impact estimates vs. actuals
- Risk probability estimates vs. actuals
- Frequency of new issues and problems
- Mitigation plan estimates vs. actuals
- Contingency plan estimates vs. actuals

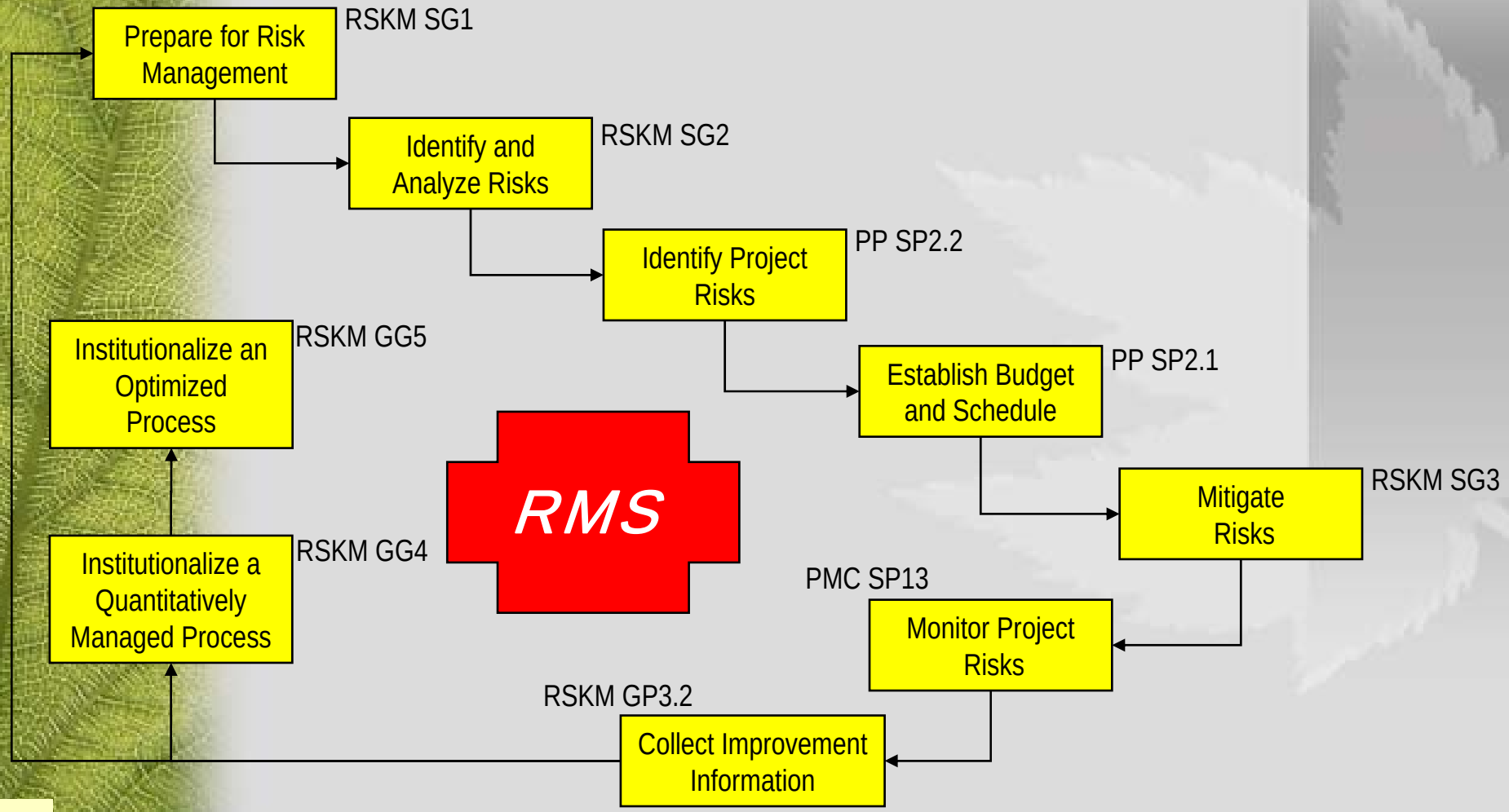


Using the System at Level 3

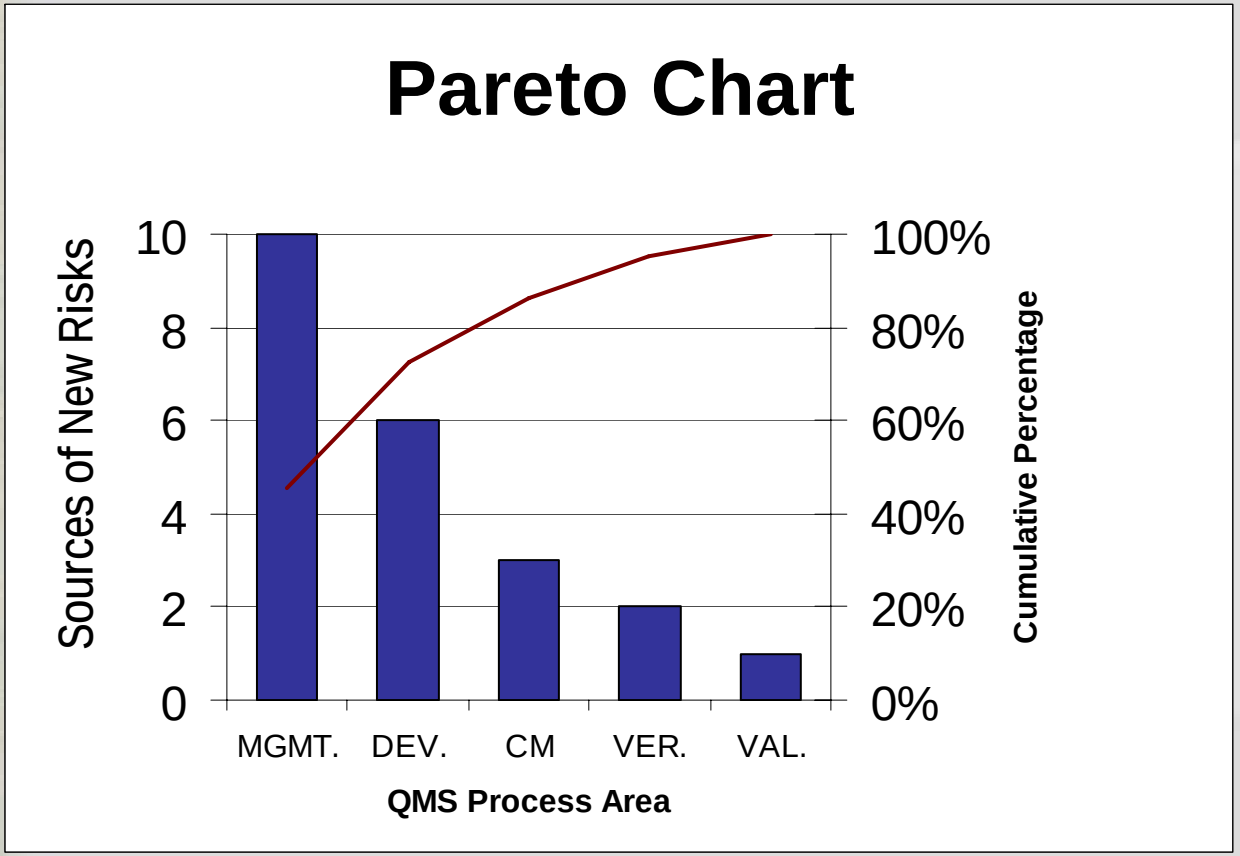


Using the System in Higher Maturity Levels

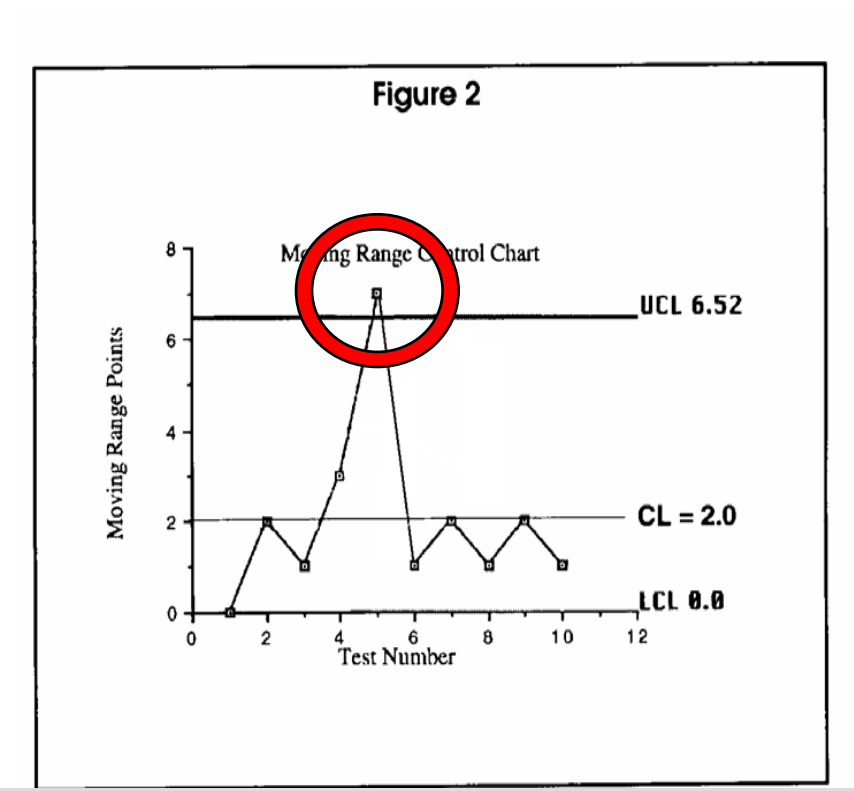
Level 4 & 5 Risk Practices



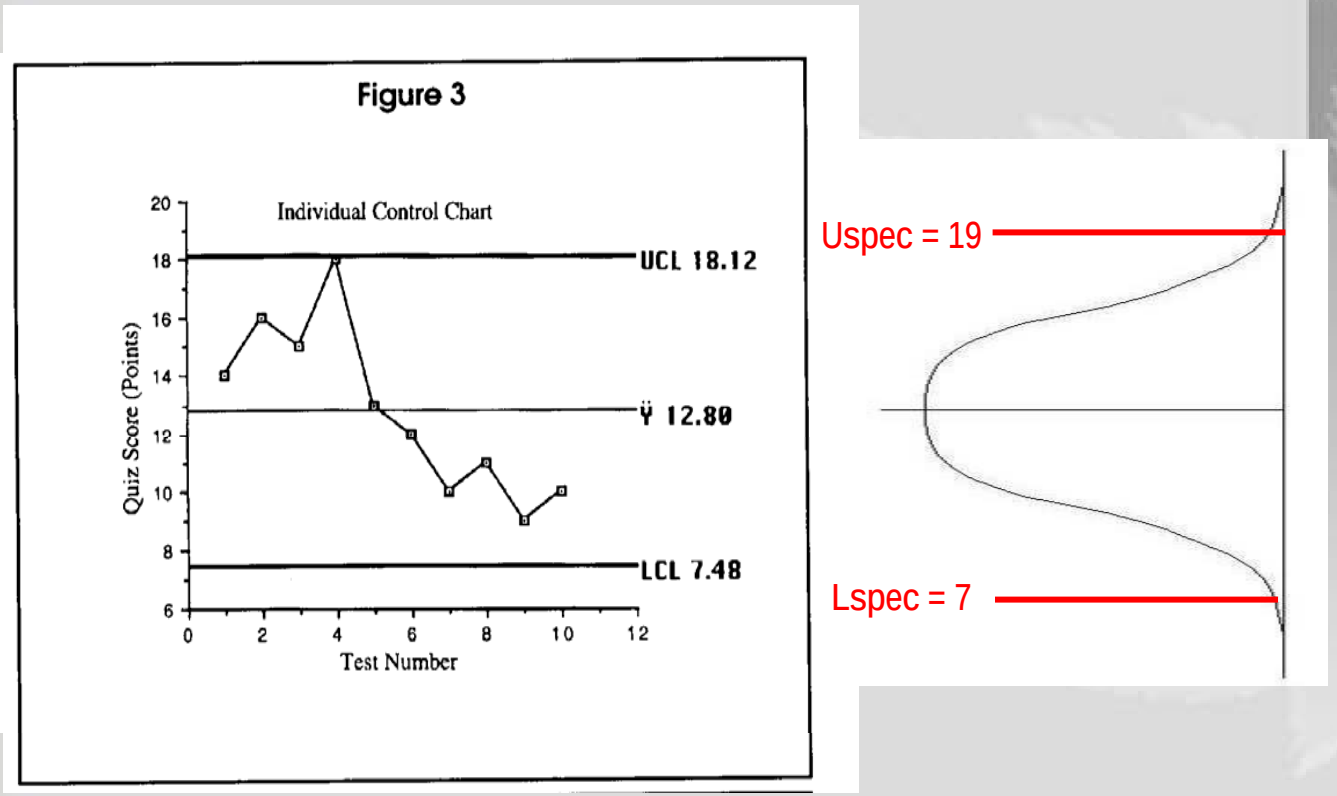
Correct Root Causes of Problems



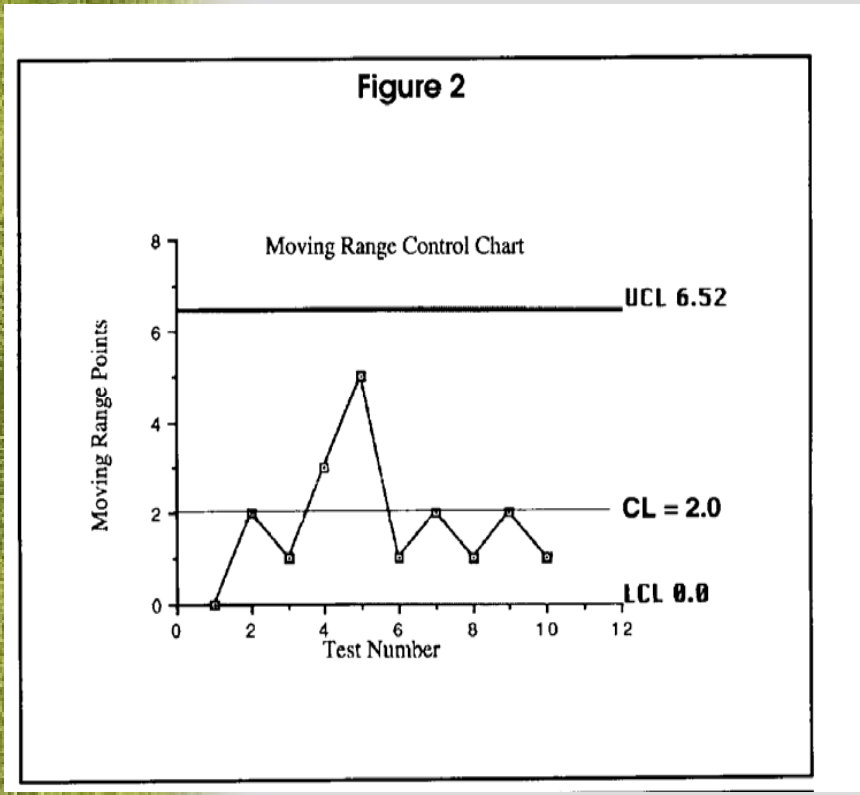
Stabilize Subprocess Performance

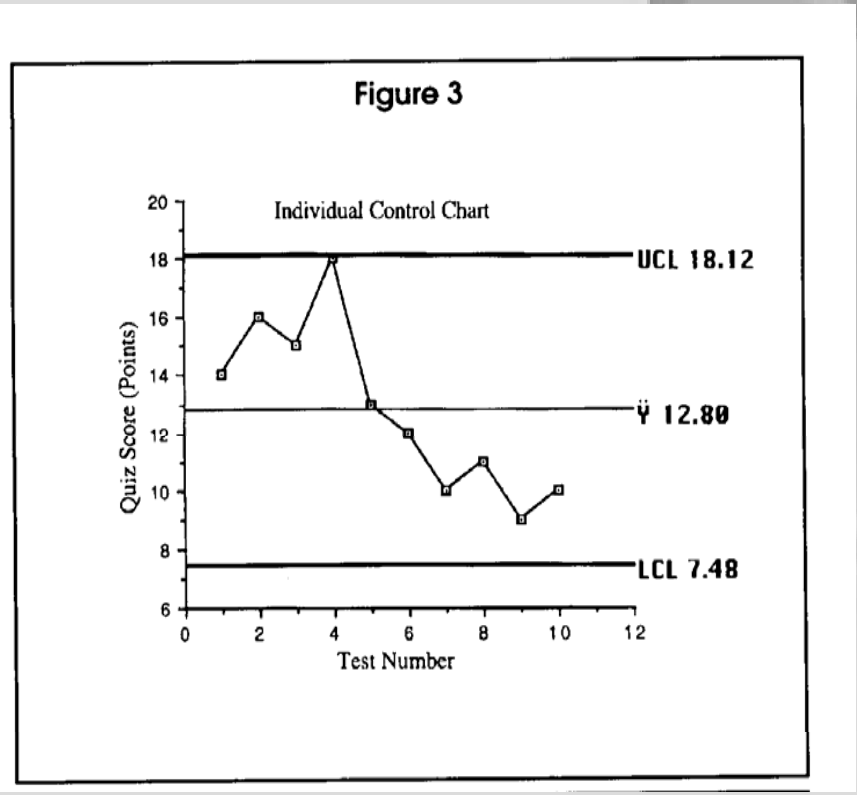


Quantitatively Managed Process

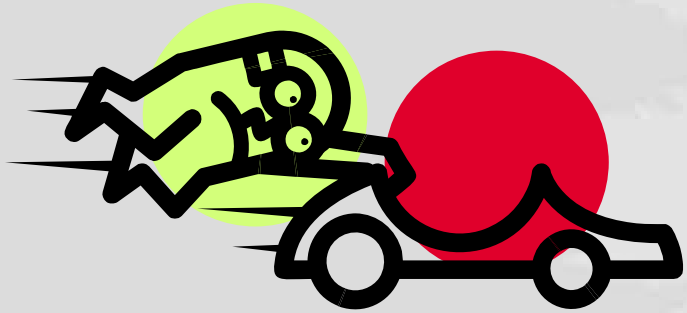


Ensure Continual Process Improvement



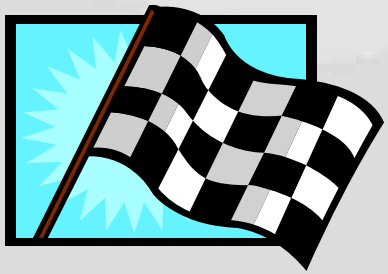


Going Forward



Summary

- Risk estimating can be improved by avoiding a common statistical trap
- Risk Management can be improved even at Level 3
- It takes a system to optimize Risk Management



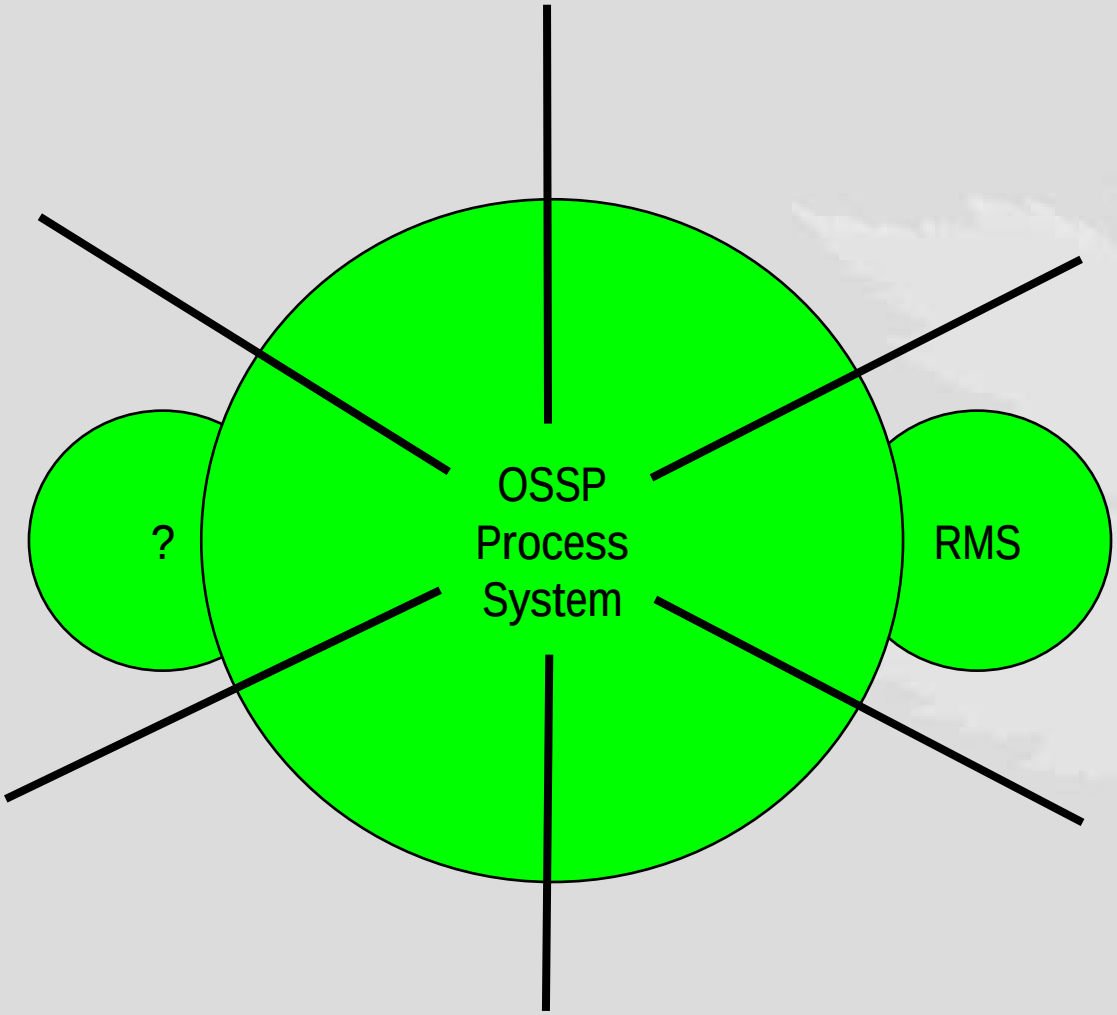
Conclusion

- It takes a system to optimize anything
- A system where that optimization is its AIM

Where can we apply such a system?

- Project estimating
- Requirements Management

Adding to your System



Thank You!

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Thank You!

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