

Comp8081

Management Issues in Software Engineering

Donna Turner



Agenda

- ◆ Attendance
- ◆ Review Risk Management (McConnell – Chapter 5)
- ◆ Tangent: How to Measure Anything
- ◆ Core Issues in Rapid Development (McConnell – Chapter 6)
- ◆ Summary
- ◆ For next week

Review

Risk Management - McConnell, Chapter 5



Four Pillars of Rapid Development

Best Possible Schedule

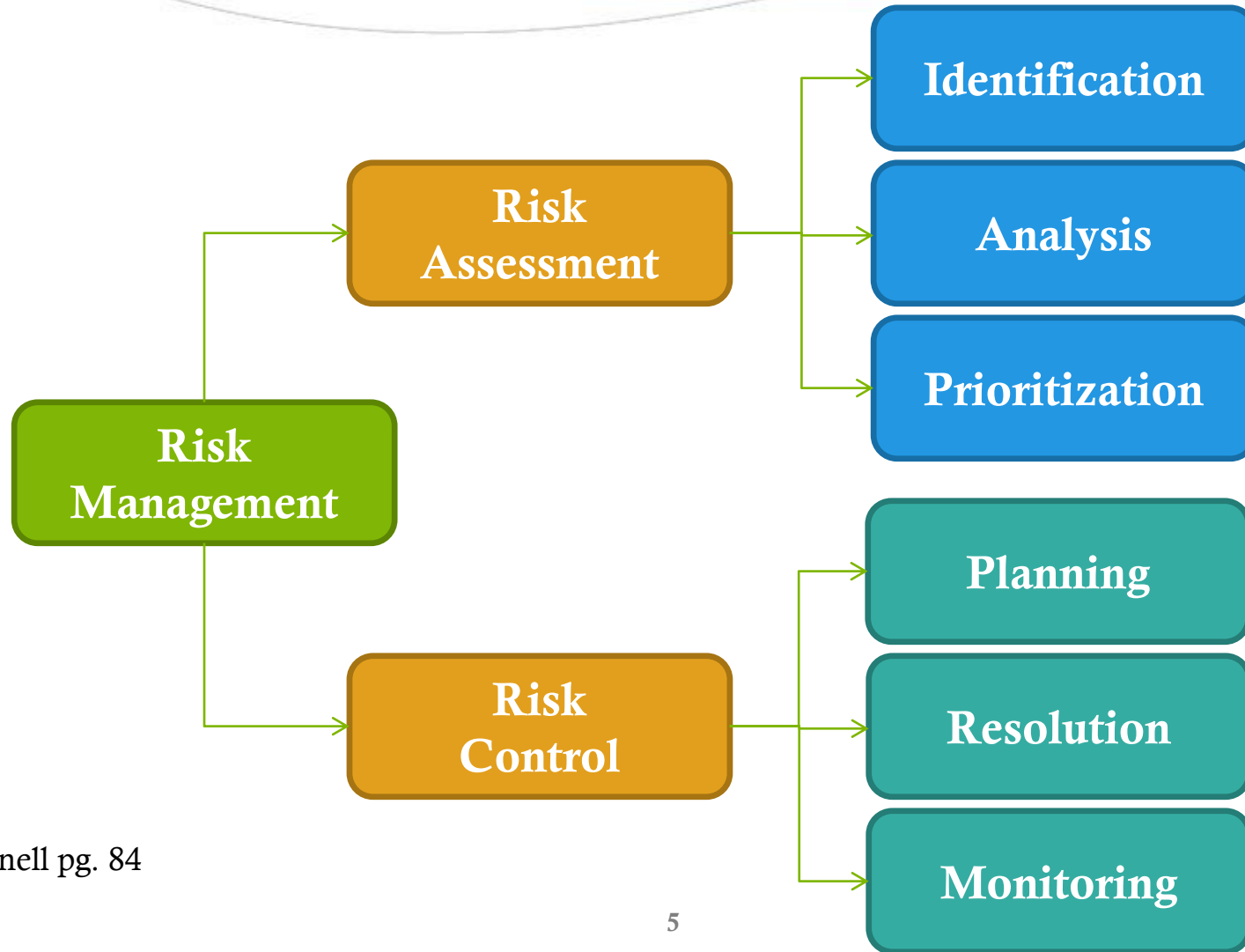
Development
Fundamentals

Risk Management

Avoid Classic
Mistakes

Schedule-Oriented
Practices

Risk Management Process



Key Terminology

Risk Management – Processes to identify, address and eliminate risks.

Risk – An Uncertain Event that, if it occurs, has a positive or negative impact on the project's objective such as time, cost, scope, quality, etc.

Risk Analysis Table – Quantitative method of identifying and assessing risks.

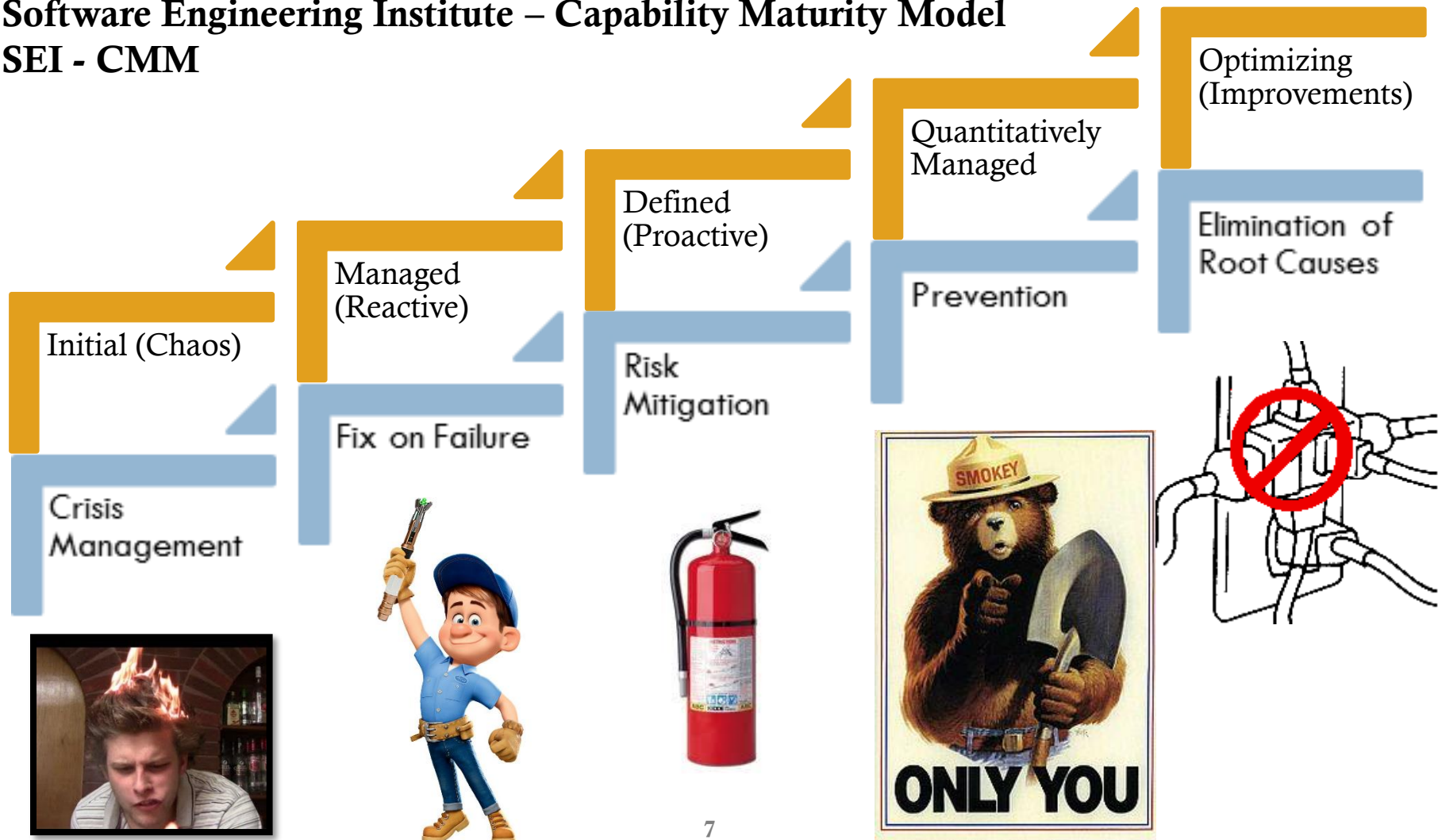
Probability of Loss (P) – Mostly subjective estimate of the probably that a risk will will be encountered.

Size of Loss (S) – The impact of a risk, typically measured in time (i.e., days) or money.

Risk Exposure (RE) – Calculated, $RE = P * S$

Levels of Risk Management

Software Engineering Institute – Capability Maturity Model SEI - CMM



Risk Management Scenarios

Scenarios – Levels and Process Steps

1. Deciding which to deal with first, one team member is not yet up to speed on your new language, or that the config of your test environment is behind schedule.
2. Going back to the previous project plan to remember and reuse the previous testing approach.
3. Giving your colleague a piece of your mind when you discover he isn't regularly pushing to the repository.
4. Team member goes for training on that language.
5. Checking that all team members know how to use and are pushing to the repository regularly.
6. Learning that the test environment is also being used by another development project.
7. Uncovering when the other dev team is expected to be finished with the test environment.



Tangent:

How to Measure Anything: Finding the Value of Intangibles in Business

By Douglas Hubbard



website “Less Wrong” references Hubbard’s book

[http://lesswrong.com/lw/i8n/how_to_measure_anything/]

- ◆ Anything can be measured. If a thing can be observed in any way at all, it lends itself to some type of measurement method. No matter how “fuzzy” the measurement is, it’s still a measurement if it tells you more than you knew before.
- ◆ A *measurement* is an observation that quantitatively reduces uncertainty. Measurements might not yield precise, certain judgments, but they *do* reduce your uncertainty.

... website references, continued

Much pessimism about measurement comes from a lack of experience making measurements. Hubbard, who is *far* more experienced with measurement than his readers, says:

- ◆ Your problem is not as unique as you think.
- ◆ You have more data than you think.
- ◆ You need less data than you think.
- ◆ An adequate amount of new data is more accessible than you think.

Applied Information Economics (AIE)

Hubbard's method "Applied Information Economics" (AIE) consists of 5 steps:

1. Define a decision problem and the relevant variables. (Start with the decision you need to make, then figure out which variables would make your decision easier if you had better estimates of their values.)
2. Determine what you know. (Quantify your uncertainty about those variables in terms of ranges and probabilities.)
3. Pick a variable, and compute the value of additional information for that variable. (Repeat until you find a variable with reasonably high information value. If no remaining variables have enough information value to justify the cost of measuring them, skip to step 5.)
4. Apply the relevant measurement instrument(s) to the high-information-value variable. (Then go back to step 3.)
5. Make a decision and act on it. (When you've done as much uncertainty reduction as is economically justified, it's time to act!)

Calibrated Estimation

- ◆ Guess the number of M&M's in the candy jar
- ◆ How certain are you of your answer?
- ◆ What if I asked you for a range of values such that you have 90% confidence that the values falls in the range.
- ◆ This means there should be only a 5% chance that the true answer is below your lower bound (95% chance it is above) and a 5% chance that the true answer is above your upper bound (95% chance it is below)



Calibrated Estimation

- 💧 **The point:** You know more than you think you do, even with limited information. It takes practice to improve your skill and confidence.

	Lower Bound (95% chance value is higher)	Upper Bound (95% chance value is lower)
On average, if a software development project was projected to take 17 months, it actually takes how many months?		
The average house in the United States uses how many gallons of water per day?		
What is the road mileage from Seattle to Atlanta?		
What is the average defects per thousand lines of code for U.S. commercial software?		

Core Issues in Rapid Development

McConnell, Chapter 6



One size fits all?



Definitions

(Google)

💧 Reliability

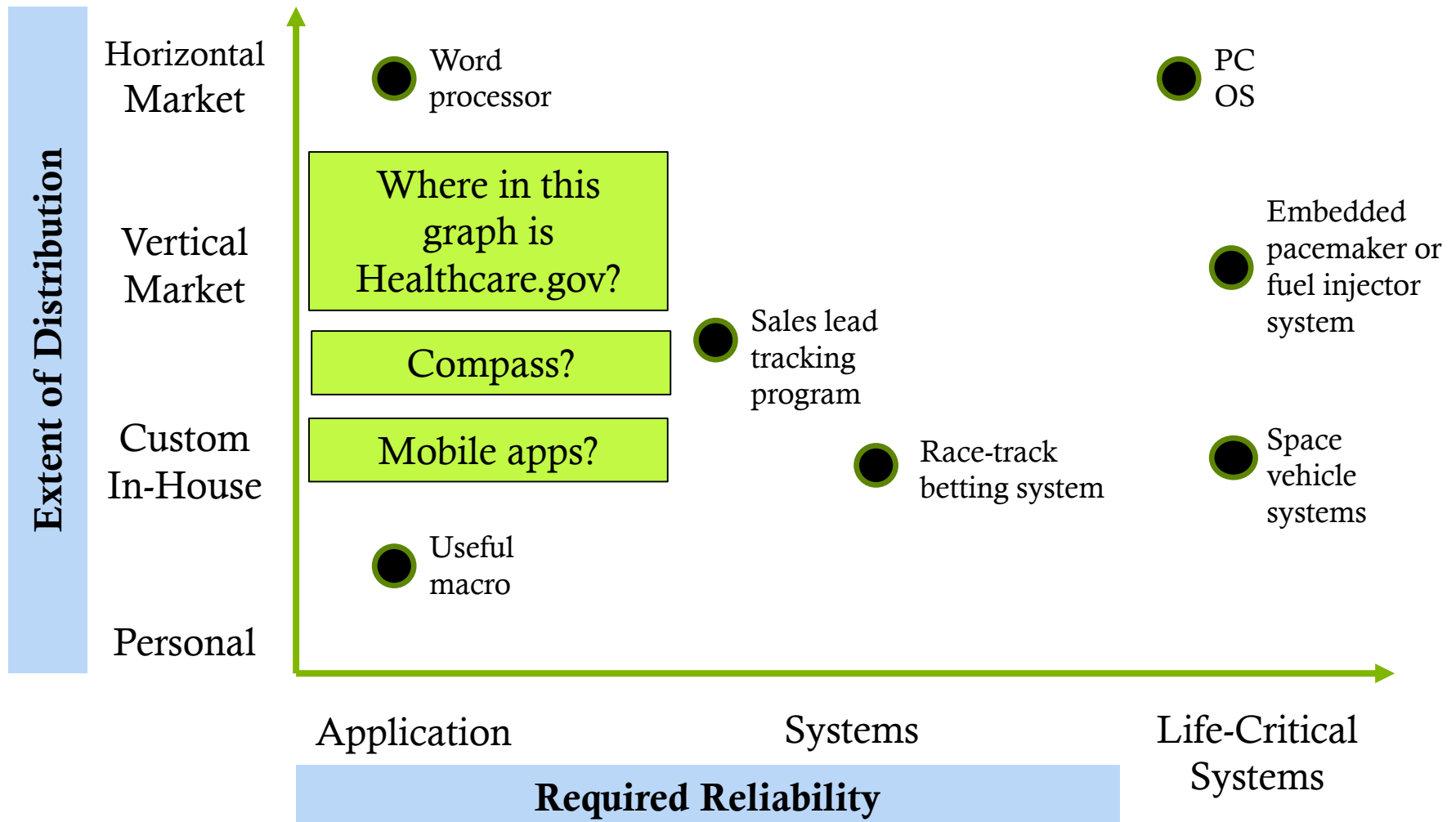
THE QUALITY OF BEING TRUSTWORTHY OR OF
PERFORMING CONSISTENTLY WELL.

💧 Distribution

THE ACTION OR PROCESS OF SUPPLYING GOODS TO
STORES AND OTHER BUSINESSES THAT SELL TO
CONSUMERS.

Distribution and Reliability

Adapted from McConnell pg. 110



Loss due to software/system failure

The impact could be observed in multiple areas:

- ◆ Life
- ◆ Money
- ◆ Time
- ◆ Reputation
- ◆ Business
- ◆ Information

Identify the impacts of... (1/2)

- ◆ Scenario 1:

An Excel sheet you used to maintain your monthly expenses crashed and didn't save data correctly

- ◆ Scenario 2:

An Excel sheet with complex macros produced erroneous results, and these results were used to make investment decisions for over a \$100M CAD affecting 5 companies with total 100 employees

Identify the impacts of... (2/2)

- ◆ Scenario 3:
A blood sugar indicator showing incorrect sugar levels
- ◆ Scenario 4:
A car suddenly stops functioning on a highway
(or, recall the GM 2016 recall regarding airbags)
- ◆ Scenario 5:
System failure in autopilot mode in an aircraft during its flight

Questions to ask

- ◆ How widely distributed will the product/system be?
- ◆ How important is reliability of the product/system?
- ◆ Can you afford to increase risk by reducing the schedule?
 - ◆ Customers will remember a bad product more than they will remember a late one. (Discuss Compass card example)

Core Issues in Rapid Development

Management Considerations

- Different projects have different development needs
- Projects that are widely distributed and/or with a high reliability requirement need to be developed more carefully

Selecting an Approach

- Determine whether rapid development is justified:

Examine if the Value Line for the system is for “typical” product, or one with a strong schedule constraint

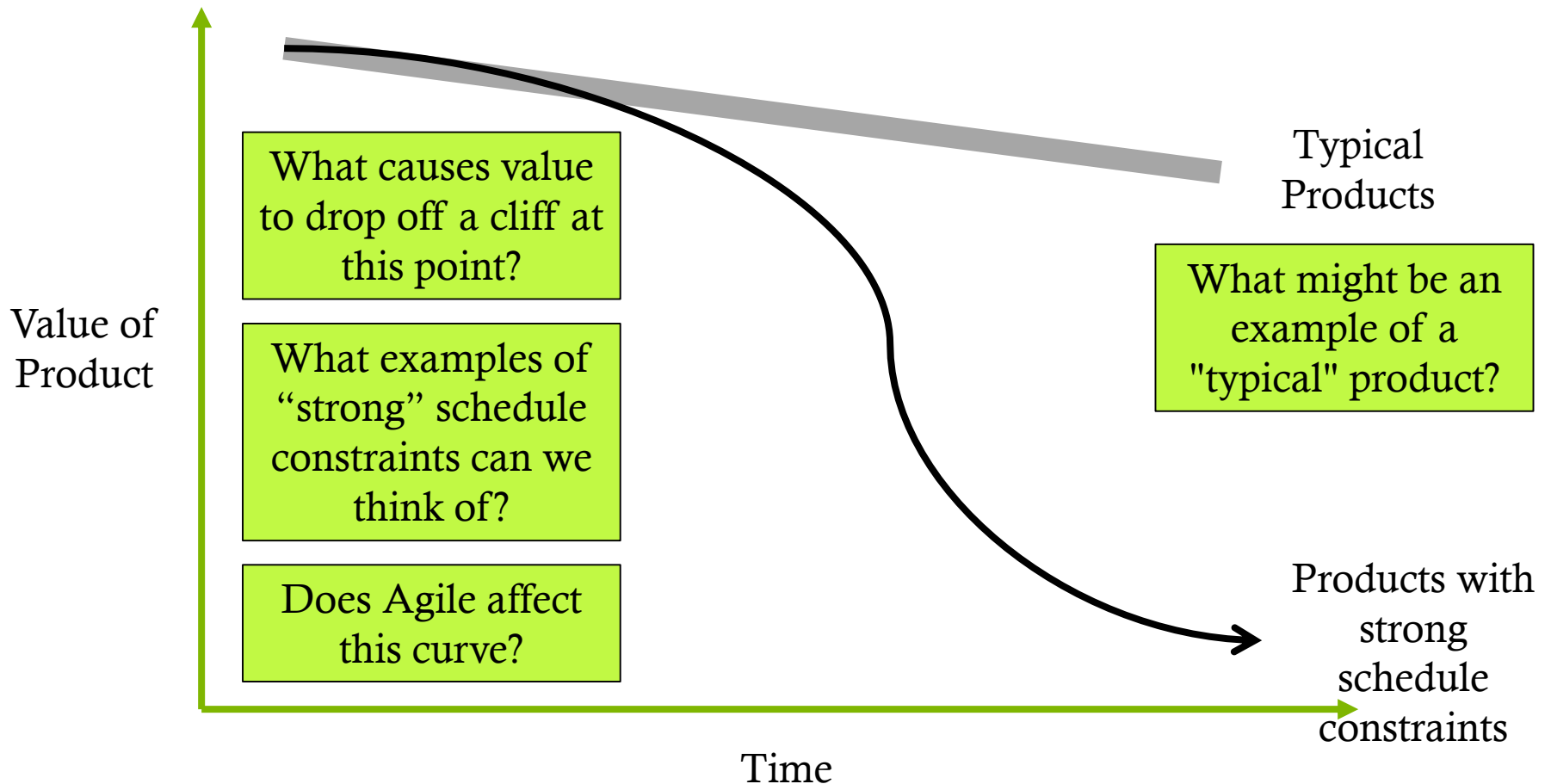
"Value Line" Considerations

- Is there a fixed drop-dead date?
- Does the value of the system drop precipitously if the system is delivered after the drop-dead date?

Project Risks

- If you release a low-quality product on time, what will customers remember?
- Which variable is most critical:
 - Product scope/quality
 - Cost
 - Schedule

Value over Time



Rapid Development Look-Alikes

At one level ALL projects are ASAP – but there are other reasons organizations emphasize schedule-oriented practices – these are the ones McConnell highlights

Runaway Prevention

- Org has a history of exceeding schedules and budgets
- True goal: schedule and budget assurances

Predictability

- Org coordinating multiple simultaneous efforts – internal interdependencies
- True goal: to be predictable enough to enable coordinated planning

Lowest Cost

- If the organization emphasizes schedule as a proxy for cost control
- True goal: to minimize costs rather than improve the schedule

Fixed Drop-Dead Date

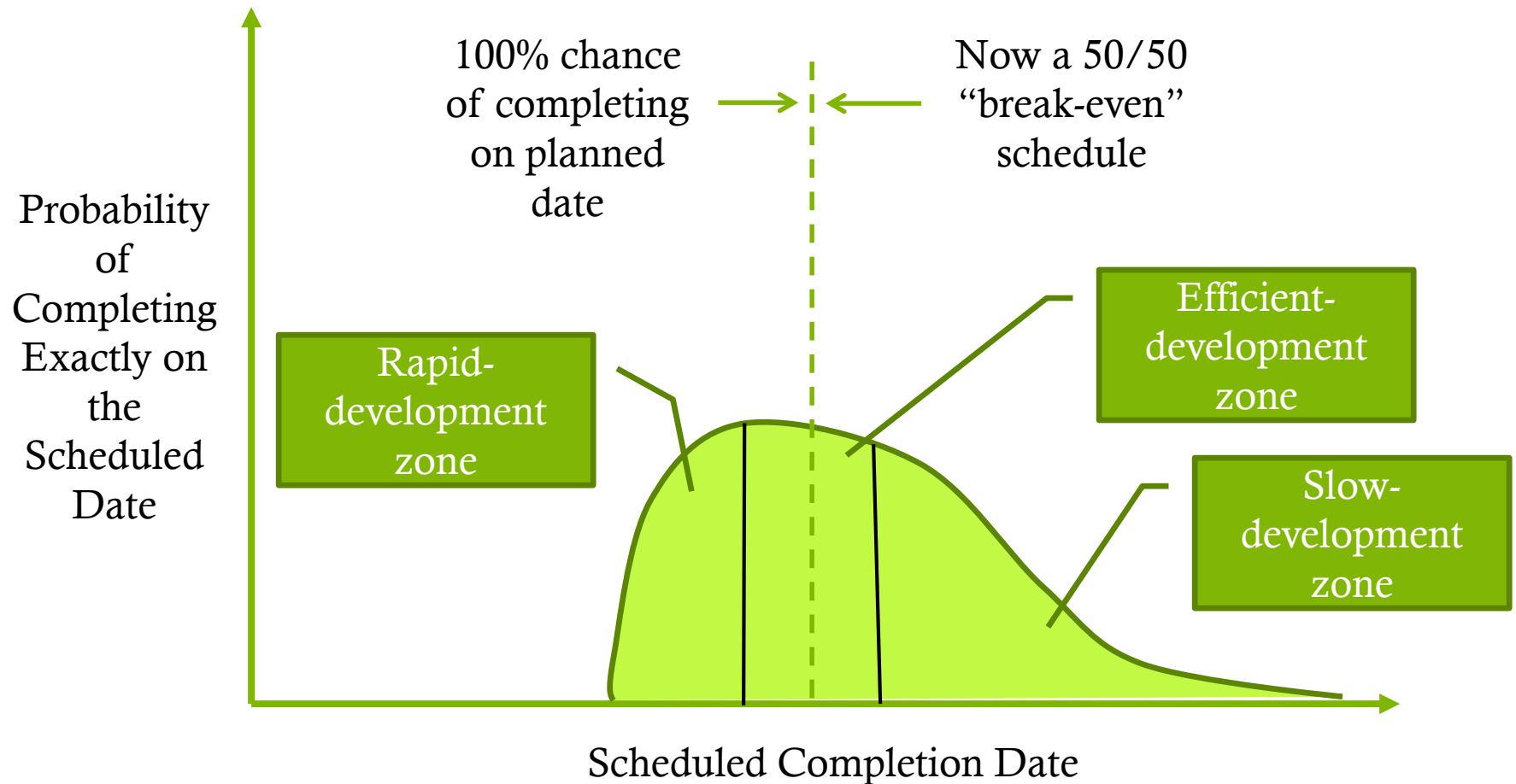
- A point where the value of the project drops off precipitously
- Efficient development practices may meet the schedule – but rapid development may still be required

Desire for Free Overtime

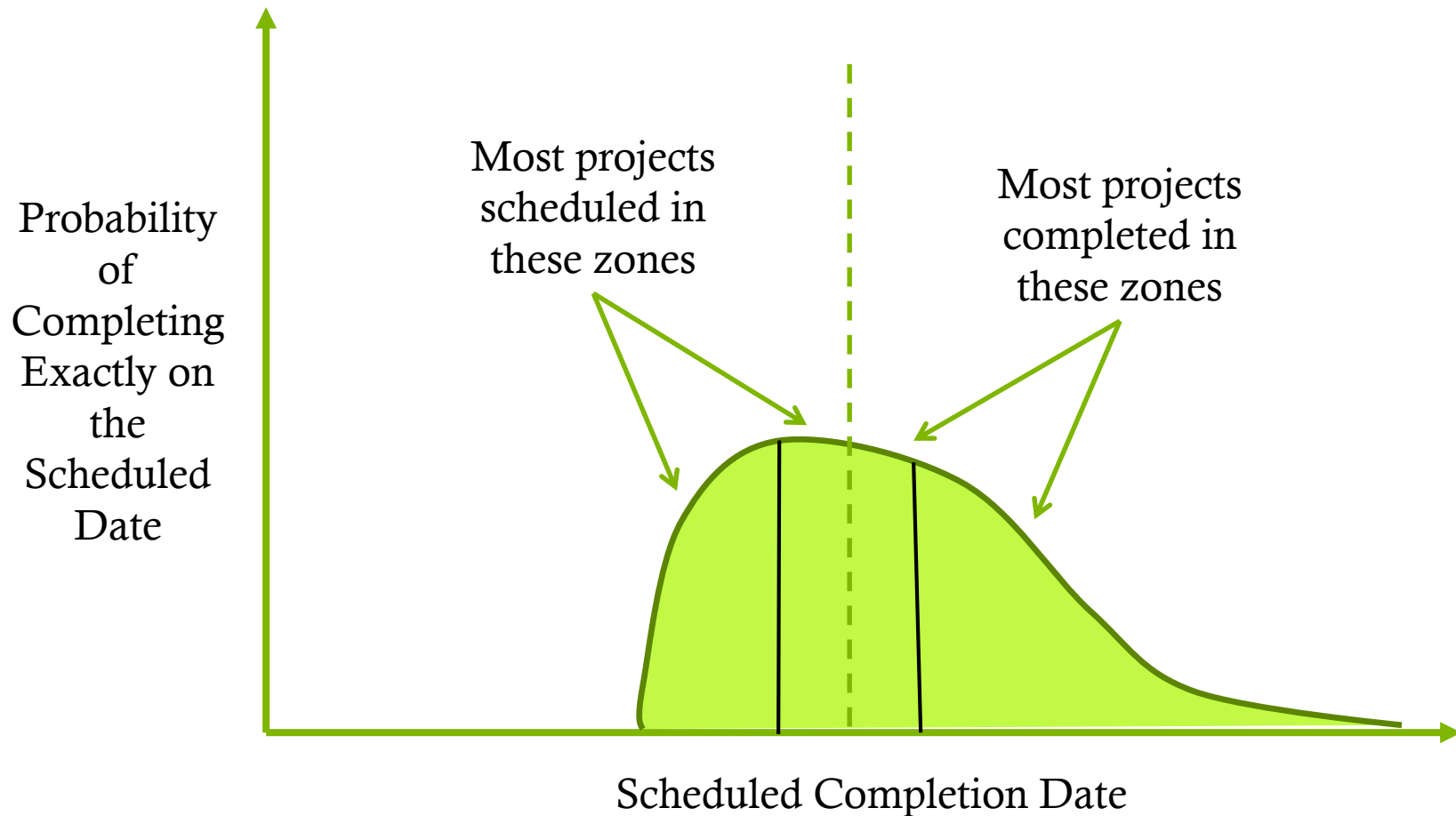
- Emphasis on schedule, but no appropriate support, e.g. new tools or hardware, feature trade-offs, etc.
- McConnell's advice is simple and drastic – find a new organization

Recognize any of these drivers from your own experience?

Odds of Completing on Time



Expectations



Core Issues in Rapid Development

Discuss and **note** your views on these questions in groups

Most projects are scheduled in the *Rapid* or *Efficient* zone, but finish in *Efficient* or *Late* zone

- What does it mean to manage the *reality* of slow development?
- What does it mean to manage the *perception* of slow development?
- Why are most projects scheduled and then executed this way?
- Does Agile change any of these factors?

Where the Time Goes

Activity	Small Project (2500 LOC)	Large Project (500,000 LOC)
Architecture/design	10%	30%
Detailed design	20%	20%
Code/debug	25%	10%
Unit test	20%	5%
Integration	15%	20%
System test	10%	15%

Where the Time Goes

Rework

- Do it right the first time
- Goal is to correct defects early when the cost/impact is lower

Feature Creep

- Requirements changes and/or developer gold-plating
- Goal is to limit to essential changes only

Requirements Specification

- This is often open-ended
- Goal is to employ techniques such as JAD, evolutionary prototyping, staged releases and risk management approaches

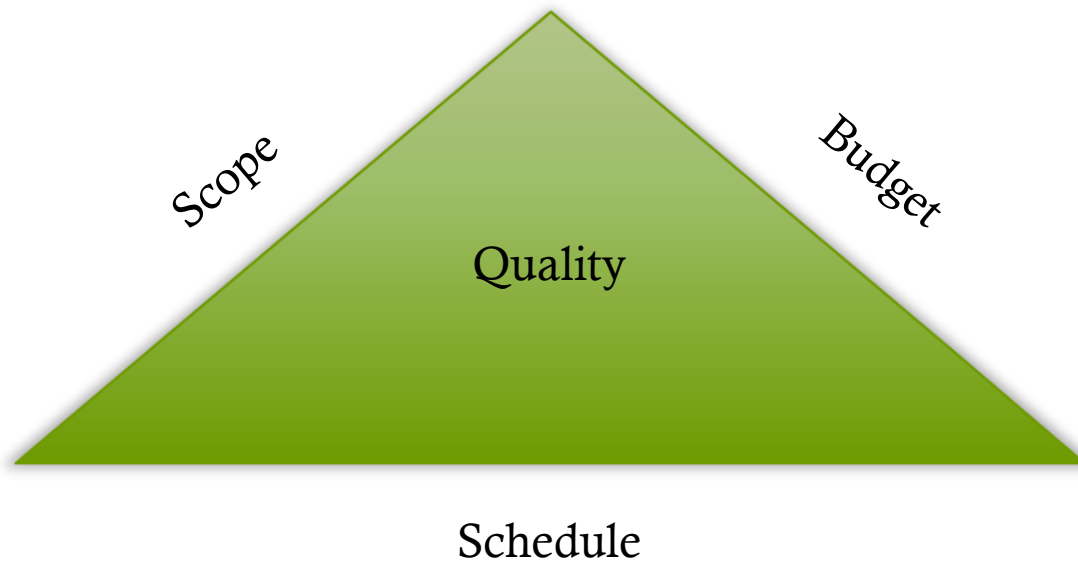
“Fuzzy” Front-End

- This is a risk if there are no formal management controls in place
- Generally, spent on the time/effort to move from idea to business case to “go” decision

**Does Agile change any of these factors?
If so, how?**

Management Fundamentals

◆ The PM Iron Triangle



Projects for Discussion

Project Summary	Questions
Mobile apps	<ul style="list-style-type: none">▪ Is Reliability or Distribution most important?▪ How do you ensure that you hit that goal?
Tesla Autopilot	<ul style="list-style-type: none">▪ Is Reliability or Distribution most important?▪ Is development speed important?▪ What is blocking widespread adoption?

Summary



Class Exercise

On D2L



For Next Week (week 5)

To Do before next class:

- ◆ Read McConnell, chapter 7: Life Cycle Planning

Reminders:

- ◆ Assignment 1 due Feb 11th midnight (~2 weeks)
- ◆ Midterm on Feb 22nd, normal class room/time

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end of Week 4

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