estimate • analyze • plan • control

Estimation Bias and Mitigation With Agile Estimate Guidance 2017 Edition

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Human Nature:
PEOPLE Are Optimism Biased

Harvard Business Review explains this Nobel Prize Winning Phenomenon:

- Humans seem hardwired to be optimists
- Routinely exaggerate benefits and discount costs
- Bias permeates opinions & decisions & causes waste & failure

Delusions of Success: How Optimism Undermines Executives' Decisions (Source: HBR Articles | Dan Lovallo, Daniel Kahneman | Jul 01, 2003)

Solution - Temper with "outside view":
Past Measurement Results, traditional forecasting, risk analysis and statistical parametrics can help

Don't remove optimism, but balance optimism and realism

The Planning Fallacy (Kahneman & Tversky, 1979)

Judgment errors are systematic & predictable, not random

- Manifesting bias rather than confusion
- Judgment errors made by experts and laypeople alike
- Errors continue when estimators aware of their nature

Optimistic due to overconfidence ignoring uncertainty

- Underestimate costs, schedule, risks
- Overestimate benefits of the same actions

Root cause: Each new venture viewed as unique

- "inside view" focusing on components rather than outcomes of similar completed actions
- FACT: Typically past more similar assumed
  - even ventures may appear entirely different

Bias Mitigation Reference Class Forecasting

Predicts outcome of planned action based on actual outcomes in a **reference class:** similar actions to those being **forecast**.

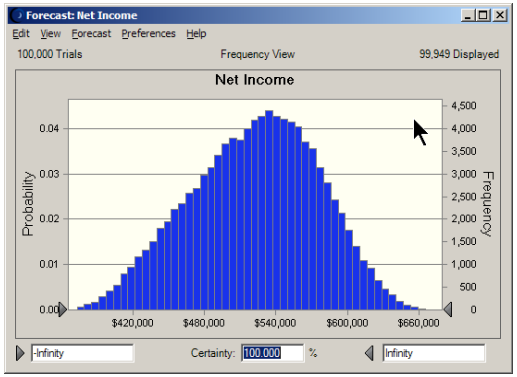
Attempt to force the outside view and eliminate optimism and misrepresentation

Choose relevant "reference class" completed analogous projects

Compute probability distribution

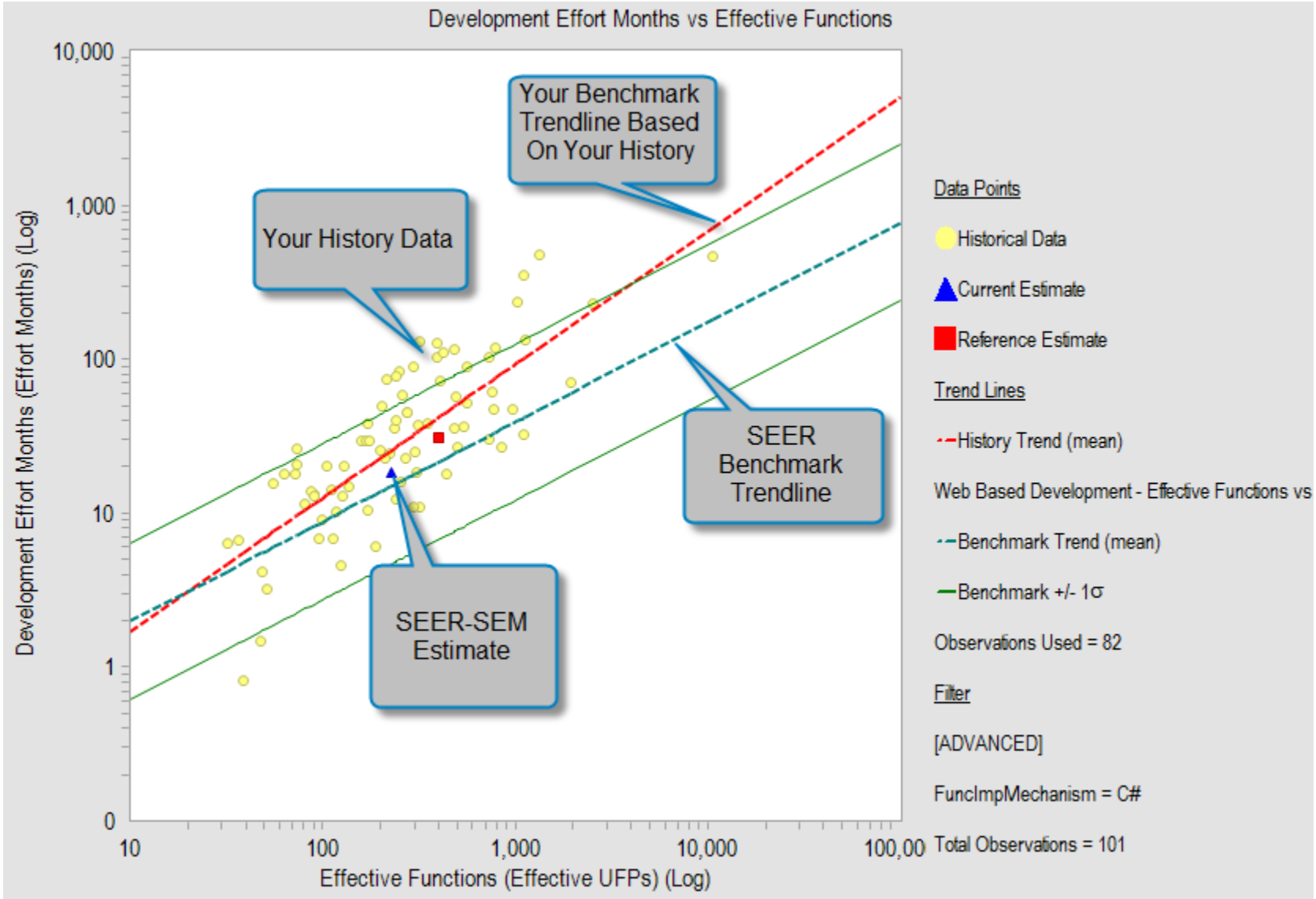
Compare range of new projects to completed projects

Provide an "outside view" focus on outcomes of analogous projects



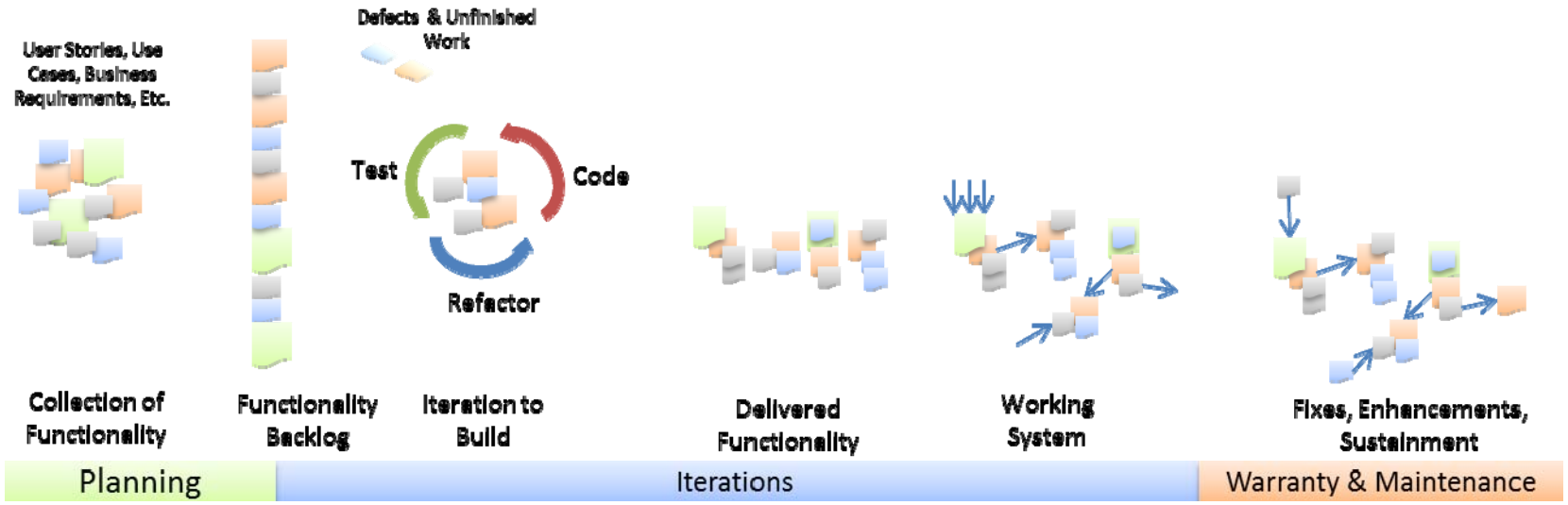
Best predictor of performance is actual performance of implemented comparable projects (Nobel Prize Economics 2002)

Example: Reference Class Forecasting



Agile: Detailed Software Development Life Cycle Management (Scrum Example)

- Focus is on what features can be delivered per iteration
- Not fully defined what functionality will be delivered at the end?



- Iterations are often called “Sprints”

An Agile Approach to Planning (Source: Cohn)

1. Projects rapidly and reliably generating useful new capabilities and new knowledge
2. Flow of new capabilities and knowledge to guide the work
3. Plan for what you want to learn – not what the product will be in the end
4. Traditional projects are like a 10K race – you know where the finish line is
   - Try to get there as fast as possible

5. Agile projects are like a timed race
   - See how far you can run in sixty minutes!
   - And iterate until the product owner is either satisfied or runs out of money or time.

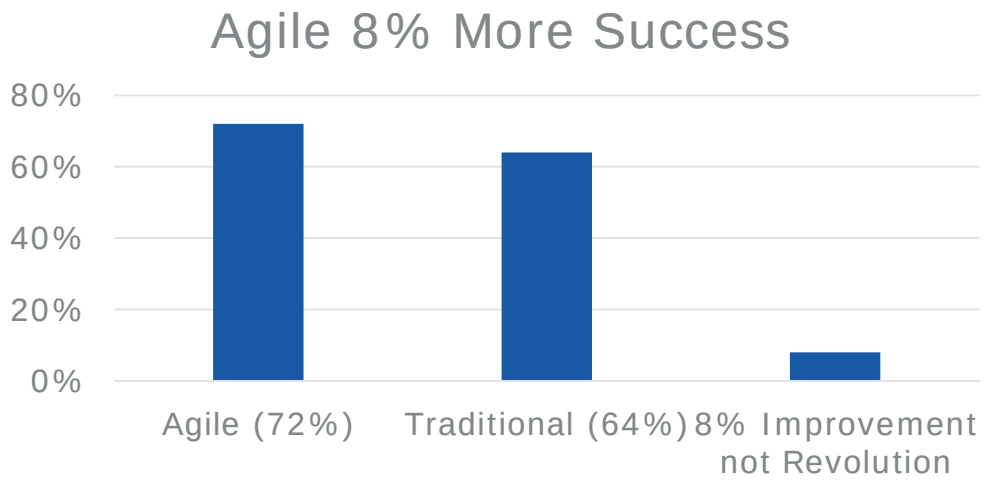
Observations

- Agile is an excellent software development life cycle approach
- For substantial developments management decisions and commitments are still critical
- For some managers at least Agile keeps them from having to think about software (problem and sort of benefit)

Agile Is Not a Silver Bullet

http://www.jamasoftware.com/blog/rethink-agile-manifesto-projects-still-fail/

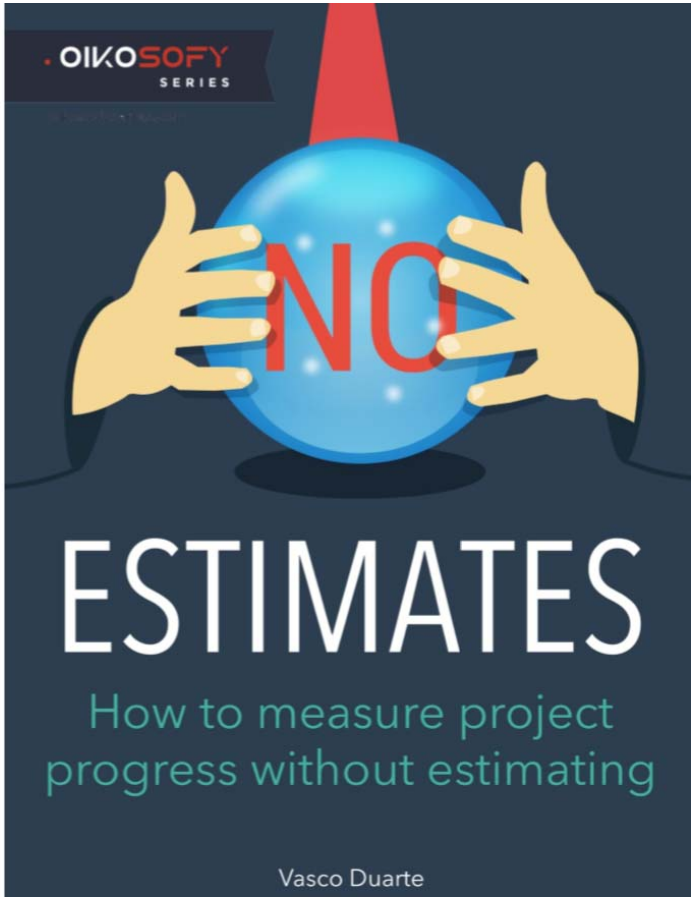
- Projects still fail at roughly the same rate as 2001
- Dr. Dobbs: Agile is not a productivity revolution



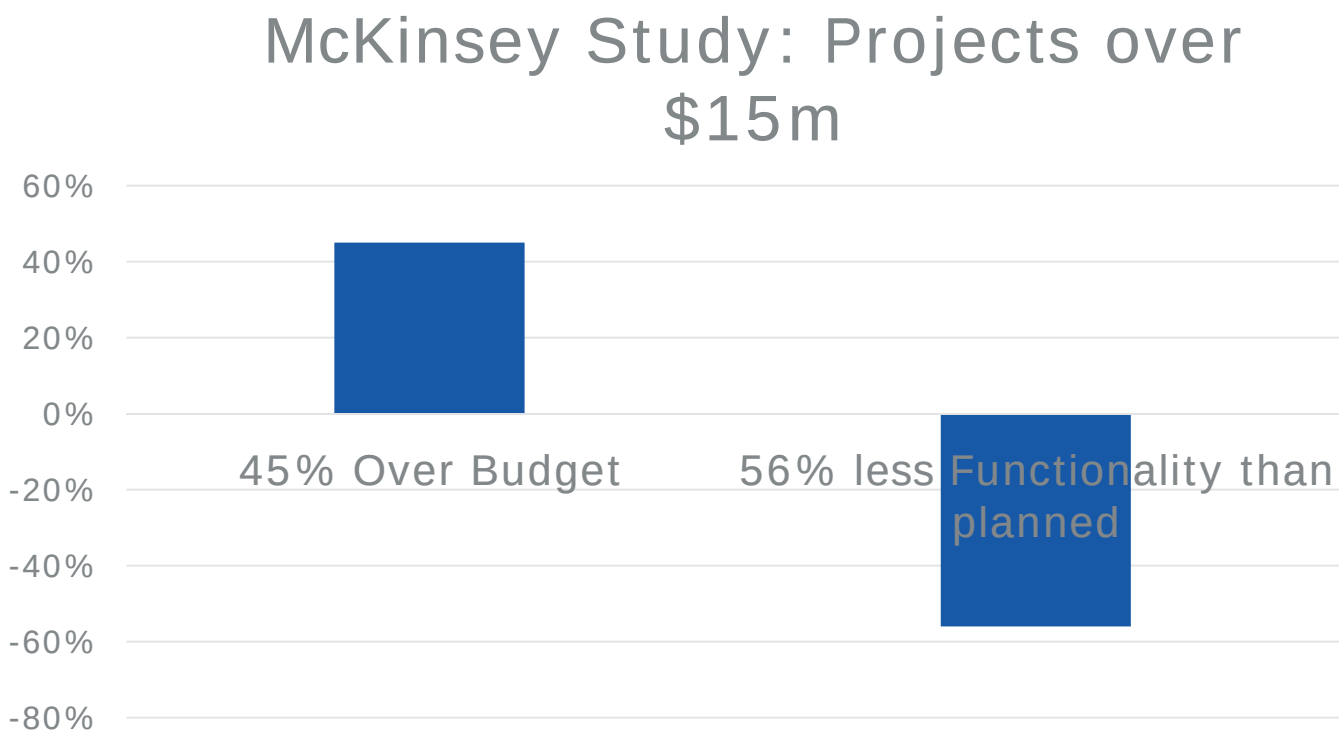
Some think agile is more successful because they remove cost & schedule goals from the evaluation

Agile Trying To Kill Estimates Without Considering Business Needs

- #noestimates



Software Project Performance Still Disappointing (McKinsey)



So does skipping estimating solve this? Well: If commitments aren't made there can be no disappointment

If A Promise or Hope Is Good Enough You Don't Need Viable Estimates (Is this a good management approach?)

- No need to estimate if:
  - A promise of 5 sprints with 4 people is good enough
  - You are willing to spend whatever it costs in whatever time it takes
  - Estimates don't impact planning or decision processes
  - You don't need to know the probability that it will be complete or when
  - You aren't concerned if it overruns substantially
  - You aren't concerned with failure and contingency
  - You don't need to consider total ownership costs
  - You are ok if resources are not optimized
  - There will be no system testing
  - If lack of documentation is ok for maintenance

Management Agile Manifesto #EstimatesSupportBusiness

- We know you are technically capable… please help:
- Stop overpromising and under delivering
- Support management ROI, schedule needs and investment strategy
- Solve our problem
- Ensure it works, is usable, and secure
- Consider total cost to the business, not just initial costs
- Don’t waste too much resource
- “Base choices on those providing the maximum business value to the organization” Eli Goldratt

Manual Estimates: Human Reasons For Error EVEN IN AGILE SPRINTS (Goldratt)

- Manual Task estimates yield SIGNIFICANT error
- Desire for "credibility" motivates overestimate behavior (80% probability?)
  - Then must spend all the time to be "reliable"
- Better approach: force 50% probability & have "buffer" for overruns (Organization portfolio of programs provides the buffer to a point)
- Technical pride sometimes causes underestimates

Viable up-front estimates provide agile teams with fair terms and the organization with an idea of expected cost and schedule.

Agile Large Systems Back To Waterfall (Estimation & Planning Should Consider Hybrid)

- BACK TO WATERFALL or HYBRID
  - UK's Universal Credit Welfare System , "a complex IT project that involves switching off multiple benefits and reworking them into a new tax credit system" was, by most accounts, the most ambitious agile software development project in history. Suppliers include Accenture, Cap Gemini, HP, and IBM
  - Quoting Computer Weekly " DWP drops agile from flagship government software project"
  - Cast Software research found that applications produced using traditional Agile or Waterfall methods alone have more security vulnerabilities, more reliability and performance issues, and a higher cost to maintain than those produced with a mixed method.

COUNTERPOINT: #noestimate: No Problem?

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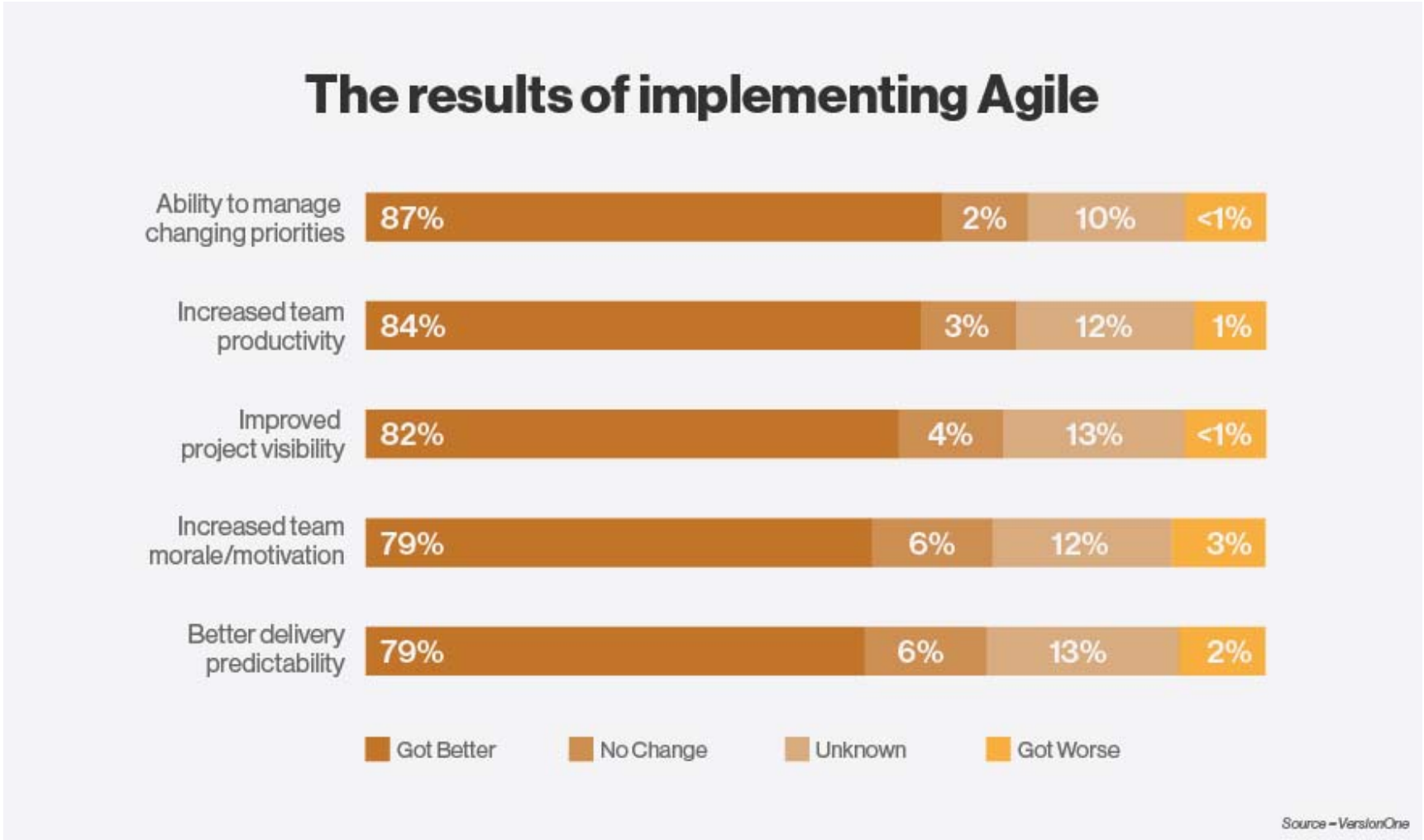
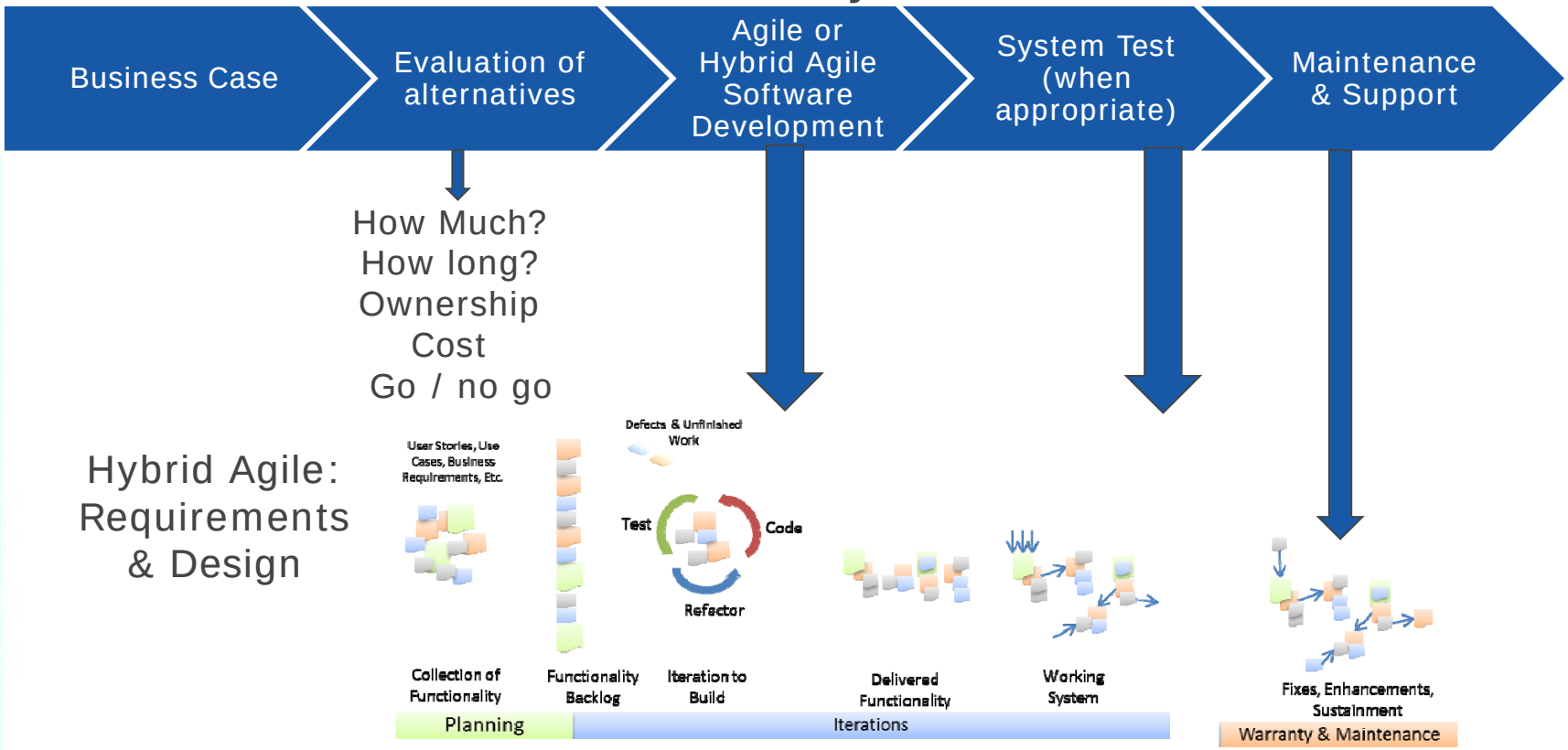


Agile can sometimes remove software worries from the C level (But what about Reliability?)

#noestimates Viable For Detailed Development - Should Not Abdicate In Substantial Developments

For substantial systems



Agile development = root level software development management…
Story point estimating is short term productivity management
It is not a business decision making process

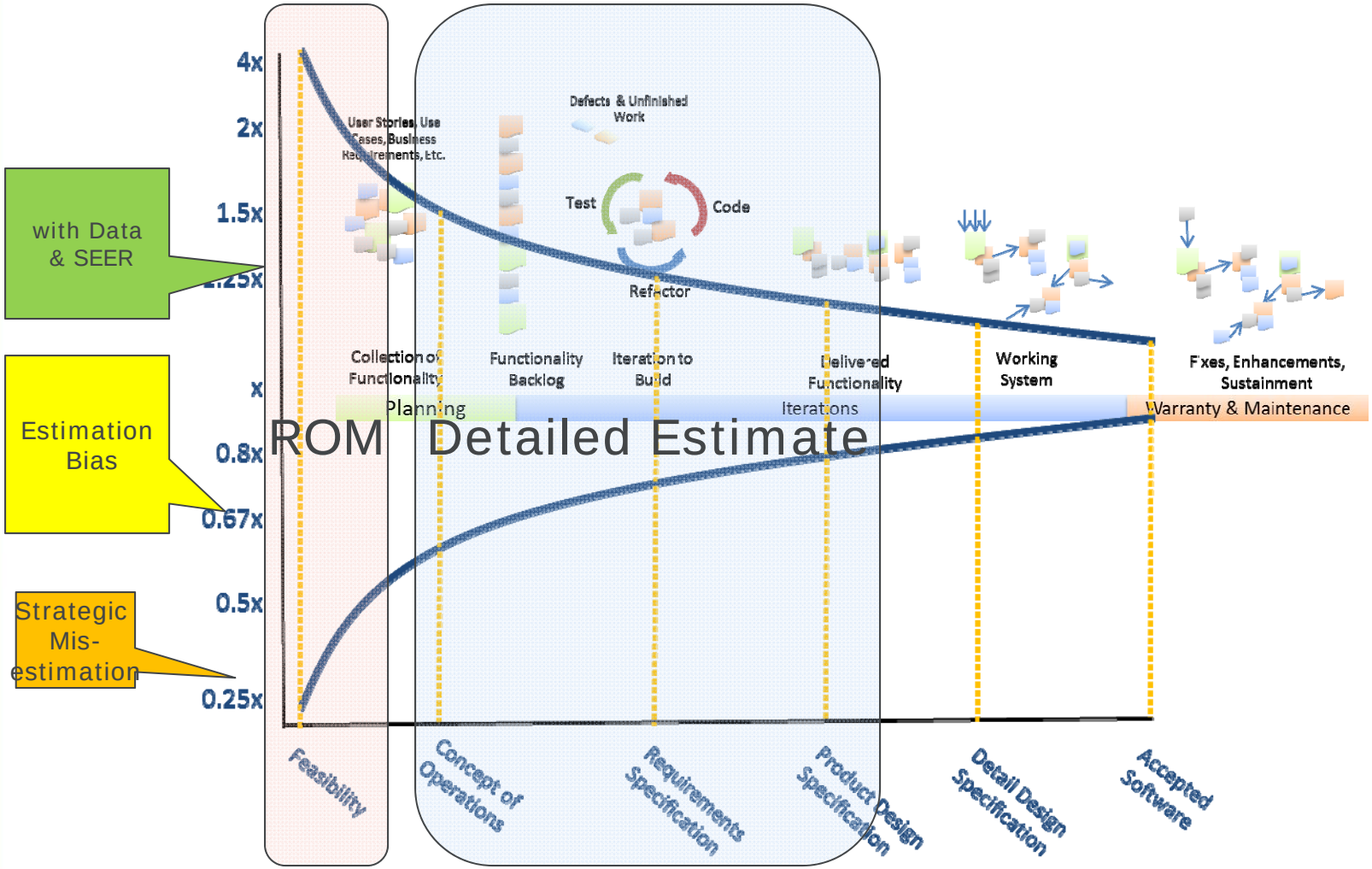
Every Decision is a Forecast
(L. Maccherone, AgileCraft)

- You are forecasting that your choice will have better outcomes than other alternatives
- So quality of decisions depends on
  1. Alternatives considered
  2. Processes and models used to forecast the outcome of these alternatives…
- Probabilistic models are superior

- http://www.slideshare.net/lmaccherone/you-want-it-when-probabilistic-forecasting-and-decision-making

Agile Developments Should Consider Risk and Probability

- For Estimation the Cone is the same – AND Loss Aversion may keep projects alive that should be killed



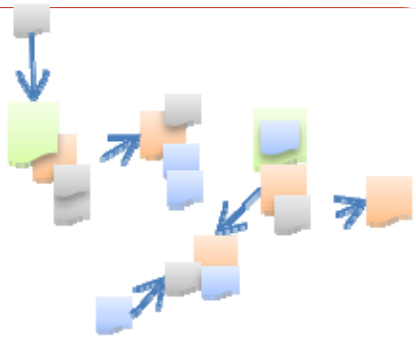
Give Management The Whole Picture: Total Ownership Costs Includes On-Going Support

Development + Maintenance

Identify Total Ownership Costs for the Software

Allows Independent Maintenance Team Assumptions

Estimate Cost of: Corrective, Adaptive, Perfective, and Enhancement support



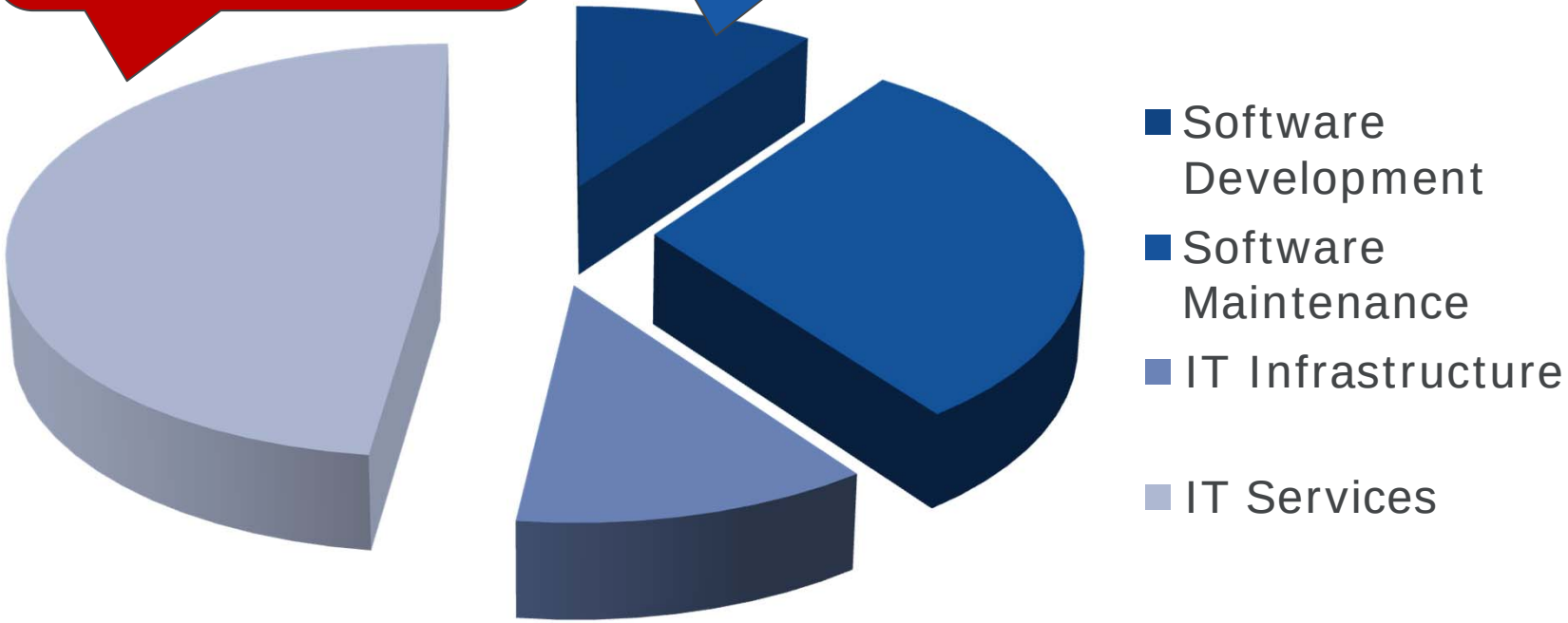
Warranty & Maintenance

Many programs need total ownership cost evaluation...
Estimation is essential

When Making Management Decisions Remember: Software Often Less Than 10% Total Ownership Cost

IT Services & Infrastructure Are Situational but Generally 60% of TOC

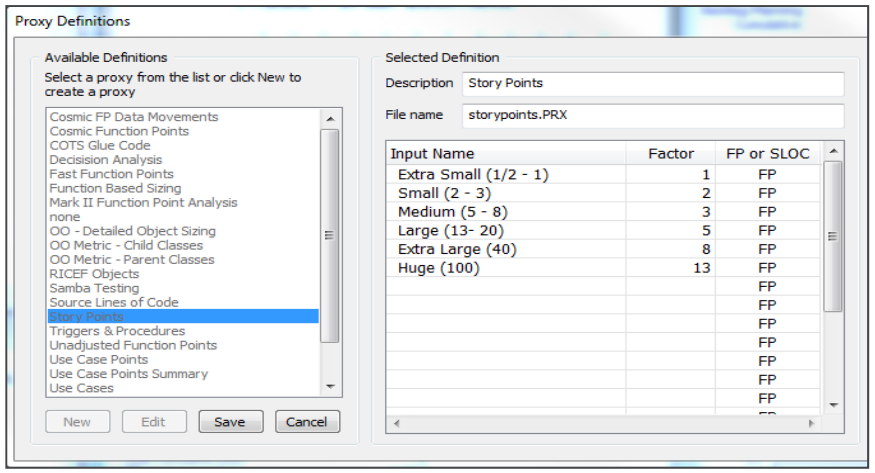
Development = Biggest Risk



Software Development is about 6-10% of total ownership cost… But much more of the risk
Assume $10m development could be over $100m total ownership

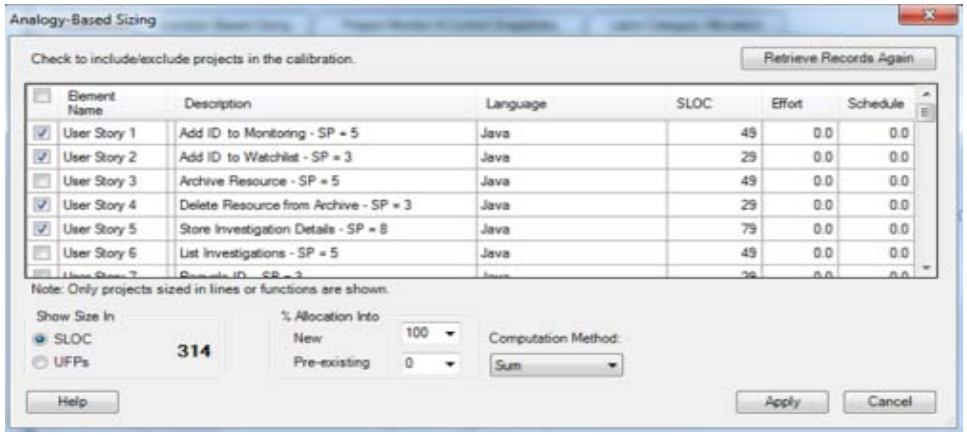
Predictive Analytics Provide Outside View: Agile Estimates & Risk Analysis

Using Agile Artifacts: Story Point and Epoch Sizing



Estimate Using Project History:

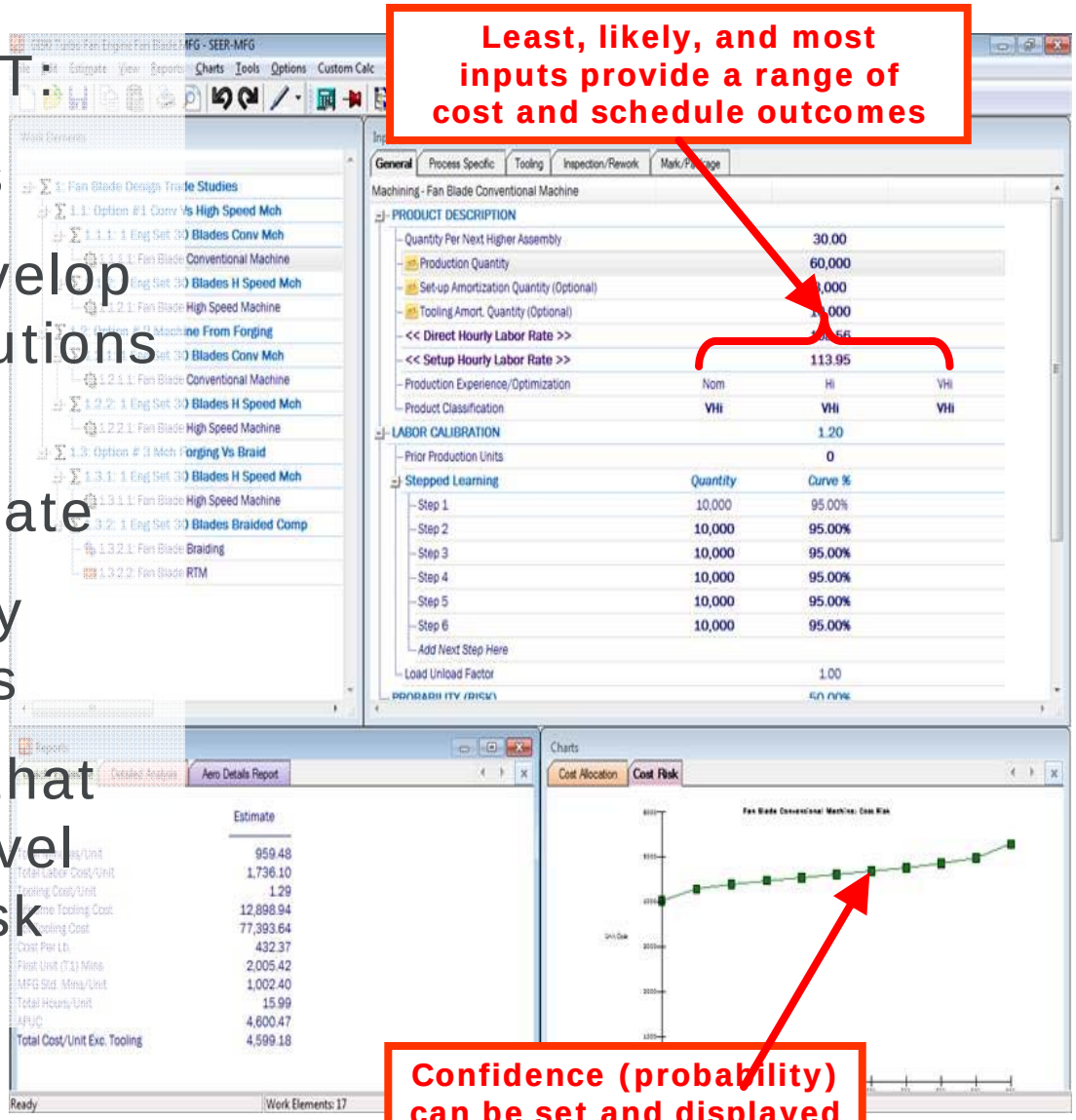
- Development
- Defects
- Total Ownership Cost



Agile Risk Still Needs Consideration

Bias Mitigation: Risk

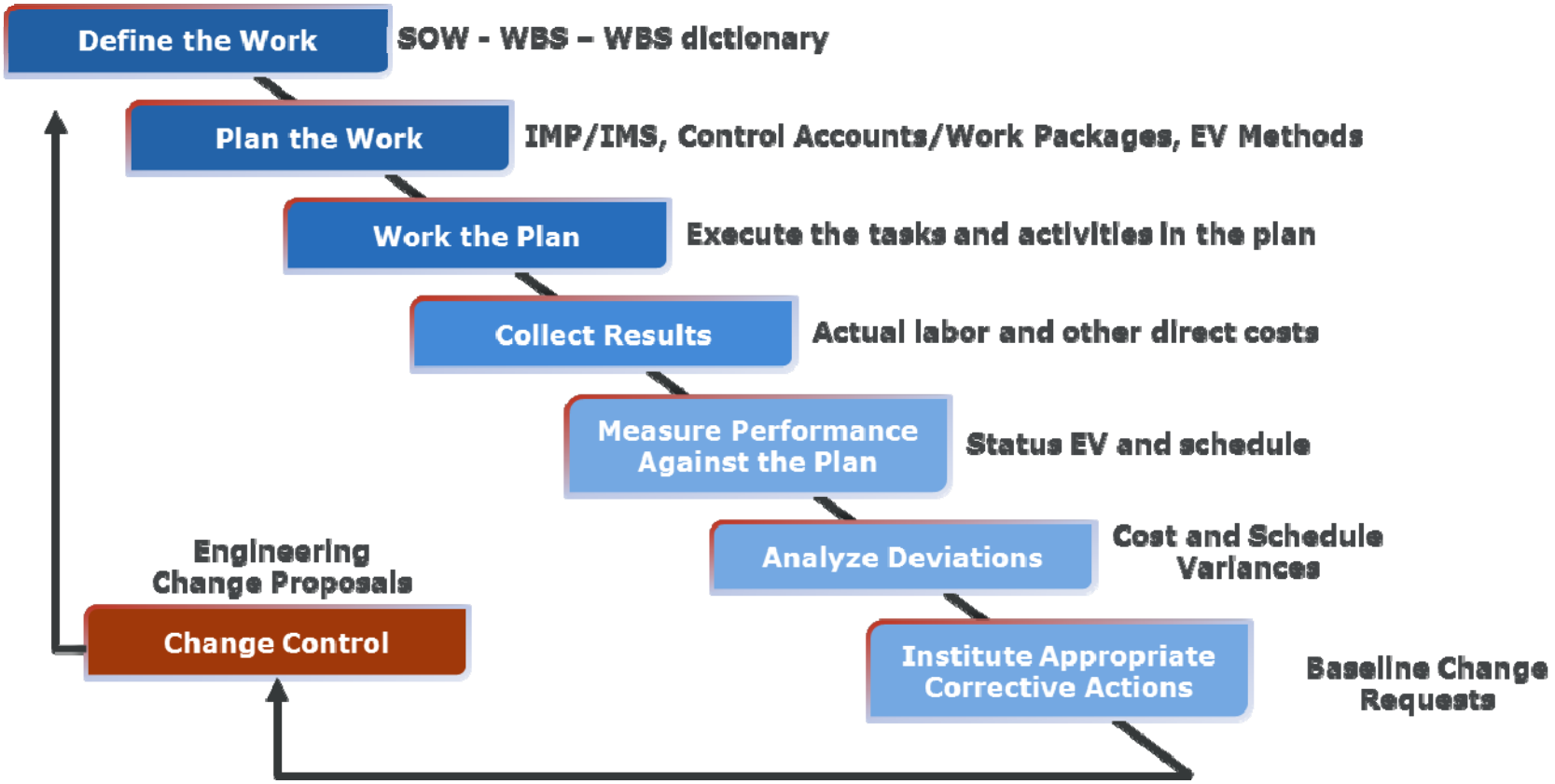
- USE MODELS THAT:
- Predicts outcomes
- Uses inputs to develop probability distributions
- The result is a probabilistic estimate
- Will predict a likely range of outcomes
- Uses simulations that provide project-level assessments of risk



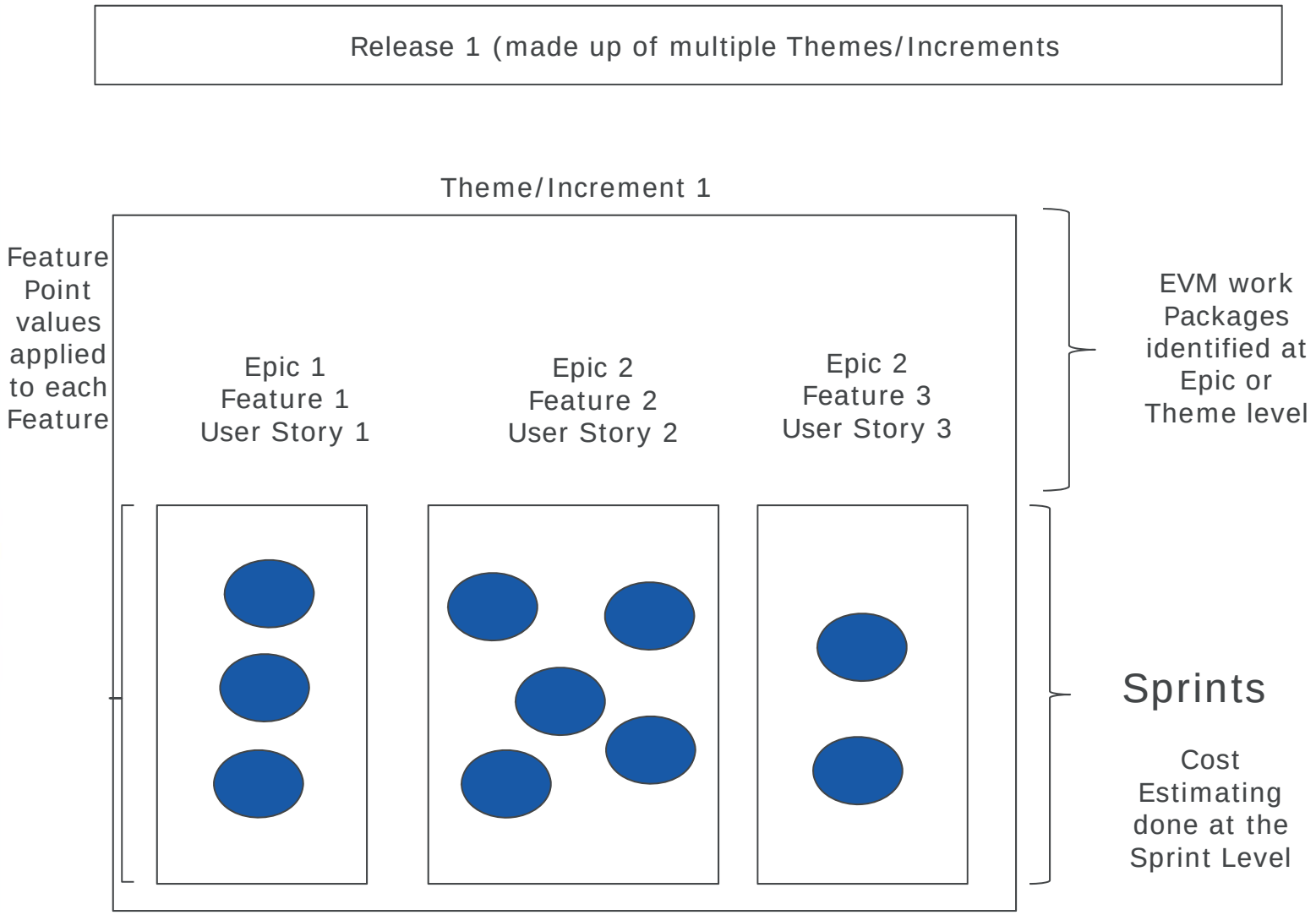
Apply Earned Value Management To Large Agile Systems

- **As long as there is a plan and product, which can be measured EVM can be used**
- Work is planned and status is rolled up at the EPIC Level, which in this example is the Control Account (CA)
  - Below the EPIC is the Feature at the Work Package (WP) level, which breaks the EPIC into functional packages
  - Sprints are statused by, in this case, Stories and Story Points, which are statused in an Agile Program Management Tool
  - A way to think of this is that the Sprints are the process to the completing the Story(s) and the Stories are Steps to completing the Feature, which rolls into the EPIC
- As Features are completed the percent complete is rolled up to the EPIC level

Earned Value Management Process



Agile Earned Value Management Building Blocks*



* These “building blocks” are program specific and may be called by different names

Key Points

Every forecast is subject to estimation bias…a major cause of program failure and corporate mis-spending

Experts Bias is probably costing in cost, schedule, and less than hoped for benefits

Agile is a good thing.

Estimates are still important

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