Planning for Success: Accurate Agile Estimation

The Next Generation in Agile Project Estimation

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Introductions

Co-Founded Quadrus in 1993

Heavily involved in Software Estimation for past decade+

Championed Quadrus Estimation Methodology (codified in Quadrus Estimator)

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Software Project Estimation

Industry Track Record

1995: Standish Group CHAOS Study

- 31% of projects cancelled before completion
- 53% finished late, over budget, or incomplete
- *"…in 1995 American companies and government agencies will spend $81 billion for cancelled software projects."*

The Standish Group - CHAOS Report 1995

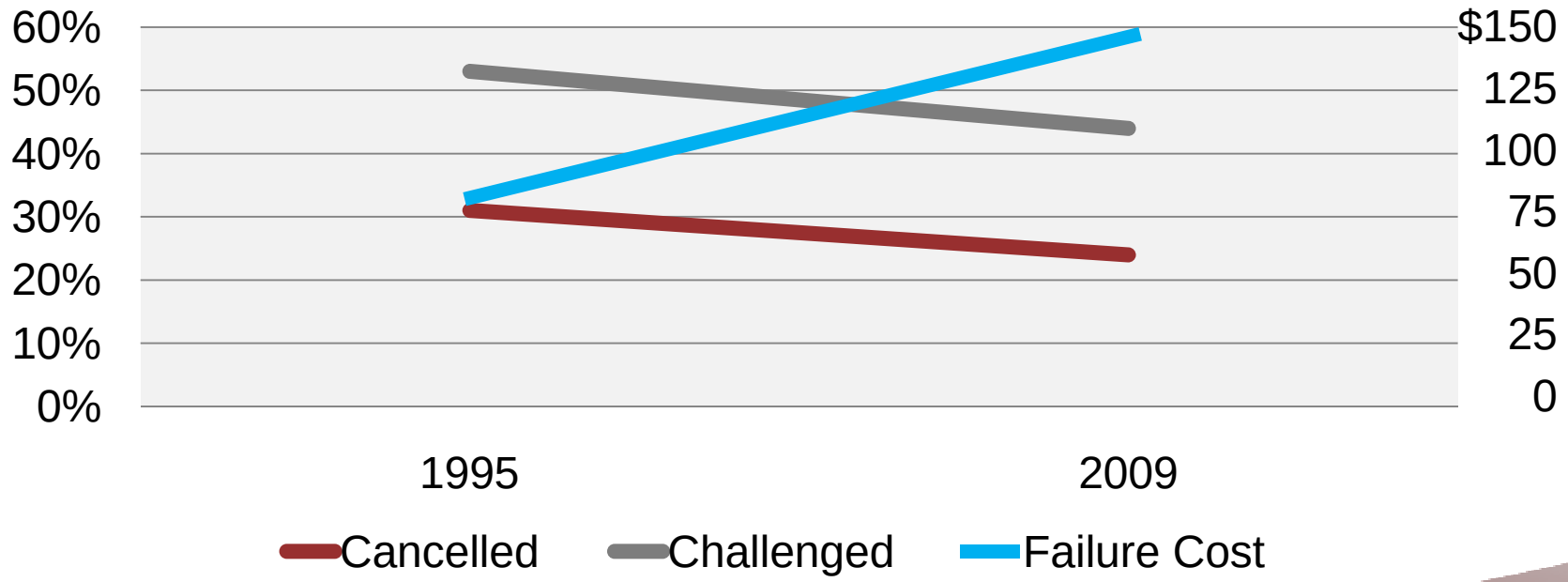
2009: Standish Group CHAOS Study

- 24% of projects cancelled before completion
- 44% finished late, over budget, or incomplete
- *"…cancelled projects cost American organizations over $145 billion in 2008."*

The Standish Group - CHAOS Report 2009

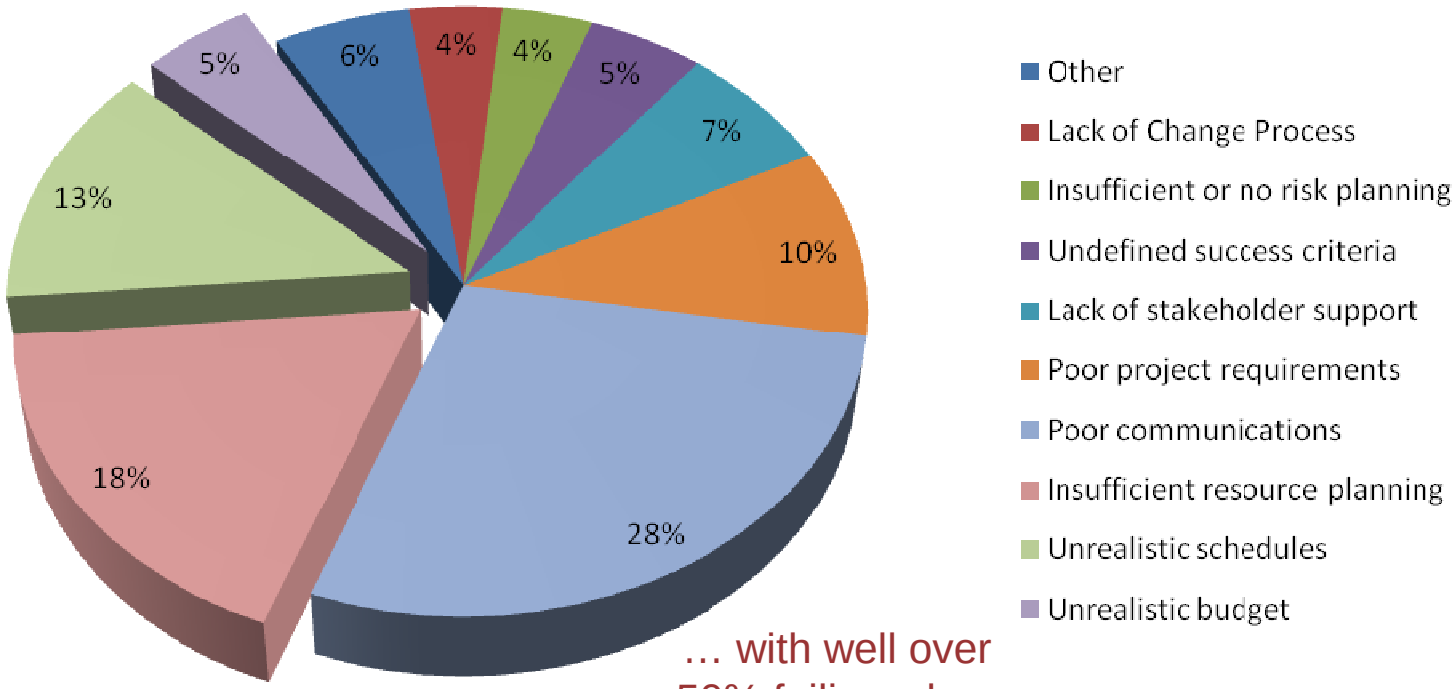
CHAOS Study 1995 - 2009

Statistics	1995	2009
Cancelled projects	31%	24%
Challenged projects	53%	44%
Project failure cost	$81 Billion	$145 Billion



Reasons for IT Project Failures

36% of IT project failures are directly due to poor estimates…



… with well over 50% failing when indirect causes are included.

Computing Technology Industry Association (CTIA) Survey of 1,000 respondents, 2007

Agile's Ability to Improve Estimation

Projects face a variety of challenges

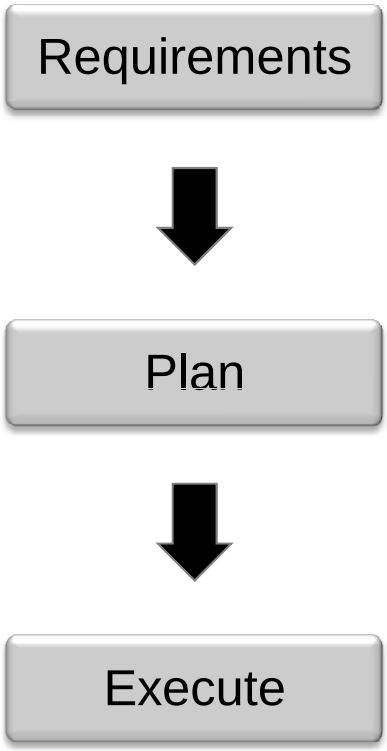
Estimation not main focus of recent process improvement efforts

Estimation directly impacts project success

Current Estimation Techniques

A Quick Backgrounder

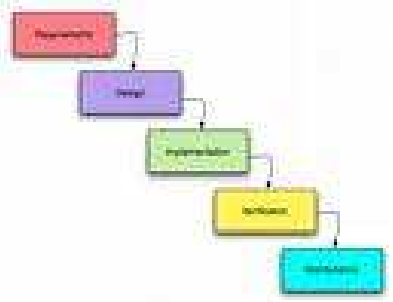
Defined Development Process



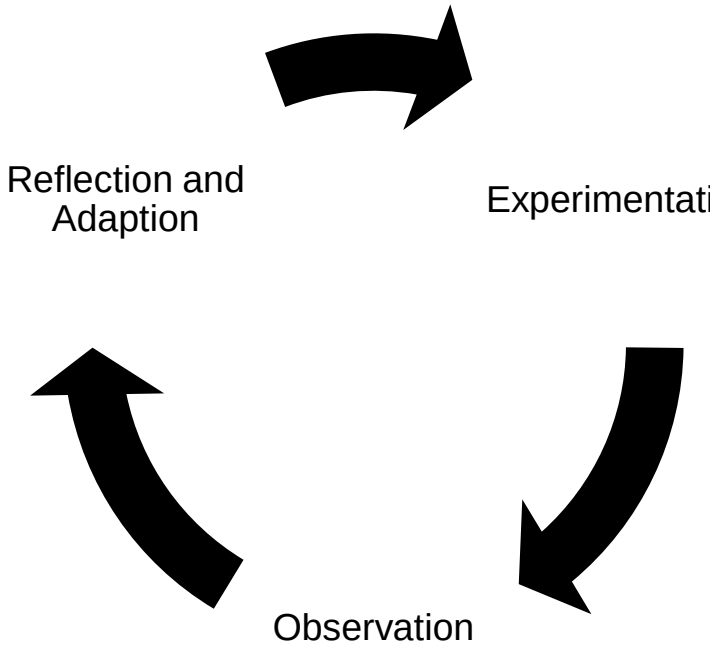
- Linear and predictable
- Focus is specification and decomposition

Estimation Challenges:

- All requirements must be known prior to planning



Empirical Development Process



- Cyclical and reflective
- Focus is invention and learning
- Agile processes are Empirical

Agile Estimation Challenges:

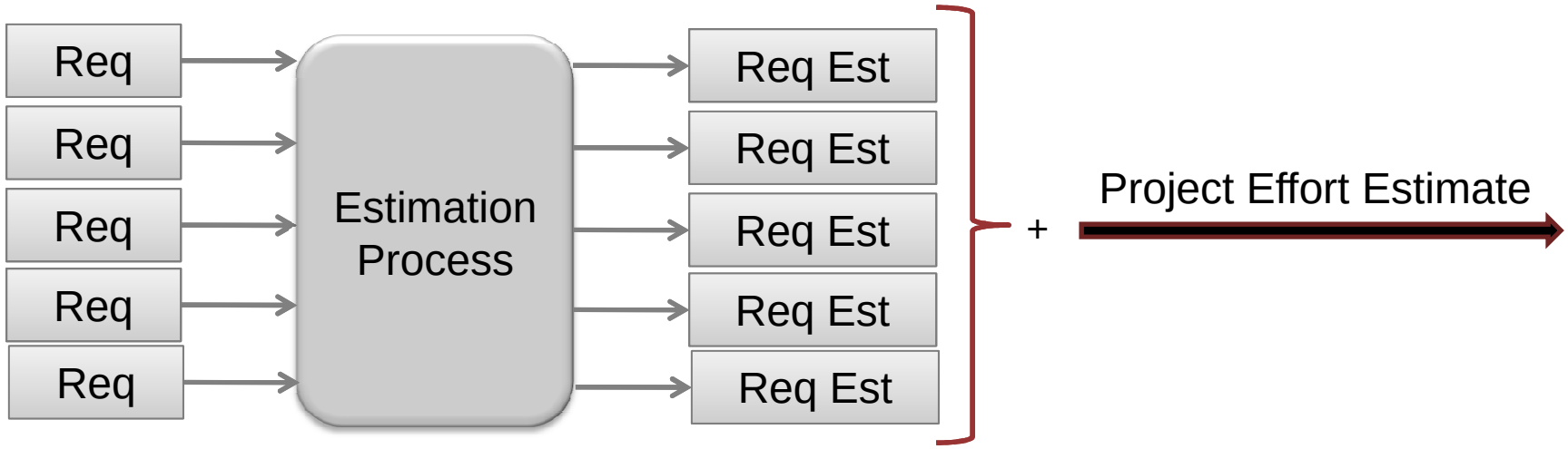
- Estimating entire project, not just next iteration

Time-Based vs. Size-Based Estimation

Time or Effort-based:
- Days
- Months
- Story Points
- Gummy Bears
- Shirt Sizes

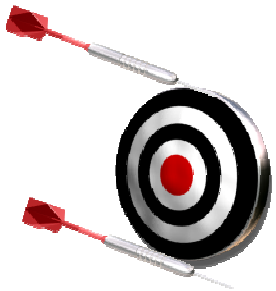
Size-based estimation:
- Lines of Code
- Function Points
- Input Screens
- Database Tables
- Reports

Defined Estimation: Time-Based

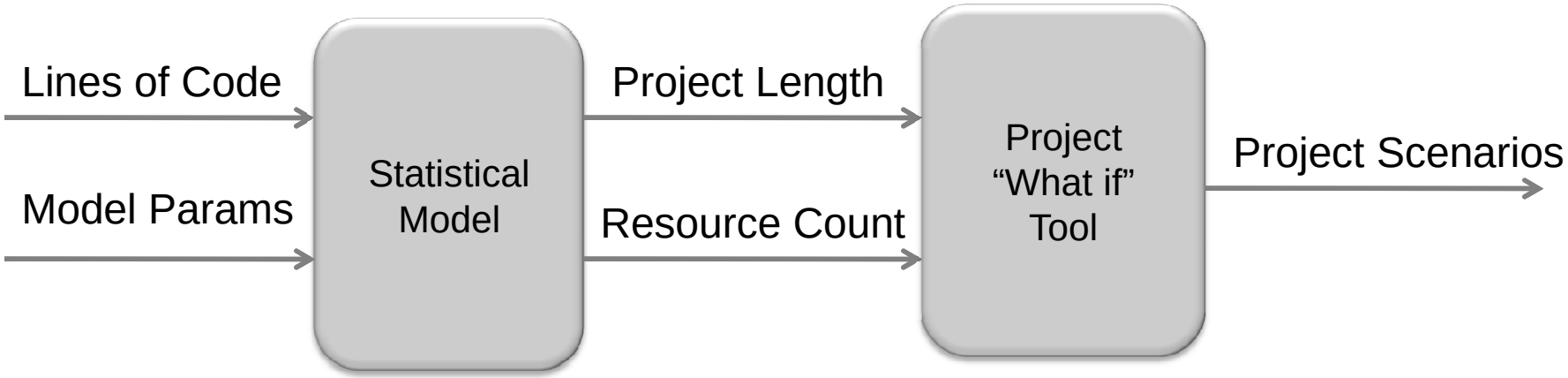


Time-based estimation

- Simplest approach
- Estimate targets often missed
- Resources? Schedule?
- Inaccurate but widely used



Defined Estimation: Size-Based



Garbage In, Garbage Out

- Outputs only as good as inputs
- Predicting LOC is a dark art
- Parameters add complexity

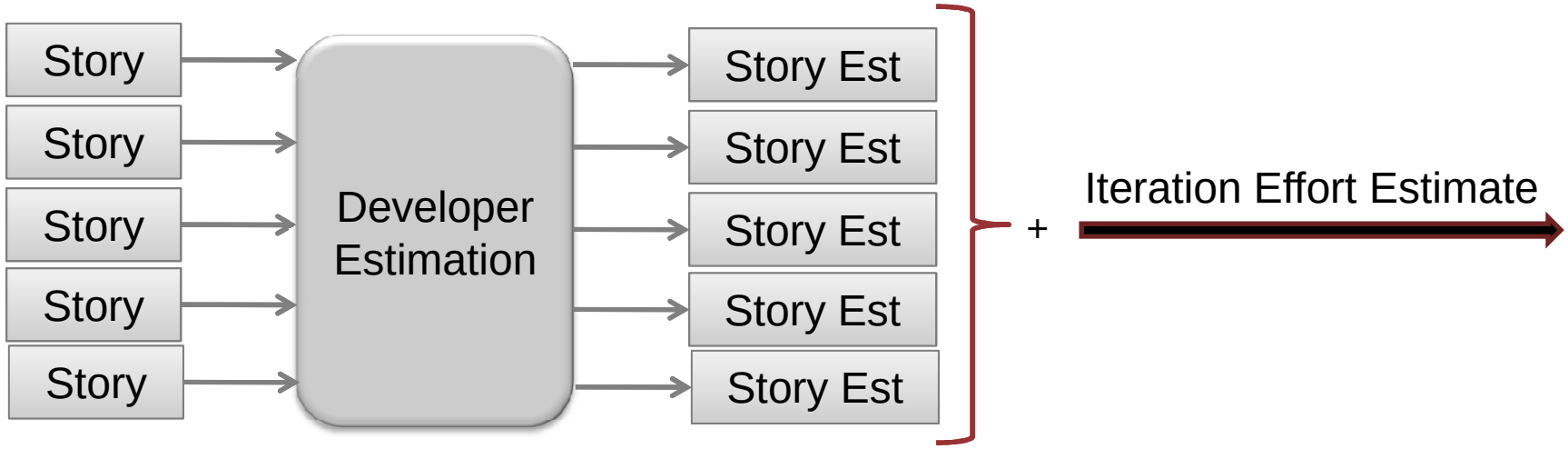
What about non-dev work?

- Coding only part of effort

All requirements known?

- Typically not the case

Current Agile Estimation Methods



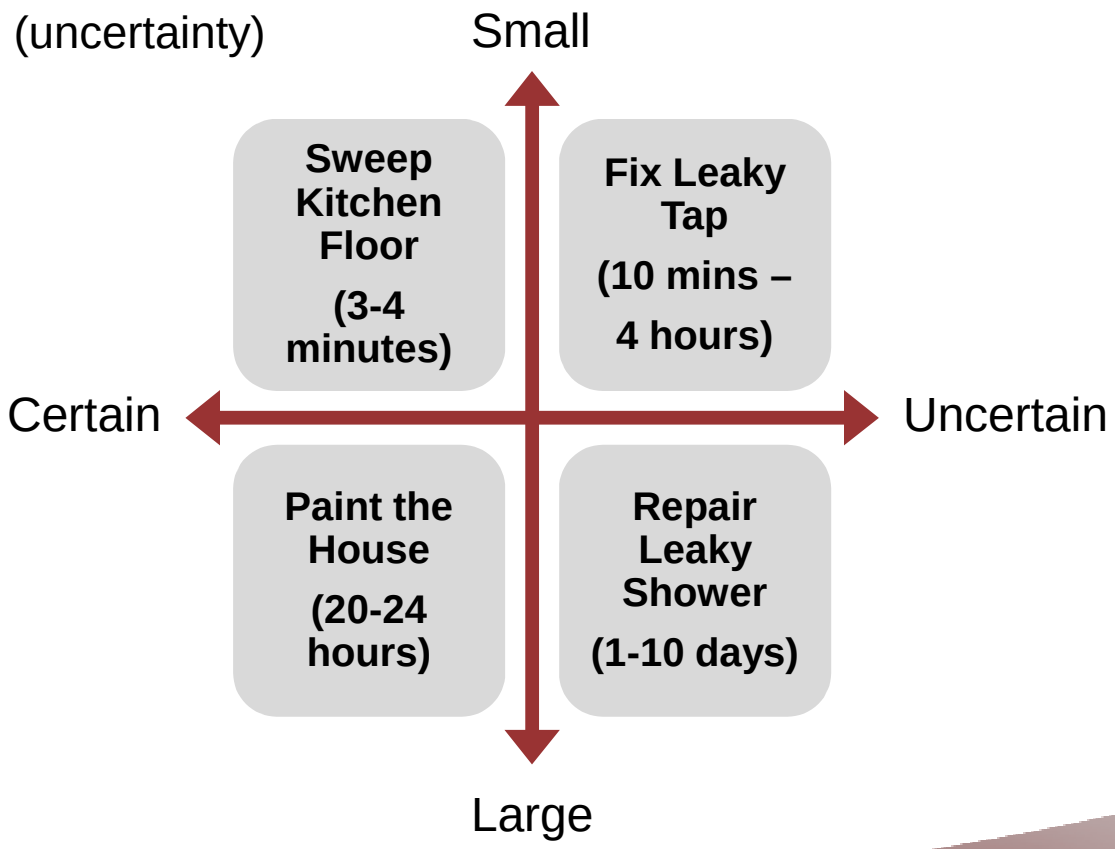
Challenges and Shortcomings

- Iteration-based, not project-based
- Budget, resources and schedule **are** estimated for most Agile projects – but not by project team
- Simplistic methods lead to under-estimation

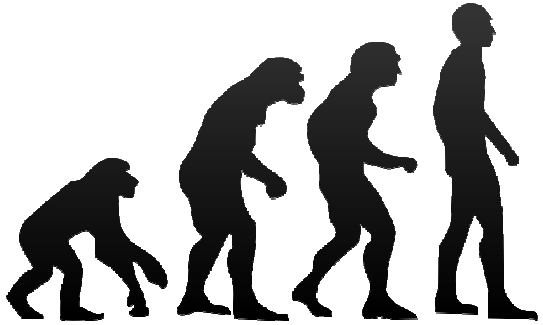
Estimation Difficulties

The two factors that most strongly influence estimates:

- How much is it? (effort)
- How confident am I? (uncertainty)



Estimation Evolution



Single point estimate

- Most basic but least useful
- 100% certainty, 50% certainty, 10% certainty?

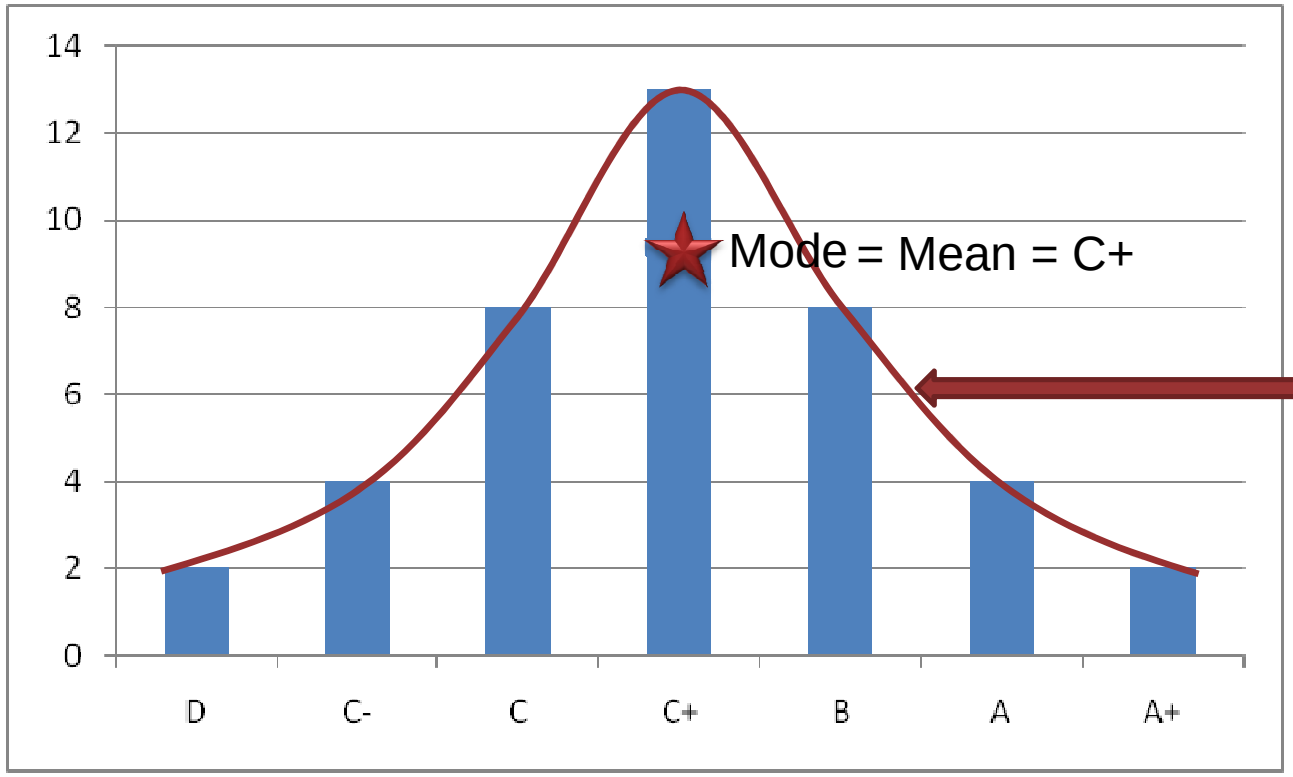
Range estimate

- Better, but still problematic
- User determines the shape of the probability curve

Math Refresher: What's a *probability curve*?

Probability Curves

Example: Class grades distribution (41 students)



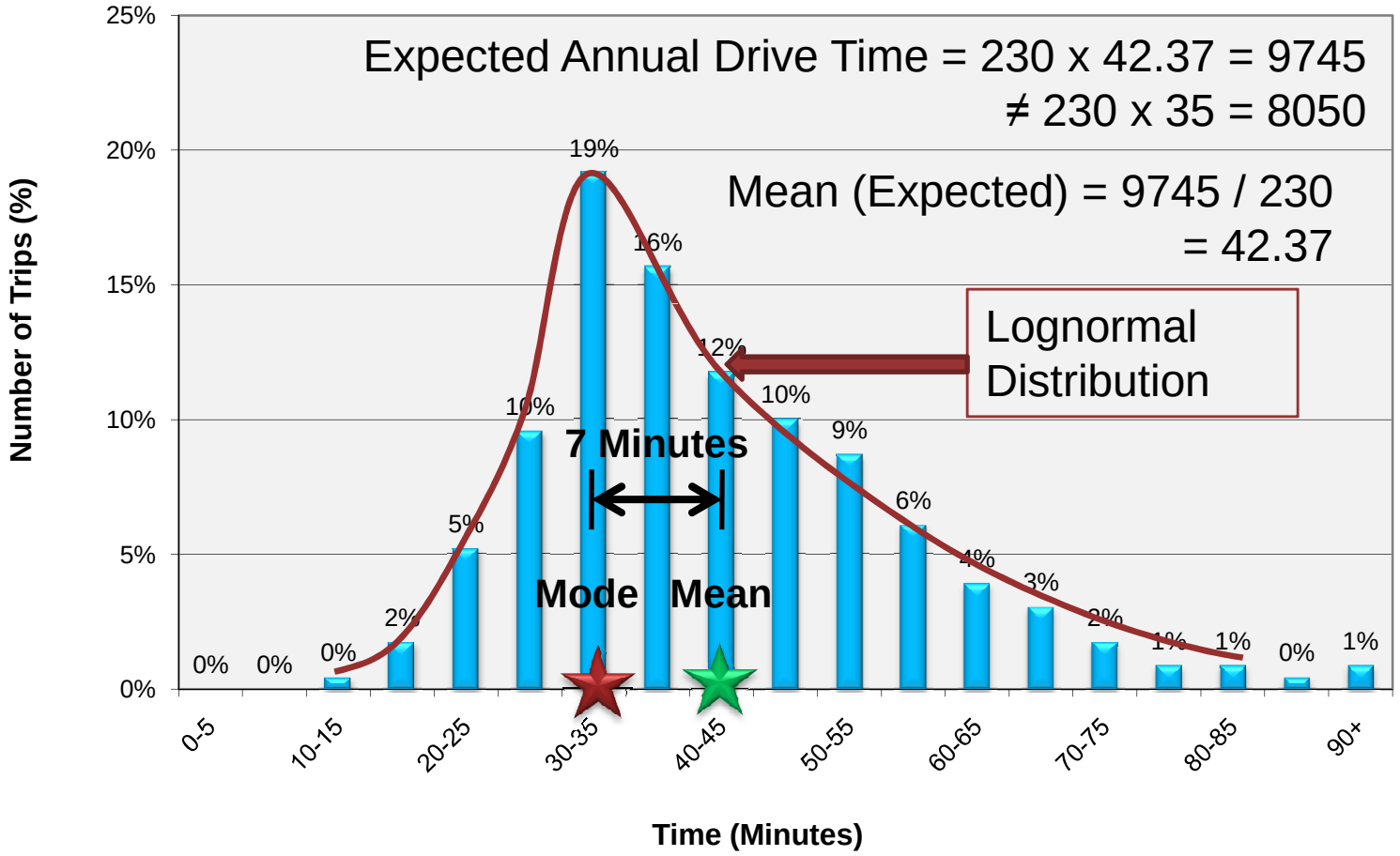
Normal Distribution ("Bell Curve")

D	=	1
C-	=	2
C	=	3
C+	=	4
B	=	5
A	=	6
A+	=	7

Mean = (1x2 + 2x4 + 3x8 + 4x13 + 5x8 + 6x4 + 7x2) / 41 = 4

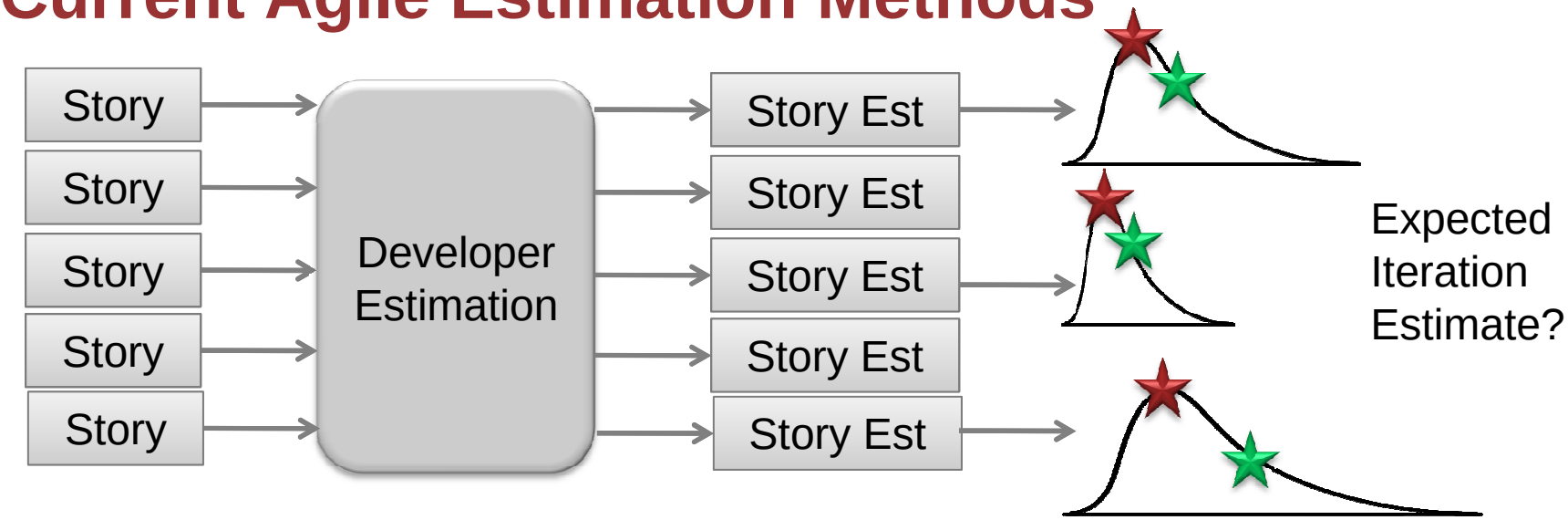
Probability Curves

Example: Drive time to work (230 drives; 5 minute intervals)



21% Error

Current Agile Estimation Methods

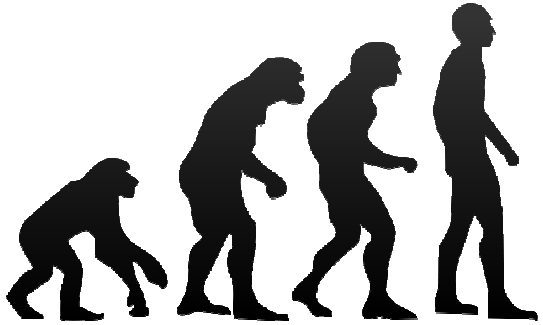


Developer has probably estimated Modes – what if we just add these?

Must sum Means for Expected Iteration Estimate ∴ suming Modes=underestimation

Note: Even a correctly computed Expected Iteration Estimate is only 50% likely!

Estimation Evolution



Single point estimate

- Most basic but least useful
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Range estimate

- Better, but still problematic
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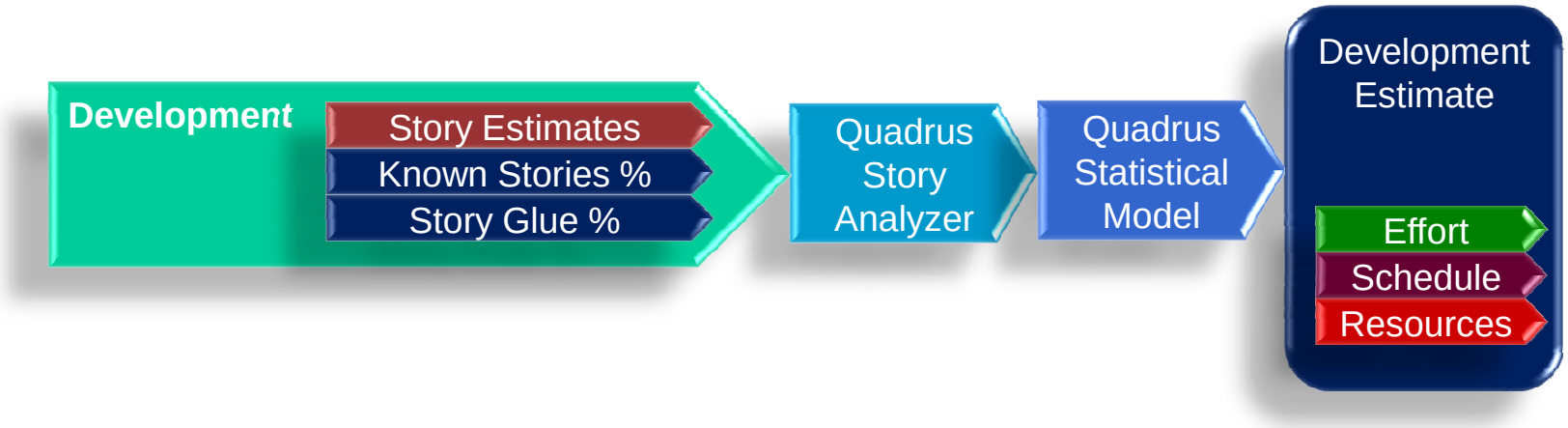
Next generation estimation approach 

- Point estimate with an uncertainty factor
- Probability curve is auto-generated leaving less room for user-error
- Correct combination of individual estimates to form overall estimate

Next Generation Project Estimation

The Quadrus Estimation Methodology

QEM: Development Estimate Overview



QEM: Development Estimate Inputs

User Story Estimates

Known Stories Percentage

Story Glue Percentage

QEM: Known Stories Percentage

User Story Estimates

Known Stories Percentage

Story Glue Percentage

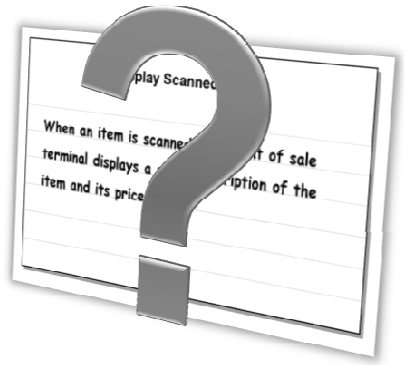
QEM: Known Stories Percentage

100% of User Stories are rarely known up front

The Estimation Analyst specifies Known Stories Percentage

Estimating Known Stories Percentage requires experience

QEM works with as few as 50% of User Stories known



QEM: Known Stories Factors

Factor	20%	50%	80%
User/Business Analyst involvement	Never	Occasionally	Always
Knowledge of business domain	Poor	Good	Excellent
Role participation	None	Most	All
Development approach	Agile	Mixed	Traditional
Scope control	None	Negotiated	Full
Application novelty	R&D	Augmentation	Replication
Detail of known requirements	Open-ended	High-Level	Detailed
Degree of technological change	Significant	Some Change	None
Interaction with other systems	Significant	Limited	None
Business environment and context	Dynamic	Some Change	Stable
External influences (e.g. government, vendor)	Significant	Some	None

QEM: Story Glue

User Story Estimates

Known Stories Percentage

Story Glue Percentage

QEM: Story Glue

"Any development activity that does not contribute directly to the product itself"

Non-development activities that occur on a continuing basis

Distinct from project initiation and completion tasks

Specific to project, organizational standards, culture, environment, etc.

In QEM, Story Glue is entered as a percentage of development effort (typically 20% to 40%)

QEM: Story Glue Examples

Presentations

Story decomposition

Status meetings

Demos

Daily stand-ups

Release planning

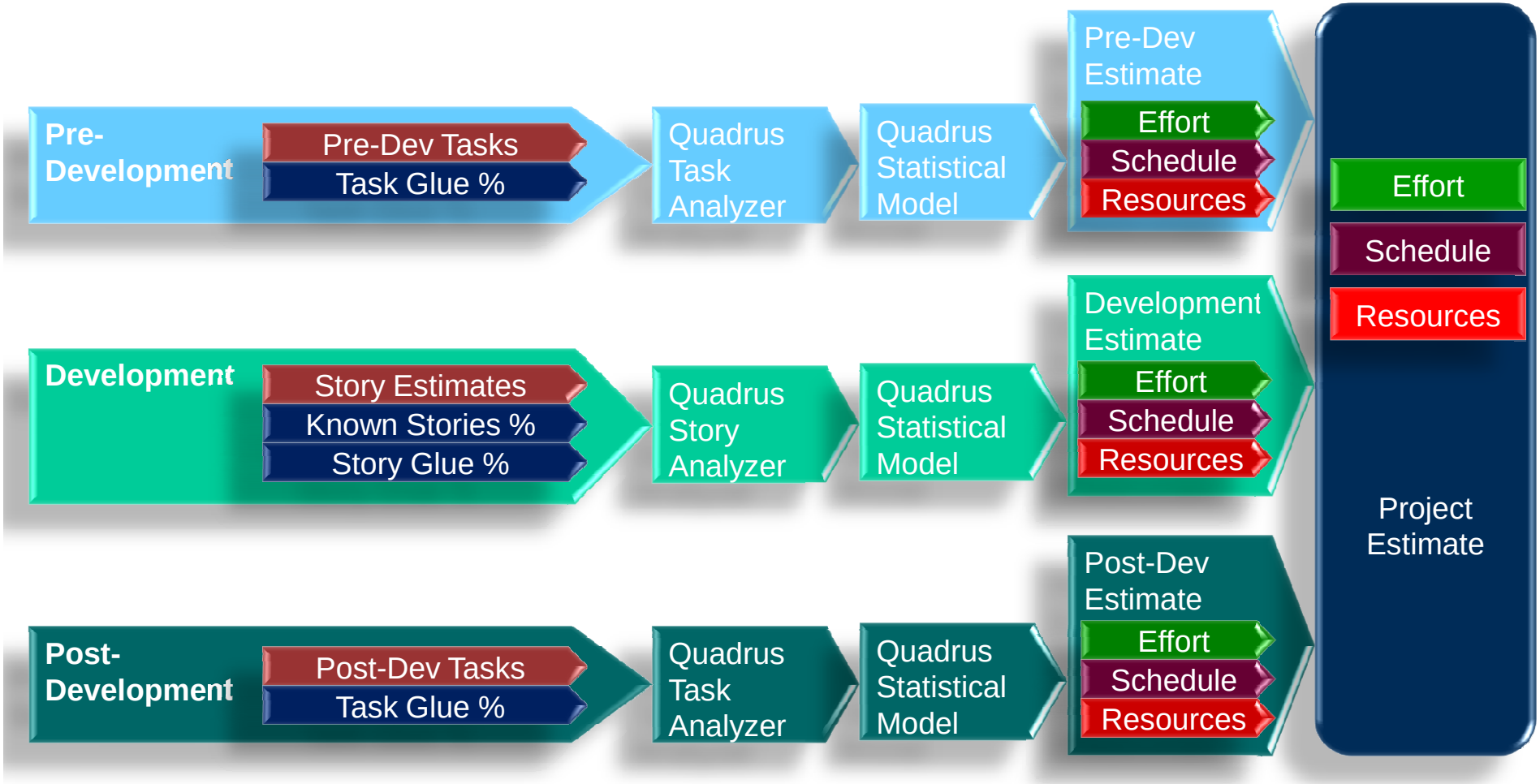
Test planning

Regression testing

Project management

Iteration review

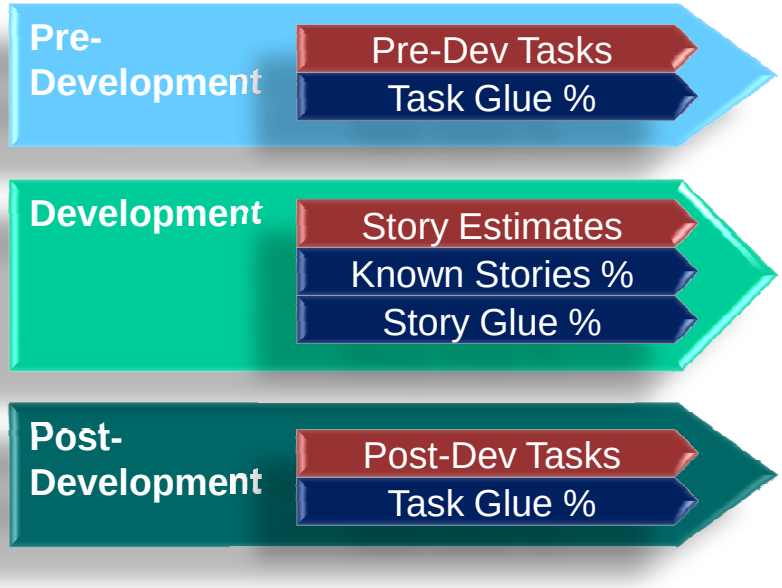
QEM: Project Estimate Overview



QEM: Project Estimate Inputs

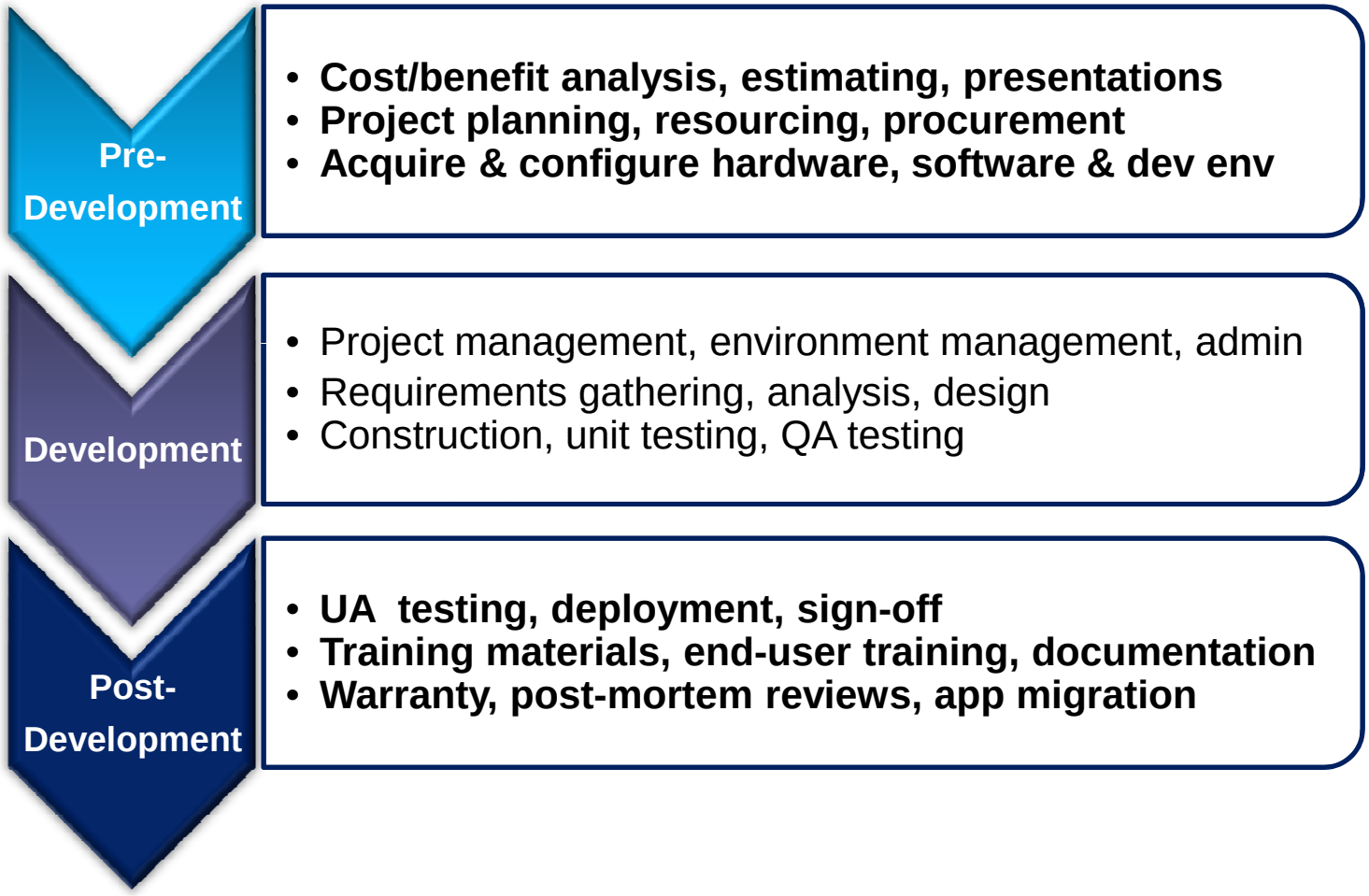
Pre-/Post-Development Tasks

Task Glue %

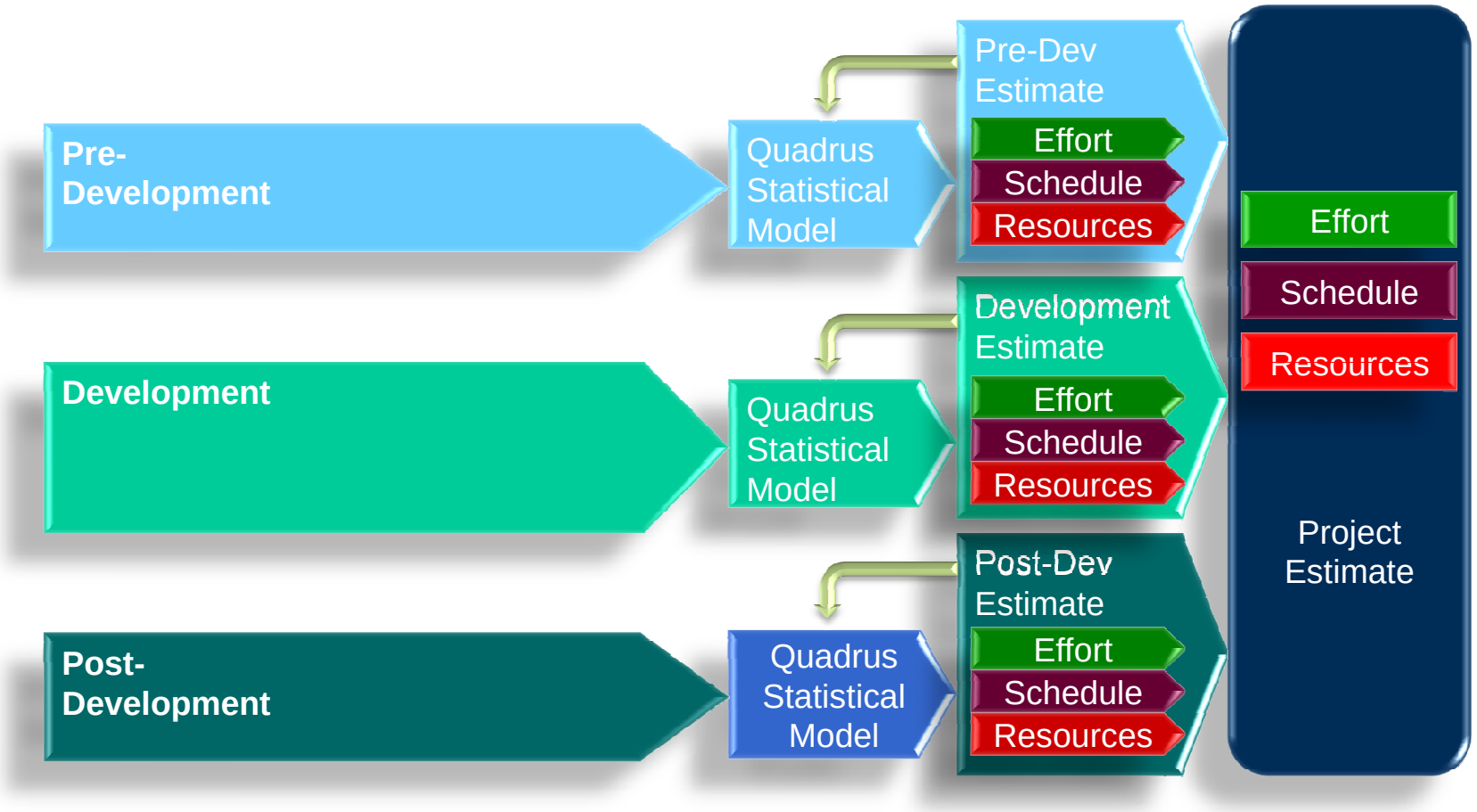


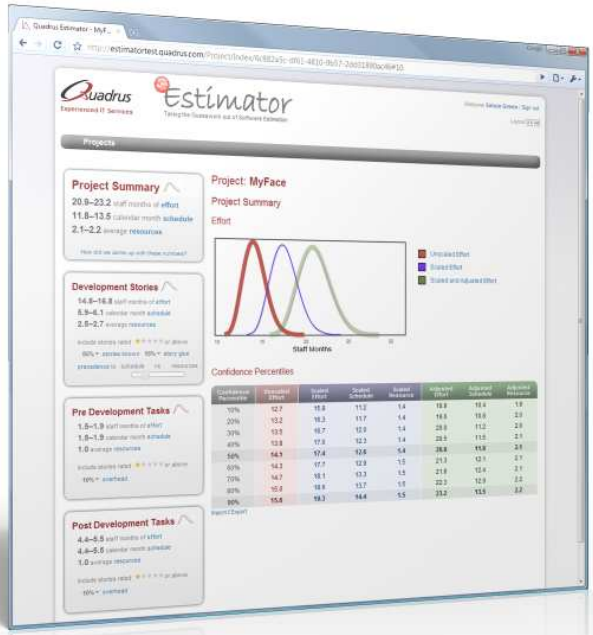
QEM: Pre-/Post-Development Tasks

QEM: Pre-/Post-Development Task Identification



QEM: “What If” Scenario Construction





Demonstration

Quadrus Estimator

Quadrus®

Approaches to Estimation