A PDC WHITE PAPER

Parametric Schedule Estimation Tool

Executive Summary

Ad-hoc estimating of product development schedules causes problems ranging from cost overruns and inefficient resource allocation to unhappy customers. Many estimating tools are overly complex and based on questionable data, which deters project teams from using them. PDC has created a simple tool that helps teams consistently improve schedule predictability by leveraging the top few critical parameters that consistently drive schedules.

Introduction

In product development, speed matters more than ever. The expected pace of development has accelerated while the world has become a lot less forgiving of delays. Predictability is at a premium, with services such as overnight shipping raising the bar. Failure to deliver a product when promised can damage your reputation and push customers to your competitors.

The tool helps teams consistently improve schedule predictability by leveraging the top few critical parameters that consistently drive schedules.

Beyond speed and predictability, extended enterprise design and development requires that you synchronize disparate tasks to optimize cost and quality.

In this environment, guesstimates about schedule aren't good enough. Many organizations now use some form of a phased development system that breaks the overall timeline into a handful of key intervals. This provides a framework for measuring time in a more granular fashion. You can examine not only time to market, but also time elapsed during a given phase.

Unfortunately, many of the tools intended to support this new approach are expensive, complicated, and based on flimsy data. Teams often abandon the tools—and the most elegant tool in the world won't help if no one wants to use it.

PDC's Parametric Schedule Estimation Tool fills the need for speed and predictability simply and elegantly. It rapidly (in fewer than 15 minutes) provides schedule estimates by phase, based on historical data, that can be more accurate than a bottoms-up Gantt chart. And it always engenders a more rational discussion about the process than ad-hoc guesses.

How the Tool Works

The Parametric Schedule Estimation Tool guides the estimate of the amount of time a project takes in a given phase by using experience combined with the critical few key drivers that impact schedule.

Parametric Schedule Estimation Tool (example)				
Product group: System Hardware			{Enter project name}	
Project characterization	Historical range		Estimate	Data, comments or explanation
1) Concept Phase	1	12	{Enter # months}	
Backup data - key variable elements affecting schedule				
Number of new interfaces	0	8	Enter # new interfaces	
Number of new processes that are part of the design	0	5	Enter # processes	
Number of major new technologies required	0	4	Enter # technologies	
Need vs. access to specific deep technical experience	0%	100%	Enter % of access	
Relative complexity of getting applicable VOC on key concepts	0%	100%	Enter % complexity	
Available resources planned vs. optimum resources for concurrent efforts	0%	100%	Enter % of optimum	
2) Design Phase	4	36	{Enter # months}	
Backup data - key variable elements affecting schedule				
Percentage of interfaces fully defined	0%	100%	Enter % defined	
Complexity of system integration - delta from old to new interfaces	0	12	Enter # new integrations	
Percentage of coupled vs. independent interfaces	0%	100%	Enter % highly coupled	
Number of new vendors on the "critical path"	0	10	Enter # new vendors	
Number of components with long lead times	0	10	Enter # LLT components	
Number of iterations during development	0	3	Enter # iterations	
Available resources planned vs. optimum resources for concurrent efforts	40%	100%	Enter % of optimum	
3) Development Phase	1	10	{Enter # months}	
Backup data - key variable elements affecting schedule				
Percentage of the specification with quantified test limits	40%	100%	Enter % of spec	
Number of subsystems to be verified	1	10	Enter # subsystems	
Number of verifications dependant on prior verifications	0	20	Enter # dependant	
Number of iterations - due design feature creep	1	8	Enter # iterations	
Available resources planned vs. optimum resources for concurrent efforts	40%	100%	Enter % of optimum	
4) Testing Phase	1	11	{Enter # months}	
Backup data - key variable elements affecting schedule				
Number of new processes requiring detailed test	1	25	Enter # of new processes	
Relative completeness of design for manufacturability by this phase	0%	100%	Enter % of DFM done	
Percentage of new vs. old use models	0%	100%	Enter % new uses	
Relative amount of pre-work done with the customer	0%	100%	Enter % done	
Number of test cases	10	100	Enter # cases	
Relative availability of manufacturing bandwidth for low-rate builds	0%	100%	Enter availabilty %	
Available resources planned vs. optimum resources for concurrent efforts	40%	100%	Enter % of optimum	
5) Production Readiness Phase	0	14	{Enter # months}	
Backup data - key variable elements affecting schedule				
Number of geographies targeted	1	5	Enter # geographies	
Relative complexity of introduction (in the aggregate)	0%	100%	Enter complexity %	
Interactions / dependencies with other introduction	0%	100%	Enter interaction %	
Lag time after pilot introduction	0	4	Enter # months	
Relative marketing strategy uncertainty	0%	100%	Enter uncertainty %	
Available resources planned vs. optimum resources for concurrent efforts	40%	100%	Enter % of optimum	
Characterization 6 {enter if applicable}				
Characterization 7 {enter if applicable}				
This project's estimated schedule (months) =				
This project's actual schedule performance (months) =			Enter # months	
Reflection metric: This project's schedule performance vs. estimate =				

Measuring Critical Inputs

This simple spreadsheet-based model uses five to eight inputs per phase to predict the duration of each phase based on the range of typical times and the technical complexity of the design. In the tool, the phases run down the rows and the time estimates and complexity values are input into the columns.

The first column under each phase contains the critical few schedule drivers, *derived directly from the experience of your team and your organization*. You tap the knowledge of your organization by collecting drivers from your most experienced project manager. Examples of these drivers for a software project might be: number of interfaces, complexity of system integration, percent of testing that is automated, and number of geographies.

The second and third columns contain the historical ranges of these drivers in numbers or in percentages, from low to high. The fourth column represents your estimate of the complexity of the project, while the fifth column is for comments.

Applying Expert Judgment

After entering all the estimates for the drivers in a phase, the project manager applies his or her judgment to indicate the anticipated duration of the phase given estimates for each of the individual drivers.

In a pinch, a program manager alone can use this tool. However, the results are more accurate if the cross-functional team works together to come up with estimates. For extremely complex projects, you can deconstruct the estimate into its component parts, such as software, hardware, and accessories. After doing individual estimates, the program managers for the subsections should provide an integrated estimate that takes into account the possibility of parallel development efforts.

> With consistent use, the tool's accuracy grows over time.

Additional Considerations

A couple of factors can limit the accuracy of the Parametric Schedule Estimation Tool.

The most important concern is that if your design paradigm changes, you may not have correct or sufficient baselines from which to estimate (for example, if you just started to do remote development or just implemented an agile software process).

The second concern is that the estimation is based on at least a cursory definition of the product or service to be developed. If you don't know what will be involved in the design, you won't know where it falls in the range of critical schedule parameters. Competent voice of the customer (VOC) work should provide sufficient information to define the needs and the potential solutions.

Business Problems Addressed

The Parametric Schedule Estimation Tool improves customer satisfaction and enhances your competitive advantage. Fast and predictable development helps satisfy customers who have come to expect a new product every nine months or sooner. The tool also improves internal relationships and efficiency by increasing predictability around milestones important to operations and the field.

Within product development groups, the tool reduces waste because of the increased predictability it makes possible. You can schedule teams more efficiently and avoid waiting for a deliverable that fails to meet its scheduled delivery date.

PDC's Parametric Schedule Estimation Tool offers the following benefits:

- Increases the success of inexperienced program managers in estimating
- Improves communication with management around scheduling
- Provides an alternative to time-consuming bottoms-up Gantt charts (although it can be used effectively in conjunction with Gantt charts in many situations)
- Improves the predictability of schedules
- Reduces conflict between the team and management by moving what is often an emotional debate to a more rational discussion based on past history
- Can start out simple and improve in accuracy over time as you add successive projects to the mix
- Captures organizational knowledge (especially important given turnover)
- Establishes a common language and a familiar visual tool (the spreadsheet) for schedule estimation

Outcomes

Organizations that use the Parametric Schedule Estimation Tool can:

- Immediately start using important project parameters to estimate and attach time estimates to each.
- Leverage the experience of project teams to identify the top five to seven factors that make or break your schedule for each phase of a project, based on what made or broke them in the past.
- Create a time range using trade-offs for each phase based on factors that have *actually* made a difference in the past.
- Create a historical picture of your project schedules that grows more accurate—and thus more powerful—over time.
- Present your entire schedule in a one-page Excel spreadsheet.
- Have "adult conversations" about schedule estimates.

Conclusion

Incorrectly estimating a product development schedule can cause endless grief: cost overruns, inefficient resource allocation, and unhappy customers. If you're doing seat-of-the-pants schedule estimation, you've probably had more than a few arguments among team members or with management about what numbers to plug in. The truth is that it's hard to have an adult conversation about scheduling when you don't have a simple, reliable tool. There are lots of elaborate software tools available for estimating schedules and churning out beautiful charts, but most of them are expensive, complicated, and based on flimsy data. It ends up that no one wants to use them.

PDC's Parametric Schedule Estimation Tool tackles these issues. Because it's built in an Excel spreadsheet, everyone already knows how to use it. It leverages the top few critical parameters that consistently drive your schedules and grows more valuable over time as you build up historical data about projects. Using the tool consistently improves schedule predictability and, ultimately, your bottom line.

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For information about PDC's Parametric Schedule Estimation Tool, contact Wayne Mackey at 310-376-8016 or wayne_mackey@pdcinc.com.

Since 1990, PDC has helped companies create market-winning product portfolios using customer-centric innovation management. PDC's services span the product development spectrum, from portfolio management and voice of the customer to product definition and metrics.

Working with PDC, you'll not only develop a deep understanding of your customer's beliefs, desires, and environment, you'll apply the data you gather to answer the trickiest product development questions.

See PDC's web site at **www.pdcinc.com** for more.

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