CDC Unified Process

Project Management

Newsletter

Supporting A Common Project Delivery Framework

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The Art of Estimating

The Society of Cost Estimating and Analysis defines an estimate as "the art of approximating the probable worth or cost of an activity based on information available at the time."

Establishing realistic estimates for project schedules, budgets, resources, etc. is one of the most challenging aspects of project planning because estimates are often provided for work necessary to successfully deliver projects, which by definition are temporary endeavors undertaken to create a unique product, service, or result. Estimating reduces some of the uncertainty associated with planning such efforts. Ultimately, providing project stakeholders with a better sense of what will be done and when.

Organizations use estimates because expenditures are often tied to results. However, stakeholders often already have some idea of what to expect when requesting estimates. As a result, estimates either confirm or challenge those assumptions.

Estimating also supports Capital Planning and Investment Control (CPIC), Enterprise Performance Life Cycle (EPLC), Office of Management and Budget (OMB) 300, Earned Value Management (EVM), etc.

According to the Government Accountability Office (GAO) characteristics of credible estimates include:

- Clear identification of tasks
- Broad participation in preparing estimates
- Availability of valid data
- Standardized structure for the estimate
- Provision for uncertainties
- Recognition of inflation
- Recognition of excluded costs
- Independent review of estimates
- Revision of estimates for significant changes

Some common elements necessary to produce credible estimates include:

- Identified deliverables
- Defined units of measure (square feet, lines of code, data sets, functions, packages, etc
- Staffing/resource and/or profiles to deliver results
- Scheduled activities
- Quality acceptable criteria
- Identified risk and associated mitigation strategies
- Data and informational reports

Some common factors that hinder effective estimating include:

- Lack of historical data
- Lack of estimating experience
- Lack of estimation process, techniques, models
- Failure to include activities
- Failure to include products that are within scope
- Unrealistic expectations
- Unrealistic assumptions
- Unrecognized, unaddressed uncertainty
- Measuring and estimating just once
- Personal biases

Some common estimating approaches include:

- *Parametric* estimating uses a statistical relationship between historical data and other variables to calculate an estimate
- *Analogous* estimating uses values from previous activities as the basis for estimating values for similar future activities
- *Bottom-Up* estimating decomposes work and then aggregates estimates for the work details into a total quantity for a given component of work
- *Rough Order of Magnitude (ROM)* estimating only provides a very wide range of +/- 50% or more
- *Activity-Based* estimating assigns the cost of each activity to a product or service according to the actual consumption by each
- *Program Evaluation and Review Technique (PERT)* estimating applies a weighted average of optimistic, pessimistic, and most likely estimates
- *What-If Analysis* is used to evaluate the effects of changing factors influencing the estimate to determine what effects those changes may have on the outcome of the effort

All estimating techniques involve assumptions and guesses. Additional information often changes initial perceptions and results in changes to initial estimates. Thus, it is important not to rely on only one source for any particular estimate. It is good practice to obtain estimates from multiple sources and if possible utilize multiple different estimating techniques to derive the most accurate estimate possible. As a result, estimating is actually an activity that occurs throughout the life cycle of an effort. In the early stages of the life cycle less information is known about the work required to complete the effort and thus estimates are often very rough. As the effort progresses more information regarding the work becomes available.

"*With many calculations, one can win; with few, one cannot. How much less chance of victory has one who makes none at all! By this means I examine the situation and the outcome will be clearly apparent.*"
Sun Tzu – The Art of War

Revised estimates become more accurate as greater detail becomes know about the work to be accomplished. If necessary, updates to the project schedule and other project documentation should be made to reflect major changes in estimates. These changes should be properly communicated to project stakeholders and, if dramatic enough, may require a change request against the project.

Circumstances that cause change may also impact original estimates. Such factors may include:
- Changes in ownership
- Unexpected conditions
- New technology or regulations
- Natural disasters
- Design, development, or implementation errors

Managing change, measuring progress, and communicating effectively with stakeholders using the appropriate level of data and detail helps provide transparency into project activities and facilitates managing the inevitable project change and its impact upon any original estimates.

However, applying project controls to stay in-line with the original estimates should not necessarily be the focus but instead to stay as close as possible and make necessary adjustments needed for the project to succeed.

Communicate progress, identify and deal with change and communicate frequently to ensure stakeholders are aware of any changes and their impact on estimates.

Portions of this newsletter were paraphrased from a presentation by Brad Radichel delivered during the January 2010 meeting of the CDC Project Management Community of Practice (PMCoP). For more information on the PMCoP, or the CDC Unified Process (UP) please visit the CDC UP website at http://www.cdc.gov/cdcup/. ▮

Project Management Community of Practice

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  EPLC Tailoring
- ***September 24, 2010***
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For more information on the Project Management Community of Practice visit the PMCoP website at http://www2.cdc.gov/cdcup/library/pmcop/ ▮

CDC Unified Process Presentations

The CDC UP offers a short overview presentation to any CDC employee and/or contractor group, upon your request. Presentations are often performed at your facility, on a day of the week convenient for your group, and typically take place over lunch structured as 1-hour brown bag/lunch-and-learn style meeting.

Contact the CDC Unified Process at cdcup@cdc.gov or visit http://www.cdc.gov/cdcup to arrange a short overview presentation for your group. ▮

Contact the CDC Unified Process

The *CDC Unified Process Project Management Newsletter* is authored by Daniel Vitek, MBA, PMP and published by the Office of Surveillance, Epidemiology, and Laboratory Services.

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