**Estimating:**

*It's easy to estimate what you know.*

*It's hard to estimate what you know you don't know.*

*It's very hard to estimate things that you don't know you don't know (some would say impossible).*

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This document is prepared for the Estimating sessions.

## The Estimating Checklist:

There is no requirement to estimate every task in a project – the decision is the Project Managers.

|  |  |
| --- | --- |
|  | Activity/Requirement/Comments |
| Decision | Which areas, tasks, activities require estimating? |
| Ability | Do the estimators require training on estimating? |
| Question | What level of experience does the estimator have? With a low level of experience consider Peer Review of estimates or assigning the estimating to another resource.  Have they done this before? |
| Requirement | Forming the foundation of an estimate; the business requirements[[1]](#footnote-1), functional, non-functional, Business Case, Scope and the Work Breakdown structure is complete or draft copies are available.  Subject Matter Experts are available for estimating or part of the Project Team.  **The information is key to creating a good estimate.** What if some or all of the information is not available for the project? Uncertainty would increase. |
| Interview | Interview Subject Matter Experts   1. Have they performed this type of work before and if yes, how many years? 2. SME **justifies** the estimate (justify is specific to Expert Estimating) 3. Interview for assumptions the expert made in constructing the estimate. 4. Interview for constraints the expert made in constructing the estimate. 5. Interview for risks the expert made in constructing the estimate. 6. Set the **Uncertainty** Level. |
| Project | Update the project plans with the assumptions, constraints and risk information. Adjust timelines, resource estimates and the budget if required. |

**Have we done this before?**

**High Uncertainty?**

## The Estimating Process:

Conduct Peer Review

Construct Estimates

Request an Estimate

✔

✔

✔

Project Manager

Architect

Optional

Optional

✔

✔

Optional

Optional

✔

✔

✔

Quality Assurance

Business Analyst

Enterprise Architect

1. Sufficient project documentation completed or in draft to construct estimates?
   1. Scope
   2. Business Case
   3. Functional and Non-Functional requirements
2. Build the Work Breakdown structure
3. Determine if expertise to support the technology, business analysis and other project deliverables
4. Issue Work Breakdown packages – Issue Estimating Templates
   1. Select 1, 2 or all Estimating Methods (3 Point, Expert and/or Bottom Up)
   2. Construct tasks through either
      1. Group Facilitation either Brainstorming or Agile
      2. Interviews
      3. Individual submission
   3. Determine Uncertainty, Assumptions, Constraints and Risks
   4. Submit completed estimating packages to the Project Manager
   5. Project Manager performs a Reasonability Check
   6. Project Manager adjusts the timeline, Business Requirements, Project Charter and the Project Execution Plans.

## What is an Estimate?

An estimate is a statement of probability. Estimates can be an assessment of time, cost or an outcome.

We are using 3 estimating methods, Bottom up (WBS –based), Expert Estimating, and 3 Point Estimating. Included are examples of other types of estimating. You can use any combination of the estimating methods to achieve the project timeline.

|  |  |  |
| --- | --- | --- |
| Estimation Approach | Category | Comments |
| Bottom Up (WBS-based) | Judgement based | Judgement based is designed on input from the Project Team. Significant reliance on the experience and skill of the project team and the Project Manager because they based their response on their experience. |
| Expert Estimating | Judgement based |
| 3 Point Estimating | Judgement based |

## Peer Review

A Peer Review is a Quality Assessment tool and an opportunity to confirm an estimate or additional requirements offering a greater degree of accuracy. Peer reviews could identify gaps in the estimating, timelines, strategy, costs, and labour.

Peer Reviews can be completed for time and cost estimates but should not be limited to reviewing of a task. Peer Reviews could also occur in Project Management, Quality Assurance, and the Business Analyst teams. Input can be sought to could confirm their strategy, deliverables and goals. BA's could confirm the requirements.

*Who can request a Peer Review?*

The individual that has constructed the estimate or the Project Manager.

#### Steps/Requirements for a Peer Review:

1. Identify which tasks/activities/areas require a peer review.
2. Select experienced individuals who have relevant skills, knowledge and expertise for the review.
3. Provide background information that supports your estimate including assumptions, constraints, risks and other relevant project documentation.
4. Time frames for a Peer Review can be 10 to 15 minutes or a group facilitation to examine a broader scope of estimates could take 2 hours.
5. Conduct the peer review; negotiate a completion date/time for the review to conclude.
6. Review the feedback and adjust your estimates as appropriate. Indicate in the Estimating Templates that a Peer Review has been conducted.

## Uncertainty

Uncertainty describes the amount of ambiguity of a project. Uncertainty can be represented by unknown technology, or technological issues, or unstable timelines, or lacking expertise in a project.

A large amount of uncertainty (50% or more) is expected at the beginning of the project. As the project progresses the uncertainty should not be greater than 50%. Prior to the execution of uncertainty should drop below 10%.

## Variation

Project variation is where elements, tasks, activities or people create variation in the project. Examples follow:

* Customer insists on new requirements throughout the methodology
* Customer insists on new technology, changing the scope
* Scope cannot be agreed to.

**Experience**

If the variation is not brought under control, uncertainty will continue to be high.

*Uncertainty and variation are reduced by using the skills and experience of the project team.*

*Missing or poor requirements? 60-80% of project failures can be attributed to poor requirements gathering, analysis and management.*

## Estimating Rules

* Assume resources will only be productive for 80 percent of their time.
* Resources working on multiple projects take longer to complete tasks because of time lost switching between them.
* People are generally optimistic and often underestimate how long tasks will take.
* Make use of other people's experiences and your own.
* Get an expert view.
* Include management time in any estimate.
* Always build in contingency for problem solving, meetings and other unexpected events.
* Cost each task in the Work Breakdown Structure to arrive at a total, rather than trying to cost the project as a whole.
* Communicate any assumptions, exclusions or constraints you have to your customer.
* Provide regular budget statements to your customer, copying your team, so they are always aware of the current position.

## Estimating Mistakes

* Not understanding what is involved to complete an item of work.
* Starting with an amount of money and making the project cost fit it.
* Assigning resources at more than 80 percent utilization.
* Failing to build in contingency.
* Failing to adjust the estimate following changes in scope.
* Providing estimates under pressure in project meetings.
* Giving single-data-point estimates rather than range estimates.
* Not adjusting the timeline for vacations.
* Not understanding the capabilities of the Project Team.

*Using Single Point Estimates for the entire project? Chances of meeting the project completion date less than 50%.*

*The weakness in a Single Point Method will appear in the execution when it becomes apparent the project will not meet the project end date and Change Requests appear lengthening the project.*

## 3 Point Estimating Standard

If the estimates are wild guesses, using this approach or any estimating approach is not going to help.

*The estimating template is named "PMOPDF Estimating" and the worksheet reference is "3 Point Estimating".*

**Use 3 Point Estimating when Uncertainty is high and/or Expert Estimating is not available.**

1. Optimistic (Best) – Estimate the shortest time based on your experience. This is key, estimating **not what you think the shortest time could be but what you have experienced.** For this example, let’s say the shortest time to drive to work was 22 minutes.
2. Pessimistic (Worst) – Estimate the longest time based on your experience. This is the scenario where everything has gone wrong – how long did it take? For this example, let’s say the longest time experienced was 47 minutes.
3. Most Likely (Average)– Based on experience, how long does it usually take. For this example, let’s say on average it takes about 30 minutes to drive to work.

In the template workbook provided(PMOPDF Estimating.xlsm) open the worksheet named “3 Point Estimating”.

Enter your calculations in the worksheet in the appropriately labelled columns.

|  |  |  |
| --- | --- | --- |
| **Best (in hrs)** | **Worst (in hrs)** | **Most Likely (in hrs)** |
| 12.00 | 55.00 | 20.00 |

The worksheet will provide the result based on the following formula:



|  |
| --- |
| **Result** |
| 24.50 |

### Uncertainty:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Uncertainty** | **Classification** | **Overrun** | **Beginning Value** | **End Value** |
|  | Routine has been done before | Low | 0% to 2% | 0% | 2% |
|  | Routine but possible difficulties | Medium to Low | 2% to 5% | 2% | 5% |
|  | Development with little technical difficulty | Medium | 5% to 10% | 5% | 10% |
|  | Development with some technical difficulty | Medium to High | 10% to 15% | 10% | 15% |
|  | Significant Effort, technical challenge | High | 15% to 25% | 15% | 25% |
|  | No Experience in this area | Very High | 25% to 50% | 25% | 50% |

The table is an essential step in all of the estimating methods. As each estimate is construction an uncertainty value should be added to the effort calculations.

**Uncertainty**



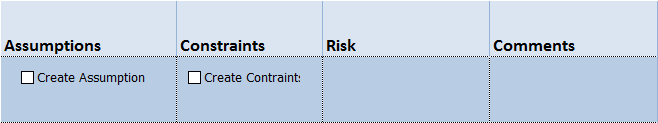
The worksheet will provide a ranged estimate for the task.

|  |  |
| --- | --- |
| **Beginning Range** | **End Range** |
| 30.63 | 36.75 |

To further define the accuracy of the estimate, a peer review can be conducted.

|  |
| --- |
| **Peer Review** |
|  |

The final steps are creating the assumptions, constraints, risks and comments.



## Expert Estimating

Expert Estimating replaces single point estimating today.

**Use Expert Estimating when you have an expert. This method can be the most accurate estimating model.**

Enter the single point estimate in the columns.

|  |  |
| --- | --- |
| **Activity/Task/Resource/ Item** | **Estimate (in hrs)** |
| Drive to work | 20.00 |

Similar to the steps in 3 Point Estimating, select the Uncertainty. The spreadsheet like the previous estimating methods provides a range.



Justify the estimate. Why this number?



|  |
| --- |
| **Justification of the Estimate** |
|  |

Option to provide additional estimates furthering the level of accuracy for the estimate.

|  |  |
| --- | --- |
| **Peer Review** | **3 Point Estimate Performed** |
|  |  |

The final steps are creating the assumptions, constraints, and the risks.



## Bottom Up Estimating

Bottom Up format and approach is Expe9rt Estimating. The difference is that all tasks will be estimated.

**Bottom Up can be very accurate if you have the time to construct and estimate the tasks and if you subject matter experts available.**

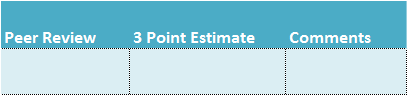
Enter the single point estimate in the columns.

|  |  |
| --- | --- |
| **Activity/Task/Resource/ Item** | **Estimate (in hrs)** |
| Parking | 12.00 |

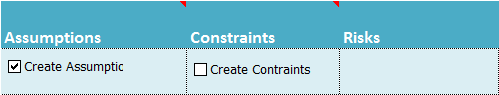
Similar to the steps in 3 Point Estimating, select the Uncertainty. The spreadsheet like the previous estimating methods provides a range.



Option to provide additional estimates furthering the level of accuracy for the estimate.



The final steps are creating the assumptions, constraints, and the risks.



# Appendix A

# Detailed information on Assumptions and Constraints

## Assumptions

Assumptions are factors that, for planning purposes, are considered to be true, real, or certain without proof or demonstration. Assumptions affect all aspects of project planning, and are part of the progressive elaboration of the project.

### Environmental Assumptions

* Issues will be resolved in a timely manner.
* The project organization described in the project plan will be put in place.
* Systems components will be capable of being integrated with minimum rework.

### Budgetary Assumptions

* The statistics used in preparing the estimates are accurate within a given percent.
* No outside consulting will be required or outside consulting will be limited to a specified number of days at a specified rate per day.

### Functionality Assumptions

* The scope of the project is limited to that described in the project charter.
* Formal charter and scope change procedures will be followed.

### Resource Assumptions

* Project staff resources will be available when and as they are needed.
* Required hardware resources will be available when and as they are needed.
* Required customer resources will be available when and as they are needed.
* A significant percentage of the project staff will be experienced with the technical environment.
* A significant percentage of the project staff will be experienced with the operating environment.
* Access to industry experts and specialized skills will occur as needed.
* A "full-time" resource implies at least 35 hours productive work per week.

### Delivery Assumptions

* Deliverables will be subject to no more than a specific number of review cycles.
* Equipment order lead times are known and can be expected to be met.

## Constraints

The state, quality, or sense of being restricted to a given course of action or inaction. An applicable restriction or limitation, either internal or external to the project, that will affect the performance of the project or a process.

### Environmental Constraints

### The development or operating environment is new, and no project staff members are familiar with it.

### Key decision-makers are difficult to contact when issues arise.

### The project does not have a customer project manager (or executive sponsor, or steering committee)

### The project environment is new and the components have not yet been successfully integrated.

### The project depends upon the successful and timely completion of associated projects.

### Budgetary Constraints

### Statistics used in preparing the estimates are unreliable.

### Outside consulting requirements cannot be accurately estimated.

### Functionality Constraints

### The scope of the project is unclear.

### The project depends upon receiving data from other, external applications.

### Resource Constraints

### Key staff resources will be available only on a part-time basis.

### Computer resources will be available on a limited basis.

### Key customer resources will be available on a restricted basis.

### A significant percentage of the project staff will not be experienced with the technical environment.

### A significant percentage of the project staff will not be experienced with the operating environment.

### The customer has limited staff capable of adequately describing in detail the functional requirements of the system.

### The customer has limited staff capable of adequately describing in detail the operational requirements of the system.

### Delivery Constraints

* Deliverables submitted for approval will require working days for review.
* There is no limit to review and approval cycles.
* Equipment order lead times cannot be specified with accuracy.

1. 60% – 80% of project failures can be attributed directly to poor requirements gathering, analysis, and management [↑](#footnote-ref-1)