Software Estimating Model

using

IFPUG standard sizing method

Christine Green
IFPUG Board of Directors
Hewlett Packard Enterprise
A little bit about me

IFPUG

- Board of Directors
- Director of Certification
  - Past – Direction of Applied Programs
  - Past - Vice-chair of IT Performance Committee

Hewlett Packard Enterprise

- Process, Estimating & Measurement
- RCA on Cost Model – Budget and Tracking
“The single most important task of a project: setting realistic expectations.

Unrealistic expectations based on inaccurate estimates are the single largest cause of software failure.”

Futrell, Shafer and Shafer, “Quality Software Project Management”
Realistic expectations
- Accurate Estimates – Informed Tracking

Good project
Meeting cost (almost)

Bad project
Optimistic from day one
Never delivered the Anticipated scope
Root Cause Analysis

- Little or no perspective of Scope Impact
- Optimistic Cost Models in initiation
- Task’s blocks in Cost Model to high level
- Cost based on expected resources (FTE)
  - Without task breakdown using unit of size
- No assessment of Estimation Risk
- Un-realistic expectation of Productivity
- Project Constrains impacting effort & cost
- Unexpected changes in influencing factors
- Estimators with little experience in estimation

Good Estimating – What is that?

Promote confidence, understanding, acceptance

Balance between many factors

- **Confidence**
  - Accurate
  - Achievable
  - Competitive

- **Understanding**
  - Scope
  - Constrains etc.

- **Acceptance**
  - informed project planning/Cost decisions
  - facilitate effective project tracking & oversight
  - increase product & Process quality
Influencers

Assess and Analyze

Size (Scope),
Influencers
Project
High level Perspective

**Inputs**
- Project Information
- Scope
- Requirements
- Constrains, Assumptions, Risk
- Technology
- Staff profile
- Benchmark data

**Estimation – focus on Effort and Cost**
Normalize by using same WBS and lower level task profile

- Parametric
  - Competitive
- Bottom-up
  - Expert focus
- Cost
  - Staff rate

**Validate, Compare and Consolidate**

**Outputs**
- Cost data
- EVA data
- Quantitative Scope data
- Effort data
- Staffing profiles
- Performance and Productivity data

**Participants**
- Parametric Experts
- Sales Experts
- Project Experts
- Sizing Experts
- Process Experts
- Benchmark Experts
- Management
- Solution Experts
Three Point Estimating is a technique which can be used effectively as part of Bottom-up for Effort (and Cost)

```
<table>
<thead>
<tr>
<th>Phase</th>
<th>Low</th>
<th>Most likely</th>
<th>High</th>
<th>Expected time</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refine Scope and Analyze Requirements</td>
<td>10</td>
<td>15</td>
<td>35</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>Design (High and low level design)</td>
<td>15</td>
<td>20</td>
<td>66</td>
<td>24</td>
<td>72</td>
</tr>
<tr>
<td>Produce (Coding, Code Review)</td>
<td>44</td>
<td>55</td>
<td>66</td>
<td>48</td>
<td>13</td>
</tr>
<tr>
<td>Unit &amp; Integration Testing</td>
<td>60</td>
<td>88</td>
<td>130</td>
<td>80</td>
<td>136</td>
</tr>
<tr>
<td>Release (QC &amp; Staging)</td>
<td>80</td>
<td>60</td>
<td>40</td>
<td>47</td>
<td>44</td>
</tr>
<tr>
<td>Acceptance Testing</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Implement</td>
<td>8</td>
<td>16</td>
<td>32</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Project Management (Start-up, Plan, Manage, Closedown)</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>27</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>247</td>
<td>299</td>
<td>429</td>
<td>271</td>
<td>920</td>
</tr>
</tbody>
</table>
```

Expected time = \[rac{\text{Low} + 4 \times \text{Most likely} + \text{High}}{6}\]
Parametric Effort Estimate

Gives you the power to…

- Develop realistic, data-driven „cost“, effort and duration estimates
- Sanity check plans against your history and industry trends
- Scenarios to see impact of constrains and assumptions
Historical Data Collection
Monitoring, Control, Benchmark

Value Benefits

Metrics Delivery
Metrics Tracking
Metrics Value

Size
Cost
Price
Effort

Size
Effort
Staff
Duration
Changes
Defects
Resource

Benchmarks
a simplification of the real world

Scope – The Black Box
Software Product

IFPUG Sizing Standards
A size of the software derived by quantifying The Functional or Non-functional Requirements.
From Black Box to Quantitative measure Using Sizing Standards

Quantitative Scope

- Scope to # of
- Sizing Standards
- Scope crepe control
- Thresholds acceptable

Unknown
- Quantitative the Black Box
IFPUG Function Point Analysis (FPA) - The Process

Functional Size:
- Total “Lego” Size
- # of blocks and # Lego Studs
- # of Interfaces (EIF)
- # of Reports (EO, EQ)
And many more
IFPUG FPA Example

Application A – The focus

WBS

Estimate

Application B – Interface

Retrieve

Staff Rate

Input

WBS

Effort

Report
Benefits of using Parametric Effort Estimating Techniques

- Peer review of the project documentation by the Function Point Analyst
  - an indication of scope quality and accuracy
- Identification of other critical tracking metrics
- Risk identification on Effort, Duration & Staff
- Competitive analysis (Industry)
- Productivity Analysis (Internal)
- More reliable go-live dates (scenarios)
- Collection of historical data for future use
Accuracy of the Effort estimates

Accuracy depends on
- The reliability of scope definition.
- The quality of the documentation.
- The assumptions/constraints that will have an impact
- The reliability of the historical information
- The uniqueness of the project

Accuracy is important in order to evaluate the level of control of the estimates needed.

Main Indicator
- Indicator for quality of the estimate
- Indicator for Risk associated with Project cost and milestones
- Indicator for contingency need
- Accuracy assessment to prevent penalties.
The most important things to consider during reconciliation are

- What is the accuracy of the different estimates?
- Why is there a difference in the estimates?
- Why are there a difference between the phase estimates compared to industry data?
- Is something missing or non standard?
- Have all assumptions, constraints and risk been identified during the process for the estimates?
- Can we track the estimates?
- Can we control when a re-estimating is needed?
Next Step – After the Effort Estimate

- Develop schedule
  - Including impact of combining the staffing and duration constraints
  - Remember impact on effort of utilizing different staffing experience

- Cost Estimate
  - Staffing rate
  - Resource allocation
  - Non-sized cost associated
  - Travel, training etc…

- Always Take CAR(e)
  - Constraints, Assumptions, Risks

Set the realistic expectations
Maximise it

- Cost Model - is the end of the path
  - Scope, Size, Effort, Schedule and Cost
- Utilise more then one estimating technique
- Create a good foundation of information as input
- Use Estimating Experts
- Assess quality and accuracy
- Document constraints, assumptions and risks
- Contingency - known-unknowns
  - Quantitative and identified Risks
- Track the estimates and progress
- Identify thresholds for re-planning
Don’t treat Estimating as a pain – use it as an opportunity for improvement and Consolidation of information

Well estimated projects are usually those delivered within budget and schedule – and with good Change Management and tracking procedures.

Well estimated projects have no issues with measurement and analysis on cost as well as Scope, effort, staff, changes etc..

Well estimated projects think in # from the beginning
To create a Budget without Monitoring and EWI is a bit like having a car without the wheels and ability to drive.

The Monitoring and Early Warning Indicators for a software project