Effective Project Estimating; Tips, Tools and Techniques

March 09, 2010
11:00 – 12:30 PM
David Herron
VP Knowledge Solution Services
DCG, Inc.
dherron@davidconsultinggroup.com

Michael Milutis
Director of Marketing
Computer Aid, Inc. (CAI)
Michael_milutis@compaid.com
• DCG is an international IT process improvement and measurement company managing value-driven engagements with companies and government agencies around the world.

• **Software Process Improvement** – utilizing CMMI, Six Sigma, Lean and Agile methods.

• **Software Sizing** - using IFPUG Function point Counting and alternative sizing techniques.

• **Software Measurement** - providing roadmap planning, estimation models, performance benchmarks and outsourcing SLA support.

• **IT Performance Improvement** – improving IT operations through ITIL and IT Governance.
About Computer Aid, Inc. (CAI)

- **CAI** is a global IT outsourcing firm currently managing active engagements with over 100 Fortune 1,000 companies and government agencies around the world.
- **CAI** is a leader in IT Best Practices for legacy support and new development application management.
- **CAI’s** focus is directed toward practical implementations that track and measure the right activities in software activity management.
- **CAI** consistently promises and delivers double digit productivity in its outsourcing and consulting engagements.
- **CAI** makes all of this possible through the use of:
  - Standard processes
  - Management by metrics
  - SLA compliance management
  - Detailed cost, resource, and time tracking
  - Capacity management
PDU CREDITS
FOR THIS WEBINAR

• The Project Management Institute’s ISSIG group has accredited this webinar with PDUs

• Stay tuned! Your PDU code will be displayed at the conclusion of this webinar.
NOW AVAILABLE!
ONLINE WEBINAR RECORDINGS
ANYTIME ACCESS!

WWW. ITMPI.ORG / LIBRARY

7 Day Free Access For All Recordings
Effective Project Estimating
Tips, Tools and Techniques

Presented by: David Herron
Topics

• What’s the Issue
• Estimating Techniques
• A Basic Estimating Model
• Estimating using Historical Data
• Estimating using Industry Date
• Estimating and Automation
• On-Demand Estimating
“Estimation is several parts science and at least one part magic” Agile Estimation Using Functional Metrics, T. Cagley, 2009

Pick a card, just one, and remember what your card is
Magic?

- This only works about half the time (which are better odds than most estimates).

- Now, on with the science
Critical Issues for Senior Managers

- Controlling enterprise-wide operating costs
- Improve effectiveness of enterprise work force
- Contributing to business strategy creation
- Revenue growth
- Enter new markets, new products or new services
- Service to customers
- Ensuring business continuity
- Complying with regulatory requirements
- Innovative products & services
- Improving processes
Critical Issues for Project Managers

• Understanding the Customer’s Requirements
  ➔ Clarity, Completeness

• Effectively Sizing the Requirements
  ➔ Functionality Delivered

• Accurately Estimating the Deliverable
  ➔ Defined, Credible Process

• Managing a Successful Delivery
  ➔ On Time, On Budget
Business Impact

- Continuous Process Improvement
  - Improve Productivity
  - Reduce Time to Market
  - Increase Quality
  - Lower Costs
- Improve Margins
- Strategic Positioning (Business & Technical)
  - Satisfy Customer
  - Improve Competitive Position
  - Increase Market Share
- Shareholder Value
- Deliver Value
- Increase Revenues
Benefits of Good Estimating

• Reduce Risk
• Reduce Costs
• Gain Credibility
• Manage Expectations
• Resource Capacity Planning
• Improve Decision Making Capability
Estimating Techniques

There are any number of estimating techniques that involve various tools, techniques and formulas.

– Manual, using organizational baseline data
– Manual, using standard industry data
– Automated, using a commercial estimating software package
SEI Best Practice

The Software Engineering Institute (SEI) requirements for good estimating:

- Corporate **historical database**
- **Structured processes** for estimating product size and reuse
- Mechanisms for extrapolating benchmark characteristics of past projects
- Audit trails
- Integrity in dealing with dictated costs and schedules
- Data collection and feedback processes foster correct data interpretation
Estimating Maturity

Level 0
- Informal or no estimating
- Manual effort estimating without a process

Level 1
- Direct Task Estimation
- Spreadsheets
- Ad Hoc Process

Level 2
- Formal Sizing (e.g., function points)
- Direct Task Estimation
- Simple model (Size * Prod) or informal SEER Use
- Same measurement & analysis
- Informal Process

Level 3
- Formal Sizing
- Robust Parametric estimation (SEER)
- Estimate vs. actual capture
- Rigorous measurement & analysis
- Parametric planning & Control
- Repeatable process

Level 4
- Formal Sizing
- Repeatable process
- Robust parametric estimating (SEER)
- Rigorous measurement & analysis
- Parametric estimation with tracking & control
- Process improvement via lessons learned

Level 5
- Formal Sizing
- Repeatable process
- Robust parametric estimating (SEER)
- Rigorous measurement & analysis
- Parametric estimation with tracking & control
- Continuous process improvement

Source: www.Galorath.com
Basic Estimating Model

- Quantify the size
- Assess the complexity
- Understand the capacity to deliver

Estimating Model
Why is Sizing Important?

Finding –
Nine out of ten projects that fail have not been properly sized

Consider -
When you build a house you specify all the functions and features you want – these are your requirements. The builder then generates an estimate based on the size (square footage) of your requirements.

- Size is the key to effectively managing software projects
Characteristics of Effective Sizing

- Meaningful to developer and user
- Defined (industry recognized)
- Consistent (methodology)
- Easy to learn and apply
- Accurate, statistically based
- Available when needed (early)
- Addresses project level information needs
Why Function Points?

Function Point Analysis is a standardized method for measuring the functionality delivered to an end user.

- Consistent method
- Easy to learn
- Available early in the lifecycle
- Acceptable level of accuracy
- Meaningful internally and externally

Function Point counts have replaced Line of Code counts as a sizing metric that can be used consistently and with a high degree of accuracy.
The Function Point Methodology

The software deliverable is sized based upon the functionality delivered.

Five key components are identified based on logical user view:

- Inputs
- Outputs
- Inquiries
- Data Stores
- Interface Files

![Diagram of the Function Point Methodology]

www.davidconsultinggroup.com

©2007 David Consulting Group
The Formal Process

1) Identify Components
2) Assess Complexity
3) Apply Weightings
4) Compute Function Points

<table>
<thead>
<tr>
<th>Components</th>
<th>Low</th>
<th>Avg</th>
<th>High</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Stores</td>
<td>__</td>
<td>__</td>
<td>__</td>
<td></td>
</tr>
<tr>
<td>Interfaces</td>
<td>__</td>
<td>__</td>
<td>__</td>
<td></td>
</tr>
<tr>
<td>Inputs</td>
<td>__</td>
<td>__</td>
<td>__</td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td>__</td>
<td>__</td>
<td>__</td>
<td></td>
</tr>
<tr>
<td>Inquiries</td>
<td>__</td>
<td>__</td>
<td>__</td>
<td></td>
</tr>
</tbody>
</table>

Total Function Points
Common Criticisms of Function Points

- FP methodology terms are confusing
- Too long to learn, need an expert
- Need too much detailed data
- Does not reflect the complexity of the application
- Takes too much time
- We tried it before
Simplifying the Methodology

• Definitions - Make them more user friendly

• External Input ► Input Supports daily operations
• External Output ► Output Produces reports
• External Inquiry ► Inquiry Provides information
• External Interface Files ► Interfaces Passes information to other systems
• Internal Logical Files ► Data Stores Maintains data, records, files
### Simplifying the Methodology

- Assume complexity to be average

#### Complexity

<table>
<thead>
<tr>
<th>Components:</th>
<th>Low</th>
<th>Avg</th>
<th>High</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Stores</td>
<td>_x 7</td>
<td>_x 10</td>
<td>_x 15</td>
<td></td>
</tr>
<tr>
<td>Interfaces</td>
<td>_x 5</td>
<td>_x 7</td>
<td>_x 10</td>
<td></td>
</tr>
<tr>
<td>Inputs</td>
<td>_x 3</td>
<td>_x 4</td>
<td>_x 6</td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td>_x 4</td>
<td>_x 5</td>
<td>_x 7</td>
<td></td>
</tr>
<tr>
<td>Inquiries</td>
<td>_x 3</td>
<td>_x 4</td>
<td>_x 6</td>
<td></td>
</tr>
</tbody>
</table>

**Total Function Points**
Exercise -- Identify the Functionality

Inputs
- USER
  - ADD, CHG INVOICES
- USER
  - PAYMENTS

Data Stores
- INVOICES
- VENDOR
- ACCOUNTS PAYABLE

Interface
- PURCHASE ORDER SYSTEM
  - PURCHASE ORDER INFO
- USER
  - PAYMENT STATUS
- USER
  - PAID INVOICES

Output
- USER
  - Input
- USER
  - Inquiry

Data Stores
- USER
  - Input
- USER
  - Inquiry

www.davidconsultinggroup.com

©2007 David Consulting Group
Determine the Functional Size

The FP Lite™ Process
1) Identify Components
2) Assess Complexity
3) Apply Weightings
4) Compute Function Points

<table>
<thead>
<tr>
<th>Components:</th>
<th>Low</th>
<th>Avg.</th>
<th>High</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Stores</td>
<td></td>
<td>3 X 10</td>
<td>X 15</td>
<td>30</td>
</tr>
<tr>
<td>Interfaces</td>
<td>X 5</td>
<td>1 X 7</td>
<td>X 10</td>
<td>7</td>
</tr>
<tr>
<td>Inputs</td>
<td>X 3</td>
<td>3 X 4</td>
<td>X 6</td>
<td>12</td>
</tr>
<tr>
<td>Outputs</td>
<td>X 4</td>
<td>1 X 5</td>
<td>X 7</td>
<td>5</td>
</tr>
<tr>
<td>Inquiries</td>
<td>X 3</td>
<td>1 X 4</td>
<td>X 6</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>58</td>
</tr>
</tbody>
</table>

Function Point Size

©2007 David Consulting Group
The Opportunity to Get it Right Up Front

Requirements Phase - best opportunity to talk to client (they are willing!)

Properly set expectations - early on in lifecycle (their role, their responsibility)

Engage user in the process - involve in the process from the beginning
Estimating Techniques

– Manual, using organizational baseline data
– Manual, using standard industry data
– Automated, using a commercial estimating software package
Estimating Using Delivery Rates

**DEFINITION**

- REQUIREMENT
- PROJECT SIZE

**CAPABILITY**

- PROJECT COMPLEXITY
- RATE OF DELIVERY

**ESTIMATE**

- FUNCTIONAL SIZE
- PROFILE

Schedule
Effort
Costs
A Comprehensive Measurement Capability

Collection
- COLLECT QUANTITATIVE DATA
  - Size
  - Effort
  - Duration
  - Defects
- COLLECT QUALITATIVE DATA
  - Process
  - Methods
  - Skills
  - Tools
  - Management

Analysis
- Measured Performance
- Capability Profiles

Results
- Benchmark Data

Action
- Delivery Rates
- Best Practices

https://www.davidconsultinggroup.com

©2007 David Consulting Group
## Developing a Performance Profile

### Product Deliverable

- D
- C
- B
- A

### Performance Indicators
- Duration (Months)
- Cost (Effort)
- Quality (Defects)

### Performance Risk Factors
- Management
- Definition
- Design
- Build
- Test
- Environment

### SIZE

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>550</td>
<td></td>
</tr>
</tbody>
</table>

### RATE OF DELIVERY

- 19 FP/PM
- 13 FP/PM
- 16 FP/PM
- 10 FP/PM
- 5 FP/PM

### PROFILING

- PROFILES
- PROFICIENCIES
- INADEQUACIES

---

©2007 David Consulting Group
Overall Measurement Framework

Enterprise

Executive Management Dashboard

Performance Measures

Process Management

Measurement Repository

Enterprise Database

Benchmark

Process

Process Measures

Historical Measures

Project

PAL

Project X

Project Y

Project Z

Project Data

BI Product Releases | Q2 2007

56.2 68 62 68 58 41 35

EDW Phase IV:  Applicant Tracking System

44.3 68 49 57 35 28 35

CRM Product Maintenance Releases | Q3 2007

60.2 73 74 68 65 41 27

Road to 90: In Bound

36.4 57 44 32 46 22 27

SAR PM 2.0

37.5 50 51 25 46 28 27

Meetings | Teleconf. vendor selection

46.6 68 62 57 38 25 27

CoBRA Application

53.6 77 64 50 46 50 31

Web 2.1

53.2 61 72 48 58 41 31

Web 2.0 Q1 Maintenance

43.7 61 54 20 58 44 31

Q3 2007 Web v2.1 Enhancements / Maintenance

47.3 61 54 20 58 41 31

Web v2.2 (EPN)

59.8 77 69 55 58 53 31

Web v2.2 Enhancements / Maintenance | Q4 2007

44.2 61 54 20 65 41 31
Estimating Using Delivery Rates

**DEFINITION**

- REQUIREMENT
- PROJECT SIZE
- FUNCTIONAL SIZE
- PROJECT COMPLEXITY

**CAPABILITY**

- RATE OF DELIVERY
- PROFILE

**ESTIMATE**

\[ \text{Person Months} = 58 \times 16 = 3.6 \]

www.davidconsultinggroup.com

©2007 David Consulting Group
Estimating Techniques

– Manual, using organizational baseline data
– Manual, using standard industry data
– Automated, using a commercial estimating software package
Industry Data Reveals Best Practices

Research

<table>
<thead>
<tr>
<th>MEASURES</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Size</td>
<td>Skill Levels</td>
</tr>
<tr>
<td>Level of Effort</td>
<td>Automation</td>
</tr>
<tr>
<td>Time to Market</td>
<td>Process</td>
</tr>
<tr>
<td>Delivered Defects</td>
<td>Management</td>
</tr>
<tr>
<td>Cost</td>
<td>User Involvement</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
</tr>
</tbody>
</table>

Analysis

PERFORMANCE LEVELS

PROFILES

Results

- Correlate Performance Levels to Characteristics
- Substantiate Impact of Characteristics
- Identify Best Practices
## Delivery Rates

### Productivity per Person Month by Application Release

<table>
<thead>
<tr>
<th>Category</th>
<th>1-150</th>
<th>151-300</th>
<th>301-500</th>
<th>501-750</th>
<th>751+</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Dev Mainframe</td>
<td>12.2</td>
<td>10.6</td>
<td>9.3</td>
<td>8.1</td>
<td>6.7</td>
</tr>
<tr>
<td>New Dev C-S</td>
<td>17.9</td>
<td>15.9</td>
<td>13.8</td>
<td>11.8</td>
<td>9.9</td>
</tr>
<tr>
<td>Enh Mainframe Internal</td>
<td>15.7</td>
<td>14.7</td>
<td>12.3</td>
<td>10.8</td>
<td>8.8</td>
</tr>
<tr>
<td>Enh Mainframe Package</td>
<td>16.3</td>
<td>17.5</td>
<td>14.7</td>
<td>12.9</td>
<td>10.1</td>
</tr>
<tr>
<td>Enh C-S Internal</td>
<td>16.6</td>
<td>15.9</td>
<td>13.3</td>
<td>11.4</td>
<td>9.3</td>
</tr>
</tbody>
</table>

Note: Above values are expressed in Function Points delivered per Person Month (equivalent to 130 hours).

### Delivery Cycle Time in Calendar Months by Application Release

<table>
<thead>
<tr>
<th>Category</th>
<th>1-150</th>
<th>151-300</th>
<th>301-500</th>
<th>501-750</th>
<th>751+</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Dev Mainframe</td>
<td>4.7</td>
<td>6.3</td>
<td>8.3</td>
<td>11.9</td>
<td>14.8</td>
</tr>
<tr>
<td>New Dev C-S</td>
<td>3.8</td>
<td>6.3</td>
<td>8.7</td>
<td>10.4</td>
<td>12.7</td>
</tr>
<tr>
<td>Enh Mainframe Internal</td>
<td>3.9</td>
<td>7.0</td>
<td>9.6</td>
<td>12.5</td>
<td>16.6</td>
</tr>
<tr>
<td>Enh Mainframe Package</td>
<td>3.8</td>
<td>6.6</td>
<td>8.6</td>
<td>11.5</td>
<td>16.1</td>
</tr>
<tr>
<td>Enh C-S Internal</td>
<td>3.8</td>
<td>6.8</td>
<td>9.2</td>
<td>12.4</td>
<td>16.4</td>
</tr>
</tbody>
</table>

Note: Above values are expressed in Calendar Months to deliver a project within the specified range of Function Points. Any time for work stoppages is excluded.
Estimating Using Delivery Rates

DEFINITION

Requirement → Project Size \times Project Complexity \times Rate of Delivery

FUNCTIONAL SIZE

58 \times 15.7 = 3.7 Person Months

CAPABILITY

ESTIMATE

Schedule
Effort
Costs

www.davidconsultinggroup.com

©2007 David Consulting Group
Estimating Techniques

- Manual, using organizational baseline data
- Manual, using standard industry data
- Automated, using a commercial estimating software package
Benefits of Automation

– Sophisticated Analysis
– Information displays – charts, graphs, reports
– Interfaces to PM systems, others
– Simulation, modeling capabilities
– Multi-variable modeling
– Calibrated based on actuals
SEER-SEM User Interface

- Menu Bar
- Tool Bar
- WBS Window
- Parameter Window
- Inputs
- Outputs
- Views Window
- Reports Window
- Charts Window
SEER – Risk Driven Estimates
The Engine For Project Evaluation

• SEER predicts outcomes
• SEER uses inputs to develop probability distributions
• The result is a probabilistic estimate
• SEER will predict a likely range of outcomes
• Monte Carlo provides project-level assessments of risk

Least, likely, and most inputs provide a range of cost and schedule outcomes

Confidence (probability) can be set and displayed for any estimated item
SEER for Software Example; Goals/Risks/Outcome Probabilities
### Detailed Staffing Profile

<table>
<thead>
<tr>
<th>Month</th>
<th>Mgmt</th>
<th>SW Reqs</th>
<th>Design</th>
<th>Code</th>
<th>Data Prep</th>
<th>Test</th>
<th>CM</th>
<th>QA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Jan-07</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.4</td>
</tr>
<tr>
<td>2 Feb-07</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>3 Mar-07</td>
<td>0.1</td>
<td>0.1</td>
<td>0.4</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
</tr>
<tr>
<td>4 Apr-07</td>
<td>0.2</td>
<td>0.2</td>
<td>0.8</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
<td>0.0</td>
<td>0.0</td>
<td>1.9</td>
</tr>
<tr>
<td>5 May-07</td>
<td>0.3</td>
<td>0.3</td>
<td>1.1</td>
<td>0.3</td>
<td>0.2</td>
<td>0.4</td>
<td>0.1</td>
<td>0.1</td>
<td>2.8</td>
</tr>
<tr>
<td>6 Jun-07</td>
<td>0.4</td>
<td>0.3</td>
<td>1.2</td>
<td>0.7</td>
<td>0.3</td>
<td>0.5</td>
<td>0.1</td>
<td>0.1</td>
<td>3.5</td>
</tr>
<tr>
<td>7 Jul-07</td>
<td>0.3</td>
<td>0.1</td>
<td>0.2</td>
<td>2.3</td>
<td>0.2</td>
<td>0.6</td>
<td>0.2</td>
<td>0.2</td>
<td>4.1</td>
</tr>
<tr>
<td>8 Aug-07</td>
<td>0.3</td>
<td>0.1</td>
<td>0.3</td>
<td>2.5</td>
<td>0.3</td>
<td>0.7</td>
<td>0.2</td>
<td>0.2</td>
<td>4.6</td>
</tr>
<tr>
<td>9 Sep-07</td>
<td>0.4</td>
<td>0.1</td>
<td>0.2</td>
<td>2.0</td>
<td>0.4</td>
<td>1.3</td>
<td>0.2</td>
<td>0.2</td>
<td>4.9</td>
</tr>
<tr>
<td>10 Oct-07</td>
<td>0.4</td>
<td>0.1</td>
<td>0.2</td>
<td>2.0</td>
<td>0.4</td>
<td>1.5</td>
<td>0.3</td>
<td>0.3</td>
<td>5.0</td>
</tr>
<tr>
<td>11 Nov-07</td>
<td>0.4</td>
<td>0.1</td>
<td>0.2</td>
<td>1.8</td>
<td>0.3</td>
<td>1.6</td>
<td>0.2</td>
<td>0.2</td>
<td>4.8</td>
</tr>
</tbody>
</table>

### Staffing Plan

- **Report Management Module**
  - Estimate: 5123 Hours; 10.96 Months

- **Labor Category Allocation**
  - Mgmt: 8.8%
  - SW Reqs: 5.4%
  - Design: 14.1%
  - Code: 35.6%
  - Data Prep: 7.2%
  - Test: 21.9%
  - CM: 9.0%
  - QA: 3.8%
Numerous Options for Sizing

- Sizing Options
  - Lines
  - Functions
  - Others:

- Cosmic Function Points
- Mark II Function Point Area
- Metric - Fast Function Point
- Metric - Function Based SI
- Metric - Source Lines of Code
- Metric - Unadj Function Point

---

**Field Function Points Inputs - Program: Redstone Scheduler**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>100</th>
<th>120</th>
<th>140</th>
<th>226</th>
<th>401</th>
<th>923</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Functions</td>
<td>1,200</td>
<td>1,200</td>
<td>1,200</td>
<td>1,200</td>
<td>1,200</td>
<td>1,200</td>
</tr>
<tr>
<td>Pre-existing functions</td>
<td>10.00%</td>
<td>25.00%</td>
<td>91.00%</td>
<td>11.00%</td>
<td>22.00%</td>
<td></td>
</tr>
<tr>
<td>Redesign required</td>
<td>6.00%</td>
<td>11.00%</td>
<td>22.00%</td>
<td>11.00%</td>
<td>22.00%</td>
<td></td>
</tr>
<tr>
<td>Reimplementation required</td>
<td>38.00%</td>
<td>59.00%</td>
<td>100.00%</td>
<td>59.00%</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>Retest required</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Pre-exists, designed for reuse</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Pre-existing functions</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Redesign required</td>
<td>2.00%</td>
<td>13.00%</td>
<td>23.00%</td>
<td>13.00%</td>
<td>23.00%</td>
<td></td>
</tr>
</tbody>
</table>

---

**Quick Estimate**

- Program: Redstone Scheduler
- Estimate

| Development Schedule Months | 14.88 |
| Development Effort Months | 71.80 |
| Development Effort Hours | 10,914 |
| Development Base Year Cost | 1,249,375 |
| Defect Prediction | 29 |
| Constraints | MIN TIME |

---

**Redstone Scheduler**

- New: 23.17%
- Existing NDR: 76.83%
- Existing DR: 0.00%
Metrics Analysis & Benchmarking: Use To Substantiate & Benchmark

Data Points:
- Historical Data
- Current Estimate
- Reference Estimate

Trend Lines:
- History Trend (mean)
  \[ r^2 = 0.88 \]
  \[ y = 0.0006x^{1.2072} \]

2005 - Ground Effective Size vs. Effort
- Benchmark Trend (mean)
- Benchmark +/- 1σ
- Benchmark +/- 2σ
- Benchmark +/- 3σ

Filter:
Platform = Ground-Based Mission C
Application = Command/Control
Observations = 197

Your History Data
SEER-SEM Estimate
Galorath Benchmark Trendline
Your Data Regression Trendline
The estimate is based on the best available information. A poor requirements document will result in a poor estimate.

Accurate estimating is a function of using historical data with an effective estimating process.
Estimating Checklist

Seven Questions to Ask When Assessing Your Willingness to Rely On a Cost and Schedule Estimate

1. Are the objectives of the estimate clear and correct?
2. Has the task been appropriately sized?
3. Are the estimated cost and schedule consistent with demonstrated accomplishments on other projects?
4. Have the factors that affect the estimate been identified and explained?
5. Have steps been taken to ensure the integrity of the estimating process?
6. Is the organization's historical evidence capable of supporting a reliable estimate?
7. Has the situation changed since the estimate was prepared?

What Is Estimating On Demand?

• Estimating On Demand is an estimating service
• It provides organizations with the information they need in order to make important decisions regarding the status of selected projects
• The cost is minimal, the savings can be significant and the value is immediate
The On Demand Approach

• Takes advantage of acquired knowledge
• An available estimating resource when and where you need it
• Similar to a Software as a Service model
• The cost of the service is often less than 2% of the total project cost
On Demand Process

Step 1
Determine the type of project
Understand the basis for
the estimate. Set expectations
as to the deliverables.

Step 2
Assess the size and
the complexity. Provide input
to all the required project variables
- Staffing levels, & experience
- Requirements stability
- Confidence level
- Target/Host systems
- Schedule Considerations
- Reusability
- Integration
- Labor rates
- Maintenance levels

Step 3
Generate required
estimates including
level of effort, duration,
risk analysis, and quality.

Step 4
Review the estimate
with the project team.
Make necessary
adjustments. Re-estimate
as necessary

Step 5
Generate final estimate
Estimating – Which One is Right for You?

– Manual, using organizational baseline data
  • Baseline, commitment
  • Rigorous data collection
  • Accurately reflects organization

– Manual, using standard industry data
  • FP centric
  • Values may not be representative
  • Quick start-up

– Automated, using a commercial estimating software package
  • Investment in software
  • Develop expertise
  • Increasing accuracy with calibration
Questions?

Your PDU CODE: S010-ITMPL0xxxxx
CAI Sponsors

The IT Metrics & Productivity Institute:

- Clearinghouse repository of best practices: [WWW.ITMPI.ORG](http://WWW.ITMPI.ORG)
- Weekly educational newsletter: [WWW.ITMPI.ORG](http://WWW.ITMPI.ORG) / SUBSCRIBE
- Weekly webinars hosted by industry leaders: [WWW.ITMPI.ORG](http://WWW.ITMPI.ORG) / WEBINARS
- ACCESS WEBINAR RECORDINGS ANYTIME AT [WWW.ITMPI.ORG](http://WWW.ITMPI.ORG) / LIBRARY
- Online Expert Training Through CAI University (CAIU): [WWW.CAIU.COMPAID.COM](http://WWW.CAIU.COMPAID.COM)
- Follow us on TWITTER at [WWW.TWITTER.COM](http://WWW.TWITTER.COM) / ITMPI
# Software Best Practices Conferences Around the World

**Spring 2010**

<table>
<thead>
<tr>
<th>Date</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 23</td>
<td>Tampa, FL</td>
</tr>
<tr>
<td>Mar. 18</td>
<td>San Antonio, TX</td>
</tr>
<tr>
<td>Mar. 23</td>
<td>Philadelphia, PA</td>
</tr>
<tr>
<td>Mar. 30</td>
<td>El Segundo, CA</td>
</tr>
<tr>
<td>Apr. 15</td>
<td>Philadelphia, PA</td>
</tr>
<tr>
<td>Apr. 20</td>
<td>Detroit, MI</td>
</tr>
<tr>
<td>Apr. 29</td>
<td>Chicago, IL</td>
</tr>
<tr>
<td>May 4</td>
<td>Trenton, NJ</td>
</tr>
<tr>
<td>May 11</td>
<td>New York, NY</td>
</tr>
<tr>
<td>May 20</td>
<td>Albany, NY</td>
</tr>
<tr>
<td>May 25</td>
<td>Toronto, ON</td>
</tr>
</tbody>
</table>

**Fall 2010**

<table>
<thead>
<tr>
<th>Date</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep. 14</td>
<td>Baltimore, MD</td>
</tr>
<tr>
<td>Sep. 21</td>
<td>Sydney, AU</td>
</tr>
<tr>
<td>Sep. 28</td>
<td>Detroit, MI</td>
</tr>
<tr>
<td>Oct. 7</td>
<td>Tallahassee, FL</td>
</tr>
<tr>
<td>Oct. 13</td>
<td>Orlando, FL</td>
</tr>
<tr>
<td>Oct. 21</td>
<td>Philadelphia, PA</td>
</tr>
<tr>
<td>Nov. 16</td>
<td>Miami, FL</td>
</tr>
</tbody>
</table>

[WWW.ITMPI.ORG / EVENTS](http://WWW.ITMPI.ORG/EVENTS)
David Herron
VP Knowledge Solution Services
DCG, Inc.
dherron@davidconsultinggroup.com

Michael Milutis
Director of Marketing
Computer Aid, Inc. (CAI)
Michael_milutis@compaid.com