But Wait, There’s More!

Using Simple Function Point Analysis for your Cost, Schedule & Performance Needs

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DHS Challenges and Charge

Charge by the DHS Under Secretary for Management (USM) to CAD in 2017:

1. Enhance the credibility and accuracy of a software development estimate and
2. Decrease the time required to develop the estimate.

DHS invests billions of dollars of taxpayer dollars per year in a variety of systems.

In FY16 GAO noted the IT budget was **$6.2 Billion** the third largest in the federal government.

How do we estimate the cost of flexible, user-centric software requirement in the federal acquisition process?
Agile Software Development Cost Estimating

Size
- a standard unit of measure that quantifies the size and complexity of a software (e.g., Function Points)

Throughput
- the effectiveness of the development team to output product as measured by a rate term using output per unit of input (e.g., Hours/FP, $/FP)

In simplest terms: **Effort = Size x Throughput**
Software Sizing Measurements

SLOC
- Objective Size Measurement
- Good for ROM analogy estimate
- Easy to collect
- Highly dependent on coding language and skill of programmer

Story Points
- Subjective Size Measure
- Relative measure
  - Determined by individual Agile Teams
  - Cannot be compared across programs
- Team level view

Function Points
- Objective Size Measure
- Standard unit of measure
  - ISO Standard
  - Comparable across programs
- Program level view

Different size measurements provide different levels of insight into a program
As Seen on TV!

Simple Function Points are for You!

Do you NOT have a large repository of SLOC?

Are t-shirts never in your size?!

Are you intimidated by the 300+ page IFPUG Counting Manual?
Simplified Function Point Analysis (SFPA)

- Method developed by Italian researchers, acquired by IFPUG in 2019*
- Can be performed quickly and early in a program’s lifecycle using existing documents
- Focuses on three elementary processes:
  - Transactions
  - Logical Data Groups
  - Interfaces

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<th>IFPUG Components</th>
<th>Low</th>
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<tbody>
<tr>
<td>External Inputs</td>
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<table>
<thead>
<tr>
<th>SFPA Components</th>
<th>Weighting Factor</th>
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<tbody>
<tr>
<td>Transactions (Create, Update, Delete, Report, Read)</td>
<td>4.6</td>
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<tr>
<td>Logical Data Groups (Saves)</td>
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*https://www.ifpug.org/ifpug-acquires-the-simple-function-points-method/
### SFPA – Counting

#### Transaction Types

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<th>Action</th>
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<th>Update (EI)</th>
<th>Delete (EI)</th>
<th>Report (EO)</th>
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# FPs = (4.6 * # of Transactions) + (7.0 * # of Saves) + (14.0 * # of Interfaces)
SFPA – Functional Breakdown

Concept of Operations

CONOPS

Functional Capabilities

Business Functions

Stakeholders

Elementary Processes

Transactions (Create, Delete, Update, Read, Report)

Logical Data Groupings (Saves)

Interfaces

SFPA estimates the Functional Size from high level requirements (i.e. CONOPS)
Used CONOPS to identify Functional Capabilities; Assigned Elementary Processes using Action Verbs

**Functional Capabilities for Scenario 2a**

- **Create** user accounts for school officials
- **Submit** school certification petition
- **Maintain** user accounts for school officials
- **Submit** school re-certification petition
- **Submit** certification information updates
- **Receive** certification/re-certification decisions
- **Respond** to requests for evidence
- **Withdraw** certification
- **Register** school for service interface (batch)
- **Appeal** certification/re-certification decisions
- **Cancel** certification appeal

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Throughput

• Agile Team Throughput is based on many factors, including:
  – Team Composition & Experience
  – Requirements Complexity
  – Coding Language

• Strategy for developing throughput estimates:
  – Early in program, use rates from analogous programs and/or readily available commercial data
  – Over time, update based on actual team throughput rates
But Wait, There’s More!
1. Develop Schedules – “When can this be delivered?”
   - Total function point size determines work that needs to be done

2. Estimate Resources – “What staff is needed?”
   - If timeline established, SFPA provide a way to identify resources required to meet milestones

3. Planning Agile Sprints – “What is everyone’s workload?”
   - Requirements can be separated into manageable pieces to complete in the sprint timeframe
4. Reviewing Vendor Proposals – “Is this bid realistic?”
   - SFPA can be applied to vendor proposals to see if scope is mutually understood and cross-check a proposal using analysis in 1 & 2

5. Tracking Progress – “How is the program performing overall?”
   - Program projects progress towards completion based on remaining function points and observed team throughput
Progress Tracking Chart: STEP 1

- **X-Axis** = Time (Months, Weeks, Sprints, etc.)
- **Y-Axis** = Function Points
- **Horizontal Orange Line** = Estimated Total FP Baseline
- **Vertical Lines** = Today’s Date, FOC Objective and Threshold (if known)
• **Green Bars** = The number of agile development teams
  - Method 1: Agile Team Profile is known; use FP estimate to calculate FOC date
  - Method 2: Schedule (FOC) is known; use FP estimate to calculate Agile Teams required
• **Dashed Curve** = ‘Function Points Planned’ line; Function Points to be completed vs Time
  • Method 1: Use Agile Team Profile and Throughput; FOC is when Baseline reached
  • Method 2: Work backward from FOC date and FP estimate to plot curve; Calculate Agile Teams required to meet necessary throughput
• **Blue Curve** = ‘Function Points Completed’ line; Function Points actually completed vs Time
  • Track progress over time: On Schedule, Ahead of Schedule, Schedule Delay?
  • NOTE: Progress Tracking Chart meant as communication tool; provide high-level progress
SFPA Use at DHS

Program A
- Level 2 ($300M-$1B Total Lifecycle)
- Public facing web-based system
- First pilot program for SFPA, prove the methodology’s viability

Program B
- Level 1 ($1B+ Total Lifecycle)
- Complex, critical system with large computing/storage requirements and interfaces
- Program used COSMIC Function Points, CAD cross-checked using SFPA and was within 8% of the program’s estimate
- Progress tracking chart utilized for bi-annual Program Reviews

Program C
- Level 2 ($300M-$1B Total Lifecycle)
- System that streamlines many unique process workflows into a single management platform
- Updated LCCE to reflect shift in acquisition approach to agile s/w development
- CAD used SFPA to identify new date to reach FOC using SFPA
CAD Successes

• DHS Leadership Support

• Engagement with DHS Stakeholders

• Adoption by New Acquisition Programs

• Joint Agile Software Innovation (JASI) Cost IPT

• Data Collection
SFPA provides several benefits to an agile program:

- Provides a faster, more reliable and repeatable process to produce credible estimates
- Tied to high-level program requirements (i.e. CONOPS)
- Can be performed early in the program’s life-cycle

Tracking function points provides insight into overall program progress:

- Plan appropriate program schedule and resources
- Allows issues to be identified early

“Work in Progress”

- We seek to improve based on data and lessons learned to share with the community
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Web Resources:

• International Function Point User's Group (IFPUG) Website
• Simple Function Points Website
• EU Recommends IFPUG FP for Pricing Software Development

*Email now!*