But Wait, There’s More!

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

Joint Software and IT Cost Forum
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DHS Challenges and Charge

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.

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.

Poll Question #1

What is your agency/organization?

a. DHS
b. DOD
c. Other Federal Agency
d. Non-Government / Industry
How do we estimate the cost of flexible, user-centric software requirements in the federal acquisition process?
Poll Question #2

What acquisition discipline do you support?

a. Cost Estimating
b. Program Management
c. IT / Technical
d. Other
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**
Poll Question #3

What’s your experience level with Software Cost Estimating?

a. What’s software cost estimating?
b. I am a Jedi Padawan
c. I am a Jedi Knight
d. Master Yoda I am

Or?
# 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
- Cannot be independently estimated / analyzed

## Function Points
- Objective Size Measure
- Standard unit of measure
  - ISO Standard
  - Comparable across programs
- Long term view at the Program level
- Can be independently estimated / analyzed

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Different size measurements provide different levels of insight into a program
Poll Question #4

What is your organization’s preferred sizing/estimating method for software?

a. SLOC
b. Story Points
c. Function Points
d. SME Judgment
e. Not Sure/Don’t Know
f. Other (Tell us in the comments!)
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>
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<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>
<td>7</td>
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SFPA – Functional Breakdown

SFPA estimates the Functional Size from high level requirements (i.e. CONOPS)
SFPA Counting Example

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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<th>Delete</th>
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# FPs = (4.6 * # of Transactions) + (7.0 * # of Saves) + (14.0 * # of Interfaces)
• 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
Poll Question #5

Do you think you would be able to develop an SFPA estimate for your program(s)?

a. Yes
b. Maybe – Need better written requirements
c. No
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
Poll Question #6

Which of these SFPA methods would be useful to your organization’s programs/projects? (Check all that apply)

a. Develop Schedules – “When can this be delivered?”
b. Estimate Resources – “What staff is needed?”
c. Planning Agile Sprints – “What is everyone’s workload?”
d. Reviewing Vendor Proposals – “Is this bid realistic?”
e. Track Progress – “How is the program performing overall?”
f. None
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
Conclusions

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
Poll Question #7

What is your all-time favorite “As Seen on TV” product?

a. OxiClean (#RIPBillyMays)
b. Sham-wow
c. Snuggie
d. Scrub Daddy
e. Too difficult to choose!
f. Other
Contact Information & Resources

CAD IT/SW Development Team:

– Kammy Mann
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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!*