Let’s SiSE Agile Program Requirements!

*Introducing Simplified Software Estimation (SiSE)*

Joint IT Software and Cost Forum
September 14, 2021

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History of SiSE at DHS

DHS USM charge to CAD about s/w cost estimates:
1. Increase credibility & accuracy
2. Decrease cycle time

2017

DHS Financial MGMT Policy Manual:
All Level 1 & 2 Agile software dev program estimates shall use Simple FP

2020

IT Dashboard.gov:
DHS IT budget is 3rd largest in Federal Government @ $7.4B

2021
Poll Question #1

b. DOD

c. Other Federal Agency

d. Non-Government / Industry
Pre-requisites for a Realistic Agile Estimate

1. Current program information
   - Scope and purpose of the estimate
   - Complexity of software, and capability of development team
   - Program data: new development/enhancement, COTS, language, platform, etc.
   - \textbf{Estimated Size} of release or product backlog in standard units of measure (SLOC or FP)

2. Historical Program Data
   - Scope of historical data
   - Complexity of software, and capability of development team
   - Program data: new development/enhancement, COTS, language, platform, etc.
   - \textbf{Software size} in standard units of measure: SLOC, FP, SP
   - \textbf{Effort} in standard units of measure: hours, sprint
Pre-requisites for a Realistic Agile Estimate

In simplistic terms:

- **Effort** = **Size** * **Throughput**
- **Cost** = **Effort** * Labor Rate
- **Schedule/duration (months)** = **Effort** / (FTE Team Size * Hours per person-month)

**Size** (Estimated amount of functionality in product backlog; includes factors for economies of scale)  
**Throughput** (Rate that functionality can be developed)  
**Effort** (Time needed for development)
Poll Question #2

How much of your program has Agile software development?

a. A little, mainly hardware with some software components (0% - 25%)
b. Some, most software is still COTS (~26% - 50%)
c. A good amount, but there are other parts to the program (~51% - 75%)
d. A lot, the program is only developing software (~76% - 100%)
e. I don’t know
The challenge: How to create realistic size-based cost estimates for agile software development from a high-level product backlog for short- and long-term planning?
Poll Question #3

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

a. SLOC or ESLOC
b. Story Points
c. Function Points
d. SME Judgment
e. Not Sure/Don’t Know
f. Other (Tell us in the chat!)
### Issue #1: What unit of measure is best for estimating Agile Program size?

<table>
<thead>
<tr>
<th>Unit of measure</th>
<th>Measure of...</th>
<th>Standard Yes/No</th>
<th>What is needed?</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
</table>
| **Source Lines of Code (SLOC) or ESLOC** | Physical size | Yes             | Delivered code  | • Historical data available  
• Good for Rough Order of Magnitude (ROM) | • Coding language and skill dependent  
• Can’t be used with user stories |
| **Story Points**                     | Relative size | No              | User stories    | • Agile vernacular  
• Easy to estimate within team | • Only valid within team  
• Can’t be independently estimated/analyzed |
| **IFPUG* Functional Points (FP)**    | Functional size | Yes             | Detailed requirements | • ISO standardized  
• Can be used across programs | • Need detailed requirements to count  
• Requires training |
| **Simple FP (SiFP)**                 | Functional size | Yes             | CONOPS/ user stories | • Can be used across programs  
• Can estimate from high-level requirements (CONOPS or user stories) | • Requires training (but less than FP) |

Different sizing units provide different levels of program insight

*International Function Point Users Group*
DHS chose Simple FP (SiFP) units for SiSE

- SiFP Method developed by Dr. Roberto Meli and Italian researchers, and acquired by IFPUG in 2019\textsuperscript{1}
- Simplifies functional sizing into two types of functions:
  - Generic Transactional Functions (elementary processes)
  - Generic Logical Data Groups
- Sizing process can be performed quickly and early in a program’s lifecycle using existing documents. Compatible with IFPUG FP

<table>
<thead>
<tr>
<th>IFPUG Components</th>
<th>Low</th>
<th>Average</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Inputs</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>External Outputs</td>
<td>4</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>External Inquiries</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Internal Logical Files</td>
<td>7</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>External Interface Files</td>
<td>5</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

**FP Values**

<table>
<thead>
<tr>
<th>SiFP Components</th>
<th>SiFP Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transactions (Create, Update, Delete, Report, Read)</td>
<td>4.6 SiFP</td>
</tr>
<tr>
<td>Logical Data Groups (Saves)</td>
<td>7 SiFP</td>
</tr>
</tbody>
</table>

\textsuperscript{1} https://www.ifpug.org/ifpug-acquires-the-simple-function-points-method/
Issue #2: How to Estimate SiFP from CONOPS/User Stories?

Simplified Software Estimation (SiSE) template generates a Functional size estimate (in SiFP units) based on a lexicon of 140+ verb keyword patterns.

**High-level software functionality**

Prioritized product backlog of user stories.

User stories can be

- **Functional**
- Non-functional
- Fixes, spikes, dev / testing

**Business Functions**

- Transactional Functions (Create, Delete, Update, Read, Report)
- Logical Data Groupings (Saves)
- Interfaces with other systems or agencies

**Stakeholder Group(s)**

Consistent requirements definition leads to repeatable, consistent effort.

**Functional user stories** describe functions using verbs

As a <user> I want to <function> so that I can <outcome>

**CONOPS**

**Functional size estimate (in SiFP units)**
Poll Question #4

What is your level of knowledge of Functional Sizing?

a. What’s functional sizing?
b. I’ve heard of it, couldn’t define it
c. I’m studying the 300+ page IFPUG manual
d. I’m a Certified Function Point Specialist (CFPS)
e. Master Yoda I am at Functional Sizing
Why does DHS need SiSE?

• **Software size** is proven to be *THE major cost driver of software development*

• Traditional Agile metrics *difficult to use in software estimating*:
  - **Agile Velocity** (story points delivered per sprint) is team-specific and based on two non-standard variables:
    • *Size in story points (SP)* = team-specific, relative effort value for *completed* user stories (*i.e.*, *non-completed user stories = 0 SP)
    • *Per Sprint* = inconsistent scope capacity (*person hours per sprint can vary by # of calendar days, and FTE team size*)

• Functional size *measurement* (function points) requires details that are not yet available when estimating the program

SiSE, used with CONOPS or User Stories, can consistently and reliably estimate functional size in SiFP units for agile software development
How does SiSE work? Example of CONOPS Capabilities and SiSE Verb Keywords

**SiSE uses Verb Keyword patterns to generate SiFP values**

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### 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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### CONOPS operational scenarios

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<table>
<thead>
<tr>
<th>Verb Keyword</th>
<th>Transactions</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create</td>
<td>1</td>
<td>1 1 1 16.2</td>
</tr>
<tr>
<td>Appeal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Cancel</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

SiFP = (4.6 * # of Transactions) + (7.0 * # of Data)
### Got CONOPS functions? SiSE them!

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>REQUIREMENT DESCRIPTION</th>
<th>Non Functional Requirement?</th>
<th>Verb 1</th>
<th>Verb 2</th>
<th>Verb 3</th>
<th>SIFP (1)</th>
<th>SIFP (2)</th>
<th>SIFP (3)</th>
<th>Total SIFP (row total)</th>
<th>Cumulative SIFPs</th>
<th>Month</th>
<th>Calendar Year</th>
<th>Program Increment/Sprint</th>
</tr>
</thead>
</table>
| 1      | Create a user account for members of the public  
(Note: this is part of Maintaining a user account -) | Not standalone |        |        |        | 0.0      | 0.0      | 0.0      | 0.0                    | 0.0            |        |               |                          |
| 2      | Receive custom alerts to the user’s smart phone | Alert |        |        |        | 4.6      | 0.0      | 0.0      | 4.6                    | 4.6            |        |               |                          |
| 3      | Receive custom alerts via email (different alerts from | Alert |        |        |        | 4.6      | 0.0      | 0.0      | 4.6                    | 9.2            |        |               |                          |
| 4      | Maintain user accounts | Maintain is Create, Read, Update, Delete (CRUD) + data store |        |        |        |          |          |          | 4.6                    |                | 25.4  |               |                          |
| 5      | The target solution shall have security measures in place to manage the data access and governance and | NFR - security and governance |        |        |        |          |          |          |                        |                | 0.0   | 0.0           |                          |
| 6      | The WEATHER UI should be updated to display the latest weather information for a specified geographical region. The user can search for valid specific regions in the continental US | Two functions: 1. Display weather by region - DISPLAY. 2. SEARCH for a listing of valid regions. Note that the verb Update is not a function but implies that the function is being enhanced. | Display | search |        | 4.6      | 4.6      | 0.0      | 9.2                    | 43.8           |        |               |                          |
SiSE verb keywords equate to an “established pattern” of functions. Simple FP (SiFP) values are assigned to over 400 verbs & synonyms

<table>
<thead>
<tr>
<th>Keyword</th>
<th>TOTAL FOR VERB SiFP</th>
<th>Synonyms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept</td>
<td>16.2</td>
<td>grant, allow</td>
</tr>
<tr>
<td>Activate</td>
<td>16.2</td>
<td>turn on, start, initiate, initialize, process</td>
</tr>
<tr>
<td>Add</td>
<td>16.2</td>
<td>append, infuse, inject, insert, introduce</td>
</tr>
<tr>
<td>Adjust</td>
<td>4.6</td>
<td>accommodate, adapt, conform, edit, fit, tailor</td>
</tr>
<tr>
<td>Alert</td>
<td>4.6</td>
<td>warn, notify, caution, forewarn</td>
</tr>
<tr>
<td>Allocate</td>
<td>16.2</td>
<td>apportion, distribute, lot, allot, dispense,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>partition, prorate, ration, share, slice, split, cut up, divvy</td>
</tr>
<tr>
<td>Allow</td>
<td>16.2</td>
<td>grant, accept</td>
</tr>
<tr>
<td>Analyze</td>
<td>4.6</td>
<td>assess, audit, evaluate, examine, review, tabulate</td>
</tr>
<tr>
<td>Apply</td>
<td>16.2</td>
<td>enforce, execute, implement</td>
</tr>
<tr>
<td>Apportion</td>
<td>16.2</td>
<td>allocate, allot, cut up, distribute, divvy up, dispense, partition, prorate, ration, slice, split</td>
</tr>
<tr>
<td>Approve</td>
<td>4.6</td>
<td>accredit, authorize, confirm, finalize, ratify, sanction, warrant</td>
</tr>
<tr>
<td>Assess</td>
<td>4.6</td>
<td>analyze</td>
</tr>
<tr>
<td>Assign</td>
<td>16.2</td>
<td>appoint, designate, name, delegate</td>
</tr>
<tr>
<td>Associate</td>
<td>4.6</td>
<td>affiliate, connect, couple, group, integrate, link, relate, relate, share</td>
</tr>
</tbody>
</table>


Poll Question #5

Are you interested in developing an SiSE estimate for your program(s)?

a. Yes, but I will need more training
b. Yes, I want a copy of the free SiSE handbook & template
c. Maybe… this looks interesting but it’s the first time I’ve seen SiSE
d. Maybe later, when I have to estimate an Agile program
e. No, I have no need for SiSE
f. No, I’m not interested
What Can You Do with a SiSE Estimate?

1. Develop Cost & Schedule Estimates
2. Estimate Resources
3. Plan Agile Sprints
4. Review Vendor Proposals
5. Track Progress
Poll Question #6

Which of these uses would benefit your organization’s programs/projects? (Check all that apply)

a. Develop Cost & Schedule Estimates
b. Estimate Resources
c. Planning Agile Sprints
d. Reviewing Vendor Proposals
e. Track Progress
SiSE Summary

- Simplified and streamlined functional sizing
- Verb keyword lexicon represents functionality patterns
- Standardized unit of measure (Simple FP)
SiSE Conclusions

SiSE provides 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 functional delivery (SiFP) 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
How to Get Involved with SiSE

SiSE Products are available to the JITSCF audience:

- Draft Version of SiSE Handbook and Template -- available Q1 FY22

SiSE industry pilot project – starting in Q1 FY22

- Email Kammy Mann to join [Katharine.Mann@hq.dhs.gov]

SiSE Support and Resources:

- SiSE training – coming soon!
- SiSE brown bag – coming soon!
Thank you for attending!

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