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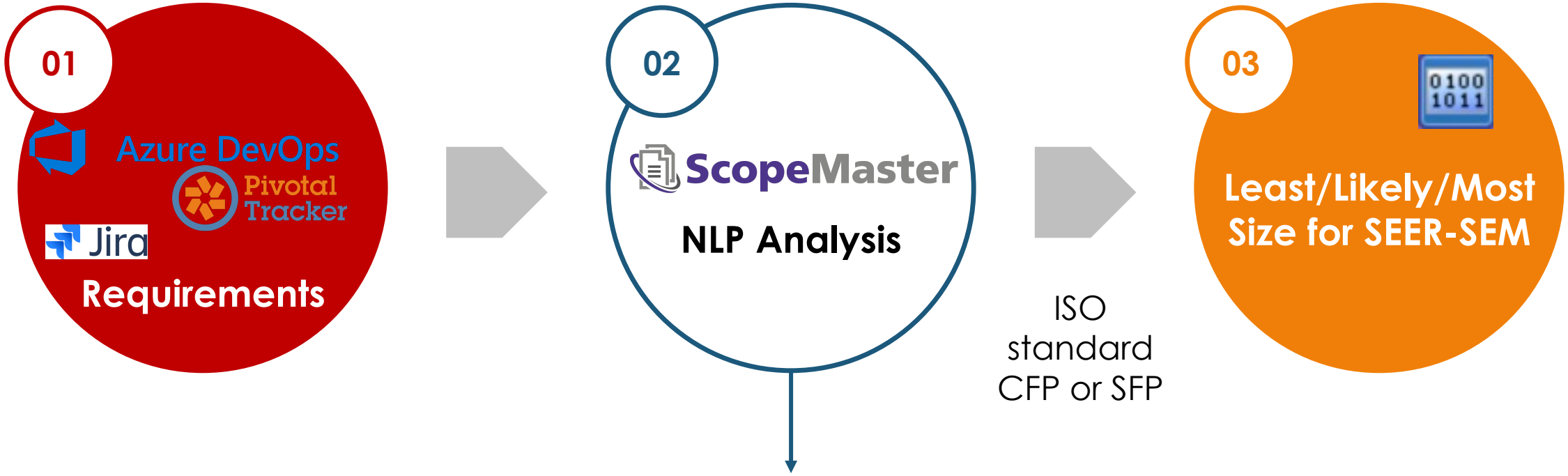
Software Estimation Using Functional Size Derived from User Stories

Karen McRitchie
Esteban Sanchez
Alton Ng
Colin Hammond

Abstract

30,000 foot view of sizing from stories



Requirements, in the form of stories can be analyzed by ScopeMaster and offer suggestions to improve requirements for clarity, consistency and testability. It also computes functional size that can be used for estimation. SEER-SEM has leveraged this capability and offers an approach to use the generated functional size, considering the uncertainty around the results.

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The Challenge

Agile sizing is associated with story points… but they have issues

Stories are team specific

Lack of Standardization occurs when each team defines what is meant by a story. It can be helpful for project implementation, but there is no practical way to compare stories from one team to the next.

Difficult to measure and learn

Loss of learning The lack of non-standard metrics leads to the lack of historical perspective. Benchmarking and measuring improvement become nearly impossible, even within an organization.

The Opportunity

Natural Language Processing of Requirements to Generate Standard Size

Evaluates Stories

Review requirements/stories to identify users, objects and their functional relationships.

Improves Quality

Feedback on requirements offers improvements in consistency, completeness, clarity, and testing.

NLP with ScopeMaster

analyzes requirements, offers improvement and provides a quantitative summary of the results

Generates Functional Size

Evaluation of objects and users and data movements enables automated sizing for Cosmic Function Points and Simple Function Points which can be the input to the software estimate.

Leverages Popular Tools

Stories can be linked from Jira, Pivotal and Azure DevOps. Also offers CSV import REST API for easy access to your data.

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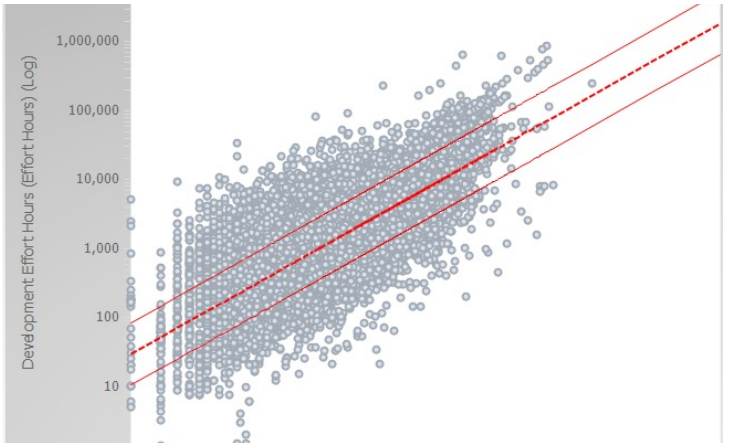
Using Functional Size for Estimation

Would you like me to give you a formula for success? It's quite simple, really: Double your rate of failure. You are thinking of failure as the enemy of success. But it isn't at all. You can be discouraged by failure or you can learn from it, so go ahead and make mistakes.

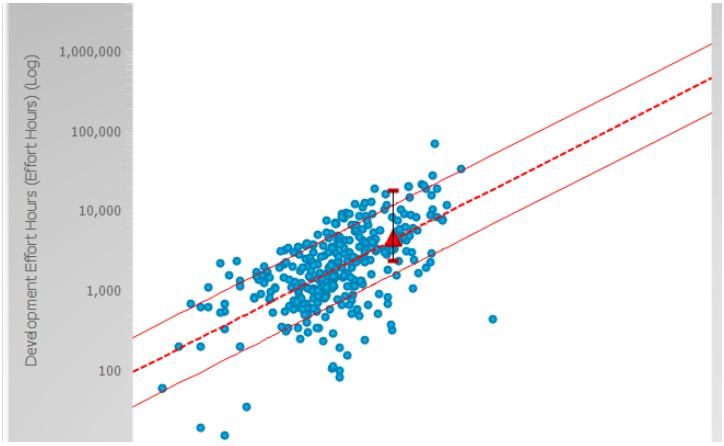
Mature and ISO standard

Functional size metrics have been around for years and several are ISO standard. They have been successfully used for estimation for decades.



Correlated with Effort

Functional size metrics have been shown to be a strong predictor of effort.



Enables Benchmarking

A standard size makes it easier to compare projects and to keep a meaningful historical record. (ISBSG)

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General Function Size Challenges

Use of manual counting methods

Error Prone

Manual counting introduces the possibility of human error.

Time Consuming

Manual counting involves review of requirements (or as-is system) and can be time consuming

Requires Judgement

Discernment is needed to classify requirements and, in some cases, relative complexity levels.

Ambiguous Requirements

All of the above issues are compounded when requirements are ambiguous or incomplete.

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ScopeMaster for Sizing

- Web-based tool
- Requirements analysis and refinement
- #1 goal was to automate functional sizing
- Outputs COSMIC, IFPUG/Simple Function Points
- Consistent results
- Supports a custom vocabulary
- Transparent use of AI (NLP)
- Fast. Estimate 100 user stories in less than 5 minutes, no setup
- Create stories in ScopeMaster or import CSV or via REST API.

Size and Uncertainty

Uncertainty is part of the estimating fabric

Size Ranges

Uncertainty around the size is considered a software estimation best practice. Thus, any automated sizing should consider a range of outcomes.

Embracing Imperfection

Feedback and Improvement is key to the ScopeMaster process and should be embraced. Because estimators are not the ones to be refining stories/requirements they need to consider the ambiguity in the sizing.

Sizing Metric

Functional Size Metrics using either COSMIC or Simple Function Points can be used.

Known Unknowns

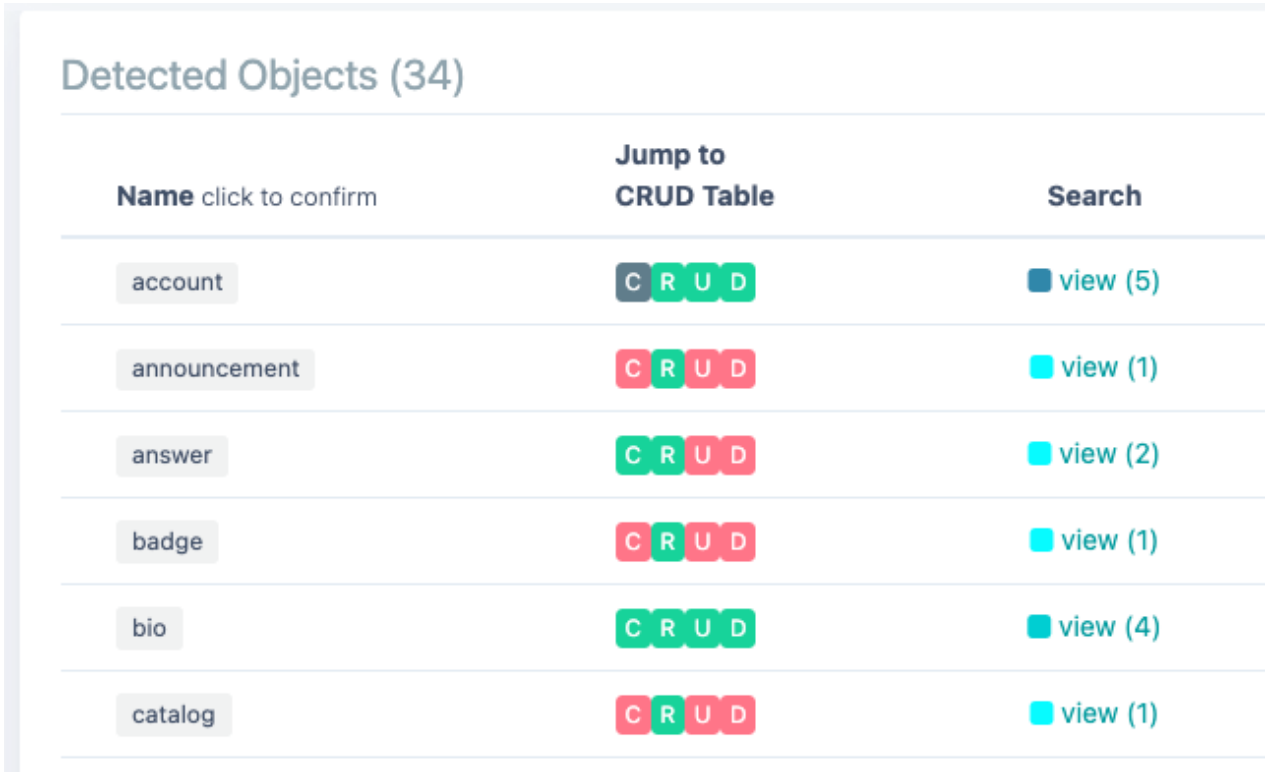
Missing Functions can be detected using CRUD analysis and should be part of the sizing.

Terminology

- Requirement – aka a story, usually specifies a requirement from a user perspective
  - **“As a [persona], I [want to], [so that].”**
- Sized Requirement – a requirement for which functional intent is detected
- Ambiguous Requirement – a requirement no functional intent is detected.
- Missing – fills in transactional functions that might be missing (see CRUD)

Missing Requirements

- CRUD – Create, Read, Update, Delete
  - Four basic function types
- Each object ideally would have at least one C, R,U and D function specified as par of the requirements.
- If an object does not have the full CRUD, the missing add transactions



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Interpreting the Uncertainty

Sized

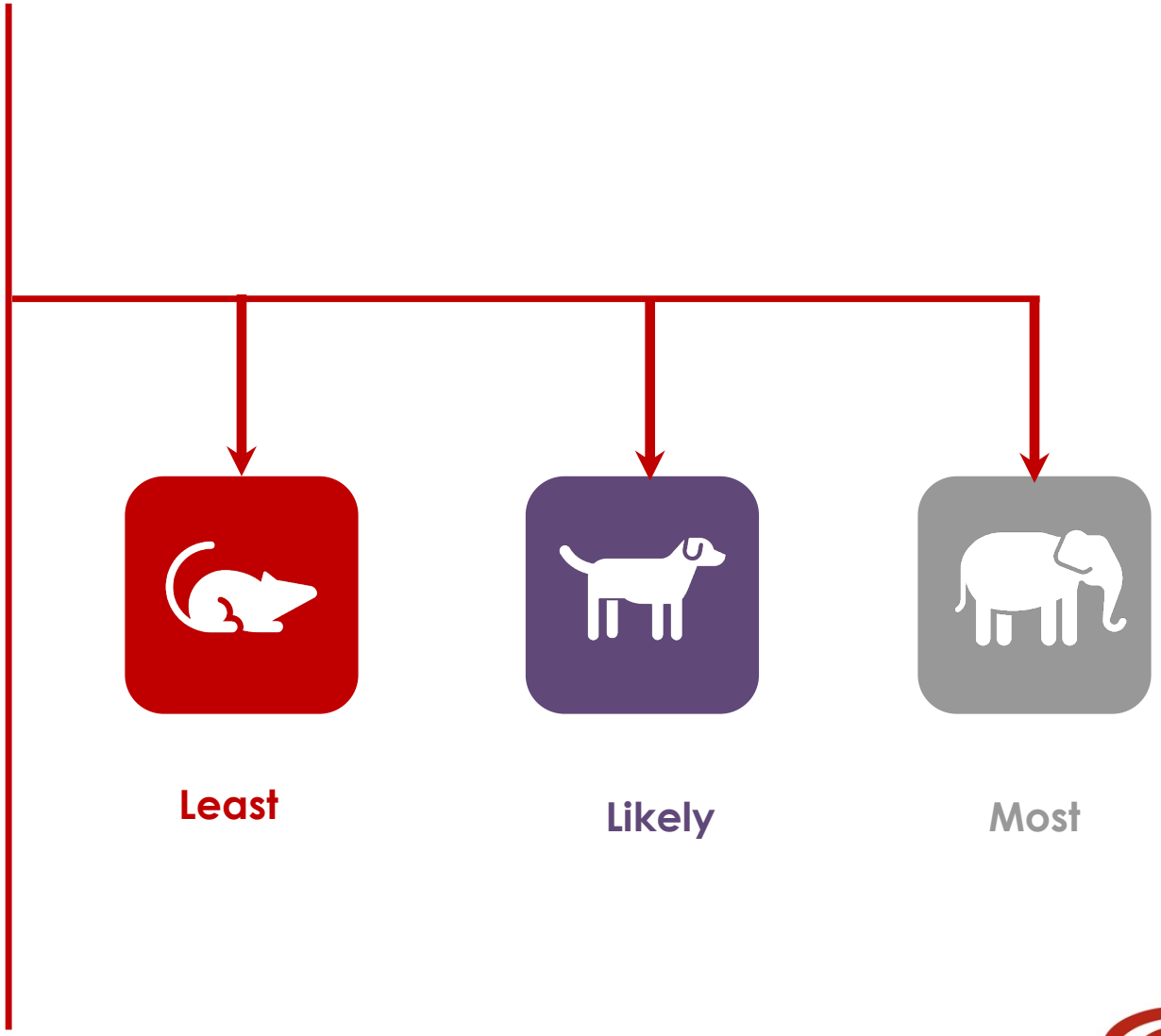
Requirements where functions are identified and are counted based on transactional scope. This is usually the headline size.

Ambiguous

Uncertain Functional Intent
Requirements where functional intent is not detected. Ideally these requirements can be refined.

Missing

Extrapolated Functions based on potential missing CRUD



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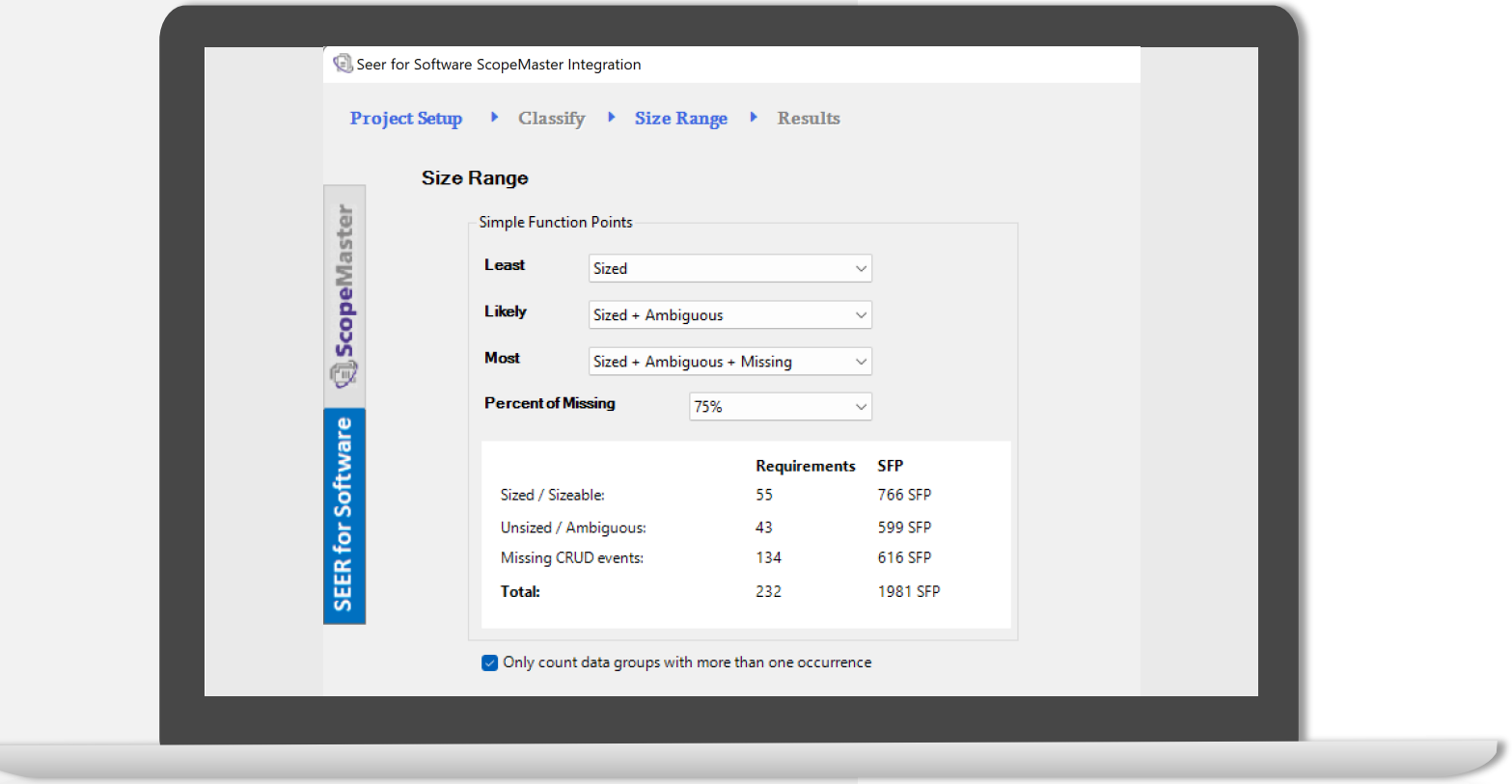
Establishing a Size Range



Sized Requirements

Minimum Size established from analyzing requirements. This size is likely to be optimistic unless requirements have been refined .

Ambiguous

Uncertain Size that should be considered as part of the likely input, if not also the least.

Missing

Missing Transactions are based on CRUD analysis. Uses the idea that each object should have at least 1 CRUD transaction. If not in the requirements, missing transactions are added.

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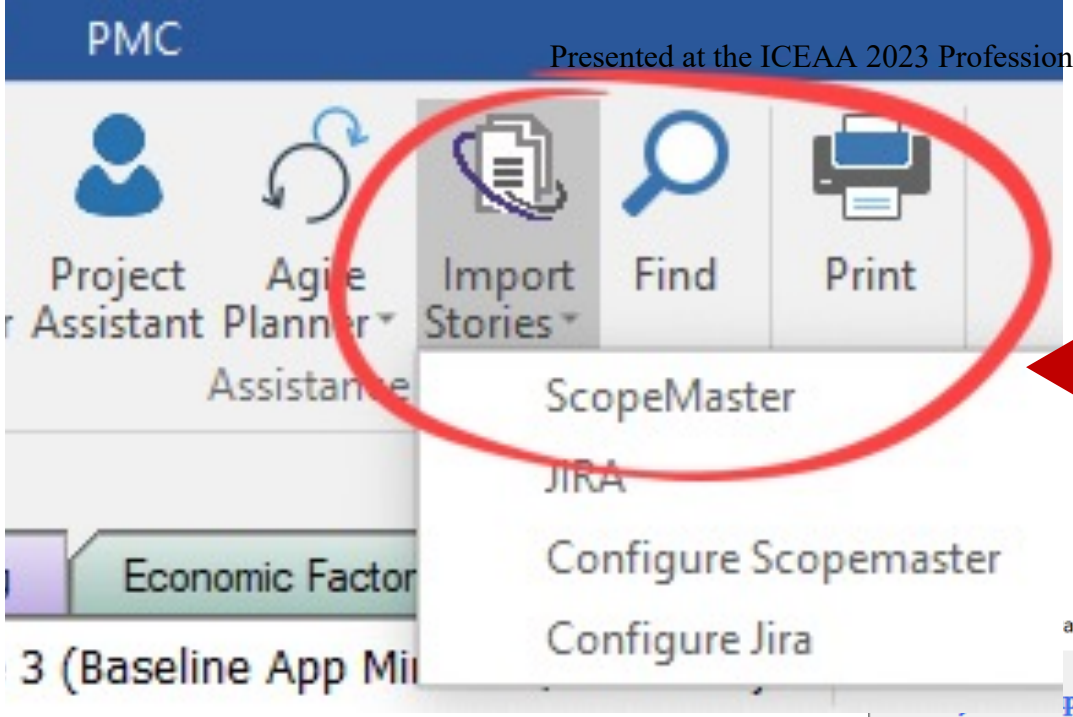


01

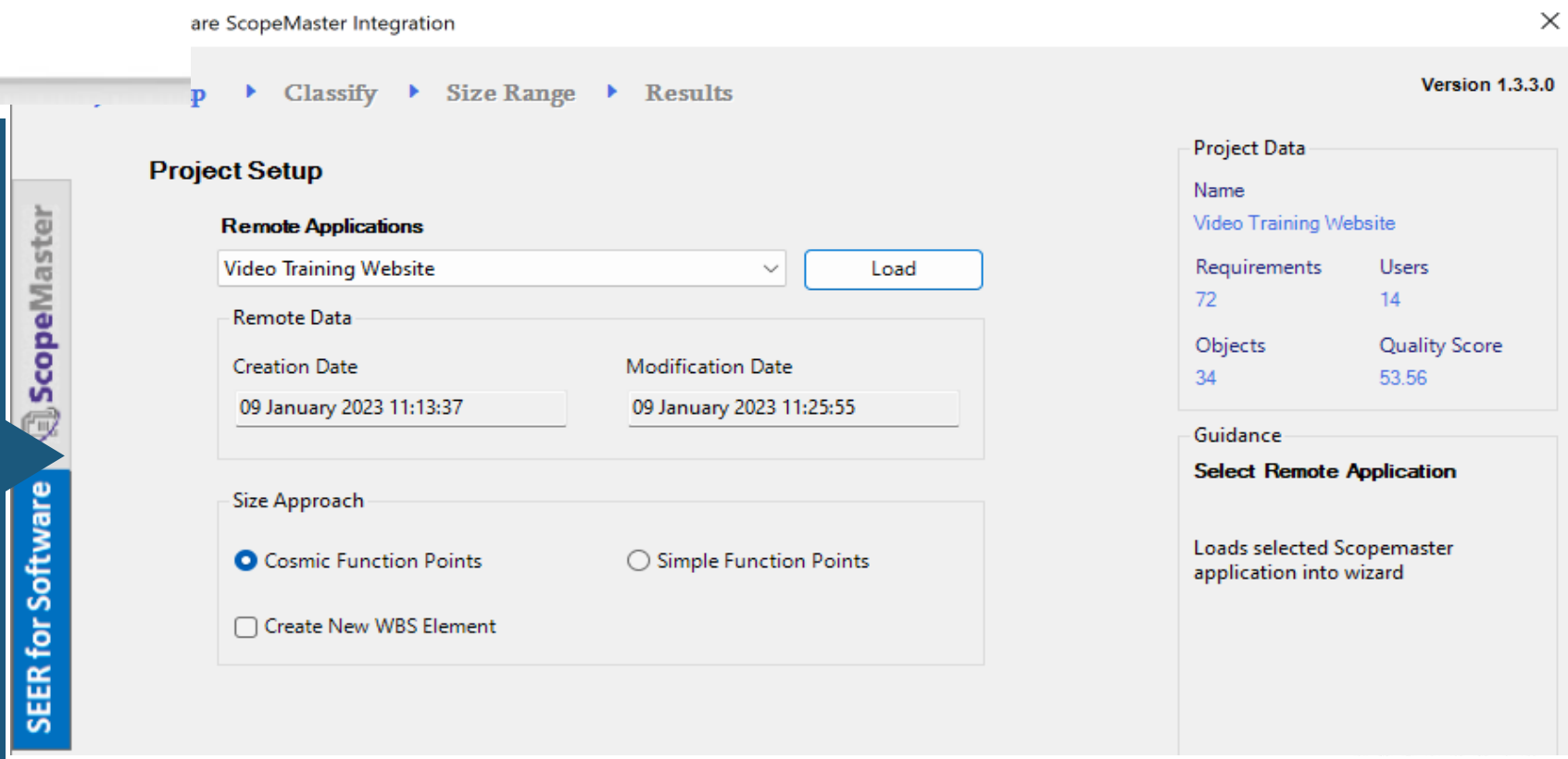
Choose Import Stories

Import Stories offers the option to import from ScopeMaster or directly from JIRA. Minor configuration is required.

02

Choose the Project

And size approach to be estimated. Cosmic Function Points (CFP) and Simple Function Points (SFP) are offered. You can import to an existing element or create a new estimate.

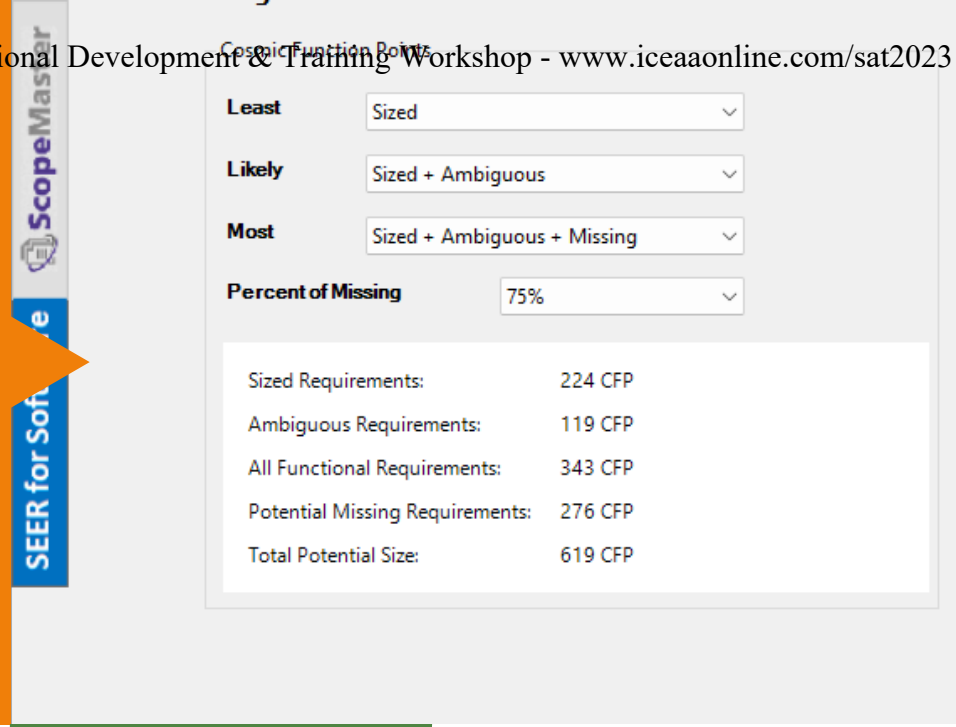


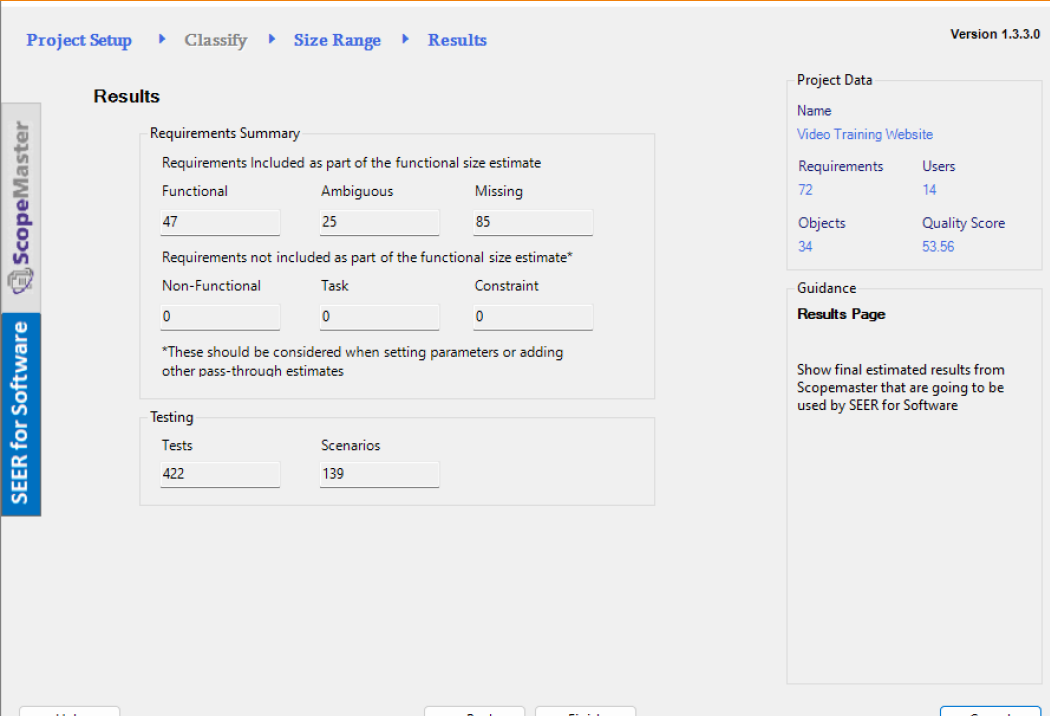
03

Size Range Method

Specify how Least/Likely and Most Sizes determined.

Sizes are cumulative to include sized, ambiguous and missing. You can specify a % of missing to be included.

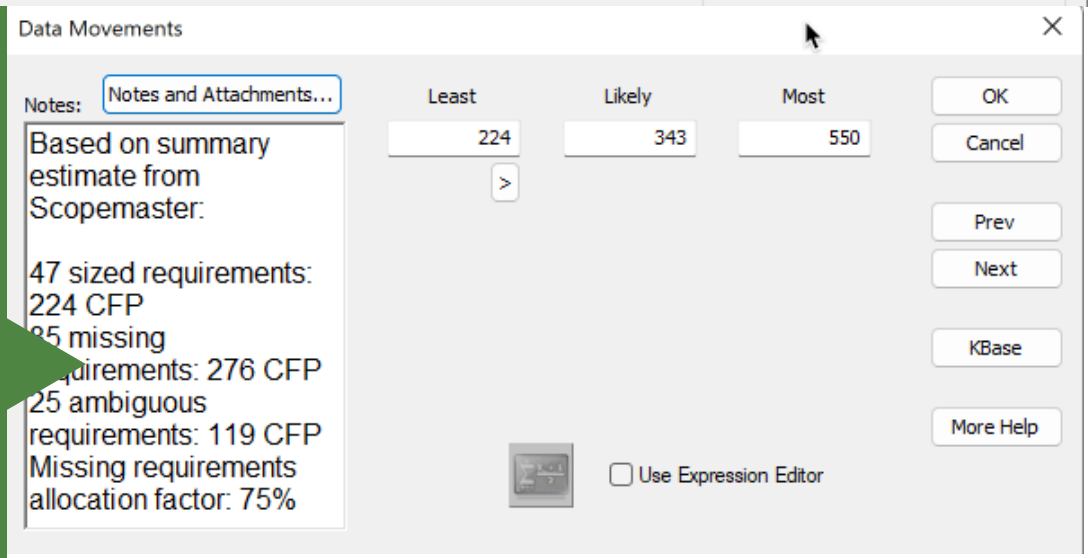




04

Results In SEER-SEM

Size range inputs are entered and notes are added documenting the size assumptions.



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Examples

Planning Poker Webapp

Data Imported from Jira into ScopeMaster

53

Requirements

Total number of stories or stated requirements.

22

Sized

Requirements that could be counted in the functional size.

19

Ambiguous

Requirements where functional intent is not detected. Ideally these requirements can be refined.

12

Non-Functional

Non-functional requirements are not sized. They may relate to technology, security, performance or other non-user requirements

33

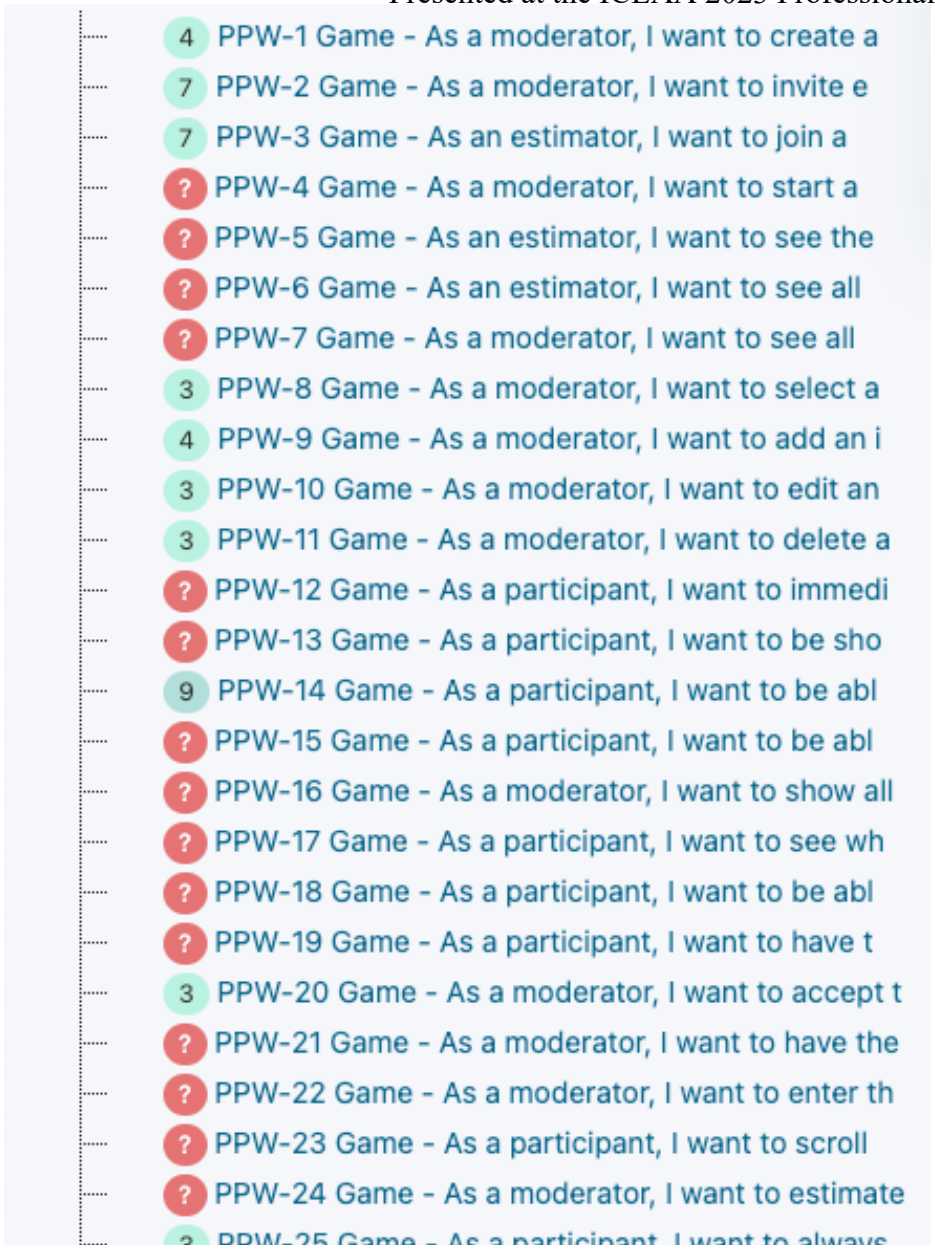
Missing Requirements

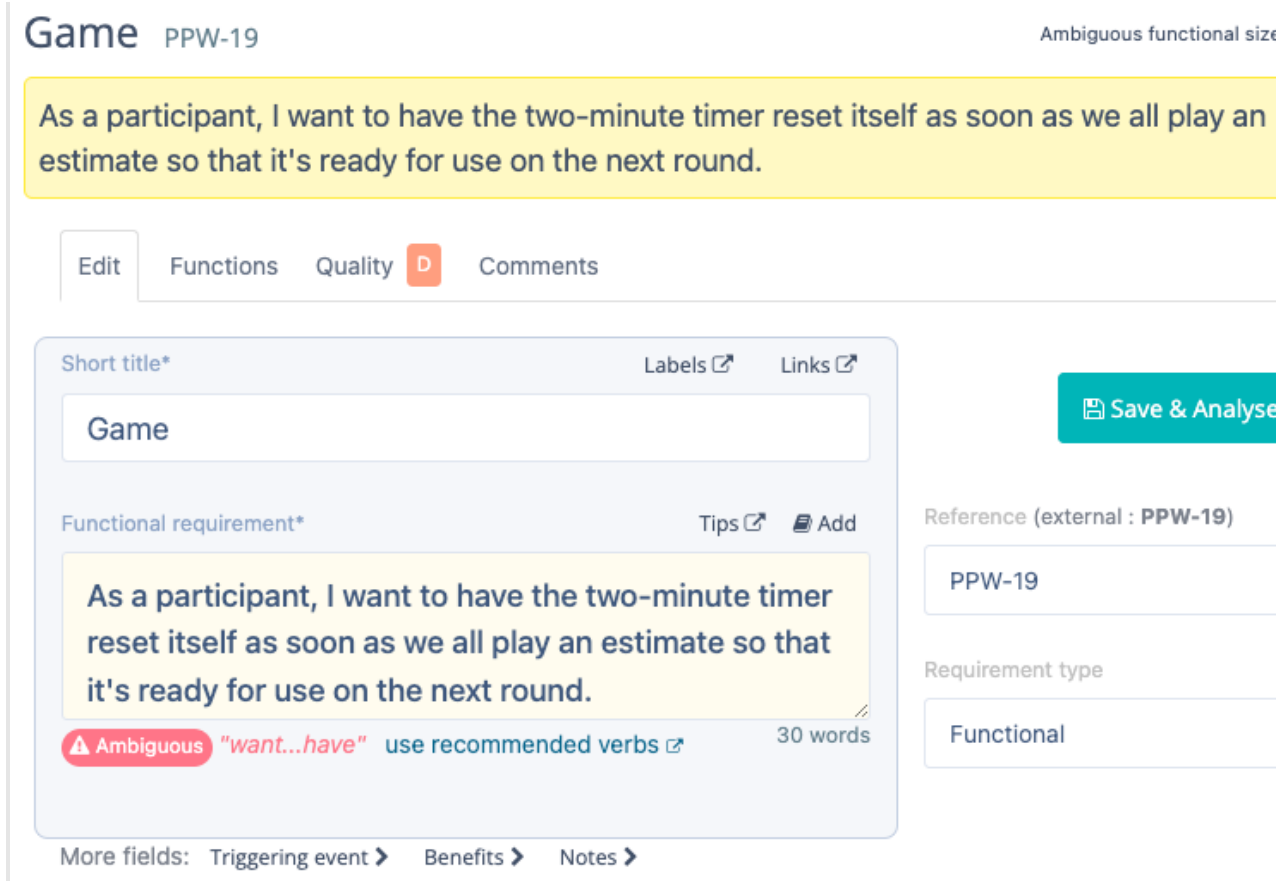
Based on CRUD analysis, fills in transactions for which an object does not have all CRUD.

11/14

Users/Objects

Detected users and objects.





What the requirements look like

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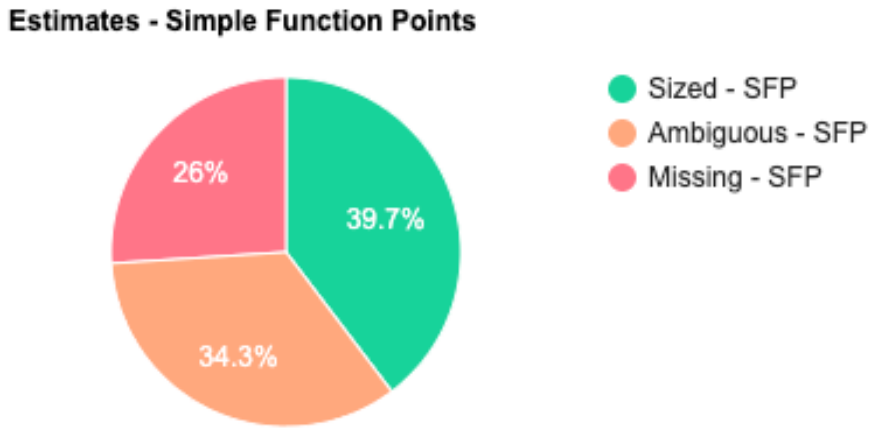
Simple Function Point Estimate

Planning Poker Webapp Example

Requirements Analysis	Count	SFP Estimate
Sized / Sizeable	22 (of 41)	231.4 SFP (40%)
Unsized / Ambiguous	19 (of 41)	200 SFP (34%)
Missing CRUD events	33	151.8 SFP (26%)
Total:		583.2 SFP



SFP Summary

Data functions and transactions are enumerated and mapped to requirements to develop a SFP count.

Allocation of Size

Quality of Requirements can result in large portions of ambiguous or missing. Not considering these as part of the size can under-estimate effort. As quality improves, ambiguous and missing will become a smaller portion of the size.

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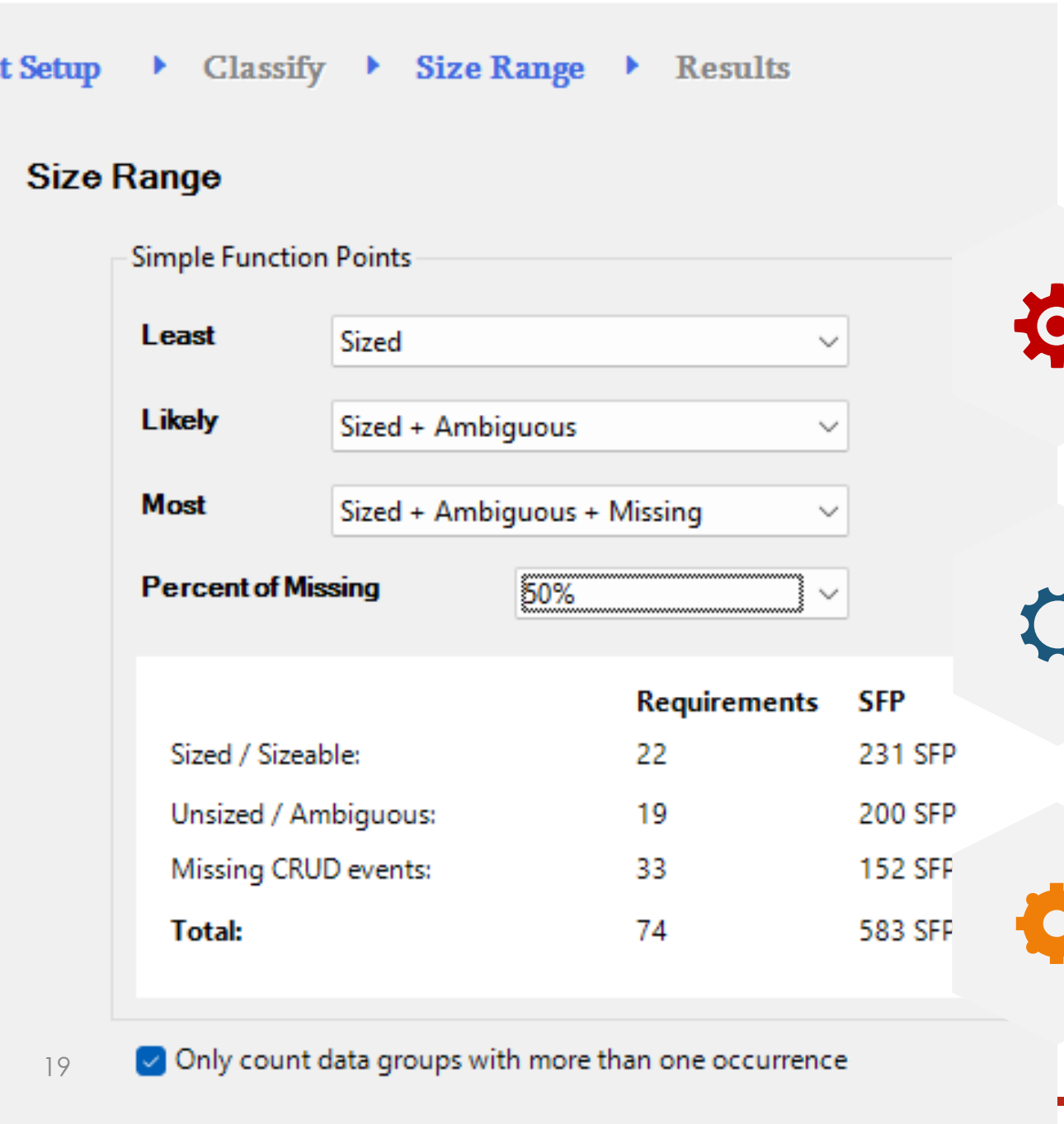

Mapping Data

How to translate into a SEER-SEM estimate

Least/Likely/Most

Size Ranges are generated based what to include. Recommend that all aspects of size should be considered. The more refined the requirements, the tighter the range will become.

Missing

Including Missing is important. However, this can be tempered by a percent to be included. Recommend 50%-75%.

Data Group Counting

SFP includes Data Functions and we found that data objects (aka Logical Files) that were only referenced once inflates the SFP count. Refinement of the requirements will generally reduce this.

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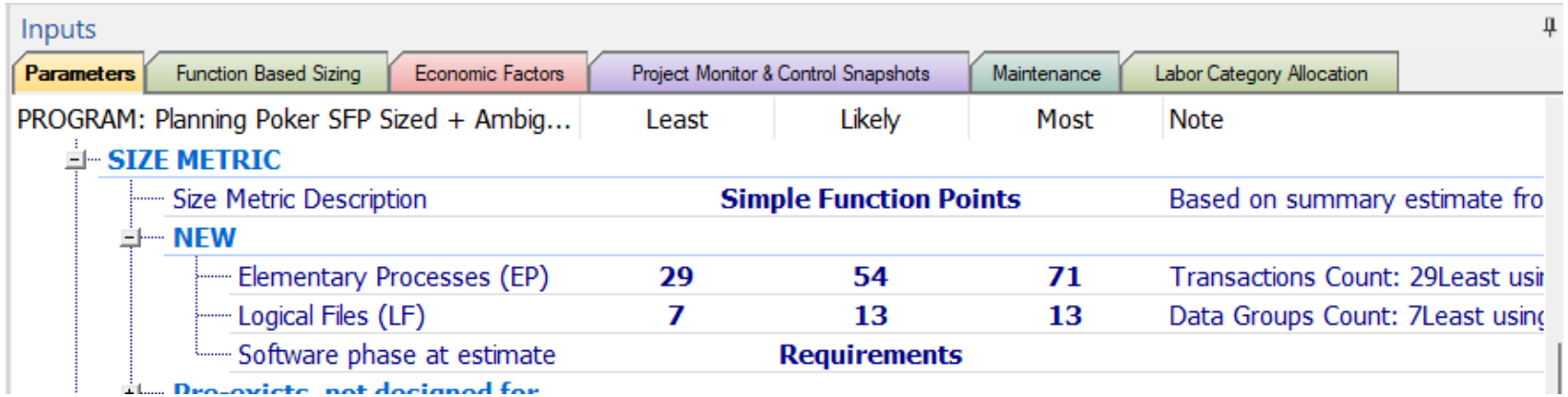
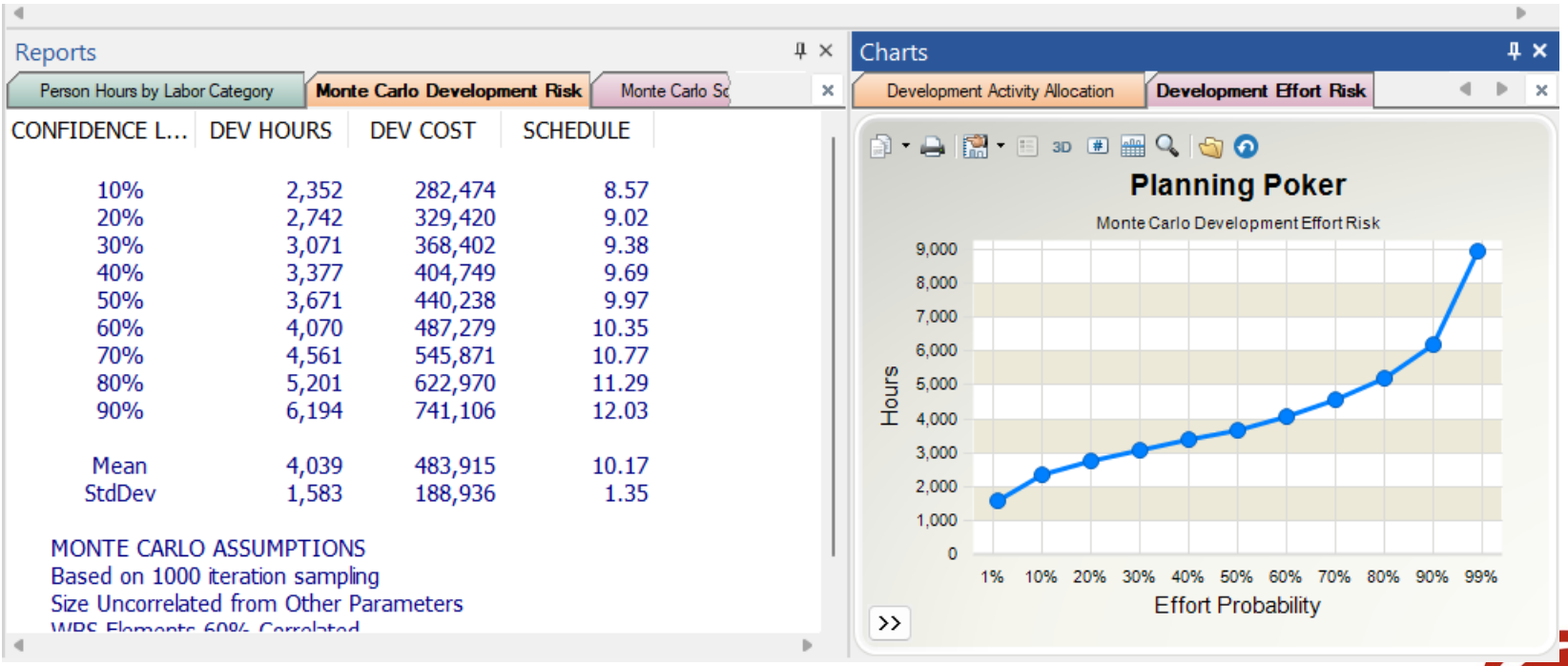
Results in SEER-SEM

Inputs and Outputs

SFP inputs for EP and LF are specified as a range. Risk assessment of the estimate range generated.

Size assumption details are logged in the notes.





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Video Training Application

Data Imported from Jira into ScopeMaster

72

Requirements

Total number of stories or stated requirements.

47

Sized

Requirements that could be counted in the functional size.

25

Ambiguous

Requirements where functional intent is not detected. Ideally these requirements can be refined.

0

Non-Functional

Non-functional requirements are not sized. They may relate to technology, security, performance or other non-user requirements

85

Missing Requirements

Based on CRUD analysis, fills in transactions for which an object does not have all CRUD.

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Users/Objects

Detected users and objects.

Cosmic Function Point Estimate

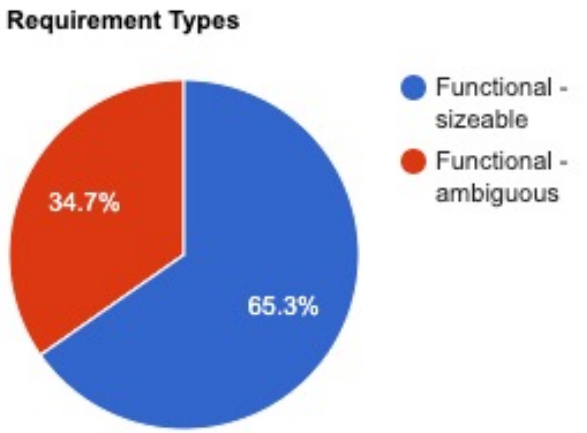
Video Training Application Example

Total Functional Size Estimate

Sized requirements	47	224 CFP
Ambiguous requirements (ie. no functionality detected)	25	119 CFP *Estimated*
All functional requirements (sized + ambiguous)	72	**343** CFP *Estimated*
Potential missing requirements (from CRUD analysis)	85	276 CFP *Estimated*
Total Potential Size (sized + ambiguous + missing)	157	619 CFP *Estimated*

CFP = COSMIC Function Points

Requirements



CFP Summary

Each Requirement is evaluated for functions and data movements for each function are determined.

Allocation of Size

Quality of Requirements can result in large portions of ambiguous or missing. Not considering these as part of the size can under-estimate effort. As quality improves, ambiguous and missing will become a smaller portion of the size.

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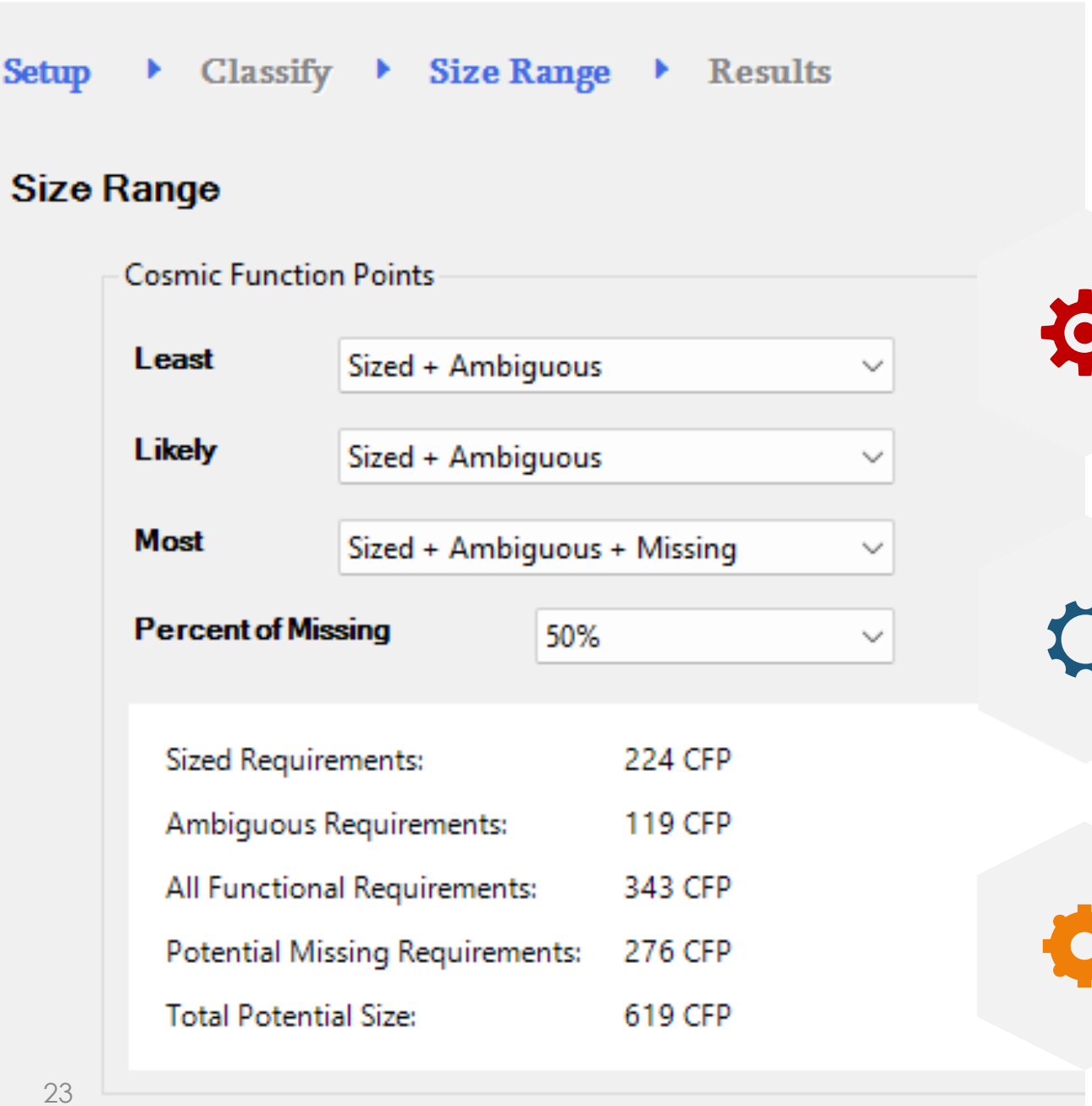

Mapping Data

How to translate into a SEER-SEM estimate

Least/Likely/Most

Size Ranges are generated based what to include. Recommend that all aspects of size should be considered. The more refined the requirements, the tighter the range will become.

Missing

Including Missing is important. However, this can be tempered by a percent to be included. Recommend 50%-75%

Size Summary

CFP range is displayed but does not include % missing adjustment.

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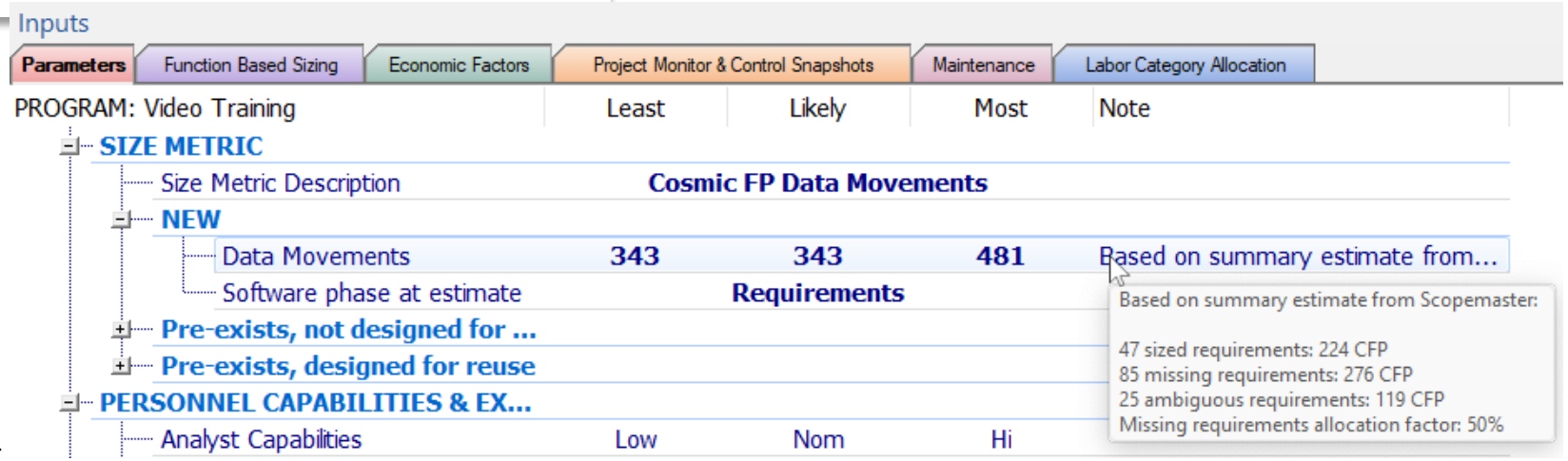
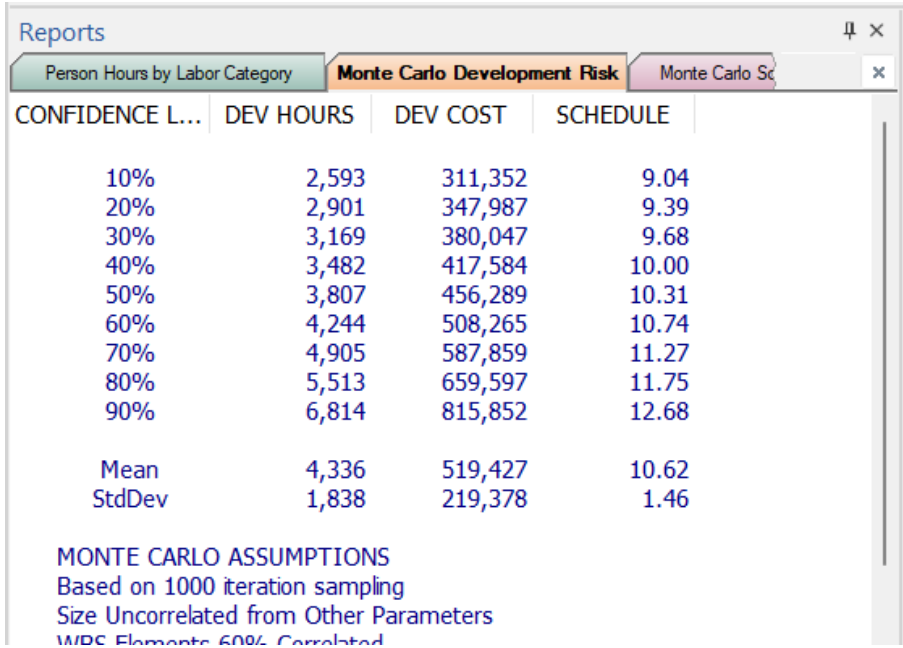
Results in SEER-SEM

Inputs and Outputs

Input range for CFP Data Movements are assigned. Risk assessment of the estimate range generated.

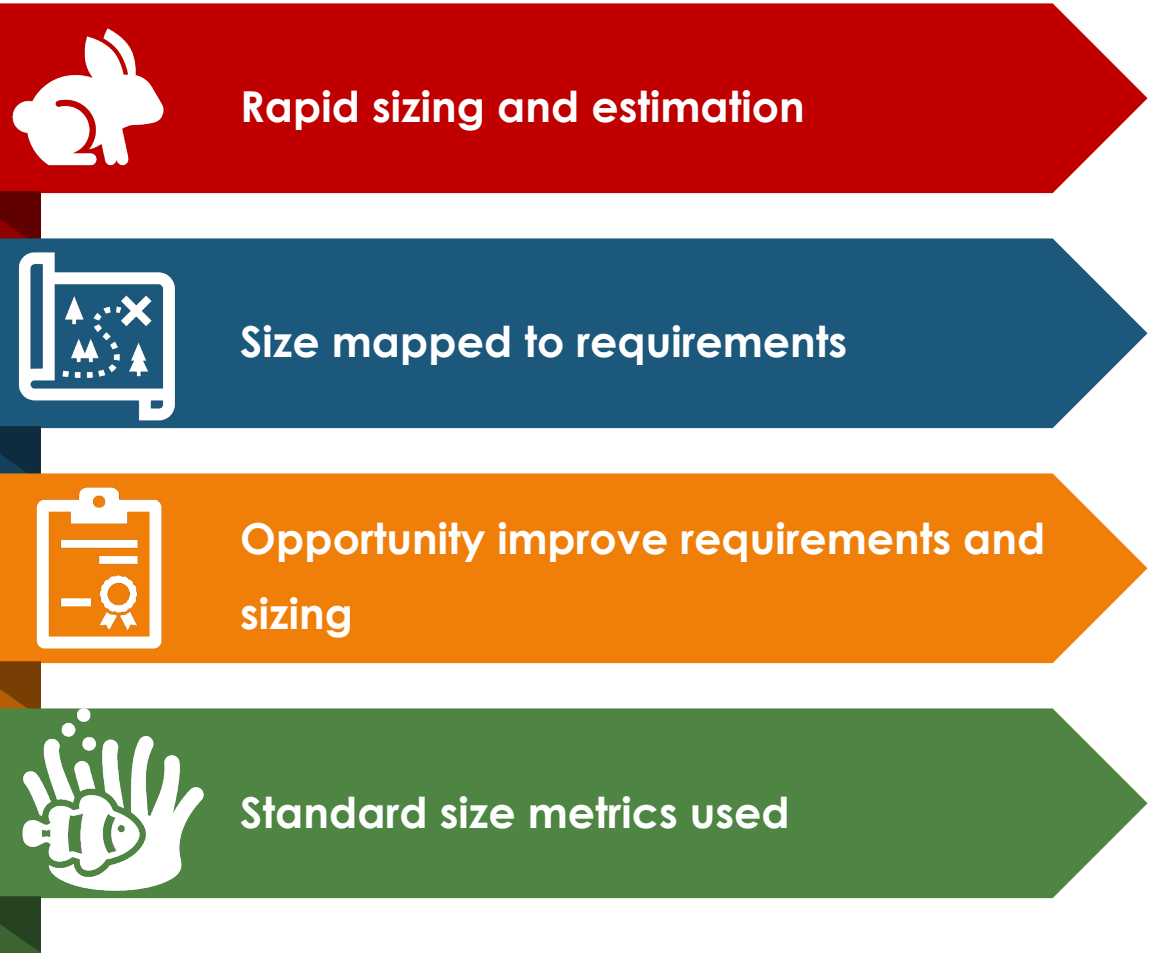
Size assumption details are logged in the notes.





Benefits of automated sizing

In addition to quality improvements



Rapid

Quickly generate size and estimates. Evaluate risk and uncertainty embodied by requirements.

Traceability

Understand how requirements drive cost.

Iterate

More time for in depth evaluation of the estimate for different team sizes/sprint length.

Standard Size

ISO standard size metrics means project data can be used for historical reference, benchmarking and learning

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How ScopeMaster Sizes

- Foreach User Story
  - Detects functional phrases
    - Detects users
    - Detects objects
    - Detects multiple functional steps within each user story
  - Encourages refinement until the functional interpretation matches your intent
- Sets of user Stories
  - Cross references them all (up to 3000 user stories)
  - Many reports and visualizations to accelerate improvement of story quality and size precision.