

Automated requirements analysis

For early sizing and quality on *agile development*

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Software Procurement & Project Management

Goal

Working software that
meets the business need
To time and Cost

Start with

Requirements written in English
(natural language)

Need

Reliable estimates

Avoid

Surprises / scope creep
Delays
Technical debt

Requirements are about communication

Requirements - Precision Matters



Requirements are like Blueprints

...that tell you how deep to dig your foundations, the type of windows to order and how much cabling is needed.

English words translated to Code
1 word or requirements : 25 SLOC*

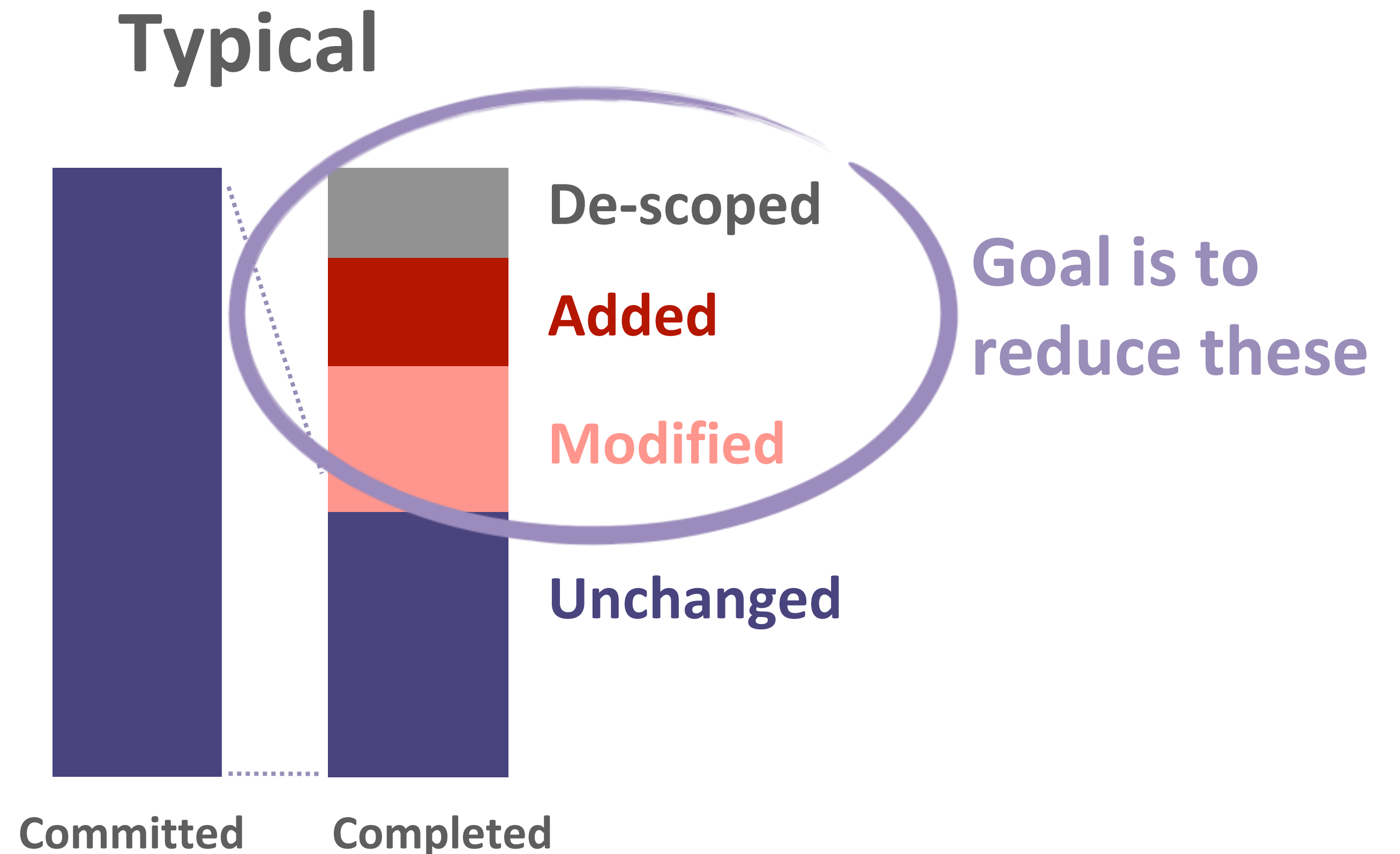
=> Defects are amplified

Get the requirements as good as you can as early as you can

Cognitively intensive

Changing midstream is disruptive

Evolve
Commonly
±2%
Per month



Example User Story

Requirements in Agile

“User Stories” are the catalyst
of the conversation.

Add Delivery Details

SP

As a ... Site visitor

I want ... Add my delivery addresss

So that ... I can receive my goods

Who & what

Why

Acceptance/Test Criteria ...

I can click pencil to enter my zip
code and full home address

Back

**Given , when
& then**



*I set out to automate the functional sizing of
user stories*

Discovering functional intent

Automated Functional Sizing



Delete Profile

As a ... Administrator

I want ... Delete a profile.....

So that ... I can receive my goods



Deleting a profile

Estimated CFP: **6 CFP**

As an **administrator** I want to delete a **profile** . Then the **system** should send a **confirmation email** to the **team** .

Edit Functions **2** Revisions **9** Tests **14** Related Debug

Functional Steps	Interpretation	Data Movements 6 CFP
delete profile	Delete profile	E request delete W delete profile X return error/confirmation
send confirmation email	Read confirmation email	E confirmation email id R read confirmation email from storage X display confirmation email

Who & what



Functions



Data movements

User Stories & Requirements

User Story = Requirements?

Outsource development makes it harder to create the ideal conditions ideal for agile software

In the absence of anything else, yes the user story
is the primary articulation of requirements

Challenges - Multiple meanings of the same word

Book the book from the book library

Noun
Verb
Adjective

Noun
Verb
Adjective

Noun
Verb
Adjective

Challenges - common potential ambiguities

... I'd like to assess ...

...I'd like to see...

...I'd like to decide...

Challenges - some other challenges

Distinguish between :

Objects vs properties of objects

People as users vs people as objects

Singular vs plurals

Challenges - custom terminology

“... the tilt sensor sends the realtime angularity reading to the inclinator...”

Analysing the text

What the analyser does:

1. Reads the user story, analyses with NLP+
2. Detects the functional intent(s)
3. Detects likely users and objects
4. Ontology agnostic
5. Compares the story with all the other stories
6. Finds problems and suggests fixes (>50%)
7. Proposes functional test cases
8. Produces clear documentation
9. Takes only 2-4 seconds per story



Case Study

160 defects found and fixed in 16 hours

Intelligent Analysis of User Stories

“As Registered user I want to update my profile”

nt

CSV
No setup

refine



CSV

Benefits:

Sizing

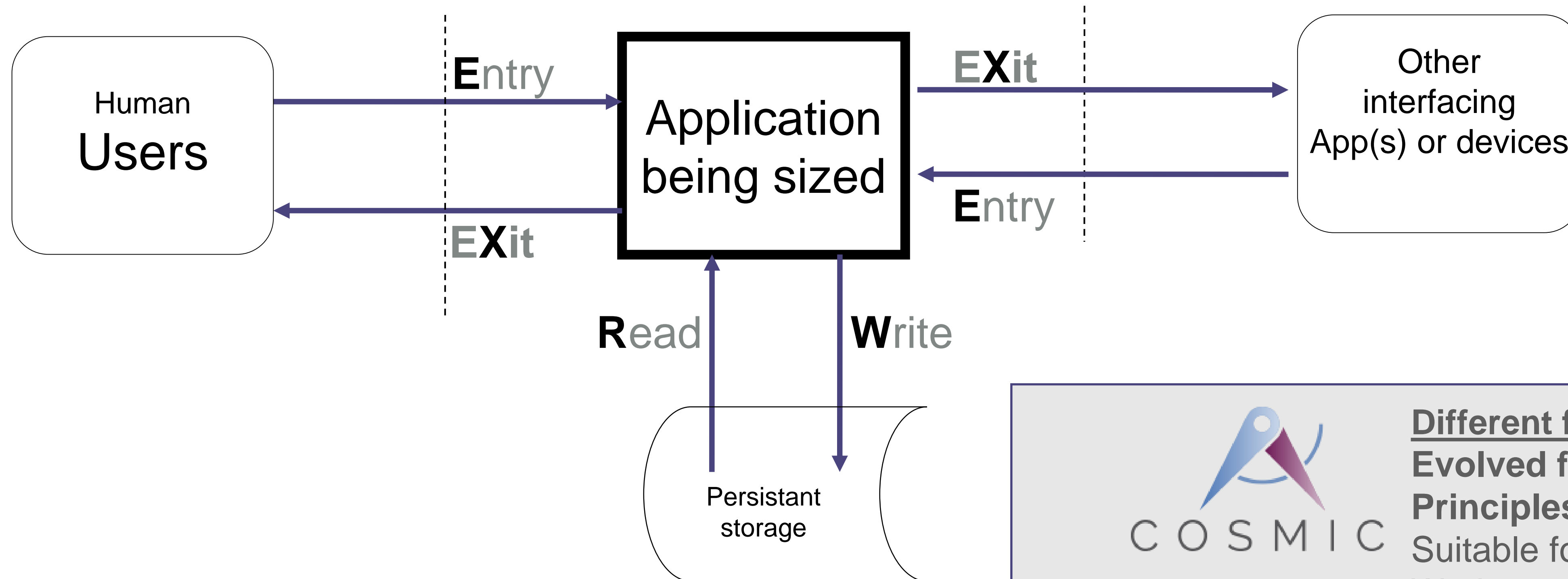
- Reliable, valid estimates
- $\pm 20\%$ accuracy
- 100% consistent
- Estimate faster
- More Reliable planning
- Metrics to manage S,V,Q



Quality

- Fewer ambiguities,
- Fewer omissions, duplicates
- Fewer inconsistencies
- Better documentation
- Reduced scope churn & creep
- Less rework & fewer bad fixes
- Less effort to get good quality

COSMIC Functional Sizing - the successor to IFPUG



$$\sum E, X, R, W = CFP$$



<https://cosmic-sizing.org>



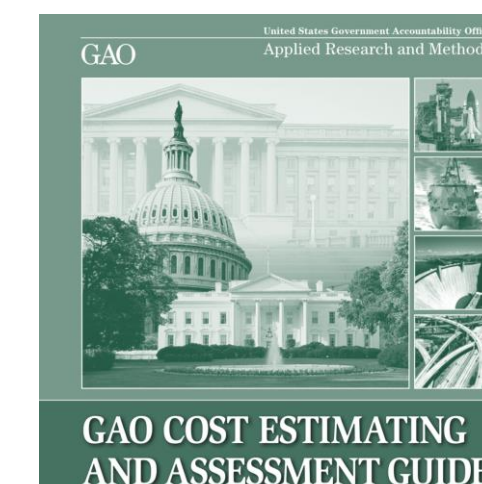
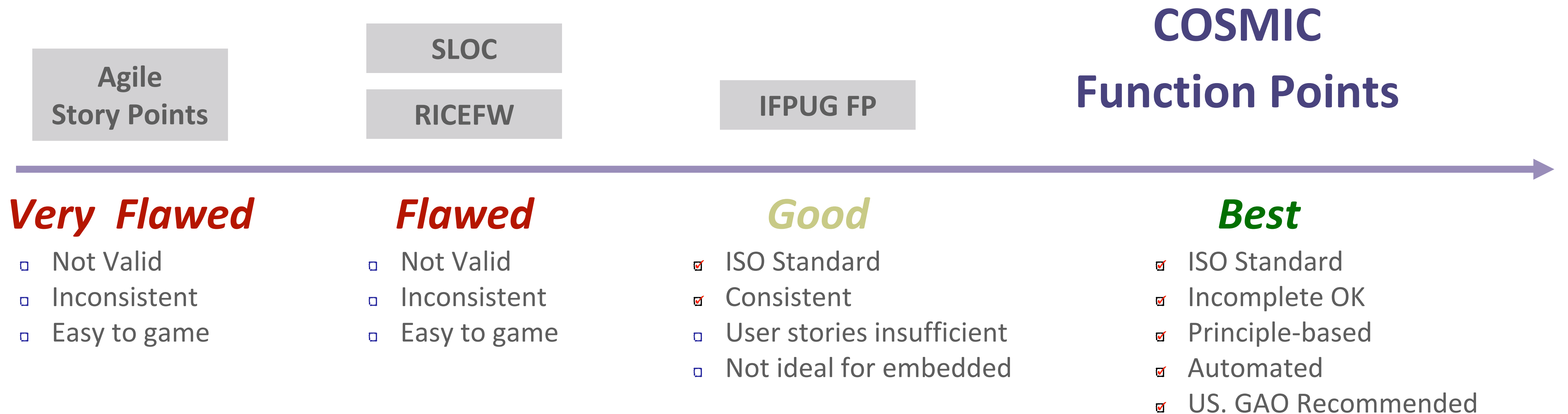
Different from IFPUG
Evolved from inc improvements
Principles not rules
 Suitable for all S/W
 Works on incomplete / **Agile**
 Open source

2016 NIST - canonical reference
 reference for a FP

<https://nvlpubs.nist.gov/nistpubs/ir/2016/NIST.IR.8101.pdf>
<https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.500-307.pdf>

Sizing software

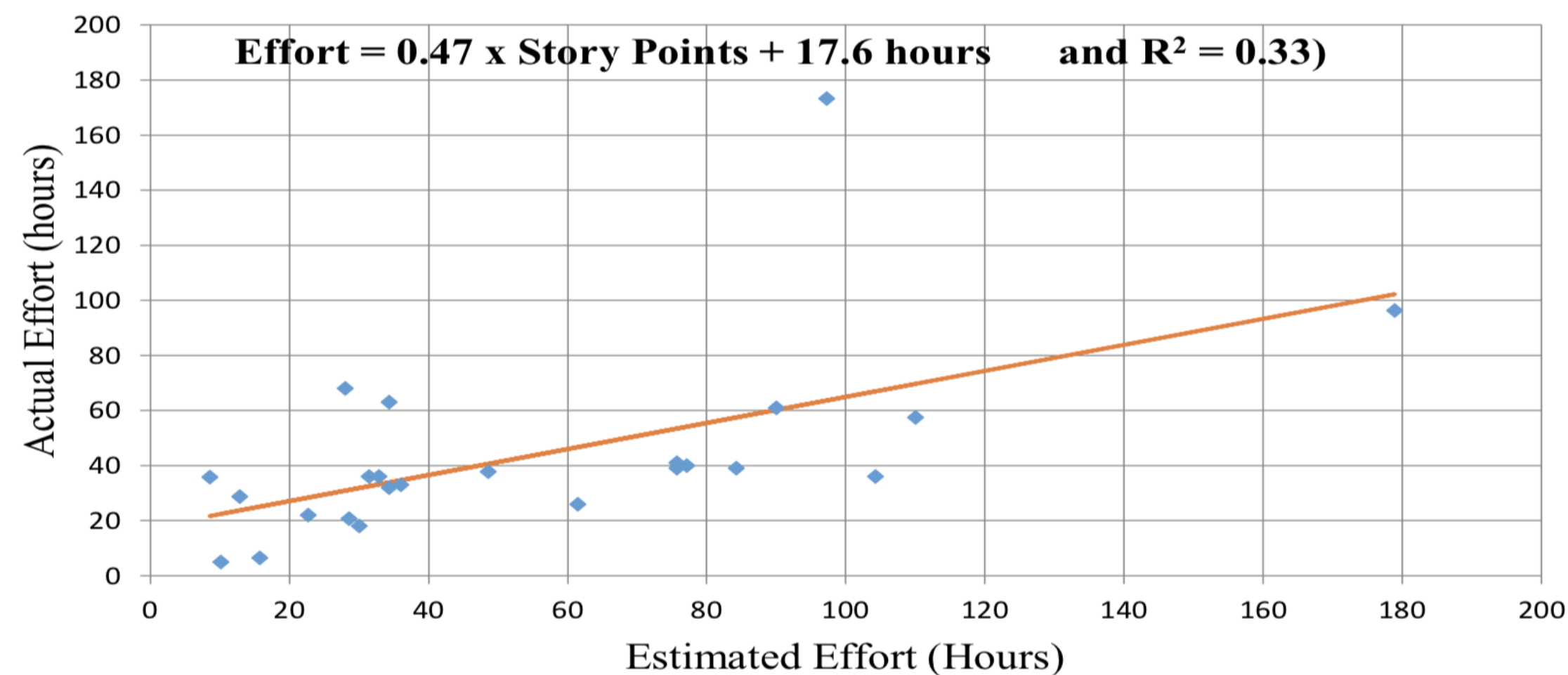
Functional Size Metrics on Software Projects



Case study to compare SP vs CFP

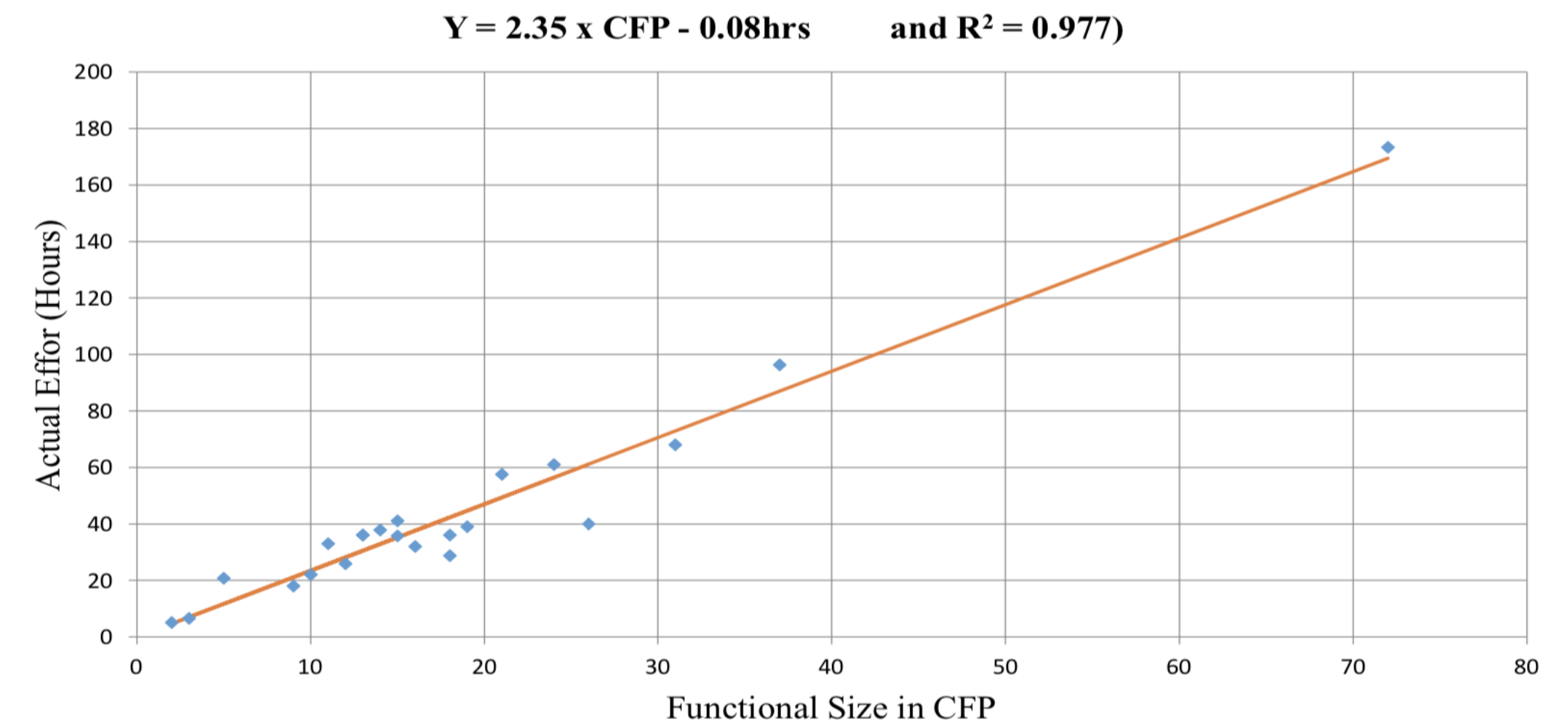
Story points vs actual effort

$R^2 = 0.33$



CFP vs actual effort

$R^2 = 0.97$



Conclusion:

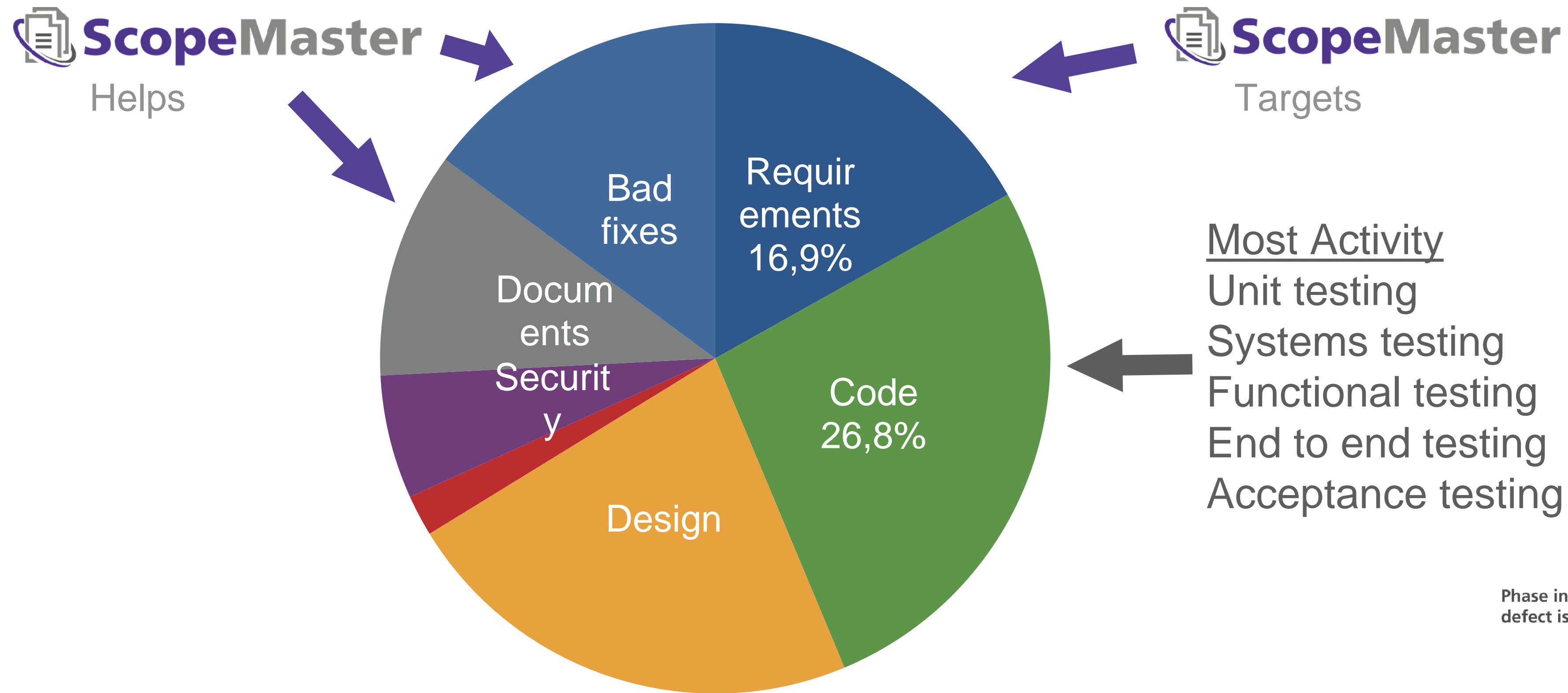
CFP is a better predictor of effort than story points.

C. Commeyne, A. Abran, R. Djouab. "Effort Estimation with Story Points and COSMIC

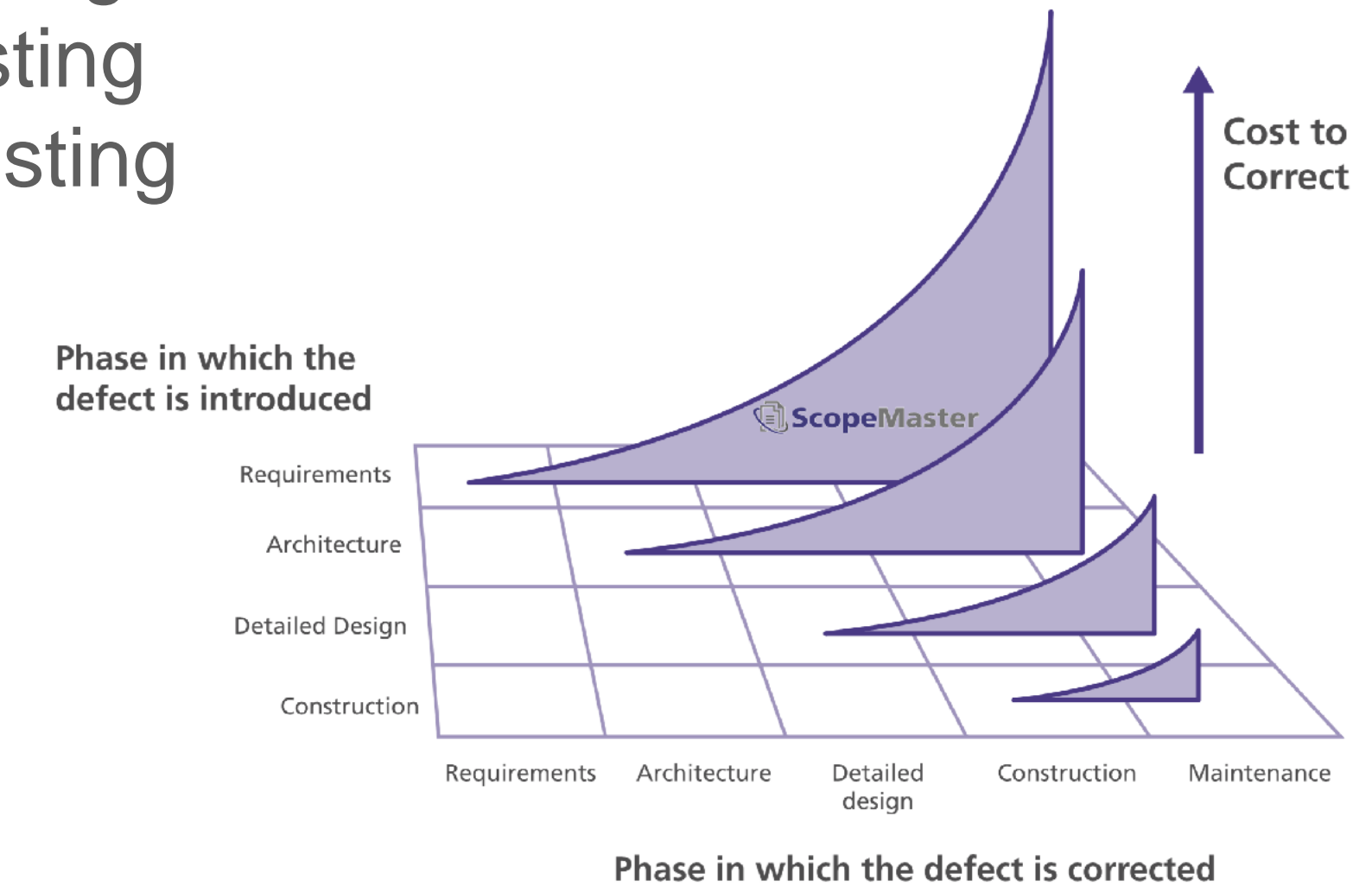
Function Points

Abstract: "Case Study" Software Measurement (New York: NY, 2016).

Typical Source of Defects on Software Projects



1,000 FP Application
 Source: Capers Jones
Applied Software Measurement, third edition



QA of user stories

Consistency

Potential missing

Overall quality

Potential duplicate

**ScopeMaster
QUALITY SCORE**

61.2

**Potential
DEFECTS**

Ambiguous :**105**
Missing :**217**
Duplicated :**25**

Using ScopeMaster, you can fix many requirements problems in minutes, sometimes seconds

The key metrics

Valid Metrics based on CFP

1. **Scope** CFP estimated, delivered, removed
2. **Velocity** Rate of delivery of CFP
3. **Cost** to develop and test CFP
4. **Quality** Defects delivered per CFP

Agile development contracts...



Promise



Reality



*With CFP-based
contracts*

Benefits of just knowing the software / project size up front




Value of knowing the size

Given a typical Cost of \$2,000 per CFP

	Indicative Benefits	
Vendor negotiation, reasonable price, quality & schedule	\$200	10%
Efficient project management (scope, effort, cost, quality)	\$100	5%
Avoid de-scoping and reduce rework by using size to manage & ensure quality of each activity early.	\$300	15%
	<hr/>	
	\$600	Per CFP 30%

Functional Sizing Automation is Available

Tools:

Based on	Tool	Additional Benefits	Links
Pre-requirements			Namcook Analytics LLC
High level written requirements		1.Requirements QA 2.Functional test generation	ScopeMaster Ltd
Code		1.Structural software analysis	Castsoftware

Summary

1. Knowing the functional size is valuable
2. Early functional sizing analysis leads to better quality
3. Functional sizing automation is here
4. COSMIC FSM is ideal for Agile projects & contracts