EFFORT ESTIMATION MODEL FOR AGILE DEVELOPMENT USING WEIGHTED COMPLEXITY FACTOR FOR OPEN-SOURCE PROJECTS

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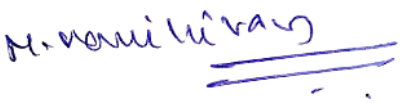
2025

DECLARATION

I hereby declared that the presented work in the thesis entitled "**Effort Estimation Model for Agile Development using Weighted Complexity Factors for Open-Source Project**" in fulfilment of degree of **Doctor of Philosophy (Ph. D.)** is outcome of research work carried out by me under the supervision of Dr. Manmohan Sharma, working as Professor, in the School Of Computer Science of Lovely Professional University, Punjab, India. In keeping with general practice of reporting scientific observations, due acknowledgements have been made whenever work described here has been based on findings of other investigator. This work has not been submitted in part or full to any other University or Institute for the award of any degree.



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CERTIFICATE

This is to certify that the work reported in the Ph. D. thesis entitled "**Effort Estimation Model for Agile Development using Weighted Complexity Factor for Open-Source Project**" submitted in fulfillment of the requirement for the award of degree of **Doctor of Philosophy (Ph.D.)** in the School of Computer Application, is a research work carried out by Ravi Kiran Mallidi, 41900541, is bonafide record of his/her original work carried out under my supervision and that no part of thesis has been submitted for any other degree, diploma or equivalent course.

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Abstract

Context: Organizations / Programs that develop software with considerable resource planning. However, many organizational projects fail to deliver within the time and budget. One of the most common issues for project failure is the inability to provide accurate forecasts on time and the resources needed to complete the project by the managers/scrum masters. In addition, maybe poor usage of estimation techniques/lack of experience for the use of the techniques / expert-based estimation without considering the project complicity factors like resource experience, identification of work item, architecture capability in the team, and automation factors.

Numerous estimation techniques are proposed for use in software projects to estimate the size of the project with time and cost. Most methods are effective in traditional software development implementation models like the waterfall, rapid application development, spiral, V-model, and Iterative models. In most of these models, the requirement is defined upfront, and the activities are accordingly. But, for the last couple of years, the project execution methodology has changed to Agile, emphasizing faster release cycles, frequent delivery of new features, and close collaboration between all stakeholders (product owner, the customer, and the development team). Various estimation techniques are available to determine the time to complete the task in agile projects, but most team members adopt an expert judgment approach to estimate. Due to this, most Agile-adopted projects fail to deliver the project within the time and budget. The current study proposes a new estimation model for Agile projects considering complexity factors.

Purpose: This research study was carried out to improve the effort estimation process for Agile software projects by applying various assigned factors, including Project Level Factors (PLF) like Architecture Capability (AC), Build Automation (CI/CD), Automated Code Generation (ACC), Test Driven Development (TDD) and Story Level Factors like Functional Complexity (FC), Technical Complexity (TC), Resource Experience (RC).

Methods: Scientific Research Methodology comprises testing and experimenting phases. These phases have been used in this research study through experimentation and detailed validations. The core work in the study was conducted via quasi-experimental methods with 18 agile projects of different sizes. WEighted COmplexity Factor Estimation Model (WECOFE) - the proposed model of estimation is applied for 18 projects comprised of 109 sprints, and their performance is assessed using Magnitude of Relative Error (MRE), Mean Magnitude of Relative Error (MMRE) and PRED (25). Compare the evaluated results with existing expert judgment estimates and efforts incurred. The statistical significance of the WECOFE methods was determined by calculating one-way ANOVA (Parametric) to determine the practical efficacy. Further, the WECOFE model is verified through empirical and laboratory validations of the data of 109 sprints from 18 previously completed Agile projects / existing running Agile projects.

Contributions: From this research, three primary contributions are to improve accuracy in effort estimates for Agile Software Development projects. Design and development of the novel WECOFE model, outperforming the existing method of expert judgment estimation by exhibiting 20% overall improvements in accuracy during the field trials and experiential evaluations, respectively.

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Table of Content

Chapter 1 – Introduction 1

1.1 Context 1
1.1.1 Work Breakdown Structure 1
1.1.2 Simple Medium Complex (SMC) 2
1.1.3 Use Case Point 3
1.1.4 Function Point Estimation 4
1.1.5 Agile Story Point Estimation 6
1.2 Evolution of Agile Methodology 8
1.2.1 Planning Poker 11
1.2.2 T-Shirt Size 11
1.2.3 Dot Voting 12
1.2.4 Bucket System 13
1.2.5 Large / Uncertain / Small 13
1.2.6 Ordering Method 14
1.2.7 Divide Until Maximum Size or Less 14

Chapter 2 – Background and Related Work 20

2.1 Non-Algorithm Based Estimation Models 20
2.2 Algorithm-Based Estimation Models 32
2.3 Non-Algorithm Vs Algorithm Estimation Model 38

Chapter 3 – Research Gap and Problem Statement 40

3.1 Current State of Story Point Estimation 40
3.2 Research Gap 41
3.3 Problem Statement 41
3.4 Motivation 42
3.5 Role of Architecture 43
3.6 Survey Methodology 43
3.7 Objectives 52
3.8 Research Methodology 53

Chapter 4 – Proposed WECOFE Model 56

4.1 Why Estimations Wrong 58
4.2 Potential Factors for Agile Estimations 58
4.3 Define Base Estimations 62
4.4 Project Level Factors 69
4.4.1 Architecture Capability (AC) 69
4.4.2 Build Automation (CI/CD) 75
4.4.3 Automated Code Generation (ACC) 76
4.4.4 Test Driven Development (TDD) 77
4.5 Story Level Factors 81
4.5.1 Functional Complexity (FC) 82
4.5.2 Technical Complexity (TC) 83
4.5.3 Resource Experience (RE) 84
4.6 Project Level Adjusted Factors Calculation 86
4.7 Story Level Adjusted Factor Calculation 88

4.8 Calculate WECOFE Adjusted Factor 90
Chapter 5 – Data Collection and Model Validation 92
5.1 Experiment Planning 93
5.2 Data Collection 94
5.3 Project Selection and Identification 97
5.4 Linear Proportions of Weights 100
5.5 Treatments applied to Sprints. 100
5.5.1 Treatment 1 100
5.5.2 Treatment 2 103
5.5.3 Treatment 3 107
5.6 Data Calibration Using Statistical t-Test. 110
5.7 Model Validation 154
Chapter 6 – Findings and Discussions 164
Chapter 7 – Conclusion 167
Chapter 8 – Future Work 169
Chapter 9 – References 171
Chapter 10 – Appendix 176
10.1 Appendix A 176
10.2 Appendix B 258
10.3 Appendix C 260
10.4 Appendix D 261
Chapter 11 – Publications 265
11.1 Journal Publication Papers 265
11.2 Conference Papers 267

List of Tables

Table 1: Estimation Techniques 15
Table 2: Agile Scrum Estimation Challenges 17
Table 3: Legacy Modernization Approaches and Benefits 50
Table 4: Tool Base Vs. Manual Migration Comparison 52
Table 5: PLF Definitions 81
Table 6: SLF Definitions 85
Table 7: PLF Adjusted Final Factors 87
Table 8: SLF Adjusted Final Factors 89
Table 9: Org 1 Project Details 95
Table 10: Org 2 Project Details 96
Table 11: Org 3 Project Details 97
Table 12 – Organization 1 Project Details 176
Table 13 – Organization 2 Project Details 216
Table 14 – Organization 3 Project Details 221
Table 15 – Continentals Project 230
Table 16 – List of Journal Papers Published 265
Table 17 – List of Conference Papers Published 267

List of Figures

Figure 1: Work Breakdown activities 2
Figure 2: Estimation Template for SMC model 2
Figure 3: Functional Point Estimation Template 5
Figure 4: Story Point Estimation Template 8
Figure 5: Planning Poker 11
Figure 6: T-Shirt Size Estimation 12
Figure 7: Dot Voting 13
Figure 8: Bucket System 13
Figure 9: Tool-Based Migration Approach 51
Figure 10: Manual Migration Approach 51
Figure 11: Research Methodology 55
Figure 12: Factors for Requirement 58
Figure 13: Agile Story Point Estimation Steps 59
Figure 14: Agile Sprint Planning Activities 59
Figure 15: Deliberation Factors considered to determine story point estimation. 61
Figure 16: Factors for Agile Estimations 62
Figure 17: N-Tier Architecture 71
Figure 18: Single Page Architecture 71
Figure 19: Microservices Architecture 72
Figure 20: Streaming Platform Architecture 73
Figure 21: JMS Architecture 74
Figure 22: SOA Blueprint Services 75
Figure 23: TDD Process Flow 78
Figure 24: PLF Complexity Factor Values 81
Figure 25: SLF Complexity Factor Values 86
Figure 26: Grouping of Factors 93
Figure 27: Project Identification Flow Diagram 99

Chapter 1 – Introduction

1.1 Context

Organizations face common problems in executing projects with over-budget and late delivery due to the accuracy of estimations for years. Sometimes, the estimates depend on the development methodology recommended specific estimation approach or practice. Various methods of measures for Development and Maintenance Projects with the nature of the project and delivery model. Software organizations are using a variety of estimation models, such as

- Work Breakdown Structure
- Simple-Medium-Complex (SMC)
- Use Case Point
- Functional Point
- Wideband Delphi
- Agile SCRUM Story Point

Estimation starts from the software development life cycle (SDLC) and is refined to all project phases, from the Planning to Maintenance phases. Estimates determine the specific project or system's time, effort, resources, and money. Estimations based on the given requirement from the Business teams include assumptions, risks, uncertainty, technology, and team composition. The software project estimate includes size, effort in person months/hours, schedule, and cost. Effort estimation accuracy would depend upon input, historical data, and predictability of the Organization's Software Development Life Cycle (SDLC) processes. Project managers are crucial in predicting accurate estimates by input or requirements. The strategy and execution mechanism would change according to the SDLC process adopted by the project. The above estimation models are detailed below:

1.1.1 Work Breakdown Structure

Break the task into a straightforward task based on the SDLC life cycle. Project Management Body of Knowledge (PMBOK) defined Work Breakdown Structure (WBS) as a "*deliverable-oriented hierarchical decomposition of the work to be*

executed by the project team." Tree representation is straightforward to understand the entire project tasks by the team. Various project life cycles include Scope, Software Requirement Specification (SRS), Design, Coding, Unit testing, System Testing, Integration Testing, and Deployment. In addition, WBS provides the basic framework for cost estimation and schedule development tasks. Figure 1 shows the tree structures of activities.

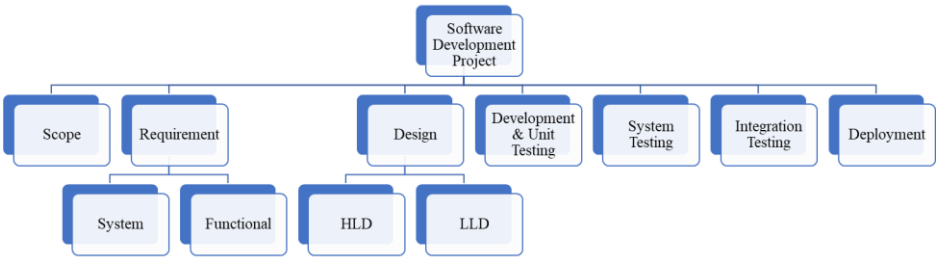


Figure 1: Work Breakdown activities

1.1.2 Simple Medium Complex (SMC)

Simple medium Complex is a fundamental estimation technique the Organization uses if they don't have the correct information. The ballpark estimation would be based on each requirement's standard estimate. Each complexity describes the person-days (PDs) for the organizational standard. The complex data must arrive from old project data and organization experience to deliver the piece of work time. Figure 2 shows the sample case study for estimation using SMC.

TEMPLATE FOR ESTIMATES - Version 1.0	.NET or Java / JSP		
Classification of Units			
Effort required for Coding and Unit Testing	Simple	Medium	Complex
Person Days	2.5	4	8
The number of units that fall into the following category	11	7	3
Total Number of Units	21		
Effort required for Coding and Unit Testing	27.5	28	24
Total Effort for Coding and Unit Testing for project	79.5		
Phases		P Days	Measurement
Familiarization & Analysis	10	17.67	10%
Analysis and Design	25	44.17	25%
Coding	45	79.50	45%
Integration and System Testing	10	17.67	10%
Deployment Support	10	17.67	10%
Effort required for Project Phases		176.67	
Others (as applicable)			
Performance Testing(PPROD)		5.00	
Environment Set up		5.00	
Overall System Testing		5.00	
Pilot and Full-Scale Deployment support		0.00	
Non -functional Requirements		5.00	
Subtotal		196.67	
With Complexity Factor		196.67	1
Project Management and Co-ordination		19.67	10%
Contingency		19.67	10%
Final offshore effort for the Project PDS		236.00	

Figure 2: Estimation Template for SMC model

The above template shows how to do estimates using SMC. First, mark the predicted Simple, Medium, and Complex factors and the number of units to be considered for the requirement or project. Then, the base Development and Unit testing effort was derived. In the above case, Analysis for 10%, Design for 25%, Development and Unit testing for 45% (arrived from average values), Testing for 10%, and Deployment Support for 10%.

1.1.3 Use Case Point

Use Case Points (UCP) derive the application size and effort from its use cases defined in the requirement phase. If the requirement is clear, the measures would be more accurate. Gustav Karner, in 1993, did work on UCP; UCP analyzes and provides estimates based on the actors, scenarios, and technical and environmental factors. Defined the variables and computed using perceived values and various constants. Formula to calculate the Use Case Point

UCP = TCF * ECF * UUCP * PF

Technical Complexity Factor (TCF), Environment Complexity Factor (ECF), Unadjusted Use Case Points (UUCP), and Productivity Factor (UF) are used for UCP calculation.

TCF factor calculated with various application technical issues. Each factor is weighted from 0-5 with relative impact. A zero weight indicates the element is irrelevant, and the five weights indicate the facet with the most relevance. The aspects consist of Distributed systems, Complex internal Processing, Performance, End-User Efficiency, Reusability, portability, Easy installation, easy-to-change, Concurrent, Special security features, direct access to third parties, and User training facilities.

ECF factors calculate the productivity impact of various technical issues in an application. A zero weight indicates the element is irrelevant, and the five weights indicate the facet with the most relevance. Familiarity with Unified Modeling Language, Object-Oriented Experience, Application Experience, Lead analyst capability, Motivation factors, Requirements stability, Working Part-time, and Programming language difficulty are the factors.

UUCP comprises two components used to calculate the Unadjusted Use Case Points

- Unadjusted Use Case Weight (UUCW) - Calculate the Number of scenarios or activities in certain use cases.
- Unadjusted Actor Weight (UAW) - Combined complexity of all the Actors in use cases.

PF factor is a ratio of person-hours per use case point based on past projects. Industry standard in-between 15-30. The value depends on the Organization's productivity values.

1.1.4 Function Point Estimation

Functionality understanding of the project depends on how much smaller Functional Point Analysis is made during requirements gathering. Project Stakeholders, users, developers, and program managers easily understand the system's functionality if the Functional Point Analysis is correctly done. Mainly Transactional Functions and Data Functions:

Transactional Functions – Mainly contains three components: they are External Inputs (EI), External Outputs (EO), and External Inquiries (EQ). The transaction is defined as adding, modifying, deleting, retrieving, or processing information contained in these Transactional Functions components.

- External Inputs – Data retrieval from external applications to internal applications. This data from the outside is used for maintaining internal logical files.
- External Outputs – Data contribution from internal applications to external applications. The data is used to update the inner logical file values. Reports generated using the internal and external interface data and the messages used for other applications as input are developed from internal valid or external interface files.
- External Inquiry – Data retrieval from external interface files and internal logical files for output and input components. The input does not update the internal valid files or external interface files. Output data does not contain derived data.

Data Functions - Mainly contains two components: Internal Logical Files (ILF) and External Interface Files (EIF).

- Internal Logical Files – Logical data within the application boundary and maintained through external inputs.
- External Interface Files – Logical data used for reference purposes only. The data available is entirely outside the application, and a different application maintains the data.

Low, Average, or High. File Types Referenced, Data Element Types, and Record Element Types used in the Ranking calculation were used to classify five significant components and factors mentioned. The total number of Internal Logical Files (ILFs) maintained, read, or referenced is called File Types Referenced (FTRs). EI / EO transactions called external interface files read or referenced. Unique user-recognizable non-recursive fields, including vital attributes maintained on ILF / EIF, are called Data Element Type (DET). Record Element Type (RET) is in the subgroup of the ILF / EIF. Transactional Functions ranking is notated as the number of files updated or referenced (FTRs) and the number of data element types (DETs) used. The sample case study described for estimation using Functional Point Estimation. Unadjusted Factor (UAF) is generated based on Transactional and Data Functions.

Component Type	Component Complexity			
	Low	Average	High	Total
External Inputs	__* 3=EI1	__* 4=EI2	__* 6=EI3	EI1+EI2+EI3
External Outputs	__* 4=EO1	__* 5=EO2	__* 7=EO3	EO1+EO2+EO3
External Inquiries	__* 3=EQ1	__* 4=EQ2	__* 6=EQ3	EQ1+EQ2+EQ3
Internal Logical Files	__* 7=ILF1	__* 10=ILF2	__* 15=ILF3	ILF1+ILF2+ILF3
External Interface Files	__* 5=EIF1	__* 7=EIF2	__* 10=EIF3	EIF1+EIF2+EIF3
Total UAF	(EI1+EI2+EI3) + (EO1+EO2+EO3) + (EQ1+EQ2+EQ3) + (ILF1+ILF2+ILF3) + (EIF1+EIF2+EIF3)			

	ILF			EIF			EI			EO			EQ		
Line Item	L	A	H	L	A	H	L	A	H	L	A	H	L	A	H
	7	10	15	5	7	10	3	4	6	4	5	7	3	4	6

Figure 3: Functional Point Estimation Template

After calculating the UAF, The Value Adjustment Factor (VAF) is calculated on General System Characteristics (GSCs). The degrees of influence range between the scale of 0-5. Data communication, Distributed functions, Performance objectives, heavily used configuration, Transaction rate, Online data entry, End-user efficiency, Online update, Complex processing, Reusability, Installation ease, Operational ease, Multiple sites, and Facilitate change are part of GSCs. Figure 3 shows the use sample template for calculating the functional point analysis.

VAF = 0.65 + (Sum of degrees of the Influence of the fourteen GSCs / 100

Multiplying VAF to Unadjusted Function Point (UAF) to calculate final Function Points

FP = UAF * VAF

Functional Point Estimations are suitable, while the requirements are very detailed. All the internal and external interfaces are evident, along with database interactions.

1.1.5 Agile Story Point Estimation

Agile requirements are volatile. The task requirement can change at any time in the sprint cycle. Estimating Agile is very complex due to the nature of the required change. Any project success is completing the project within the Budget and Time. According to The Standish Group 2020 Chaos Report, the success rate of Agile projects is approximately twice as high as that of Waterfall projects, with 42% being Successful, 50% being Challenged, and 8% Failing for Agile projects. Agile projects have a success rate that is 60% higher than non-agile projects.

Agile software development estimations are based on the relative size and measured in the Fibonacci scale of user story points. Agile Scrum is typically two to three weeks long and iterative, where the requirements are continuously improved, and development work is carried out in the subsequent sprints. The Fibonacci sequence consists of [0,1,3,5…] number sequence. Agile used the Fibonacci sequence to achieve better estimates and planning by reducing the complexity, effort, and project planning.

The most widely used Story Point Estimation is Planning Poker. Three methods of estimation techniques combined in Planning Poker

- Expert Opinion – The Expert provides an opinion on how long the task takes. The Expert provides an estimate in a product backlog meeting with their experience, gut feeling, or intuition. The Expert provided the forecast effort; the team accepted after a detailed discussion on the requirement. The process was accurate compared to other analytical methods in Agile.
- Analogy – It is mainly for user story comparison. Compare the User story with the undersized user story estimation implemented earlier or from the repository and provide the estimate correctly. Predicts accurate results as compared to other

options. Sometimes, the forecast estimate may go wrong due to the interpretation of data from earlier or history.

- Desegregation – Splitting the user stories into tiny user stories and estimates. The sprint contains two weeks, and the resource gets a development time of five to seven days to develop. So, the bigger stores split into n-number of more minor story points. This approach ensures many comparable stories.

Scrum recommends the Stories are estimated using Story Points. The team delivering the specific Story points for each sprint (with in the time line 2-4 weeks' time) to attain the working model. The working model is demonstrated to business owners for feedback at the end of each sprint. The provided feedback is incorporated in the consequent sprint as a new requirement.

The Story point estimation model was introduced to avoid the person-hours estimation in Agile. As a result, story point estimates have a more significant advantage. On the other hand, disadvantages due to lack of experience in effort estimate. The story point estimates vary from team to team. By the multiple teams, the estimates vary, and more / less compared to other estimation techniques.

The simple formula proposed for estimating Agile projects combines Team Productivity, Complexity Factor, Iterative velocity, Test Driven Development Factor (TDD) instead of following the Poker man Fibonacci scale. In this template-based approach, any person can calculate the estimations accurately. Below is the case study for the Agile Estimations. Figure 4 shows the template for estimating the effort estimates using the story point. In the story point estimates also the resources follows the standard complexity factors based on work packet and technology complexity.

Step 1: Raw Efforts considering team productivity is determined as

Yrs of Experience	> 5	3 to 5	< 3
JSP,JS	6	8	12
MVC	4	5	6
Business Object	8	9	12
DAO	4	4	6
DB Changes	2	2	2
Build on Server	1	1	1

Step 2: Complexity factor is determined as

Technology	Known	New Version	Unknown
Requirement Complexity			
Low	0.1	0.2	0.3
Medium	0.3	0.4	0.5
High	0.6	0.7	0.8

Step 3: Iterative Velocity determined as

Project Duration (in Months)	Iteration velocity	Pair Programming followed
0 - 4	2	Yes
4 - 8	1.6	Yes
> 8	1.25	Yes
NA	1	No

Figure 4: Story Point Estimation Template

Step 4: Determine the factor for Test Driven Development (TDD factor) - Factor Considered: 0.12

Step 5: Calculate the Adjusted Estimation using the formula.

Adjusted Estimates = Raw Effort (1 + Complexity Factor + TDD factor)

Step 6: Calculate Actual Efforts and Determine the Story Points

Actual Efforts = Iteration Velocity * Adjusted Estimates

1.2 Evolution of Agile Methodology

The Agile approach to software development emphasizes the importance of being adaptable, evolving continuously, delivering early, improving continually, and being open to changing requirements throughout the development process. In 2011, the Agile Alliance published the *Guide to Agile Practices*, which is an open-source collection defining agile practices, terms, and elements, and providing insights and experience from diverse global communities. The Agile Manifesto outlines twelve principles that emphasize continuous delivery, embracing changes in requirements, daily collaboration between developers and business stakeholders, individual motivation, face-to-face communication, working software, building sustainable teams, continuous design, prioritizing tasks, creating robust architectures, and fostering more effective teams.

At various stages of the project life cycle, Agile estimation is conducted. Analysis is carried out at the Proposal, Release, and Sprint levels. Estimations at the Sprint Level are crucial for ensuring timely delivery of high-quality products by the Scrum Master.

Management teams monitor efforts to effectively plan and oversee groups involved in project implementation (development), testing, and product/project delivery to the customer/end-user within the specified timeframe. Inaccurate estimates can lead to compromised planning and management activities for managers/scrum masters in Agile projects, resulting in poor quality or undesired products/projects for the customer/end-user. Agile encompasses various software development methods to cater to a wide range of Software Development Life Cycle (SDLC) needs, which includes:

- Agile Unified Process (AUP)
- Extreme Programming (XP)
- Adaptive Software Development (ASD)
- Feature-Driven Development (FDD)
- Kanban
- Scrum
- Scaled Agile Framework (SAFe)

Agile encompasses various software development methodologies that cater to requirements, design, coding, testing, planning, risk management, process, and quality. Here are a few noteworthy Agile Software Development Practices:

- Acceptance Test-Driven Development (ATDD)
- Backlogs
- Behaviour-Driven Development (BDD)
- Pair Programming
- Continues Integration (CI)
- Incremental Development (ID)
- Test-Driven Development (TDD)
- User Story
- Planning Poker
- Velocity Tracking

Over the past few years, Scrum has become a prominent framework utilized in Agile projects for developing, delivering, and sustaining complex products. For instance, within the Scrum framework, Sprint planning is carried out to divide the work into achievable goals within a 2 to 3-week timeframe as per The Standish Group 2020 Chaos Report. The term "Scrum" in software development is employed within the

Agile framework for managing intricate work through iterative and incremental processes. During the Scrum process, the Scrum master leads the Sprint Planning session, and the development team selects tasks based on priority and estimates using various methods adopted by the team. The size of Product Backlog Items (PBI) is determined using Story Points. Different Agile estimation techniques are utilized by groups across organizations to manage their project scope and experience. It is the responsibility of the Scrum Master to choose the most appropriate estimation model for estimating tasks. Scrum aids the team in more accurately assessing Story points. Relative sizing is a crucial aspect of team members' estimation of Story Points. All team members, Product Owners, Scrum Masters, Scrum developers, Scrum testers, and stakeholders share the responsibility for estimating the effor.

This research compares various models for estimating Story Points, such as Planning Poker, T-Shirt Size, Dot Voting, Bucket System, Large / Uncertain / Small, Affinity Mapping, Ordering Method, and Divide Until Maximum Size or Less, along with their associated challenges. The Agile Manifesto encompasses different Agile Scrum estimation models. Ensuring accurate product estimation in Agile projects can be challenging due to aligning project constraints, such as Specific Scope, Time-bound, Estimated Budget, Quality Constraints, resource attitudes, and project risks. Story Points are determined through comparative/relative sizing. Relative sizing of Stories is based on analyzing all tasks/stories and identifying a reference task/story. To achieve this, backlog tasks are selected, team brainstorming is conducted, questions are asked of the Product Owner, and requirements are thoroughly understood. Listing the activities required to complete the task/user story includes Design, Code, Unit Testing, Integration Testing, and Acceptance Testing. Consensus with all stakeholders is used to determine the relative Story Points for the selected task. If a new task/story requires the same effort as a recent Story, the same amount of work is assigned. Tasks/stories that require more effort are given higher values, while those requiring less effort are assigned lower values based on relative Story Points. The following are widely used estimation models for deriving Scrum Story Points to improve estimates. Based on Story Points, the team delivers specific Stories for each sprint cycle to achieve a working model. At the end of each sprint cycle, the working model is presented to end-

users for feedback. End-user feedback is then incorporated into the subsequent Sprint as a new requirement.

1.2.1 Planning Poker

Planning Poker technique is commonly used for estimating Agile Story Points. JIRA stands out as a leading tool for managing Agile Poker projects. Planning Poker involves using playing cards with values such as 0.1, 2, 3, 5, 8, 13, 21, 34, and 55 to establish relative sizing through story points as described in Figure 5. These card values represent the story points assigned to a specific item or story, determined by the team during the scrum meeting, typically following the Fibonacci sequence. Initially, the product owner or scrum master presents the user story and elucidates all its features and requirements while discussing technical and non-technical elements for estimation with the team. The primary responsibility of the product owner is to address any questions or seek clarification from the group. Following a detailed analysis and discussion of the task or story, all estimators or teams are prompted to choose a card to estimate the user story. Subsequently, each estimator or team selects a corresponding value from the poker cards, which becomes the final estimate. In cases where values differ, the moderators request an explanation from the estimators regarding their choices of high or low values. Further discussion on the requirement continues until a consensus is reached within the group. Planning Poker generates relative size estimates by grouping items of similar sizes from the Product Backlog Item (PBI).

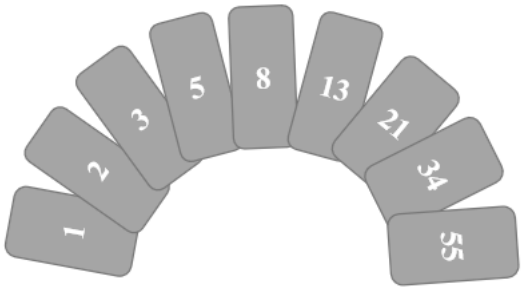


Figure 5: Planning Poker

1.2.2 T-Shirt Size

The T-shirt sizing system includes XS (Extra Small), S (Small), M (Medium), L (Large), and XL (Extra Large) sizes. Similarly, Agile estimation utilizes T-shirt sizes

to provide approximate estimates for a large backlog of items as described in Figure 6. This model facilitates rapid rough estimations for the project's scope. Team members engage in discussions to determine a relative measure, often landing on a Medium size, and collectively agree on estimations. T-shirt sizes allow for quick estimation, project initiation, and the development of a shared understanding of relative estimating within the team. This approach involves estimating in a range rather than providing absolute numbers, enabling the team to quickly reach consensus on rough measures.

Figure 6: T-Shirt Size Estimation

1.2.3 Dot Voting

The Dot Voting technique involves prioritizing the stories in the Product Backlog by ranking them from highest to lowest priority. This helps in determining which tasks or stories should be tackled first. User stories, along with their descriptions, are placed on the Scrum wallboard using yellow stickers as described in Figure 7. During the Scrum Meeting, Stakeholders participate in a voting process to identify the priority requirements for each story. Each Stakeholder expresses their opinion on the condition by placing a dot (positive/negative). The Product Owner then reorders the product backlog items based on the number of dots received by each story, placing the most voted ones at the top. Following this, the product backlog is categorized into high, medium, and low-priority groups. The same process is repeated within each group to determine the priority order. This iteration continues until a final order is established with agreement from all stakeholders. The team then starts working on the high-priority items first and completes them within the agreed period. This method is simple, quick, and effectively evaluates multiple stories (up to 8-10).

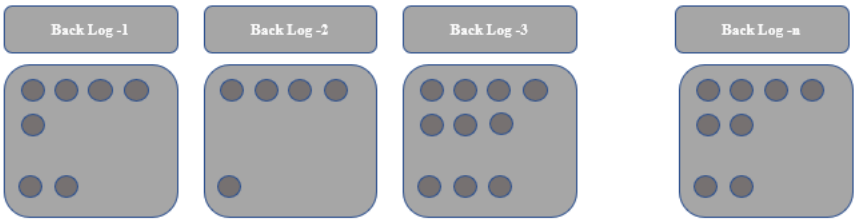


Figure 7: Dot Voting

1.2.4 Bucket System

Planning Poker becomes more complicated with a larger number of items and team estimations. The Bucket System is utilized for estimating a larger number of items by bigger teams. Different relative size buckets are established, with each bucket assigned a number ranging from 0 to 200 (0,1,2,3,4,5,8,13,20,30,50,100, 200) as described in Figure 8. When a task or story is selected from the backlog, the estimator places it into the appropriate bucket and explains the rationale. The divide-and-conquer technique is employed to assess the remaining backlog items and assign suitable estimation buckets to each task or story. This process is repeated until all tasks and stories in the backlog are estimated. The Scrum Master is responsible for ensuring that no task or story is moved without conducting sanity checks. The Bucket System is a collaborative estimation technique that is fast but requires an experienced team to accurately estimate the product backlogs.

Figure 8: Bucket System

1.2.5 Large / Uncertain / Small

There are several ways to estimate, that includes the Large / Uncertain / Small method, which is simpler than the bucket system and involves three predetermined sizes instead of multiple buckets. Teams or estimators categorize items/stories as Large, Uncertain, or Small when using this estimation technique, which is suitable for similar items/stories in the Product Backlog. This method is similar to the Simple /

Medium / Complex estimations model, where a certain number of Story points is assigned for each category for a Task/Story.

1.2.6 Ordering Method

This approach is appropriate when dealing with a large number of backlog items and a limited number of resources. It offers accurate comparative sizes for the items in the product backlog. It involves defining a range from low to high and randomly assigning priorities within that range. Each team member or estimator is tasked with shifting the items from one point on the scale to another. The items/stories are then prioritized to move up or down one place until all participants are satisfied with the product backlog order from high to low. This exercise establishes the priority order of the product backlog.

1.2.7 Divide Until Maximum Size or Less

The maximum size for estimation in the project, known as base value, is defined by the Scrum team (e.g., 8 hours of effort). During grooming sessions, each product backlog is reviewed to assess if the Story aligns with or is smaller than the estimated base value. If a Story surpasses the defined maximum size, it is divided into multiple stories to fit within the estimated base value size. This process continues until all product backlog items fall within the permissible size range.

The Agile Scrum estimation techniques mentioned above include collective sizing and relative size. All project stakeholders participate in the estimation process, with most estimations occurring during Scrum Estimation and Grooming sessions. The Scrum Master selects stories from the product backlog, discusses the requirements in the Scrum meeting, and estimates based on any of the aforementioned techniques. The collective decision was made to ensure that estimating Stories does not lead to blaming individuals for inaccurate estimates. All the Agile estimation techniques described above are utilized for relative units. User Story Points provide the benefit of comparing each other's velocity. Velocity measures the work completed by the team within a specific sprint cycle. Based on the project scope, resource experience, and size of the project, a proper estimation technique must be adopted by the Scrum Master. Table 1 provides the details of when to use which estimation technique.

Estimation Technique	Small Number of Backlogs	A more significant number of Backlogs	Numerical Estimations	New to Agile Estimations	Long-Term Plan Estimations
Planning Poker	Yes			Yes	
T-Shirt Size			Yes		
Dot Voting	Yes	Yes			
Bucket System		Yes		Yes	Yes
Large / Uncertain / Small		Yes	Yes		
Ordering Method	Yes		Yes		
Divide Until maximum Size or Less.					Yes

Table 1: Estimation Techniques

During story point estimations, the team encountered conceptual challenges. It's important to be mindful of the hurdles in Agile scrum estimates to avoid confusion about Agile processes. Making accurate estimations on the first day is a significant mistake. Without proper coaching and experience, teams cannot accurately estimate story points. Training and allowing the team to experience one to two sprints are essential for estimating story points. Lack of participation in scrum estimations poses challenges in adopting agile. At times, team members overestimate story points, impacting other resources in the learning phase. Agile allows for regular updates to requirements, design, and architecture to align with business needs. The abstract value of story points varies from team to team. Understanding the team's throughput capacity helps predict achievable work in the next sprint. Agile promotes retrospective meetings for teams to review the Sprint and adjust story points

according to their past experiences. Below, Table 2 describes the Agile Scrum Estimation challenges and their resolutions.

Challenges	Resolution
Predicting lack of story point estimation	Teams lack the ability to forecast story points for backlog items. Management must conduct considerable training programs for the team to work with Agile and do story point estimations.
No standardized estimation technique	Agile Scrum estimates are relative in size and not defined by any measure. The definition of a story point is different from project to project. Scrum Master's responsibility is to adopt proper estimation techniques for their project size and team experience.
Lack of metrics like size, effort, and velocity from another project	Most teams do not maintain data like size, efforts, and velocity of the project implementation if the data is available for other projects to estimate the same work type. Management supports the team using Agile Management tools to log the activities for further use.
Overestimation of Sprint, if already not done previously, the same type of work	Most of the time, developers inflate the story points if the team is working on new technology. Scrum Master is responsible for moderating the team and providing the team with relevant information on new technology, not to inflate the stories.
Cultural and communication bandwidth	How the resource has understood the requirement is a primary factor for Agile delivery. Scrum Master's responsibility is to conduct daily stand-up meetings with the Product Owner to understand the requirements to be delivered on time.
Too big projects or backlogs	Breaking down the backlog into smaller tasks enables the team to gain a better understanding of the requirements and complete the work within the specified timeframe.

	Forming smaller teams and encouraging individual work contributes to achieving the collective objective. Establishing Scrum-of-Scrums/Safe teams is beneficial for handling large-scale projects.
Noncommitment of the resources	Creating a team that is self-managing and self-organizing can help address commitment by enabling the group to express their creativity, foster innovation, and be recognized for their expertise.
Project Management Integration	The agile process is not suitable for projects that require a plan-driven approach. Create a hybrid Agile approach to integrate Project Management aspects into plan-driven projects.

Table 2: Agile Scrum Estimation Challenges

This thesis comprises ten significant chapters, each consisting of different sub-sections. The table below describes the detailed-out view of each chapter with the outcome.

Chapter	Sub-Sections	Outcome
Chapter 1 – Introduction	• Context • Evolution of Agile Methodology	Describes the context and agile method — details about the evaluation of agile methodology and advantages and disadvantages.
Chapter 2 - Background and Related Work	• Non-Algorithm Based Estimation Models • Algorithm-Based Estimation Models	Reviews the related work on Agile estimations using algorithm and non-algorithm models.
Chapter 3 – Research Gap and Problem	• Current State of Story Point Estimation • Research Gap • Problem Statement	Defines the research gaps along with the problem statement. The survey methodology and objectives of

Statement	• Motivation • Role of Architecture • Survey Methodology • Objectives • Research Methodology	the thesis are described in this section.
Chapter 4 – Proposed WECOFE Model	• Potential Factors for Agile Estimation • Define Base Estimations • Project Level Factors (PLF) • Story Level Factors (SLF) • Project Level Adjusted Factors Calculation • Story Level Adjusted Factors Calculation • Calculate WECOFE Adjusted Calculation	Defined the novel estimation model using Weighted Complexity Factors by adopting Project Level and Story Level Factors
Chapter 5 – Data Collection and Model Validation	• Experiment Planning • Data Collection • Project Selection • Linear Proportions of Weights • Treatments applied to Sprints. • Data Collection Using Statistical T-test. • Model Validation	Majorly defined the Data collection and project section and applied the t-test for the data collected with model validation. This part encompasses the validation of the proposed model based on three perspectives.
Chapter 6 – Findings and Discussions	• Observations and Discussions	Discussions for t-test values along with MRE and MMRE. Mean and Variance are calculated for each sprint and

		compared the values against Estimated Vs. Estimated WECOFE Vs. Actual Efforts
Chapter 7 - Conclusion	• Conclusion	Concluding the work done as part of the thesis work.
Chapter 8 – Future Work	• Future Work	Future work and limitations of the work.
Chapter 9 - References	• References	Papers referenced as part of the study the Agile estimations.
Chapter 10 - Appendix	• Appendix	Appendix A constitutes the Sprint data, Appendix B describes the Excel sheet representation. Appendix C describes the questioner used for analysis in Section 3.6 . Appendix D describes the mail communication to the project managers who help to provide the sprints.
Chapter 11 – Papers Published	• Papers	Contains the list of papers published in Journals and Conferences

Chapter 2 – Background and Related Work

This research study aims to understand and improve the forecasts of size, effort, cost, and schedule for Agile Software projects through various approaches. Related work has been done with different authors, and multiple methods are derived for size and effort for a given task. Numerous studies have provided empirical evidence demonstrating that agile effort estimations are based on Artificial Intelligence (AI) / Machine Learning (ML) and traditional estimating methods, not using AI / ML. Previous studies on estimating effort, cost, and schedule are classified based on Two ways, i.e., Non-Algorithm and Algorithm methods. Non-algorithm models include Functional Point, Use Case point models, and other approaches. Algorithm models include AI / ML along with Fuzzy logic. Many prior evaluations of estimation method performance are based on the Magnitude of Relative Error (MRE) measure of accuracy/error. A related detailed study was described in the below sub-sections. Hannay et al. (2018) suggest that the Benefit Point and the Story Point help manage projects effectively and maximize cost benefit in the early stages. They have taken three projects to study and derived three-point-based estimates like Benefit, Cost, and Benefit / Cost. Each requirement is a category to each point base, assigning the estimates and helping to eliminate the EPICs from Agile Projects.

2.1 Non-Algorithm Based Estimation Models

Alzubaidi et al. (2022) Studied various factors to identify the critical factors influencing Agile projects to improve performance. For example, it helps to increase the efficiency of scrum teams. Surveyed to validate the essential elements and found the results are encouraging. The critical factors identified are product backlog management, integration tests cost reduction, sprint duration, and product owner role. Sampling was conducted, correlating the values from the different stockholders, and concluding the results.

Altaleb et al. (2020) investigated factors affecting effort estimation on agile mobile projects. The aspects are finalized based on the beliefs of practitioners with expertise and project scope from 20 practitioners across 18 organizations. Mobile project

estimation accuracy is based on critical factors like supporting platform, tools availability, whether the developer has done similar work before, UI design, back-end configuration, and structure of mobile storage.

Rosa et al. (2021) surveyed 36 agile projects from the United States Department of Defence (DoD) to find out how effectively used. Projects are validated against a regression model with seven variables - Coefficient, Adjusted R2, Predicted R2, P-Value, Variance Inflation Factor, Standard Error, F test, and Mean Magnitude of Relative Error. The model suggested that DoD contractors adhere to peak staff, request proposals, and initial software requirements for estimating Agile projects.

Sharma & Chaudhary (2020) proposed a multi-linear regression model for agile project estimations. Found the correlation between dependent and independent variables for finding the estimates. Fraction and Dynamic Factors are identified and assigned values for each of them. The linear regression model identifies the relationship between the Fraction and Dynamic factors to identify estimates. The comparison was made using MMRE for 21 agile projects. A stepwise linear regression model was constructed with Effort, Initial velocity, total velocity, and working days.

Gupta & Mahapatra (2021) agility assessment is based on many factors that should be considered while calculating the time and cost of the project. Developed HEETAD (Hybrid Agile Software Development) has been designed considering the line of code developed. Each line of code was measured based on the complexity factor defined.

Silhavy et al. (2021) propose Use Case Estimation sizing based on Actors using stepwise regression. Actors and Use Cases Size Estimation (AUCSE) designed to add Unadjusted Actor Weight (UAW), Unadjusted Use Case Weight (UUCW), Technical Complexity Factors (TCF), Environmental Complexity Factors (ECF), and UCP (Real) to come up with estimations.

Fernández-Diego et al. (2020) extracted papers published from 2000 to 2020 in Agile estimations and techniques and identified most of the projects are using estimation models like Scrum, XP, TDD, Agile Unified Process, Kanban, and Distributed Agile Software Development. Planning poker is the most used technique in current Agile projects, but the estimations in Agile are still inconsistent. Finally, teams make effort estimations using old data (from the database), and expert opinion helps to arrive at

accurate estimates. Sarwar et al. (2020) proposed 18 hypotheses to support the Situational Agile Distributed Development (SADD) model, and every hypothesis is validated using statistical methods. Z test was performed to calculate the confidence of hypotheses with comparing probability 0.05 value was set. SADD model Software Architecture is recommended while working in different situations, and the organization's size contributes 89.39% of situational factors.

Jaatun (2019) examined the challenges in Architectural Risk Analysis in Agile methodology. Gary McGraw identified some touch points for architecture risk analysis: Code Review, Architectural risk analysis, Penetration testing, Risk-based security testing, Abuse cases, Security requirements, and Security operations. Conclude that Architectural risk analysis in DevOps and CICD pipelines are challenged and not easily automated.

Unger-Windeler & Schneider (2019) framed two research questions and sent them to 156 employees with different roles and different Organizations through email, and 84 out of them responded to identify the part of the Product Owner in agile teams. Most Employees are expected to have a Product Owner's Role to write "Write Story Points" and "Prioritize Backlog."

Zozas et al. (2019) observed seven factors in JavaScript that are critical, i.e., the number of Corrective tasks (COR_ACT), the Cumulative Activity (ACT), Lines of Code (LOC), and the Number of Open Bugs—developed maintenance indices like the Maintenance Changes Index and Maintenance Effort Index from 60 open-source projects comprising 5788 releases.

Hadar & Hassanzadeh (2019) proposed an AgiSec prototype model for prioritizing security requirements and tested the prototype with IT/OT systems. AgiSec provides business process topology and is constructed with AgiDis and AgiBuiz modules. AgiSec detects, models, and constantly prioritizes security requirements in Agile.

Shams et al. (2019) described various development values in Agile development and factors involved in mobile development and discussed different cost estimation techniques used for the last four decades. Estimation models like Analogy Effort Estimation, Regression-Based Estimation Model, Software Sized based Estimation Model, Functional Estimation Model, Work Breakdown Structure, and Story Point Estimation have been used for the past four decades and conclude Work Breakdown

Estimates and Story Points help the best estimates of Mobile Application Development.

Ibrahim et al. (2019) studied and identified several challenges in Agile development and maintenance projects: Iterative development, focused work objective, teamwork, customer involvement, face-to-face communication, light documentation, frequent testing, collective ownership, and knowledge transfer.

Hayat et al. (2019) identify project management influences in 10 knowledge areas - cost management, scope management, human resource management, procurement management, communication management, stakeholder management, risk management, and project management based on research from 30+ software houses using questionnaires.

Batra & Bhatnagar (2019) studied critical challenges in Agile Requirements Engineering to find the significant challenges in the current stage of Agile methodology. Data was collected from domains manufacturing, telco, health care, and banking, and came up with Agile Requirement Challenges spread in all Domains. It observed that the most critical challenges are Estimates, weak architecture, and minimal Documentation.

Friess (2019) recorded the Sprint Meetings for three sprints of the midsize firm with 7 minutes of stand-up calls. 69% of the team used Scrum language terms like Sprint Execution-44% and User Stories-25%. Scrum language is found in all meetings, and few associates exist between Scrum Language and Job Title.

Mathur & Satapathy (2019) proposed a combination of Agile and Non-Agile techniques for mobile development methods are MobileD, Hybrid Methodology Design, MASAM (Mobile Application Development Base on Agile Methodology), and SLeSS (An integration approach of Scrum and Lean Six Sigma Integration) to estimate the size and cost for mobile projects.

Dingsøyr et al. (2019) explain that the agile project's capabilities in development at stage include Agile portfolio management, disciplined agile delivery, Kanban method, Large Scale Scrum (LeSS), Nexus Scaled Agile Framework (SAFe), and Spotify model.

Altaleb & Gravell (2019) presented an analysis of Agile estimations in mobile platforms, conducted expert interviews of 20 persons with 18 organizations, and

compared the results. As the survey results show, 63% of projects are using Poker, 47% are using Analogy and 38% are in Expert Judgement and observed all the methods in the stores are underestimated.

Vera et al. (2019) studied Agile projects in small Chilean companies with a questioner-based approach. They found that "Companies use expert judgment for estimations" and "unplanned human resource sharing between projects." Interviews were conducted for about 30-45 minutes and recorded in audio from 10 companies with 10-49 employees' size involved.

Rak et al. (2019) proposed a Use Case Reusability (UCR) model with similar scope projects. Used the Karner-defined UCP model for the study and defined weights for various technical and Environmental factors using UCP. Based on the weights of the elements, the Effort Estimates (EF) have been derived.

Tanveer et al. (2019) developed Gradient Boosted Trees (GBT) based estimation models to derive change impact analysis in Agile Software development. Effort estimation and change impact analysis used to establish Hybrid Effort Estimation in Agile Software Development (HyEEASe) conceptual framework on top of GBT with collaboration with SAP company. The assessment was done for the HyEEASe model for real-time projects and concluded that expert-based estimation supported by the HyEEASe model is more accurate than the pure GBT estimation model.

Gandomani et al. (2019) conducted a research study comparing the average of suggested User Stores and the Consensus on the size of User Stories. A case study was chosen from two companies; one adopted Planning Poker for two years, and another used Scrum and XP for software development. We compared the Estimated size and Actual Size for both Estimation Types, Average and Consensus, and observed that using average size causes less accuracy than Consensus.

Hasan & Khan (2019) studied different Software Development Methods and their properties, from Waterfall to Agile, and provided advantages and disadvantages of each development approach and Agile methodology with eXtreme Programming (XP) along with Test Driven Development (TDD). Explains the testing process of each method and its advantages and disadvantages.

Iqbal et al. (2019) studied Agile methodologies and Cost management in extreme programming, scrum, and Kanban methodologies. A quantitative research approach

was carried out for 52 agile software companies, and Pearson's correlation and mean and standard deviation were performed for results validation. According to the research, 42.31% of projects use extreme programming, 32.69% use scrum, and 25% use Kanban. Furthermore, cost factors are positively and significantly correlated with other project management factors, slightly higher than the significance level (0.5%).

Romero-Chacón et al. (2019) experience the Costa Rican Information System on Disability System (SICID) platform developed by the Costa Rica Institute of Technology (TEC). SICID is a web-based platform implementing Web Content Accessibility Guidelines (WCAG). Adopted Accessibility tests, Accessibility corrections, and Accessibility reviews are part of the SCRUM process to achieve the requirement. Accessibility tasks to the existing SCRUM process improved the development of Disability systems.

Al-Zubaidi et al. (2018) proposed muti-objective Search Based Issues Iteration Planning (MOSBIP) to maximize business value and Alignment. Meta-Heuristic technique, namely Genetic Algorithms, to search the product backlogs. Nondominated Sorting Genetic Algorithm II (NSGA-II) performs well in multi-object iteration planning.

Jinzenji & Hamuro (2018) proposed a QCD (Quality, Cost, and Delivery) approach to predict the Agile development from LEAN. Plan-driven development measures the quality at the end of the project, whereas Agile development measures the rate at every stage. All activities are classified into three types of VA (Value Added), NNVA (Necessary but Non-Value Added), and NVA (Non-Valued Added), and also categorized into work categories Consideration, Construction, Verification, Administrative Adjustment, Environment Construction, Documentation and Defect Fixing and measured the Metrix from 120 KLOC projects with 43 backlogs. The QCD concept would be evaluated using Value Maximization in LEAN and measure the effectiveness of real projects of QCD of agile development changes, coverages, and predicted.

Zakrani et al. (2018) proposed a Support Vector Regression (SVR) model for effort estimation optimized by the Grid Search Method (GS). The new model performed Pred (0.25) MMRE and MMRE. Standish Group survey on 50,000 projects worldwide found that 9% of Agile projects fail and 52% of projects run over budget

or time. The significant advantage of the GS method is high learning and parallel processing in the training of every SVR. They validated the model against 21 projects from six software companies. Compare the GS-based SVR model with existing values.

Sellami et al. (2018), 61% of scrum projects fail during executions due to a lack of documentation and poor change control. They proposed the COSMIC FMS method for estimating Functional Changes (FC). They have taken an E-Commerce website to measure the FC using the algorithm defined. The size of use cases is done using COSMIC FMC, and the change was determined based on Functional Sizing and its impact on the development process. User requirements are classified into three categories: Functional User Requirement (FUR), Non-Functional Requirement (NFR), and Project Requirement Constraint (PRC).

Villamizar et al. (2018) introduced an approach (extending the concept of the user story to the abuser story) to handle security requirements in Agile projects. She conducted a study on search strings Agile OR Agility OR Scrum OR Extreme Programming AND Security. The search returns 171 papers using some exclusions. Twenty-one articles were identified from 31 authors for the study. Done Database search with iterative forward and backward snowballing. Agile methods by using new artifacts (User story to abuser story) or guidelines to handle security requirements. They identified a lack of research on SR (Security Requirement) verification, validation, and tool support.

Ahmed et al. (2018) covered the characteristics, risks, and definitions of Agile software development and their differences. They compared the Traditional and Agile models in terms of Adaptability and Teamwork. They defined the Risk of Agile as Lack of Understanding of Requirements, Team Meetings, Visit, Training, Poor Communication, and Number of Project Personnel.

Hoda et al. (2018) focus on the Agile historical overview and its trends. Evolution over the last two decades, and Scrum is the primary agile method from 40% in Survey 2007 to 70% IN SURVEY 2018 from the State of Agile, eXtream Programming places 2nd with 23% usage and 84% organizations are maturing agile practice.

Rehman et al. (2018) developed theoretical and empirical techniques to formulate factors used in Agile maintenance, including planning. Client satisfaction increased

by allowing small iterations, morels increased by reducing rework, integration was easy for versioning, and minimal documentation is a critical finding while doing analysis. The Scrum Software Maintenance Model improved the planning activities of the maintenance projects in the Agile development model.

Vyas et al. (2018) presented the study of Traditional and Agile-based estimates and studied various estimate techniques, including KLOC, COCOMO, Functional Point, and Agile Poker man estimation techniques. In addition, they did a comparative analysis of Expert Judgement and Machine Learning Based Estimation Techniques. Algorithm-based estimation techniques require most of the data to be loaded; in most cases, expert judgmental estimates help the projects develop appropriate estimations.

Usman et al. (2018) presented an industrial case study on how effort estimation would be done for large-scale projects in Agile. The research method was based on data collection, preparation, and analysis from 15 architects, 134 developers, and 15 support staff (188 employees). The below points are concluded after analysis of 10 Product Customizations - Involves all stockholders in the project for estimations - Re-estimate at the analysis stage improves estimates - Mature teams to complete the task on time - Mature collaboration for multi-geographical location teams.

Canedo et al. (2018) analyzed 291 published papers from 2007 to 2018 and identified appropriate estimation models from the documents. Out of the paper, Story Point is more used in the estimation model along with Expert Judgement and Use Case models. Functional Point estimates are more accurate because teams have a lot of experience.

Vetro et al. (2018) describe the process to mitigate the three significant challenges in story point estimates – the non-numerical scale of a story point, analogy-based calculations, and retrospective analysis. Four Scrum and Poker projects for the research using JIRA as storyboarding and analyzed the projects qualitatively with a new feedback approach. The process helps the projects improve estimation by 10% to 45% compared to previous estimates.

Hacaloglu & Demirors (2018) reviewed different Agile papers for sizing the Agile Projects. A total of 2581 articles were retrieved from various databases like Scopus, IEEE, ACM, and Web of Sciences. After doing some including and exclusion processes, they are considering 40 papers and answering the research questions

defined. The order of the estimation process is Story Point, COSMIC Functional Point, and Use Case Point. Challenges concerning software size in Agile projects are described, especially misinterpretation of scope, implementation difficulty, and measurement acceptability. Finally, Story Point for size estimation and other techniques for the duration of the project scope.

Canedo & Costa (2018) studied Methods and Metrics of Estimating and Planning Agile Software Projects to compare the results of Agile estimation with Functional Point analysis. Compared the results of the Estimated Velocity and Actual Velocity of Story Point analysis, calculated the project's variance (underestimated/overestimated), and validated the Functional Point analysis for Actual and Estimated estimates. Therefore, functional and Story point calculations are more appropriate for the case study.

Waterman (2018) defines the framework for agile architecture using two dimensions: design using agile and adaptability and tolerance of change. Agile project Architecture is based on tactics like keeping a simple design, architecture with code iteratively, good design patterns, delay in decisions, and planning for options. Risk impact is there on the ability to design an Agile architecture.

Idri et al. (2018) use the magnitude of relative error (MRE), such as mean/median MRE (MMRE/MedMRE), for prediction accuracy of software development effort estimations (SDEE). Therefore, pred (p) and SA would be used in the SDEE process, and observed that Pred (0.25) and SA are the same.

Adnan & Afzal (2017) explain the Scrum methodology that is a challenge in the agile context and compare the five core components: multiagent effort estimation system, ontology knowledgebase, knowledge creation, knowledge tree maintenance, and facility and proposed Multiagent Effort Estimation System. Sample project - Shopping Cart application, simulated the results with a Multiagent estimation System and developed a small application to validate the core components.

Chongpakdee & Vatanawood (2017) improved the Agile estimations by taking previous successful projects for similar estimates. The plagiarism detection tool extracts documents to prepare words and generic queries from JIRA boards. The fingerprint replaces the word or phrase in the requirement and uses the Web Document Similarity Retrieval Tool (WDSRT) to return similar comments from the

input document. The tool was studied in different case studies, and effectiveness was calculated using MMRE. The average MMRE for the case studies is 1.135. The WDSRT tool reduces the estimation time by using a document fingerprint with 10K words extracted in three seconds to show similar Story Points.

Rosa et al. (2017) describe the early phase cost estimation model for United States Department of Defence (DoD) projects. Most projects use the standard scrum framework; the project size is less than 500 person months, and only two projects are more than 1000 person months. Adopted effort estimations using formulas of PM (Engineering Labour in Person Months), REQ (Initial Requirements), and SD (Super Domain) for measuring estimates.

Prakash & Viswanathan (2017) surveyed Agile software development projects with different modules and compared estimation models like Use Case Point, Functional Point, COCOMO, Algorithm Model, Expert Judgement Model, and Estimation by Analogy. Study results say most Agile-based projects use Extreme Programming, COCOMO-II, and Functional point estimation models.

Bik et al. (2017) examined the story point life cycle process and combined Process-Deliverable-Diagram (PDD) to capture the most commonly used story points. To construct the model, followed the steps like Study Protocol, Execution, Delivery Reports, analysis reports, abstract activity and identify phases, Method Construction, and Validation. Presented Reference Method for User Story (RMUS) based story life cycle assessment. RMUS-based story point life cycle model to estimate the requirement and inspired from learning and improvement possibilities with user stories

Raunak & Binkley (2017) surveyed 99 software engineers of their choice of process, technique, and tools. The survey was conducted from 2014 to 2015 via Email, Phone, Webcam, and Chat for multiple questions. The survey results identified factors for project success or failure: successful communication, clearly established requirements, strong customer engagement, and inadequate system testing.

Tanveer et al. (2017) introduced a framework to improve Judgment-based estimates using Impact Analysis (IA). A Mockup user interface has been created to evaluate the IA factors (using the BaRZXmig tool) on SAP SE and German MNC projects. Use history data, dependency graphs, and impact information to do an estimate utilizing

the mock-up tool. Mock-up helps the new onboarding users comprehend the existing system. Finally suggested, the Impact Analysis factor supports effort estimates in the Agile development model.

Shimoda & Yaguchi (2017) combined the Agile and Waterfall methods by the trade-off between the two approaches and proposed a hybrid approach to achieve a better realization of low cost. Observed three models - Waterfall, Agile, and Hybrid- and compared the characteristics of development methods: Large-scale, High reliability, High productivity, High estimation accuracy, Early realization, and Ease of change.

Ghane (2017) derived a risk matrix from the project data that helped to adjust project time, scope, and cost. The main architectural elements considered are Data Collection, Probability distribution function modular, Risk calculator, Simulator, Data analyzer, Recommendation engine, Report generator, Feedback engine, and Feedback user interface. In addition, the system introduced a Monte Carlo simulator and data to develop predictions. Finally, the risk matrix is calculated for the project's Time, Cost, and Scope with a continuous feedback mechanism that helps the subsequent data sets improve the prediction level.

Boehm (2017) provided a short history of software history changes in estimation methods and evaluated processes, products, properties, and personnel (PPPPs). The project personnel have a significant impact on project budgets. Most cost estimation drivers are domain, technology, and tool experience levels.

Arifin et al. (2017) estimations between two methods called Expert based method, Effort-Size, and Effort-Time. Time, space, and quality are the magnitudes of physical estimates, different from the human forecast. Emphases Effort-Time is more relevant and fitted than the Effort-size model. Improve the accuracy of effort estimates using expert-based along with Effort-Time or Effort-Size. The study focuses on Effort-Time and Effort-Size estimations with the dataset of 1700 repositories from JIRA tickets. The issue was addressed by filtering the data using JIRA Query Language to fetch Story Point. Collected the data and compared between Effort-Time and Effort-Size. Effort time and effort size are correlated to the completion of Actual Effort in hours. Effort-Time is better fitted than Effort-Size. If the range of the issues is small, the Expert-Based estimation is sufficient. For a broader range of projects, a Hybrid

approach by combining Expert-Based and Effort-Time or Effort-Size would be the better option for estimations.

Dhir (2017) proposed an estimation framework consisting of a feed-forward and feed-backward approach. They used MRE (Magnitude of Relative Error) and MMRE (Mean Magnitude of Relative Error) for quantitative estimations. The developed SDV (Saru, Deepak, and V) estimation model helps avoid estimation issues using quantitative measurement. The algorithm has been provided to calculate BSP (Base Story Point), UV (Unadjusted Value), ESP (Estimation Story Points), and DV (decelerated Velocity).

Usman & Britto (2016) studied co-located Agile projects and how the estimations are distributed. A comparative study identified the similarities and differences in practicing effort estimation. One hundred eleven participants from 5 contents participated in surveys (60 co-located and 51 from distributed context). They responded to five questions. 73% co-located and 63% distributed teams using Planning Poker as an estimation model. 82% of co-located and 89% of distributed teams use the Iterative process in the Development context. Story points are widely used compared to Expert-based estimations for co-located and distributed contexts.

Hoda & Murugesan (2016) developed a theory involving 21 agile practitioners in six organizations, identified eight project management challenges, and mitigated self-organized agile teams. Includes changing requirements, eliciting management sponsorships, adequate estimations, and assuring autonomy and self-assignment at the individual level. Challenges are defined concerning Project, Team, Individual Level, and Task levels. All four significant challenges are measured in Multiple Levels of Project Management Challenges.

Munialo & Muketha (2016) covered non-algorithm estimation approaches such as Expert Judgement, Analogy technique Wideband Delphi, and algorithm-based estimation methods including Source Line of Code (SLOC), Functional Point, Object Point, and Constructive Cost Model (COCOMO). They also provided insights into Agile estimation techniques like Planning Poker, Constrictive Agile Estimation Algorithm, and Agile MOV.

Eloranta et al. (2016) conducted (a semi-structural way) study to identify harmful mishandling of scrum projects and identified 18 anti-patterns measured from the

semi-structural interviews. Anti-patterns are - Business as usual, Invisible progress, Varying sprint lengths, Big Requirements Documents, Customer Product Owner, Product Owner without authority, Long or non-existent feedback loops, Unordered Product Backlog, work estimation given to teams, Hours in progress monitoring, Semi-functional groups, and customer caused disruption.

Goswami et al. (2016) conducted an impact analysis on various estimation techniques, Ideal Time, and Story point. Make sure Project managers and developers understand the method and proper assumptions.

Zahraoui & Idrissi (2015) adjusted the effort Agile estimates using three adjustment factors and adjusted story points in velocity calculations. Adjusted factors are Story points using Priority Factors (PF), Size Factors (SF), and Complexity Factors (CF). In addition, complexity factors are categorized into five attributes, and the Story Point Adjustment Factors (SPF) is calculated with the multiplication of PF, SF, and CF.

Torrecilla-Salinas et al. (2015) presented how to estimate, plan, and manage web projects using Agile development. Defined framework for better web project management through continuous value-based estimation and management process, and the framework presented as Estimate-Manage-Measure-Adopt cycle for Agile Web Projects.

Hamouda (2014) proposed a methodology for Agile story points in CMMI organizations. First, build a reference library from the older projects, identify the Technical and Environmental complexity factors, estimate the Agile projects using story points, and add adjusted story points. The proposed methodology improves the size estimations and decreases estimation errors from 28% to 5.9%.

2.2 Algorithm-Based Estimation Models

Mahmood et al. (2022) aimed to identify which machine learning technique is used to achieve optimal effort estimates. Propose a systematic literature review to identify the relevant papers and apply quality assessment criteria. Identified 28 selects based on MMRE and PRED (25) and found that machine learning is implemented for effort estimation. Several estimation models are based on Algorithms, Expert Estimation, and Machine Learning. Compared and evaluated the SOLO and ensemble techniques by applying commonly used accuracy performance metrics (MMRE and PRED (25))

with different data sets. MRE, MMRE, and PRED (25) are widely used evaluation measures for effort estimations. Arora et al. (2021) describe a regression technique for estimating the agile projects. Used six regression techniques to train the model and optimize it. Data is proposed, followed by model selection, testing, and evaluation. IR reads the data sets from DB's and processes the data using the Synthetic Minority Over-sampling Technique (SMOTE) and defines and tests the data prepared. Categorical Boosting (CatBoost) regression was performed well when compared to other techniques, Extreme Gradient Boosting (XGB), Decision Tree (DT), Linear Regressor (LR), Random Forest (RF), and Adaptive Boosting (AdaBoost).

Moyo & Mnkandla (2020) proposed a secure software agile development methodology to improve the quality and security of software products. Integrate quality practices into the Agile software development process to improve the quality and safety of products. Used Keramati and Mirian-Hosseinabadi's algorithm to integrate the approach in Agile to achieve maximum agility. Developed Secure Solo Software Development Model (Secure-SSDM) and evaluated with a different set of projects and recommended various tools and technologies in every stage of Secure-SSDM. Secure-SSDM builds the quality and security for solo developers in an Agile project effective for small and medium-sized projects.

Algarni & Magel (2019) designed a Software Design Matrix based on the number of Attributes, Methods, Parameters, Objects, Trees, Children, Classes, Methods, Among Methods, Foreign Data, Class Cohesion, and Lines of Code. Used five machine learning tools to forecast similar features in projects chosen as 30 open-source Java systems. Four hundred sixty-two data sets are created based on the software mentioned above matrix. Calculate the Mean of Absolute Residuals (MRE), Mean Magnitude of Relative Error (MMRE), and prediction capability level of PRED (25). Concludes Lines of Code is one of the significant attributes to measure the estimation of the project.

Hacaloglu & Demirors (2019) collected four complete projects using COSMIC FMS measurement and managed the actual efforts and COSMIC Functional Points (CFP) from Organizations using Agile Kanban. Another organization organized the same paraments using Agile Story Point and observed that COSMIC FMS requires many

assumptions to determine the estimates. Concludes COSMIC FMS is unsuitable due to many beliefs to assess the forecast based on the case studies.

Choetkiertikul et al. (2018) developed a deep-learning algorithm for estimating story points for a given requirement. Building a predictive system takes input as requirements and output as story points using a pre-training model of different data sets. The Deep learning model has been developed using Long Short-Term Memory (LSTM) and Recurrent Highway Network for representation. Compared to the results against the Mean and Median techniques (MMRE), the new approach has improved by 34.06% and 26.77%, respectively, in Mean Effort Estimation averaging across 16 projects.

Dam et al. (2019) developed AI deep learning-based management assistance tools to analyze project textual artifacts and generate vectors containing Learning, analysis, and Optimization activities. This tool train to perform complex tasks like effort estimates, task refinement, and planning.

Ratke et al. (2019) efforts are predated on using Natural Language to extract verbs and nouns and standardization of keywords from Agile development. Part Of Speech Tagging (POS Tagging) is used for processing the word in text format. The User stores are grouped according to Story Points and predicted based on history-based scrum story points. Used Bayesian Network Natural Language Processing for effort calculation with an accuracy of over 81%.

Jain et al. (2019) proposed a model that utilizes a multi-criterion decision-making approach (MCDM) to estimate maintenance for Agile projects. Criteria for determining maintainability for Agile estimations are User Stores, Story Points, and Post Defects. Agile environments use weighted coefficients for decision-making Step Wise Assessment Ration Analysis (SWARA).

Kaur & Kaur (2019) proposed Functional Point Measurement (FMS) , and COSMIC (Common Software Measurement International Consortium) methods to estimate mobile applications based on five types of Functional process measurement (based on applications) called - Types are View Functionality, Data Manipulation Function, Inquiry Function, User Support Function, and Specific Function. Derived application Specification factors to derive estimation in mobile application development. Used

Simple Linear Regression to validate the relationship between test efforts and COSMIN FMS size and observed promising results.

Sharma & Kumar (2019) identified similar use cases using the RV coefficient NLP algorithm to cluster into various release planning in the Agile-based projects, classified the small Agile projects consisting of 80-100 user stories and medium to complex projects containing 500+ user stories. The proposed NLP algorithm identifies familiar user stories, plans the releases, and studies over 340 user stories in 28 release projects. Using the NLP algorithm, the planning activity of Agile projects is reduced by 17.65%, and the process is fully automated.

Villamizar et al. (2019) developed a Natural Language Processing (NLP) tool to read the requirements and generate the Security requirements based on the keywords Confidentiality, Integrity, and Availability. Based on the keywords, the NLP generates the OWSAP high-level SRs, and the approach is accepted by 75% and partially agreed by 25%.

Mairon (2019) proposed the Agile Model-Driven Method (AMDM) model, combining agile procedures with model-driven development. Development teams must adopt the AMDM process for estimating the agile tasks. AMDM model reduces the problems and technical risks and makes acceptable efforts from the development teams.

Forney (2019) defined a decision framework for the effort estimations model using dependent and independent variables. Different decision tree algorithms like Classification and Regression Trees (CRT), Chi-Squared Automatic Interaction Detection (CHAID), Exhaustive CHAID, and QUEST - Quick, Unbiased, Efficient, Statistical Tree (QUEST) are used for predicting the values.

Saini et al. (2018) took the datasets from various project requirements with model size, applied the Fuzzy Rules to get the effort estimates, and used the MATLAB tool to derive the values of estimates. Taken three variables, Low, Medium, and High, along with Team Experience, Complexity, and User Stories, to develop estimations.

Soares (2018) improved the planning and introduced text classification of issue reports in Agile development using text classification, an extraction technique that produces informative features. Proposed auto coders for estimating the Agile efforts in the context of Open-source projects, extracting the words from documents (stories),

and classifying them into company-performed requirements. Use autoencoders as a feature in effort estimations text extractions—classifications of textual noises and many unique words per document. Perform the effort estimation using the text classification. PV-DM and PV-DBOW natural language algorithms are used for text classifications. Significant evidence is that autoencoders help encode noisy documents for text classifiers and improve Agile estimations.

Yadav & Sharma (2018) presented project estimations in Functional Points (FP) for a given project requirement with Weighted and Complexity Factors. Infusing factors for the FP estimates are added and proposed an Algorithm to estimate Functional Point Estimates to Story Point Estimates. Validated the algorithm by taking case studies of E-Learning Systems, Online Shopping Systems, E-governance Systems, Clinical Information Systems, and Internet Banking systems and concluded that Functional Point is an absolute measure and Story Point is a relative measure of estimation.

Alhazmi & Huang (2018) defined the Sprint Planning Decision Support System (SPESS) tool using the Hungarian Algorithm, including seniority factors and developers' competency levels for managers for sprint planning for considering factors like developer competency, developer seniority, and task dependency. Tools have been developed using PHP, JavaScript with Hungarian Algorithm, and MySQL database. The case study takes 18 days, whereas SPESS takes 17.06 days, and concluded that developed SPESS tools.

Vladimir & Nikita (2018) developed an Algorithm to determine the Agile Estimates to automate estimating using relative units. The proposed algorithm consists of five steps.

Step 1 - Random sample estimated in shorter period

Step 2- Calculate mean relative size

Step 3 - Use a Pre-selected scale for estimation.

Step 4 - Comparison matrix to identify incorrect assessments (error ratio)

Step 5 - Declines the error of estimate to accept level.

Khuat & Le (2018) derived a novel form to estimate team velocity and story points. Swarm Optimization Algorithm (SOA) is used to optimize the formula along with Particle Swarm Optimization (PSO) and Artificial Bee Colony (ABC) to find

parameters for estimations and apply SOA and ABC to different projects for estimating Velocity and Story Points for validations.

Raslan & Darwish (2018) prepared a framework that determines estimations on a Fuzzy Logic base using COCOMO with scale factor. 5 and 7 scale factors to determine the estimates using the COCOMO model and concluded the study with the proposed model increases the product level from 70% to 80%.

Pospieszny et al. (2018) developed a machine learning algorithm to improve project success rate and align with modern development and project management. Applying the ISBSG dataset, innovative data preparation, and three machine learning algorithms (Support Vector Machines (SVM), Multi-Layer Perception Artificial Neural Network (MLP), and Generalized Linear Model (GLP)) used for creating the algorithm. Process flow was built using the Cross Industry Standard Process for Data Mining (CRISP-DM) methodology. This study took the last ten years of data sets from Standards Group, 2013. Considered 1192 projects, 11 independent, and two target variables. The performance of individual algorithms is a significant advantage of SVM over MLP and GLM for both effort and duration, with MMRE below 0.15 and PREED reaching 81%.

Basri et al. (2016) propose an algorithm-based model for Agile change effort estimations using the Software Development Phase Change Impact Analysis Framework (SDP-CIAF). Tested the Algorithm for six real-time projects. The Change Effort Estimation Model (CEEM) algorithm inputs COCOMO II variables, five scale factors, and seventeen cost drivers. The accuracy of effort estimation using CEEM is higher than the traditional methodology, and the accuracy of effort estimates differs on change requests.

Khatri et al. (2016) introduce an algorithm to achieve accuracy in estimate by considering the environment and technical factors. The method includes Total Technical Factors (TTF), Total Number of Use Case points (TUCP), and Total Environmental Factors (TEF) weights to compute the Total Estimated Cost (TEC).

Owais & Ramakishore (2016) proposed an Algorithm estimation method for agile development and compared the results with the existing approach. The effort is calculated and unadjusted effort with considered factors of Technology Integration,

Team, Risks, and Different sites during calculating unadjusted factors. Different scenarios have been considered to compare the results for the given algorithm.

Satapathy (2016) uses various ML techniques to derive software effort estimation using Class Point (CP), Use Case Point (UCP), Web-based, and Story Point Approach (SPA). CP is implemented using Stochastic Gradient Boosting (SGB) and Support Vector Regression (SVR), and UCP is implemented using Random Forest (RF) and SVR. The SVR-based effort estimation technique provides better performance than other techniques.

Panda et al. (2015) enhance the Story Point Approach (SPA) using Neural Network tools - General Regression Neural Network (GRNN), Probabilistic Neural Network (PNN), Group Method of Data Handling (GMDH), Polynomial Neural Network and Cascade-Correlation Neural Network models. Applied the neural network programs to 21 project data from 6 organizations and compared the results.

Ungan et al. (2014) compared the Story Point and Poker Man estimation with COSMIC Function Point (CFP) for projects using regression models and ANN methodology. Built a COSMIC Functional Point estimation model and applied the model for SCRUM projects in an organization of 500 developers. Ten projects were selected for the case study, and observer CFP is most suitable for Agile projects. Analyzed the data with MMRE and PRED (25) against Story point analysis.

Popli & Chauhan (2014) proposed an algorithm estimation model considering resistance factors to achieve the Agile projects' release date, cost, effort, and duration more accurately. Consider factors like people-related and project-related resistance factors while calculating estimates. Around 13 resistance factors like Team Composition, Workplace, Team Dynamics, New technology, defects in third-party tools, stakeholder’s response, requirements clarity, and working environment are used for calculating the estimations. Story Points are highly dependent on various resistance factors defined.

2.3 Non-Algorithm Vs Algorithm Estimation Model

Based on the project information availability they choose the right estimation models from - non-algorithm and algorithm-based estimation models. The non-algorithm model is more flexible, estimates with minimum details, early-stage estimates,

parameters ranging from project to project, and learning / experience-based estimations. Whereas algorithm-based estimates are less flexible, require more project/requirements data, model / formula-based estimations, simple to use from developers (know the process), and pre-defined set of parameters for estimations. More and more data is required for an algorithms-based approach rather non-algorithm approach. The data is not sufficient advice to opt for a non-algorithm approach. The algorithm-based approach is more towards the AI / ML models, this requires the team to understand every argument used in the process and estimate otherwise the estimations would be inconsistent.

Chapter 3 – Research Gap and Problem Statement

Nowadays, estimating story points is mainly an experience-based model. The stories are measured based on the experience of the team. Sometimes, the team inflates the stories to create higher velocity in the project. Optimized design, code optimization, and code re-factoring / reusability will be tumbled when the team tries to complete the tasks within tight timelines due to inflated story points calculation.

The story point estimation requires some project historical data to estimate story points for a given requirement, which will take longer. The technology and architectures are changing very fast nowadays, and the data for the project may not be valid for estimations. Most research works are done mainly by reviewing Agile projects in different domains and tasks. Questioner-based analysis is performed and provides the differences between agile estimates. Observed that no two teams/resources estimate Story points the same. Alternatives to story point estimates include.

- Research must carry out Story points with person-hours to help the project teams and manager plan for a better release.
- Time-based estimates and convert to story points.
- Calculations at EPIC / high-level item and convert to weeks or sprints.
- Weighted Complexity Factors for estimations.

3.1 Current State of Story Point Estimation

In contemporary Agile development, story point estimation largely hinges on the team's collective experience. This experience-based model often leads to inflated story points, adversely affecting optimized design and code reusability, especially when teams are under tight deadlines. Moreover, the rapid evolution of technology and architectural paradigms renders historical project data increasingly irrelevant to current estimations.

3.2 Research Gap

This thesis explores several unaddressed gaps in the realm of Agile software estimation.

- **Gap 1:** The lack of a unified approach in effort estimations, whether algorithmic or non-algorithmic

  Contribution: The thesis contributes evidence on agile effort estimation by performing a Systematic Literature review and identifying factors affecting the software estimations.

- **Gap 2:** Limited research on multi-faceted effort estimations considering Functional/Data Complexity, Architectural Complexity, and External and Internal System Integrations.

  Contribution: The thesis identifies the various factors that can lead to Agile Estimations. The elements are contextual to Project Level and Task-level factors that help determine the estimations correctly for the Open-Source projects.

- **Gap 3:** The reliance on expert judgment often results in inconsistent estimations.

  Contribution: This thesis contributes by proposing Weighted Complexity Factors on top of the project-level estimation. This gives a clear picture to the developer of how the estimates were derived and achieved within the effort defined.

3.3 Problem Statement

Due to the difficulty and importance of software estimations for agile projects, there is a continuous need to refine the existing elegant estimation models or generate new models for developers. The current methods are usually related to expert-based decisions rather than the other parameters. If the resource does not have expertise on the specific task, he may provide the wrong story points for the given tasks. After that, the member can spend more or less time completing the task. The research is carried out mainly to identify the factors affecting the cost estimations in software development. Furthermore, the elements concerning architecture trends in the IT

industry can be added along with expert estimates / pre-defined values for the task defined by the Organization.

Given the complexities and critical nature of software estimations in Agile projects, there's an urgent need to refine existing models or develop new, more reliable ones. Current methods are predominantly based on expert judgment, which can be highly variable and unreliable, especially when the resource lacks expertise. This research aims to identify the various factors that influence cost estimations in software development, particularly in the context of rapidly changing architectural trends.

3.4 Motivation

Estimating hours is one of the most widely used approaches for measuring project estimations. Person hours are easy to understand, and there are a few significant drawbacks to this technique:

- Some tasks are difficult to estimate precisely while we are working on Agile.
- The time to complete the job will vary from Developer to Developer
- Developers / Managers generally underestimate the estimates to consider a best-case scenario.

To avoid the person-hours estimation in Agile, Story points were adopted. Story point estimates have more significant advantages, on the other hand, disadvantages due to lack of experience in effort estimate. As a result, the story point estimates vary from team to team. By the multiple teams, the estimates vary and are more / less compared to other estimation techniques.

Below are the statistics about the Agile software development model.

- Viechnicki, P., & Kelkar, M. (2017) surveyed Agile usage in US federal government projects and found that 80% of federal IT projects were self-described as “Agile” or “iterative” in 2017 from Agile by the numbers. A data analysis of Agile development in the US federal government.
- 46% of organizations use Agile or hybrid Agile approach over the last 12 months from Success in disruptive times, Project Management Institute 2018
- Success rate of Agile projects is over twice as high as that of Waterfall projects, with 42% being Successful, 47% being Challenged, and 11% failing.

According to The Standish Group 2020 Chaos Report, Agile projects have a higher success rate compared to non-agile projects.

This research aims to bring a new level of rigor and reliability to Agile story point estimations by addressing these gaps and challenges.

3.5 Role of Architecture

System architecture serves as the blueprint for deriving the structural design of a software system. It encompasses various facets, including business strategy, quality metrics, human dynamics, and the IT environment. The architecture delineates the significant components of a system, outlining how they interact and coordinate to fulfill functional and non-functional requirements such as performance, scalability, availability, and security. In essence, the architecture provides the technical framework that addresses the business requirements, thereby playing a pivotal role in the overall success of a project, including its estimations. The Architecture helps to define a solution to meet functional and non-functional requirements like performance, scalability availability, and security for a given condition. The Solution impacts the overall success of the product/project development along with the estimation of the project. Software Architecture performs many activities, typically discussing requirements with stakeholders, architecture, and evaluating a design, communication, and documentation. The code Architecture design consists of Architecture Analysis, Design, Evolution, and Maintaining existing architecture. Different Architectures have evolved over the last 20-25 years to develop Web Based Applications. Web-Based Application Architectures are evolving from N-Tier to Microservices for each architecture. Nowadays, all applications are built using Microservices and migrating legacy applications to Microservices due to the advantages of the Microservice Architecture. Microservices architectures are an efficient way of building applications in various Information technology domains.

3.6 Survey Methodology

Surveyed various Architectures defined for Web-based applications developed using Open source. Formulated standard survey questions and sent them to different participants for their feedback. Questions are prepared around Architecture and Agile methodology. A comprehensive survey was conducted to gain insights into the current

architectural trends, focusing on web-based applications developed using open-source technologies. The survey was divided into three categories.

Category 1: Questions about the participants' experience, domain expertise, and roles.

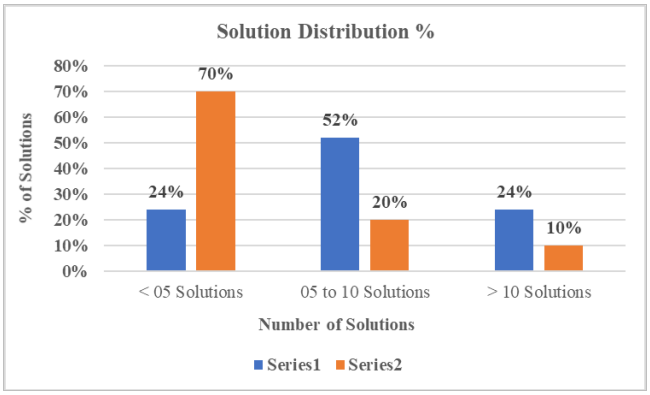
Category 2: Questions exploring solutions developed in Microservices, Cloud, and Legacy Architectures.

Category 3: Questions examining project implementation models such as Waterfall, Iterative, and Agile.

The survey was disseminated to professionals with an average experience of over 18+ years working as Architects, Project Managers, and Scrum Managers. The participants are from India, the USA, and Canada, working with different Organizations. Twenty-five participants participated in the survey within the time-bound, of which 10 Architects, 2 Director / Chief Technical Officers, 4 Project Managers, and 3 Scrum Masters. Participants include Banking, Financial Services, Health Care, Telecom, and Government projects. The geographical disposing of participants concentrated in India (18 participants), followed by the USA (05 participants) and Canada (02 participants). 90% of participants worked from Larger Organizations, with a size of > 2000 employees; 05% of participants worked from Mid and Small Organizations with 200-2000 employees and < 200 employees. Below are the critical questions and the participant's responses for motivating the research work. All question related to the survey is described in Appendix C

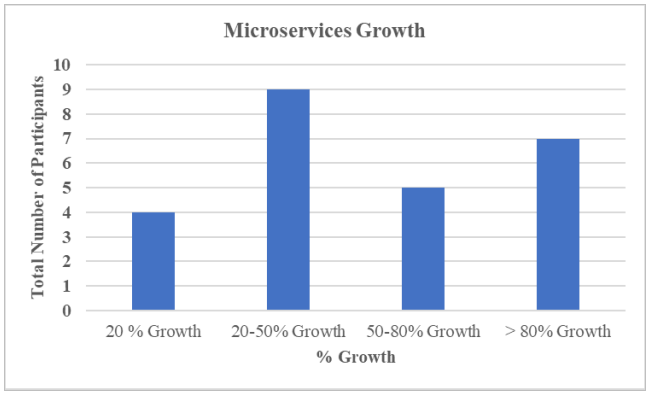
Research Question: How many total solutions were provided in 2019-20, and how many are in Microservices architecture?

Response: Clearly says that < 05 solutions provided responders provided more Microservices architects. Series 1 represents the total solutions provided in the year 2019-20. Series 2 represents % of microservices architectures provided in comprehensive solutions.



Research Question: What % of growth in Microservices architectures for the past 2-3 years?

Response: Out of 25 participants, 09 observed 20-50% growth, 07 observed > 80% growth, 05 observed 50-80% growth, and 04 observed 20% growth in Microservices architectures.



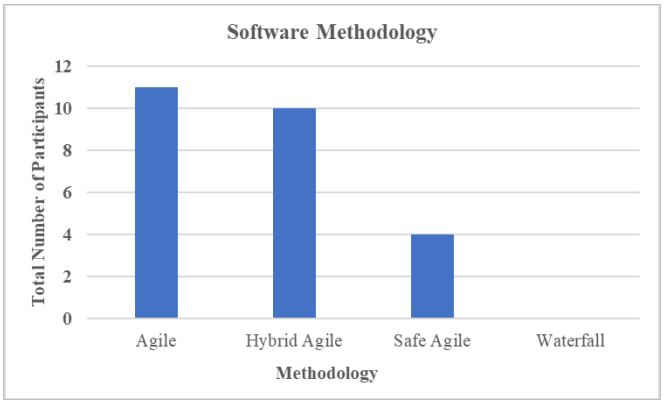
Research Question: What technologies are preferred for the implementation of Microservices?

Response: Participants use the below technologies for developing Microservices Architecture – Java Spring Boot, RedHat OpenShift with Kubernetes, Micronaut, Docker, AWS EKS, and Public Cloud Foundry (PCF). Notably, most of these technologies reside in the open-source realm, underscoring the sector's influence on contemporary Microservices development.

Research Question: What Software Development Life Cycle (SDLC) Methodologies Used for Microservices Projects in Organization?

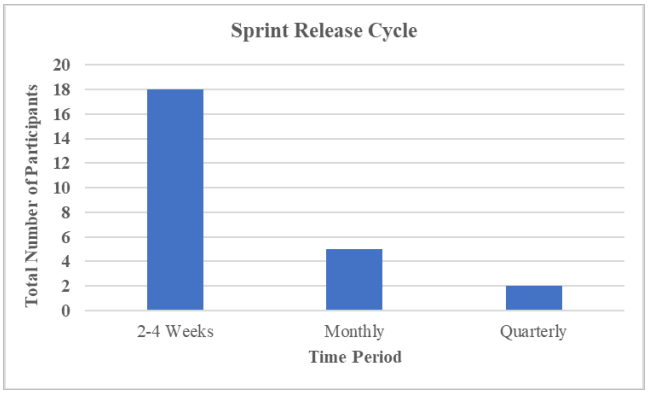
Response: Agile methodologies emerge as the cornerstone of SDLC practices for Microservices projects. Hybrid Agile closely follows this approach and Safe Agile frameworks, particularly for managing scrum of scrums. By encapsulating these key

findings, the research aims to shed light on the prevailing technological preferences and methodological approaches in the rapidly evolving landscape of Microservices architecture.



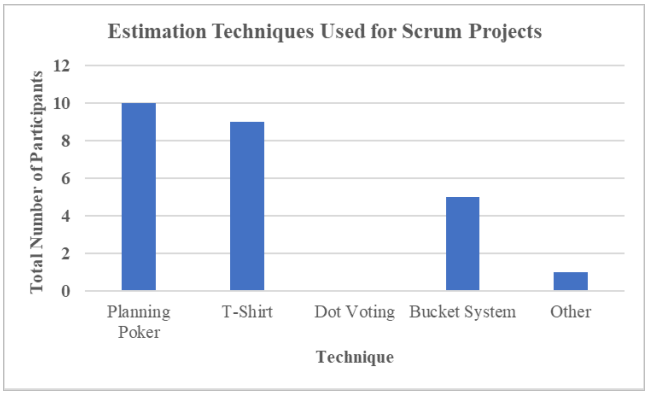
Research Question: What is the typical release cycle frequency in Agile and Hybrid Agile frameworks?

Response: The survey indicates that a sprint release cycle of 2-4 weeks is most prevalent, followed by monthly and quarterly release cycles. This highlights the industry's inclination toward shorter, more frequent release cycles, aligning with Agile principles.



Research Question: What estimation techniques are commonly employed in Scrum projects?

Response: Planning Poker emerged as the predominant technique for effort estimation in Scrum, followed by the T-shirt sizing method. These findings underscore the industry's preference for collaborative and consensus-based estimation techniques.



The survey results paint a vivid picture of current organizational practices. Agile methodologies are adopted by 48% of organizations, closely trailed by Hybrid Agile at 44%. The remaining 8% employ a mix of Waterfall and other Agile variants. Notably, 50-80% of Microservices architecture projects have embraced Agile or Hybrid Agile for project execution and delivery. Furthermore, 72% of these projects operate on a 2–4-week sprint cycle. By distilling these critical insights, the research aims to illuminate the prevailing trends in release cycle frequencies, estimation techniques, and methodological choices, thereby contributing to our understanding of the ever-evolving field of Microservices architecture.

Agile story point estimates come with challenges that necessitate the development of more refined techniques. Some of these limitations include.

- Baseline Establishment: Teams often struggle to find stories of similar size to establish a reliable baseline, requiring a period of adjustment.
- Inflated Estimates: Under pressure, teams may artificially inflate or deflate story points, distorting the effort needed for a task.
- Velocity Comparisons: Comparing velocities based on story points can lead to team performance disparities, as some may inflate their estimates.
- Neglected Optimizations: In the rush to complete work within a sprint, design, and code optimizations, as well as refactoring, are often the first aspects to be compromised.

Legacy Modernization is also one of the motivational factors for determining the Story points. The story point calculation differs from the different approaches specified in Legacy Modernization. Legacy Modernization approach consists of two major phases - The assessment and Implementation phases. The assessment phase

consists of an IT portfolio Assessment, To-Be Architecture definition, modernization strategy, and business case justifications. The implementation phase considers modernization Application Transformation, Database Transformation, Infrastructure Transformation, and Operational Transformation. Below are the challenges and considerations while modernizing the applications.

- Lack of portfolios across applications
- Poor management of systems documentation
- Large application maintenance
- Cost and duration of modernization
- Legacy and new systems coexistence
- Commitment from stakeholders
- Adoption of new technology platforms
- Cultural change adoption
- Adopting a new way of working (E.g., Work from home options)
- Retain and enhance the application with business needs.
- Business value and ROI

Application Modernization is not a rewriting of code from one technology to another. The following principles are taken into consideration while doing modernizations.

- Clear Organization Road map to get early ROI.
- Developing new capabilities
- Adoption of Open standards rather than vendor lock-in
- Adoption of microservices design rather than monolithic
- API version support for all service calls
- Use of integration layer for seamless external system integrations
- Identify new business channels and models to build new digital channels.
- Balance between Business and Technology for time to market
- Effort and cost optimizations
- End-user OR customer delight
- Adoption of Agile and DevOps

The critical factors for successful application modernization are good architecture, design, and coding, vendor-neutral, maintaining open standards, and security compliance with measurable KPIs. The assessment phase recommends the applications be Retained, Retired/Rationalize, Rehosting, Replace, Refactor, Re-architecture, and Rebuild / Rewrite. Based on the assessment recommendation, the transformation strategy derives from the Organization's goals. Legacy Applications categorization is based on the number of users, criticality, benefit, maintenance cost, risk, and feasibility. Reactor or Rewrite's legacy application decision is to study existing source code analysis, understand cloud-native compliance based on 12-factor anti-patterns, and categorize applications. Adopt Agile and DevOps for a new way of working in the digital world. Table 3 describes each modernization approach with its benefits.

Modernization Approach	**Scenarios to Fit**	**Benefit**
Retain	Retaining the application as-is without adding any new features	No change in TCO and business value
Retire/Rationalize	Applications are no longer in use. Merge the functionality to another application.	Reduce Total Cost of Ownership with rationalization of applications.
Rehosting	Deploying the applications in a Virtual / Cloud environment without any change	Reduce migration costs and operations.
Replace	Eliminate existing application components and functions with new requirements.	Lower the operational cost compared to the Legacy application.
Refactor	Standalone applications need interfaces using modern	Reduces Total Cost of Ownership and Improves

	technologies without modifying features and functions.	maintainability
Re-architecture	Shift the application to a new platform architecture with better capabilities.	Improves the non-functional capabilities
Rebuild / Rewrite / Reengineering	Rewrite the application components with a new technology stack without changing the scope and functionality.	Flexibility to customize as per business needs

Table 3: Legacy Modernization Approaches and Benefits

Application Modernization has several options, from Legacy to new Digital. Below are the top modernization options.

- Legacy to Open Platforms
- Legacy (Cobol / native languages) to Microservices
- Monolithic to Microservices
- Commercial to Open-Source

Application modernization/migration is done manually, and tool based.

Tool-based migration approach - Conversion tool to automatically convert the existing use cases into the target technologies to whatever extent the device can support and then hand-finish the code to adhere to the "as-is" functionalities. The process flow of the tool-based migration approach is described in Figure 9. Migration tool to convert the existing use cases into target platform, and this option typically has two-step processes:

- Tool-based conversion (up to 60-80% conversion)
- Hand finishes the missing content with the tool.

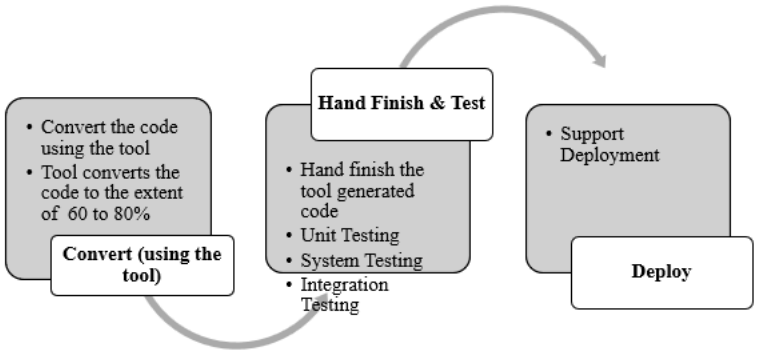


Figure 9: Tool-Based Migration Approach

Manual migration approach – Consists of reverse engineering the existing technology stack requirements and rewrites manually into target technologies, covering the entire SDLC phase of Design, Development, and Testing. Reverse engineering methodology is a two-step process called reverse engineering followed by forward engineering. Study the existing applications, collect the business rules, design models, and workflows, and document as part of reverse engineering. After reverse engineering, build the new application on the target platform using the documentation. The process flow of the manual-based migration approach is described in Figure 10.

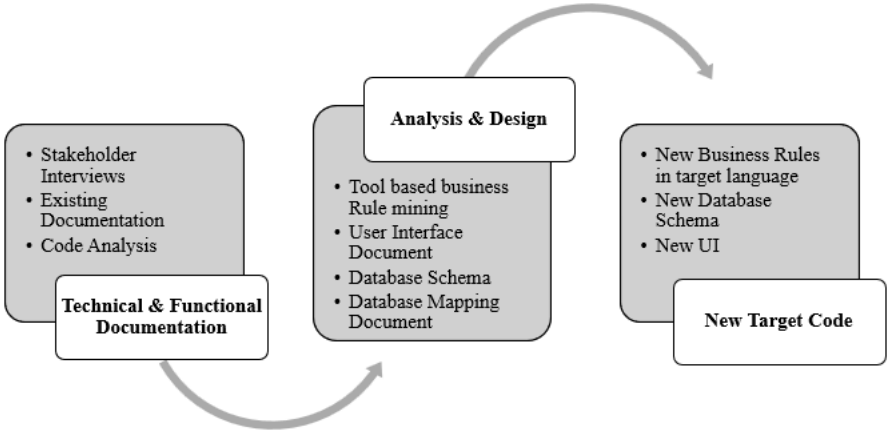


Figure 10: Manual Migration Approach

Table 4 describes the comparison between Manual and Automation migration comparisons.

Parameter	Manual Migration	Automation Migration
Cost	High	Low
Schedule / Time	Longer Development	Shorter Development Cycle

	Cycle	
Code Quality	Sometimes, it is not clean and good	Clean and good
Flexibility	Maximum flexibility in design and modification	Very rigid, based on rules defined in the tool

Table 4: Tool Base Vs. Manual Migration Comparison

Legacy modernization has many benefits: reduced cost, enhanced flexibility, and vendor options. Modernizations are widespread, from Legacy to Cloud-ready, DevOps, Automation, AI and Big Data, and Mobile First approach applications. Migrating legacy applications to Cloud for better scalability, performance, and flexibility. DevOps simplifies the process of modernization by shared responsibility and a collaborative approach. Manual processes are the barriers to Legacy applications. Organizations can reduce operational costs and increase efficiency by moving manual to automation. Digital Transformation uses AI-based tools for Data-driven decisions. Mobile-first approach development leads the business to serve the customer faster and flexibly.

The research aims to develop an estimation model for Agile-based projects with minimal effort variance. The study is carried out to eliminate the drawback of the Agile story point/poker man approach.

3.7 Objectives

This thesis aims to formulate a more precise effort estimation model for Agile project development, thereby addressing the limitations of existing Agile story points and planning poker methodologies. This research seeks to answer the following pivotal questions, which in turn define the objectives of the proposed model.

- **Question 1:** How can expert judgment-based effort estimations in Agile projects be more accurate?
- **Question 2:** What are the factors affecting effort estimations in Agile-based projects?
- **Question 3:** How can the variance in story point estimations be reduced to within ±10%?

Based on the above questions, Objectives are derived to prepare an effective agile estimation model using Weighted Complexity Factors.

- **Objective 1:** To develop an effort estimation model designed explicitly for Agile projects in the open-source domain to integrate this model into Excel or web-based tools.
- **Objective 2:** To compare the efficacy of the newly developed model against existing Scrum estimation models, such as story points and planning poker.
- **Objective 3:** To employ statistical methods to evaluate the performance of the proposed Weighted Complexity Factor estimation model across projects of varying complexity.

In this context, "size" refers to the relative scale of a development requirement, feature, or task, as measured by various techniques like Story Points, T-Shirt Size, Dot Voting, and Planning Poker. "Effort" denotes the units of size the team needs to implement a particular task or development unit.

3.8 Research Methodology

To answer the research questions stated above, the proposed **WE**ighted **CO**mplexity **F**actor **E**stimation (WECOFE) model defined and validated the model against existing Agile-based projects running on the Story Point estimation model. For this, I collected various projects with various sizes and timelines. The algorithm and flow chart describe in Figure 11 the multiple activities performed for the Research Methodology.

Algorithm:

Step 1: START;

Step 2: Collect the existing Agile project data from different Organizations;

Step 3: Finalize the projects;

Step 4: Collect the Actual Estimations for the Agile stores;

Step 5: Analyze the existing estimates;

Step 6: Collect information related to - "Why the estimations are wrong" from the existing teams wherever there is a deviation of estimates;

Step 7: Identify and Define the Factors from the information provided by the teams;

Step 8: Define WEighted COmplexity Factors Estimation (WECOFE) using Factors;

Step 9: Apply the WECOFE model for the projects identified;

Step 10: Calculate the Magnitude of Relative Error (MRE) and Mean Magnitude of Relative Error (MMRE) of existing Agile efforts and new WECOFE;

Step 11: if (the MRE and MMRE are within the range of 10% prediction for the new model) {

Step 11.1: Finalize the Model and apply the model to different project sizes;

Step 11.2: Consider the project for final research purposes;

Goto **Step 12**;

} else {

Step 11.3: Adjust the Factor values in WECOFE;

Goto **Step 9**;

}

Step 12: END;

Flow Chat:

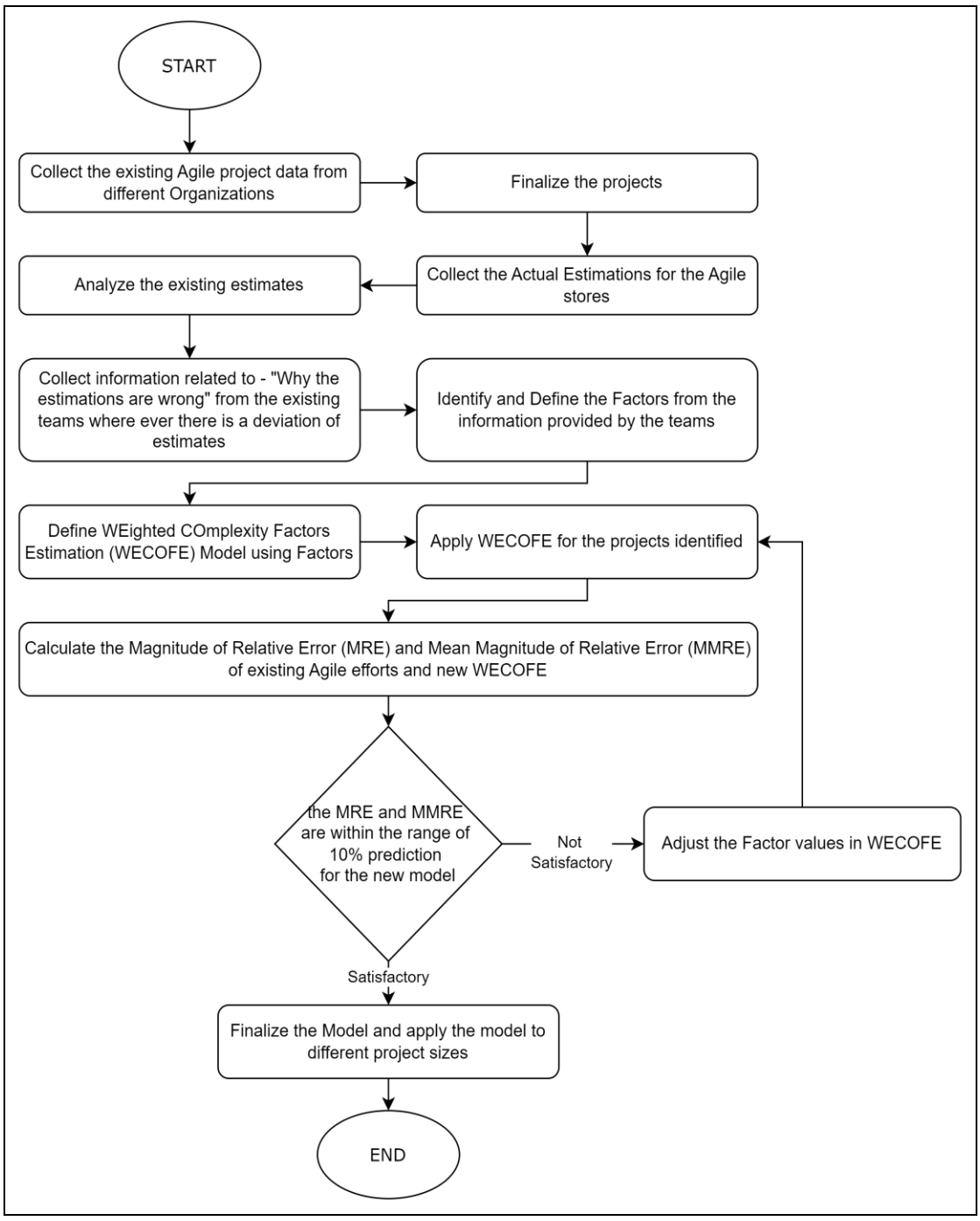


Figure 11: Research Methodology

To achieve Objective 1, the critical activity was a collection of Sprint projects with data on Story points and Actual story points spent and identifying why the estimations have deviated for 15% variance cases. Collect the information from the respective teams and correlate the data to identify the factors to achieve appropriate story points (deviation should be minimal).

Chapter 4 – Proposed WECOFE Model

Scrum methodology is challenging in an agile context, especially for effort estimation. Estimations are a difficult feat in modern software projects. Most of the project's failures are caused by improper effort estimates and ineffective resource utilization in projects. Organizations use two effective methods to identify project estimations – measuring hours and story points. Story point estimations are popularly used in agile methodology effectively. There are several ways to define the agile project estimates – Planning poker, Bucket System, Dot Voting, T-Shirt sizing, Ordering Method, and dividing until the maximum size or less described in our papers presented along with challenges. The base principle for identifying story point estimation is the principle of relativity. Ahmed et al. (2018) describe traditional and Agile estimation models as compared to Adaptability and Teamwork and identify Agile Risk as a Lack of Understanding of Requirements, Team meetings, visits, Training, Poor Communication, and Number of Project Personnel.

For example, the complexity level of task 1 is decided by the complexity level of task 2. The teams look at each aspect of the project relative to the other elements of the project/story. The unit of measure is based on the teams' difficulty and complexity of the story. The Scrum master asks the group to estimate each story's points using Fibonacci projections and the developer estimates. Each developer provides story points to each activity and validates the story points; if there is a considerable difference among each developer, the second round of effort estimation is performed with justifications. Most of the time, the process of story point estimation makes it difficult for the developer to judge the points due to the relative sizing and complexity of the software—variation of estimates observed in projects due to non-experience of the resources to identify the story points. Most of the situation's resources equate agile story points to hours. For example, two resources work on the same feature with two story points estimation. However, the time spent on the task to complete the quality differs from one resource to another. Two developers have agreed on estimating two story points for a work item even though their time estimations are different. All the developers are on the same page regarding this story point estimations despite hours

being different from one resource to another. Below are some of the disadvantages of story point estimations.

- Take time to understand and master estimation skills.
- Different from one resource to another and their justification
- A stable team is required.
- Business teams are unable to estimate things to allocate budgets.
- Possibility of misuse by the developers by providing justifications

Rak et al. (2019) propose weights defined for various technical and Environmental factors using UCP based on the factors weights the effort estimates have derived. The research aims to define a new estimation model using the Weighted Complexity of each story. Base values are determined by the Organization every year. Organizations conduct yearly hackathons and identify the efforts required to complete one task. Based on the results, each work item's story points are set in a pre-defined format with proper justification. Projects must use the base values and add Weighted Complexity factors to arrive at appropriate story point estimates. Input factors were identified and defined in this research and incorporated into a new WECOFE model.

Creating/proposing a new estimation model, as defined in Objective 1, requires data collection as the primary step. To identify the existing sprint projects, collected the different-sized projects from 3 different Organizations working on Agile sprints. Data collection is explained in detail in the section - Data Collection.

This proposal introduces a novel approach to Agile story point estimation, leveraging Weighted Complexity Factors. Unlike traditional methods that rely solely on the expertise of the resource involved, the proposed WECOFE model incorporates two pivotal elements: Project Level Factors (PLF) and Story Level Factors (SLF). These elements are critical determinants in accurately gauging the story points for any given requirement or story, as elaborated in Figure 12.

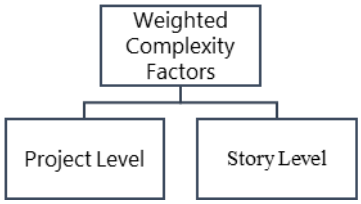


Figure 12: Factors for Requirement

4.1 Why Estimations Wrong

Agile estimation models are dependent on user experience rather than considering the other attributes. In this context, information from three Organizations' sprint teams was collected on why the estimations were wrong at the retrospective meeting. While doing this activity, the following attributes are incorrectly considered during experience base estimations.

- Code changes.
- Functional / Data Complexity
- Design Complexity
- Integration into other systems (Internal / External).
- SSL, Encryption, Database creation, and batch jobs configuration.
- Technology and Functional Complexity.
- Code reusability, Internal processing complexity, Cross-platform requirements, and response time.
- Familiarity with the project, application experience, programming language experience, and domain knowledge.
- Non-Functional Requirements

Teams fail because some of the above are not considered while doing the estimations. We grouped them into two buckets based on the above and formulated the model to minimize the effort variance. The section below defines proposed factors to eliminate the missing additional attributes while estimating story points.

4.2 Potential Factors for Agile Estimations

In Agile project management, the prevailing practice is for individual resources to estimate their effort for completing tasks. These estimates are typically a collaborative effort involving key stakeholders such as the Product Owner, Scrum Master, Developers, and Quality Assurance teams. For instance, developing a search screen compatible with multiple browsers may be evaluated as a two-point task from a development standpoint. Still, it may require considerably more effort from a testing perspective. Consequently, a holistic estimate necessitates the collective input from both Developers and QA teams. It's important to note that different groups, and even

members within the same team, may have varying metrics for story points, influenced by their individual experiences and the nature of the tasks at hand. These variations manifest themselves in the differing velocities of team members, making it imperative to strive for a standardized point scale, especially for larger, more complex projects. Figure 13 elucidates the methodology involved in story point estimations.

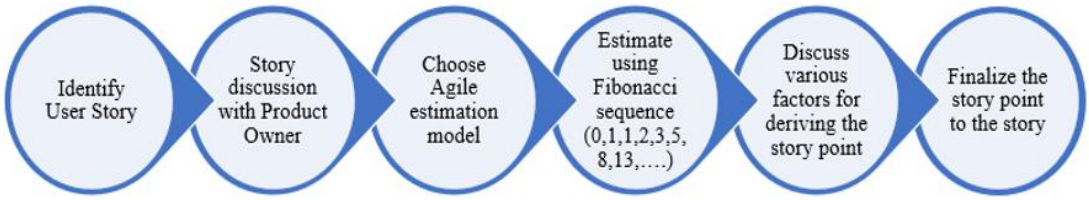


Figure 13: Agile Story Point Estimation Steps

Each development cycle, known as a sprint, typically lasts between two to four weeks. Within this timeframe, the team is tasked with completing specific business functionalities and delivering a viable product for user validation. The prioritization of backlog items is pivotal for the project's success and is categorized into four key segments: essential features, desirable features, optional features, and excluded features. Sprint cycles are structured around these categories to ensure timely and effective project delivery. Figure 14 provides a detailed overview of the sprint planning activities commencing with Sprint 0.

Figure 14: Agile Sprint Planning Activities

Navigating the labyrinth of effort estimation standardization across diverse development teams is a formidable challenge. Often limited by their experiential scope, developers may overlook critical risks when making these estimations. To remedy this, experts advocate adding additional variables identified by project teams to supplement developers' initial best-case scenario estimates. This is particularly

pertinent in today's dynamic landscape, where application architectures undergo rapid transformations, rendering traditional metrics like Functional Point estimations and Use Case models increasingly obsolete.

The academic discourse, as captured in various literature reviews, offers many studies examining the multifaceted factors that influence effort estimation. While many of these studies employ the Mean Relative Error (MRE) and prediction level p (PRED) as barometers for software effort estimation accuracy, these metrics have been criticized for their inherent unreliability. In response, Idri et al. (2018) proposed a more robust, standardized approach incorporating PRED calculations. The field currently employs diverse techniques, ranging from Use Case Reuse to venerable frameworks like the Constructive Cost Model (COCOMO), with the variance in story point estimations often gauged using MRE as a measure.

$$\text{MRE} = \frac{|Actual\ Effort - Estimated\ Effort|}{Actual\ Effort}$$

In an ideal world, meticulous project planning yields zero variance in effort estimations. However, the reality is often complicated by constraints such as resource limitations, making existing models less reliable for precise estimations. A study by Alzubaidi et al. (2022) identifies several key factors that significantly influence the performance of scrum projects. These include the prioritization of the product backlog, the efficiency of the product owner, the costs associated with integration testing, the estimated duration of sprints, and the financial implications of quality assurance. Story point estimations are not merely numerical values but are nuanced metrics influenced by the complexity of the task at hand and the skill set of the assigned team member. To enhance the accuracy of these estimations, project teams are advised to establish foundational measures for each work item, drawing upon their collective experience. These work items range from User Interface design to Business Logic and from Rest/SOAP services to Database Changes. It's crucial to recognize that these elements may vary from one team to another.

To further refine the accuracy of story point estimations, the introduction of Project Level Factors (PLF) and Story Level Factors (SLF) is recommended. These factors serve as additional components that can be integrated into the estimated efforts for

each work item, thereby bringing the story point efforts closer to the actual time invested in completing the task.

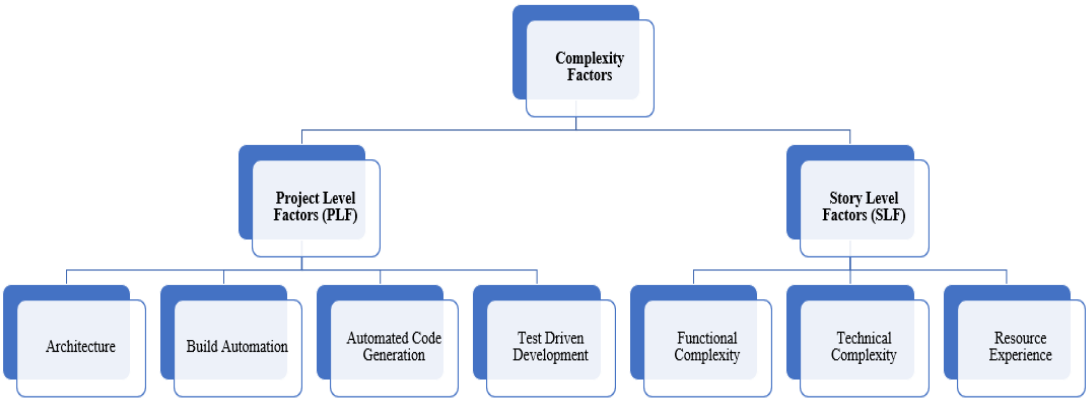


Figure 15: Deliberation Factors considered to determine story point estimation.

The inherent limitations of traditional effort estimations necessitate the incorporation of additional variables, specifically Project Level Factors (PLF) and Story Level Factors (SLF), to achieve a more accurate forecast. These factors serve as dynamic adjusters, either amplifying or attenuating the initial effort estimations made by the team, as described in Figure 15. Upon the careful evaluation of these PLF and SLF variables, the final story point estimation is then recalibrated to offer a more precise reflection of the actual time and resources required to complete a given task.

$$Story\ Point = Story\ Points\ Defined\ by\ the\ resource\ in\ an\ ideal\ scenario + Additional\ Efforts\ from\ PLF + Additional\ Efforts\ from\ SLF$$

Figure 16: elucidates a nuanced model for gauging complexity factors integral to agile effort estimations. Each contributing element within this model is calibrated on a scale ranging from Low to Moderate to High. These designated values serve as pivotal metrics, informing the final computation of effort required in agile Scrum Projects.

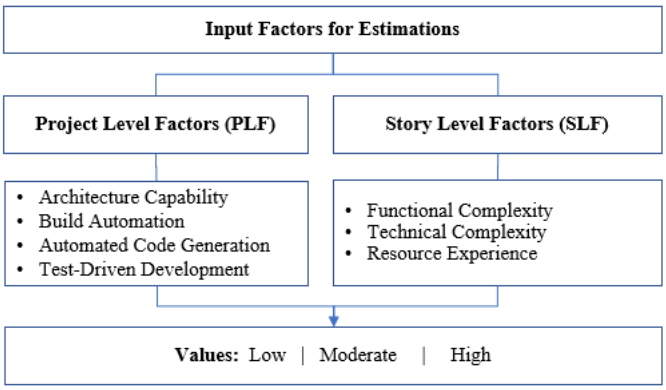


Figure 16: Factors for Agile Estimations

While traditional teams often quantify their estimates in person hours, a metric also employed by some agile teams, there is a growing consensus on the need to transition to story points. These points offer a more nuanced measure, capturing not just time but also the complexity, risk, and volume of work involved. To mitigate uncertainties, requirements are dissected into more manageable components. Teams then assign values to various complexity factors for each element, fostering a sense of uniformity across different organizational units. When these estimations are harmonized across groups, it becomes feasible to calculate and compare project velocities, thereby enhancing overall project management efficacy. The factors are dynamic in nature and the complexity may vary from project to project and team to team. Take different size project to validate the factors taken to achieve our goal or not. The project sizes are different from 1 month project to 10 months project with span of 2 to 20 sprints as described in Section 5.2

4.3 Define Base Estimations

In each organization, the foundational estimations for project requirements are uniquely tailored. To establish a standardized baseline for effort estimation, the following methodology is proposed:

Isolate a representative work packet that embodies moderate complexity, such as UI design or DAO implementation. Select a diverse pool of team members, each with varying experience levels.

Step 1: Identify the moderate work packet (ex, UI design, DAO implementation, etc.)

Step 2: Identify the various resources from the Origination with different work

experience.

Step 3: Create a moderate work packet for the specific feature and give 3-5 (minimum 3) resources in the identified resource to complete the task.

Step 4: Identify the actual time spent on the work packet for each resource.

Step 5: Average the efforts from the 3-5 resource completed work packet (identified to work on the prescribed work packet)

Step 6: Note the average Story Point identified for the work packet. The work packet would be classified as a Moderate work packet.

This research reached three Organizations to define the Base Efforts in agile story points. Introduced the above-said approach for each of the organizations. Below are efforts for each of them, along with work packet details.

Org 1:

Work Item	**Moderate Estimation (Story Points)**	**Work Packet Definition (to identify the Story Point)**
UI Page	2	UI Screen having 8 - 10 form fields. Transactions - with Business / JSON / AJAX Objects
Business Logic	3	Business Logic involves transactions with Database, Business Objects / JSON / AJAX fields (8-10 elements). Server-side validations with 8-10 elements, data from UI screen / external component.
Rest Service	3	Business Logic involves transactions with 8-10 elements, along with validations. Receive JSON object with 8-10 elements / Create JSON with 8-10 elements with business logic.
SOAP Service	3	Business Logic involves transactions with 8-10 objects along with validations. Receive SOAP object with 8-10 elements / Create SOAP with

		8-10 elements with business logic (Bottom-up approach).
External Integration	3	Create an Object with 8-10 elements and connect to an external system for sending data / receiving data.
DAO	2	Create / Update / Delate operation with 2-3 database tables. Involved in preparing statements and executing procedures if required.
DB Changes	1	Changes in existing table structure (adding, deleting, and altering constraints) and related changes.
UI + Business Logic	5	UI and Business Logic class implementation with 8-10 objects
UI + Business Logic + DAO	7	UI, Business Logic, and DAO class implementation with 8-10 objects
Business Logic + Rest Services	6	Business Logic and Rest Service implementation with 8-10 objects
Business Logic + DAO	5	Business Logic and DAO class implementation with 8-10 objects
Business Logic + External Integration	6	Business Logic class and External Service Integration implementation with 8-10 objects
UI + Business Logic + Rest Services	8	UI, Business Logic class, and Rest Service implementation with 8-10 objects
UI + Business Logic + Rest Services + External Integration	11	UI, Business Logic class, Rest Service, and External Service integration implementation with 8-10 objects
UI + Business	10	UI, Business Logic class, Rest Service, and

Logic + Rest Services + DAO		DAO implementation with 8-10 objects
Bug - UI	1	UI-related bugs (Validation, adding new field)
Bug - Business Logic	1	Business logic-related errors
Bug - DAO	1	Database connectivity / DB changes related errors
Bug - Services	1	Rest Service implementation issues
Bug - External Integration	1	Issues related to External system integration like not sending proper data, and not receiving appropriate data from external systems.

Org 2:

Work Item	**Moderate Estimation (Story Points)**	**Work Packet Definition (to identify the Story Point)**
UI Page	2	UI Screen having 8 - 10 form fields. Transactions - with Business / JSON / AJAX Objects
Business Logic	3	Business Logic involves transactions with Database, Business Objects / JSON / AJAX fields (8-10 elements). Server-side validations with 8-10 elements, data from UI screen / external component.
Rest Service	3	Business Logic involves transactions with 8-10 elements along with validations. Receive JSON object with 8-10 elements / Create JSON with 8-10 elements with business logic.
SOAP Service	3	Business Logic involves transactions with 8-10 objects along with validations. Receive SOAP object with 8-10 elements / Create SOAP with

		8-10 elements with business logic (Bottom-up approach).
External Integration	3	Create an Object with 8-10 elements and connect it to an external system for sending data / receiving data.
DAO	1.5	Create / Update / Delate operation with 2-3 database tables. Involved in preparing statements and executing procedures if required.
DB Changes	1	Changes in existing table structure (adding, deleting, and altering constraints) and related changes.
Administrative Activities	1	Related to the configuration of the server, the application
Reports	4	Generating reports using Excel, Word, CSV
Onboarding New Software	3	Installing new software for the application purpose
UI + Business Logic	5	UI and Business Logic class implementation with 8-10 objects
UI + Business Logic + DAO	6.5	UI, Business Logic, and DAO class implementation with 8-10 objects
Business Logic + Rest Services	6	Business Logic and Rest Service implementation with 8-10 objects
Business Logic + DAO	4.5	Business Logic and DAO class implementation with 8-10 objects
Business Logic + External Integration	6	Business Logic class and External Service Integration implementation with 8-10 objects
UI + Business Logic + Rest Services	8	UI, Business Logic class, and Rest Service implementation with 8-10 objects
UI + Business	11	UI, Business Logic class, Rest Service, and

Logic + Rest Services + External Integration		External Service integration implementation with 8-10 objects
UI + Business Logic + Rest Services + DAO	9.5	UI, Business Logic class, Rest Service, and DAO implementation with 8-10 objects

Org 3:

Work Item	**Moderate Estimation (Story Points)**	**Work Packet Definition (to identify the Story Point)**
UI Page	2	UI Screen having 8 - 10 form fields. Transactions - with Business / JSON / AJAX Objects
Business Logic	3	Business Logic involves transactions with Database, Business Objects / JSON / AJAX fields (8-10 elements). Server-side validations with 8-10 elements, data from UI screen / external component.
Rest Service	3	Business Logic involves transactions with 8-10 elements along with validations. Receive JSON object with 8-10 elements / Create JSON with 8-10 elements with business logic.
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DAO	1.5	Create / Update / Delate operation with 2-3 database tables. Involved in preparing statements and executing procedures if required.
DB Changes	1	Changes in existing table structure (adding, deleting, and altering constraints) and related changes.
UI + Business Logic	5	UI and Business Logic class implementation with 8-10 objects
UI + Business Logic + DAO	6.5	UI, Business Logic, and DAO class implementation with 8-10 objects
Business Logic + Rest Services	6	Business Logic and Rest Service implementation with 8-10 objects
Business Logic + DAO	4.5	Business Logic and DAO class implementation with 8-10 objects
Business Logic + External Integration	6	Business Logic class and External Service Integration implementation with 8-10 objects
UI + Business Logic + Rest Services	8	UI, Business Logic class, and Rest Service implementation with 8-10 objects
UI + Business Logic + Rest Services + External Integration	11	UI, Business Logic class, Rest Service, and External Service integration implementation with 8-10 objects
UI + Business Logic + Rest Services + DAO	9.5	UI, Business Logic class, Rest Service, and DAO implementation with 8-10 objects

4.4 Project Level Factors

The project-level scope encompasses elements universally applicable to all stories or requirements within a project or sprint. These overarching complexity factors serve as constant variables in the effort estimation equation. The following four key elements are integral to project-level considerations.

- Architectural Proficiency (AC) measures the system's structural design capabilities.
- Continuous Integration/Continuous Deployment (CI/CD) - The extent to which build automation is integrated into the development process.
- Automated Code Compilation (ACC) - The degree to which code generation is automated, affecting development speed.
- Test-Driven Development (TDD) - The adoption level of a development approach where tests dictate the architecture and code evolution.

These factors collectively shape the project's complex landscape, influencing the effort estimations for each sprint or project.

4.4.1 Architecture Capability (AC)

In today's dynamic technological landscape, many programming languages and architectural frameworks are available for application development. Digital transformation, a process aimed at modernizing legacy systems to align with contemporary needs, typically unfolds in five phases: Planning, System Requirement Gathering, Design and development, Testing, and Implementation. Various architectural paradigms have emerged over the past two to three decades, each with advantages and use cases. In the realm of open-source projects, the following architectures are predominantly employed.

- N-Tier Architecture - A multi-layered approach that separates the presentation, business logic, and data storage layers, offering modularity and scalability.
- Single Page Applications (SPA) - A client-side architecture that dynamically updates a single HTML page, enhancing user experience and reducing server load.

- Microservices - A decentralized approach that breaks down an application into loosely coupled, independently deployable services, each responsible for a specific functionality.
- Serverless Architecture - An event-driven model that allows developers to focus on code while the cloud provider manages the infrastructure, scaling, and server provisioning.
- Streaming Platforms - Architectures designed to handle real-time data streams, often used in analytics and monitoring applications.
- Queuing (MQ) Architecture - A message-oriented model that decouples producers and consumers, allowing for asynchronous communication and load distribution.
- Service-Oriented Architecture (SOA) - A design pattern where services are provided to other components through a communication protocol over a network, promoting interoperability.

N-Tier:

N-tier architecture or multitier / multi-layered architecture described in Figure 17 is a client-server architecture in which the presentation, application, and database functions are separated. Web-based development N-tier architecture has been widely used for more than a decade. Architecture is divided into three layers: Client Layer, Business Layer, and Persistence Layer. The user interacts with the application using a Browser / Mobile Browser called the Client Layer. Server Layer (Application Layer) sits between the Client and Storage layers. The server Layer is divided into Web, Business, and Persistence sub-layers. The application's entry point is the Web Layer, which is responsible for user interactions on the server side. Business Layer is where business logic is implemented as a carefully composed and well-defined API. The persistence layer is accountable for abstracting the data to Storage Layers via Object Relational Mapping (ORM) tools like Hibernate. Storage Layer retains relevant data in relational databases like MySQL, Oracle, or SQL Server.

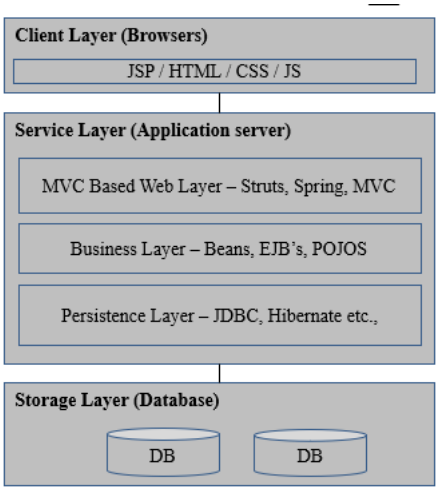


Figure 17: N-Tier Architecture

Single Page Applications (SPA):

Single-page applications (SPAs) described in Figure 18 load a single HTML web application dynamically, and the user interacts with the Server-side Component/Application using Services. SPAs use JavaScript frameworks and HTML5 to create UI and responsive Web Applications without constant page reloads. Much of the work happens on the client side in JavaScript. All the front-end pages are connected to REST / SOAP services. JavaScript frameworks like Angular ReactJS are used for developing single-page applications. The REST services interact with the Business layer for business operations. The Storage Layer retains relevant data in a relational database system like MySQL, Oracle, or SQL Server.

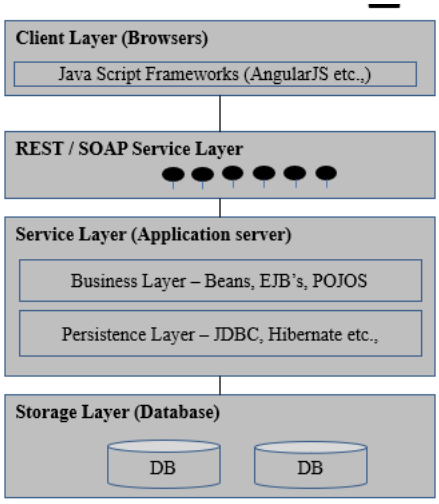


Figure 18: Single Page Architecture

Microservices Architecture:

Microservice is designed for the application as a small subset of the functionalities to fulfil the partial requirement. Leverage the Restful APIs to connect to third-party hosted services for cross-cutting concerns. They are creating a more significant number of microservices, increasing the complexity of distributed management systems. There are frameworks like Spring that can help to implement microservices quickly. Microservice Architecture allows horizontal scaling and functional change independently without impacting other components—high-level microservices architecture is defined in Figure 19.

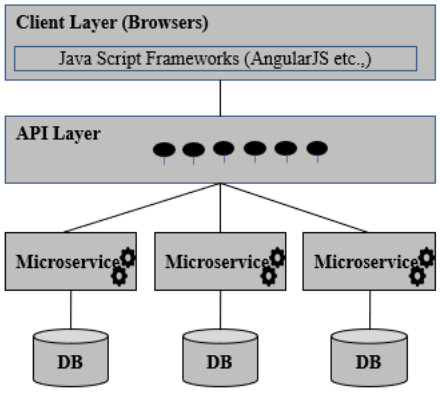


Figure 19: Microservices Architecture

Serverless Architecture:

Serverless architecture is favoured when the applications are deploying in Cloud environments. Cloud computing execution is a model called Serverless technology. The cloud provider provides the server built with the cloud platform. Developers simply write the code and deploy the piece of code to the cloud platform for execution. The developer can develop and deploy the Functions in the cloud computing services. For example, a Serverless application can be written in Amazon Web Services Lambda, Microsoft Azure functions, Google Cloud Functions, and IBM Open Whisk to fulfil the requirement. Serverless architectures are a way of executing applications and services without managing infrastructure.

Streaming Platforms:

Streaming (Kafka-based) architecture described in Figure 20 decoupling components

in a system and logical separation between the production and consumption of events, the resiliency of the event systems and fault tolerance, Independent Platforming, Scaling, and Packaging. KStream is one of the powerful features of Kafka to the abstraction of record stream of Key-value pairs. API-based banking platforms are designed to integrate between the front-end user experience layer and backend systems or third-party systems: microservices architecture and streaming platform to support connectivity between systems across firewalls. Microservice provides token-based authentication and privilege-based access for the required topic over the Internet. Kafka topics are used within the network and do not require any Microservices. Figure 20 depicts the architecture of the streaming platform.

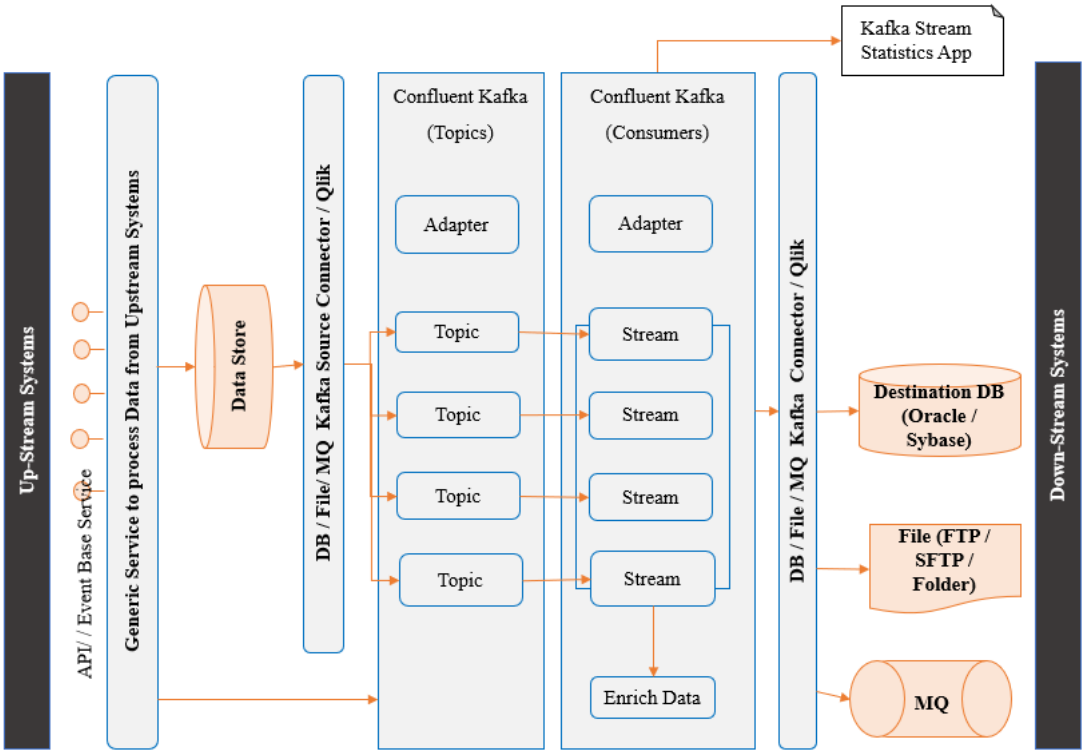


Figure 20: Streaming Platform Architecture

Queuing (MQ) architecture:

Message queues and mailboxes are software-engineering components used for inter-process communication (IPC) or inter-thread communication within the same process. They use a queue for messaging – the passing of control or content. Group communication systems provide similar kinds of functionality. The message queue paradigm is of the publisher/subscriber pattern and is typically one part of a more

extensive message-oriented middleware system. Messaging systems support publisher/subscriber models in their API. Ex: Java Message Service (JMS). Message queues provide an asynchronous communications protocol, meaning that the sender and receiver of the message do not need to interact with the message queue simultaneously. There are several open-source choices of messaging middleware systems, including Apache ActiveMQ, Apache Kafka, JBoss Messaging, and RabbitMQ.

Java Message Service, described in Figure 21, is an API that supports the formal communication between computers on a network. It provides a familiar interface for standard message protocols and message services supporting the Java programs. It gives the facility to create, send, and read messages. JMS API reduces the concepts that a programmer must learn to use the messaging services/products, and it also provides the features that support the messaging applications. JMS is used primarily to send and receive messages from one application to another. JMS API is used to create, send, receive, and read messages or exchange messages between different systems. Once developed a Java Messaging System with JMS API, then we can deploy the same application in any JMS Provider software.

Figure 21: JMS Architecture

SOA Architecture:

Service-oriented architecture (SOA) is a style of software design where services are provided to the other components by application components through a communication protocol over a network. The basic principles of service-oriented architecture are independent of vendors, products, and technologies, as defined in Figure 22. A service is a discrete unit of functionality that can be accessed remotely, acted upon, and updated independently, such as retrieving a credit card statement online. A service has four properties according to one of many definitions of SOA.

- Logically represents a business activity with a specified outcome.

- Self-contained.
- Back box for its consumers.
- Consist of other underlying services.

Figure 22: SOA Blueprint Services

4.4.2 Build Automation (CI/CD)

The Continuous Integration and Continue Delivery (DevOps) approach is designed to create an automated environment, ensuring that every change to the application results in a releasable version and that any version can be built automatically at the push of a button. Continuous integration ensures that every time a developer checks in a change, a tool like Jenkins, Cruise Control checks out all the sources, builds everything, runs all the unit tests, and reports with immediate feedback. This eliminates the need for integration testing and the cost of developers spending time on this phase. The enablement of frequent incremental builds and mandating a comprehensive automated testing process also allows developers to detect problems early and, as a result, ensure higher application quality. Here are the highlights of the CI tools like Jenkins. The DevOps platform is defined as

- Jenkins is an open-source continuous integration tool also written in Java.
- Jenkins has the following capabilities.

- Build automation in Jenkins is achieved by running automated scripts (Batch / Ant / Maven) for projects.
- Jenkins supports the commonly used SCM tools like CVS, Subversion, Git, etc., enabling easy checkouts for build automation.
- Also, it can execute arbitrary shell scripts and Windows batch commands.

- Live browser-based console view with real-time status of each build.
- Easy customization

4.4.3 Automated Code Generation (ACC)

Various frameworks are available in the market to develop enterprise application programming. Code generation denotes software techniques that generate programming code that can be used independently for runtime environments. Open-source application generators are available to create modern web applications quickly, and Microservices using Angular or React (JavaScript library) and the Spring Framework. JHipster is one such tool to generate a project with Java stack on the server side and web front-end applications using Angular / React. Also, it supports Netflix OSS, Docker, and Kubernetes container-level application generations. The code generation helps the programmers to quickly develop the application and deploy the same in the specified environment. This leads to a lot of timesaving along with saving efforts. Some of the Automated Code Generations (ACC) are as below

- JHipster
- Jmix
- AWS CloudFormation

One of the most recent advanced code-generation programming uses Natural Language Processing (NLP) for large language models (LLM). Several LLMs are Google BART and Open AI GPT to generate programming models for a specific need. Below are the top AI-based code generators based on the large language models that can generate high-quality code.

- OpenAI Codex
- Tabnine
- CodeT5
- Polycoder
- Cogram

4.4.4 Test Driven Development (TDD)

Test Driven Development (TDD) is a software development practice focusing on creating test cases before developing code. TDD approach derives its roots from the Agile manifesto principles. As an alternative to writing code, test-driven development dictates that the test cases be written first and then implement code changes until the code executes correctly. As per IBM documentation, there are five steps in the TDD flow:

- **Step 1:** Read, understand, and process the feature or bug request.
- **Step 2:** Translate the requirement by writing a unit test. Unit tests will run and fail as no code is implemented.
- **Step 3:** Write and implement the code that suits the requirement. Run the test case passes. If not, repeat this step.
- **Step 4:** Clean up your code by refactoring.
- **Step 5:** Rinse, lather, and repeat.

Figure 23 explains the TTD process flows.

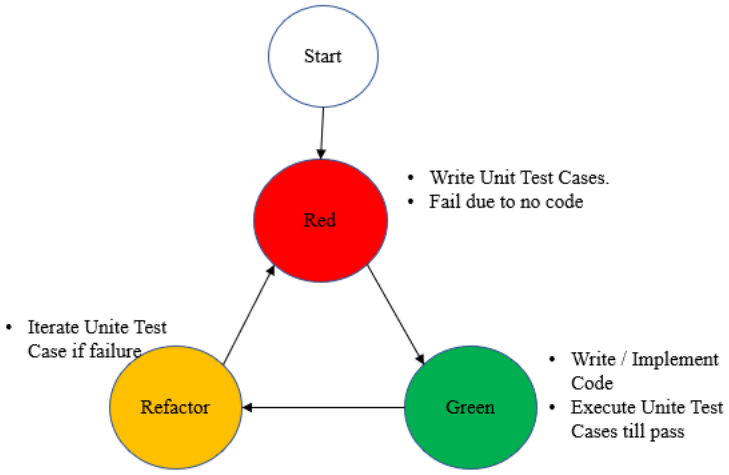


Figure 23: TDD Process Flow

It identified four factors impacting the agile estimations at the project level. The team assigned to develop the project must judge what factors are relevant to the project and post them. For example, if the unit is new to one of the Architectures, then the team requires more time to develop the task when compared to developing using known architecture. In another example, if the project uses ACC to generate code, the execution time would be less.

Each complexity factor is delineated across three levels: Low, Moderate, and High. These gradations serve as qualitative measures to gauge the intricacy of various project elements. Figure 24 visually represents the assigned values for each level of complexity, while Table 5 provides a comprehensive definition for each value, offering a nuanced understanding of the factors in question.

Factor Name	**Architecture Capability (AC)**	**Automation (CI/ CD)**	**Automated Code Generation (ACC)**	**Test Driven Development (TDD)**

Low	The team possesses limited expertise in the architectural framework established by the organization, necessitating a dedicated period for comprehending the architectural nuances specific to the project.	The project lacks an automated Continuous Integration/Continuous Deployment (CI/CD) pipeline, executing all deployments manually.	The development tools are employed in a limited capacity, primarily for generating basic code structures such as setters and getters.	No Test-Driven Development

Moderate	The team possesses a robust understanding and expertise in the architecture framework designated for the project.	The team has successfully configured Continuous Integration and Continuous Deployment (CI/CD) pipelines, employed source repositories, and built tools for deployment processes. However, the full capabilities of CI/CD are not yet being leveraged.	The team employs application code generator tools, such as no-code or low-code platforms, but their utilization remains suboptimal.	Test-driven development in the project with 40-50% coverage

High	The team possesses profound expertise in the architecture framework designated for the project.	The team has seamlessly integrated Continuous Integration and Continuous Deployment (CI/CD) pipelines, employing source repositories and automated build tools for streamlined deployments.	The team proficiently leverages no-code/low-code application code generator tools for optimized and effective code production.	Test-Driven Development in the project with > 80% coverage

Table 5: PLF Definitions

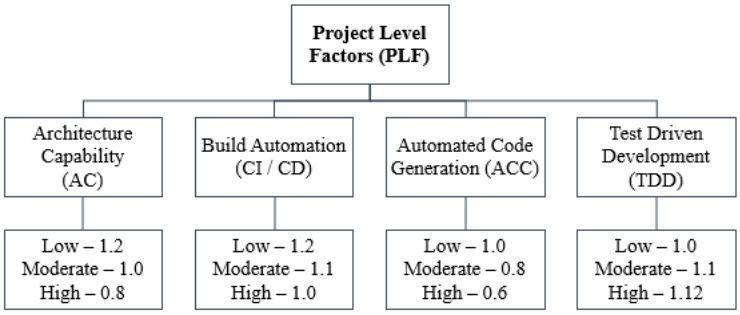


Figure 24: PLF Complexity Factor Values

4.5 Story Level Factors

Story Level scope refers to factors that are factored into the story/requirement. Below are the three elements that are related to each story level. For each story, the factors considered for effort estimations.

- Functional Complexity (FC)
- Technical Complexity (TC)

- Resource Experience (RE)

Each story is meticulously evaluated against these factors to generate a more accurate estimation.

4.5.1 Functional Complexity (FC)

Functional / Business complexity is defined as the number of requirements that must be satisfied to meet the customer, business, supplier, regulators, or systems expectation of technological advances, cultural shifts, and changing legal standards. According to Jost Hoppermann, an analyst with technology and market research company Forrester Research, business complexity has several interdependent and interconnected stakeholders, information technology systems, and organizational structures. Essentially, as businesses add new tools and clients and scale their organization, more and more interconnections, and dependencies from within the industry. As per the new era of digital transformations, Organizations should adopt strategies to knock new markets quickly and enable a remote workforce. Programmers require more information if the business grows more complex. Below are the primary types of business complexities in the IT industry.

Component Complexity:

Functional process complexity comes with both movement of data and manipulation of data, in COSMIC terminology. System complexity is derived from relationships between the operational processes like communication, concurrence, and multi-instances.

Imposed Complexity:

Regulations that are required to impose and operate certain business functions. For example, understanding financial laws for Banking, Insurance, and B2B applications.

Industry Complexity:

Business process complexity that is required to complete the activity. For example, understanding the credit and debit process in the savings bank account is significantly less complex than the design that calculates credit bureau information (requires many validations and conditions applied to calculate credit history) for a given customer.

Design Complexity:

Complexity deals with Organizations structure, processes, infrastructure, products, and services

4.5.2 Technical Complexity (TC)

According to project management experts Remington and Pollack, four types of complexity determine the projects - Structural, Technical, Temporal, and Directional complexity. For this, technical complexity is more important for deciding estimations. The resource must learn the complexity of new technology, processes, and data environment.

In an enterprise today, interconnected platforms, databases, and applications are usually complicated and even more challenging to understand. The complexity of the programming language is based on different metrics.

- Branching
- Data Access
- Data Flows
- Decisions complexity
- Path complexity

Chidamber and Kemerer (1994) described programming complexity metrics used widely in many measurements and academic articles. Weighted Methods per Class (WMC), Response for a Class (RFC), and Lack of Cohesion of Method (LCOM) are some of the metrics:

$$\text{WMC} = \sum_{i=1}^{n} Ci$$

Where n is the number of methods in the class, and Ci is the complexity of the technique.

$$RFC = |RS|$$

Where R is a set of methods called by method i and S is the set of processes in the

class.

Technical complex describes the interactions between several entities within the classes or objects. As the number of entities/objects increases, the number of interactions between them increases exponentially, and the complexity might increase. Higher levels of complexity in software programming increase the risk of unintentional and change to improve defects when making changes.

4.5.3 Resource Experience (RE)

Resource experience on the technology leads to an increase/decrease in efforts to complete the task. The resource is the critical driving force for the success of any project with constraints on cost, time, and scope. Let's give an example of the project: having resources with less experience in the tool/language leads to more time to execute the project. Before starting the project, the scrum master must assess the project scope and identify the proper recourse to manage the project, especially in Agile projects. For the Agile project from day one onwards, the resource must understand the requirement and jump on the activity to complete it within the time frame accepted in the scrum introspection meeting. In some cases, the Scrum team assesses the estimations using resource experience.

Each factor—Functional Complexity, Technical Complexity, and Resource Experience—is categorized into three levels of complexity: Low, Moderate, and High. These levels are further elucidated in Figure 25, with corresponding values detailed in Table 6.

Factor Name	Functional Complexity (FC)	Technical Complexity (TC)	Resource Experience (RE)

Low	The function in question involves minimal business validations, making its implementation straightforward.	The technology required for executing the given function is straightforward devoid of any intricate validations, logic, or algorithms.	The team member has a moderate level of expertise in the relevant technology, having worked in the field for 2-3 years, but still benefits from the guidance of more senior professionals.
Moderate	The requirement involves Moderate business validations, such as fraud detection and account verification, commonly seen in banking applications.	The function is implemented using moderately complex technology, requiring a balanced level of validation, logic, and algorithmic intricacy.	The team member possesses 3-5 years of experience in the relevant technology and is self-sufficient, requiring no guidance from senior resources. They are proficient in coding and optimization techniques.
High	The task involves intricate business validations, requiring the implementation of more than three to four distinct checks.	The task employs advanced technology and necessitates the execution of intricate validations, logic, or algorithms.	The resource boasts over five years of expertise in the relevant technology, excelling in innovative programming and optimization techniques. Furthermore, the individual is adept at reusing previously developed functions and consistently employs standard classes and functions.

Table 6: SLF Definitions

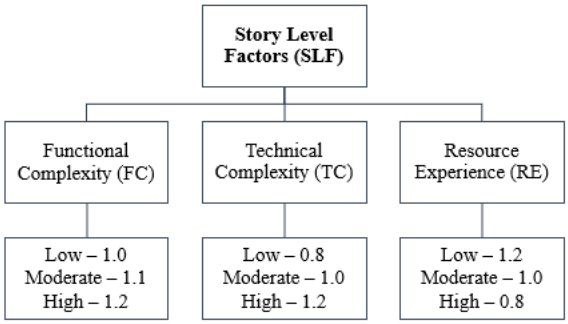


Figure 25: SLF Complexity Factor Values

The adjusted values are calculated for each defined factor and multiplied by the Raw Story points defined by the Organization. All the input factors are depicted in Figures 2 and 3. Each PLF and SLF factor has been assigned a descriptive attribute Low, Moderate, and High with their set of values. In the WECOFE model, the estimator must give discounts for each story/requirement attribute for estimations.

4.6 Project Level Adjusted Factors Calculation

As described in “Project Level Factors (PLF), " four critical factors would be considered while calculating the Agile estimation. These factors are at the project level relatively task level, which means the calculation was made at the project level, and the same applies to all the tasks. Each factor defined the values in the Low, Moderate, and High ranges. Table **7** below represents the identified final values defined after model validation in Chapter 5. In Chapter 5, the adjusted factors are validated with different treatments (which means different values for each PLF). Three treatments are defined to validate the accuracy of the Complexity Factor definitions. After the three treatments, the below values described in Table 7 are more accurate when compared to other defined weights for each complexity factor.

In the WECOFE model, each factor—at the Project Level (PLF) and Story Level (SLF)—is assigned a qualitative descriptor: Low, Moderate, or High, each with its corresponding value set. These factors are visually represented in Figures 2 and 3. For each story or requirement, the estimator assigns values to these attributes, which are then adjusted and multiplied by the organization-wide Raw Story Points to yield the final estimation.

Abbreviation	Project Level Factors	Low	Moderate	High
AC	Architecture Capability (AC)	1.2	1	0.9
CI/ CD	Build Automation (CI/ CD)	1.2	1.1	1
ACC	Automated Code Generation (ACC)	1	0.8	0.6
TDD	Test Driven Development (TDD)	1	1.1	1.12

Table 7: PLF Adjusted Final Factors

Architecture Capability (AC):

- Low (1.2): This could be tied to projects using less sophisticated, perhaps outdated architecture. The 1.2 could represent a 20% increase in effort due to the limitations or inefficiencies of the architecture.
- Moderate (1): Projects that use a standard, well-documented architecture that doesn't add overhead could be rated 1, meaning no extra effort is required.
- High (0.9): Projects that use a highly efficient, modern, and streamlined architecture could have a 0.9 multiplier, indicating that 10% less effort is needed.

In this context, the number "1" is often used as a baseline or neutral multiplier in effort estimation models. When you multiply any number by 1, it remains unchanged, so it's commonly used to indicate a "Moderate" or "Standard" level of complexity, risk, or effort in various scoring systems. Regarding Architecture Capability (AC) being rated as "Moderate," the multiplier of 1 suggests that the project's architecture neither increases nor decreases the overall effort required. It's considered the "norm" or "standard" against which other levels (Low or High) are compared. Therefore, a project with a "Moderate" AC would not require any adjustment to the estimated effort, leaving it as is.

Build Automation (CI/CD):

- Low (1.2): Manual processes are still in place, requiring 20% more effort.
- Moderate (1.1): Some automation is in place but not entirely reliable, requiring 10% more effort.
- High (1): Fully automated and streamlined, no extra effort required.

Automated Code Generation (ACC):

- Low (1): No computerized code generation, standard effort.
- Moderate (0.8): Some parts of the codebase are auto-generated, saving 20% of effort.
- High (0.6): Highly automated code generation, saving 40% of the action.

Test-Driven Development (TDD):

- Low (1): No TDD, standard effort.
- Moderate (1.1): Partial TDD, requiring 10% more effort due to initial setup.
- High (1.12): Full TDD, but with a slight 12% increase in effort for maintaining tests.

Step 1 calculates the **Total Adjusted Project Level Complexity (TAPLC)** measured using the formula below.

$$\text{TAPLC} = \sum_{i=1}^{n} (Pi\ (Complexity) - 1)$$

For i = 1, 2…. n (n represents the total number of Project Level Factors, in this case, four factors) and Pi represents each Project factor value.
Regarding the formulae provided earlier, they are conceptual representations meant to capture the essence of each project-level factor. They are not empirically derived but are intended to serve as a starting point for more detailed analysis.

4.7 Story Level Adjusted Factor Calculation

In Agile project management, three key factors are considered for story-level estimation. These factors—Functional Complexity (FC), Technical Complexity (TC), and Resource Maturity (RM)—are evaluated at the project level and apply uniformly across all tasks. Each factor is assigned a value within the Low, Moderate, or High range. The final values for these factors, as outlined in Table 8, have undergone rigorous validation through multiple treatments in Chapter 5. These treatments serve to test the robustness of the Complexity Factor definitions. After three iterations of treatments, the values in Table 8 have emerged as the most reliable.

Abbreviation	Story Level Factors	Low	Moderate	High
FC	Functional Complexity (FC)	1	1.1	1.2
TC	Technical Complexity (TC)	0.8	1	1.2
RM	Resource Maturity (RM)	1.2	1	0.8

Table 8: SLF Adjusted Final Factors

Functional Complexity (FC):

- Low (1.2): Projects with rudimentary or less efficient functionalities may require 20% more effort, represented by a 1.2 multiplier.
- Moderate (1): Standard functionalities that neither add nor reduce the effort, represented by a one multiplier.
- High (0.8): Highly efficient functionalities that reduce the effort by 20%, represented by a 0.8 multiplier.

Technical Complexity (TC):

- Low (1.2): Projects with outdated or less efficient technologies may require 20% more effort, represented by a 1.2 multiplier.
- Moderate (1): Standard technologies that neither add nor reduce the effort, represented by a one multiplier.
- High (0.8): Cutting-edge technologies that reduce the effort by 20%, represented by a 0.8 multiplier.

Resource Maturity (RM):

- Low (1.2): Less experienced resources may require 20% more effort, represented by a 1.2 multiplier.
- Moderate (1): Resources with standard experience levels that neither add nor reduce the effort, represented by one multiplier.
- High (0.8): Highly experienced resources that reduce the effort by 20%, represented by a 0.8 multiplier.

The number '1' is a baseline or neutral multiplier in effort estimation models. When any effort or complexity value is multiplied by 1, it remains unchanged. This is why the multiplier '1' is commonly used to indicate a 'Moderate' or 'Standard' level of

complexity, risk, or effort in various scoring systems.

In the context of Story-Level Factors:

Moderate (1): The project's functionalities, technologies, or resource maturity neither increase nor decrease the overall effort required. It is the 'norm' or 'standard' against which other levels (Low or High) are compared. Therefore, a project with a 'Moderate' level in any of these factors would not require any adjustment to the estimated effort.

Step 2 calculates the **Total Adjusted Story Level Complexity (TASLC)** measured using the formula below.

$$\text{TASLC} = \sum_{i=1}^{n} (\text{Si (Complexity)} - 1)$$

For i = 1, 2…. n (n represents the total number of Story Level Factors, in this case, three factors), and Si represents each Story factor value.

4.8 Calculate WECOFE Adjusted Factor

In the preceding sections, we derived the "Total Adjusted Project Level Complexity" (TAPLC) and the "Total Adjusted Story Level Complexity" (TASLC). Utilizing these metrics, the next step is to compute each story's "Total Adjusted Complexity Factor" (TACF) to ascertain its precise development story point.

Step 3 calculates the **Total Adjusted Complexity Factor (TACF**) by adding TAPLC and TASLC values.

$$\text{TACF} = 1 + TAPLC + TASLC$$

Finally, calculate the estimation by multiplying the “Raw Estimations” with the “TACF” value. These values give us an accurate Story point compared with other estimation models (refer to findings in Chapter 6).

The **WEighted COmplexity Factor Estimation (WECOFE)** is calculated by Raw efforts multiplied by the TUCF value.

$$\textbf{WECOFE} = \boldsymbol{Raw\ Estimates} * \boldsymbol{TACF}$$

In this thesis, the core work is conducted via a pseudo-experimental basis. The purpose of conducting a series of experiments was to systematically evaluate the complexity factors of forecasting techniques and their variants (MRE, MMRE, and PERT). This enabled the comparative analysis of existing methods used in Agile, like Expert Judgment / Story Point analysis of estimation, along with the novel estimation model proposed. The model was applied to and calibrated on several sprints with different projects and sizes.

Chapter 5 – Data Collection and Model Validation

In this envisaged study, multiple sources were passed through to gather Agile projects to experiment with the WECOFE model. Data is collected from diverse software Organizations and involves project managers and software architects to identify the Story work packet belonging to and assign them the factors defined in the new model. Considered three Organization for validating the model with different project sizes. Along with this considered different domains, the same was described in Section 5.3 . The techniques used for data collection are Direct, real-time data collected directly from JIRA boards and indirect methods, which involve the supply of raw data without interacting with project teams. Ethical approvals have been taken to start collecting the data from the JIRA boards and masking the data into readable format without impacting the end customer security constraints. The concerned team was accepted before collecting the raw data from the JIRA board. As per the concern from the project owner, the data can be used after masking, the same way used in this thesis work. The Agile project data is presented in the section “Data Collection.” Flow chart Figure 26 describes the factors of the Project and Story level Figure 11.

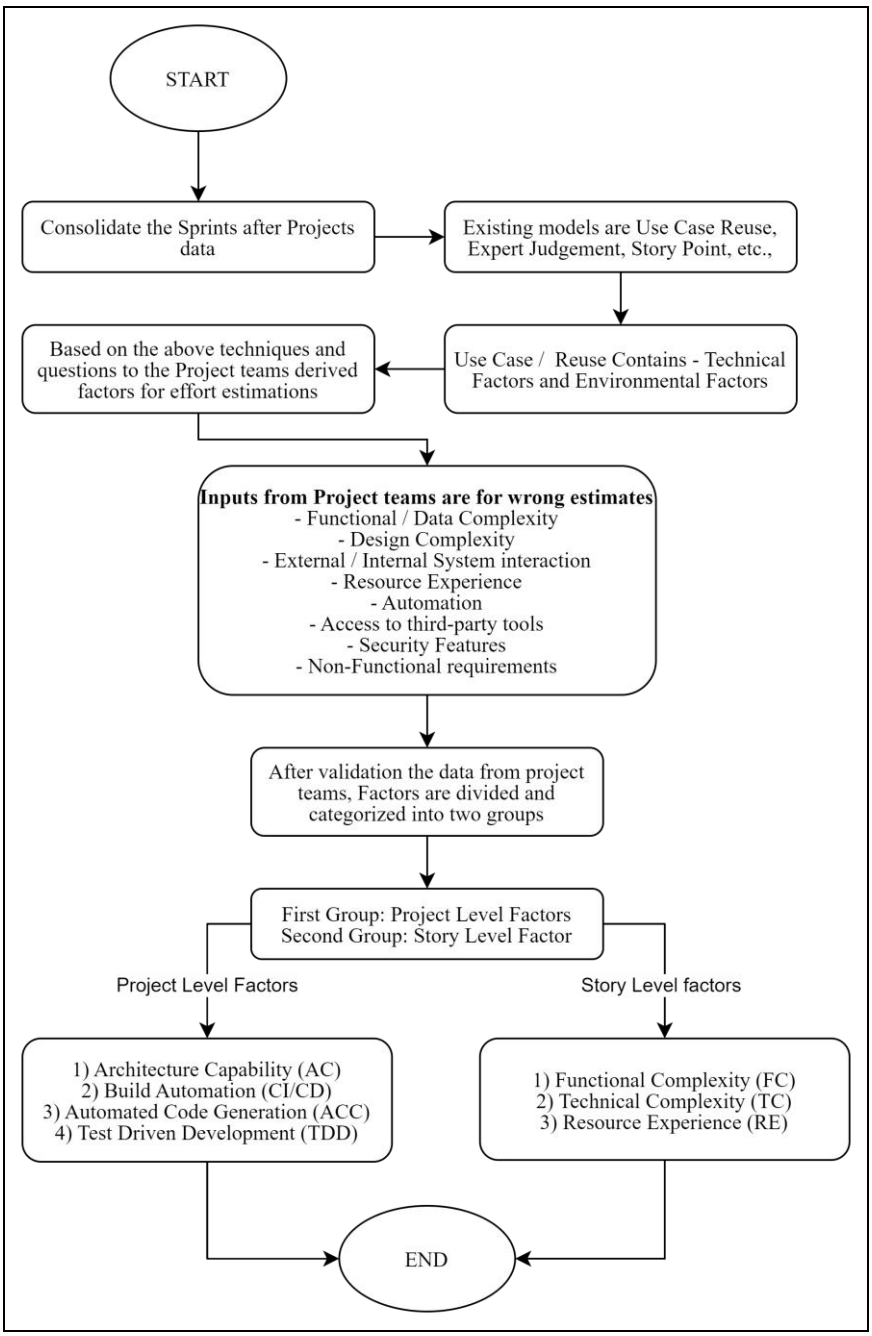


Figure 26: Grouping of Factors

5.1 Experiment Planning

The experiments were conducted in the real-world environment projects of three IT companies based out of India, and the projects are from different regions of the World. As per ethics approval, the company's actual name could not be disclosed in the thesis. Therefore, the masking names are used as Org 1, Org 2, and Org 3 to refer to the experiment host organization. Org 1, Org 2, and Org 3 were involved in

developing software projects ranging from applications like Web applications, Mobile, AI/ML, and ERP solutions for their clients. Org 1, Org 2, and Org 3 followed an agile/scrum framework to develop their IT-related projects. The proposed estimation model is applied to 14 real-time projects comprised of 109 sprints from December 2018 to July 2022. Chapter 10 - Appendix A describes the project details along with the sprints. The data collected through the experiments were shared on the Excel sheets with the researcher to Org 1, Org 2, and Org 3.

Org 1 mainly deals with Core Banking projects with a technology stack of Java, J2EE, JMS, Spring Boot, and application/web servers like Tomcat, JBoss, WebSphere, and WebLogic. Org 1 has a resource strength of 2K to 3K. The data is mainly collected from 5-6 projects for data validation.

Org 2 mainly deals with Core Banking, Insurance, Automobile, CRM, and Logistics projects with a Java, J2EE, SOA technology stack and application/web servers like Tomcat, JBoss, WebSphere, and WebLogic. Org 2 has the resource strength of 100K to 110K. The data is mainly collected from 3-4 projects for data validation. Due to end users' agreements, we cannot get many projects for verification.

Org 3 mainly deals with Banking and Trading platform projects with a technology stack of Java, J2EE, JMS, Kafka, Spring Boot, and application/web servers like Tomcat, JBoss, WebSphere, and WebLogic. Org 2 has the resource strength of 10K to 11K. The data is mainly collected from 3-4 projects for data validation.

5.2 Data Collection

In this envisaged study, the JIRA board is the source where the data is gathered and masked according to the ethical process of the Organizations. Data was collected from various software development and management artifacts and generated an Excel-based tool to provide to the existing teams to help identify the PLF and SLF factors for each story. Calculate the WECOFE factor and existing story point based on the resource input. Calculate the difference between the WECOFE and Existing Story Point measures to compare using statical analysis and MRE and MMRE.

Org 1 has graciously contributed to several projects to validate estimations. Table 9 elucidates the specifics of these projects, encompassing aspects such as Sprint Cycles,

Sprint Duration, Total Number of Sprints, Number of Stories, Technologies Employed, and the Architectural Frameworks followed.

Project Name	Industry	Spring Cycle	Project Duration	Total Sprints	No Of Stories	Technology Used	Architecture
Victorious	Core Banking	2 Weeks	2 Months	4	101	Java, J2EE, Spring boot, Tomcat	Microservices
Squirtle	Core Banking	3 Weeks	3 Months	4	120	Java, J2EE, Spring boot, Tomcat	Microservices
Blazer	Core Banking	3 Weeks	2 Months	2	46	Java, J2EE, Tomcat	Single Page Application
Fireballs	Core Banking	2 Weeks	3 Months	6	293	Java, J2EE, Tomcat	N-Tier
Trailblazers	Core Banking	2 Weeks	1 Month	2	12	Java, J2EE, Tomcat	Single Page Application
Charged	Core Banking	2 Weeks	1 Month	2	20	Java, J2EE, Tomcat	Single Page Application
TITAN	Core Banking	2 Weeks	10 Months	20	470	Java, J2EE, JMS, Tomcat	N-Tier

Table 9: Org 1 Project Details

Org 2 contributes a selection of projects to validate estimations. Detailed in Table 10 are the specifics of these projects, including the cycles of Sprints, the duration of each Sprint, the total number of Sprints, the count of Stories, the technologies employed,

and the architectural frameworks utilized.

Project Name	Industry	Spring Cycle	Project Duration	Total Sprints	No Of Stories	Technology Used	Architecture
Lords	Core Banking	2 Weeks	4 Months	7	29	Java, J2EE, Tomcat	Single Page Application
Buzzers	Core Banking	2 Weeks	1 Months	2	37	Java, J2EE, Tomcat	Single Page Application
Parts Packing	Automobile	2 Weeks	4 Months	6	17	Java, J2EE, WebLogic	N-Tier

Table 10: Org 2 Project Details

Org 3 offers a selection of projects to validate estimations. In Table 11, these projects are characterized by various attributes, including the number of Sprint Cycles, the duration of each Sprint, the total count of Sprints, the number of Stories involved, the technologies employed, and the architectural frameworks in use.

Project Name	Industry	Spring Cycle	Project Duration	Total Sprints	No Of Stories	Technology Used	Architecture
TABS	Trading System	2 Weeks	4 Months	8	41	Java, J2EE, Spring boot, Tomcat	Microservices
Sunrise	Trading System	2 Weeks	6 Months	12	146	Java, J2EE, Spring boot, JMS, Kafka, Tomcat	Microservices & Event-Driven
Continen	Trading	2	12	24	431	Java, J2EE,	Microservi

tal	System	Weeks	Months			Spring boot, JMS, Kafka, Tomcat	ces & Event-Driven
Spartans	Trading System	2 Weeks	5 Months	10	101	Java, J2EE, Spring boot, JMS, Kafka, Tomcat	Microservices & Event-Driven

Table 11: Org 3 Project Details

5.3 Project Selection and Identification

Choosing the right project is pivotal for meeting Objective 1, as outlined in the section where the reference source is currently missing. The first step involves identifying suitable Organizations. Projects should be selected based on a duration ranging from one to twelve months and span various domains such as Banking, Insurance, B2B, and B2C. Additionally, consideration should be given to diverse architectural frameworks like N-tier, Single Page Applications, Microservices, and Streaming platforms. What follows is an algorithm and flow chart that guides the project selection process for this thesis and Figure 27 describes the process flows of events to identify the project selection.

Algorithm:

Step 1: START;

Step 2: Identify the Organizations;

Step 3: Select the projects;

Step 4: if (Projects span from 1 month to 12 months) {

Identify the Project with Different Domains;

if (! Banking, Insurance, Automobile, B2B, B2C Domain) {

Reject sprint for analysis;

Goto **Step 10**;

}

Step 4.1: Identify the project with Different Architectures;

Step 4.2: if (! N-Tier, SPA, Microservices, Streaming Architectures) {

Reject sprint for analysis;

Goto **Step 10**;

}

Step 4.3: Select the sprint;

} else {

Step 4.4: Reject sprint for analysis;

Goto **Step 10**;

}

Step 5: Collect Sprint planning and retrospective meeting observations from Scrum Master;

Step 6: Collect the answers from Scrum Master;

Step 7: if (Answer the questions?) {

Step 7.1: Consider sprint for analysis;

} else {

Step 7.2: Reject sprint for analysis;

Goto **Step 10**;

}

Step 8: Identify the issues caused for

1) Over Estimation
2) Under Estimations;

Step 9: Identify the causes of estimation variance;

Step 10: Consolidate the caused issue for effort variance for analysis purposes;

Step 10: END;

Flow Chat:

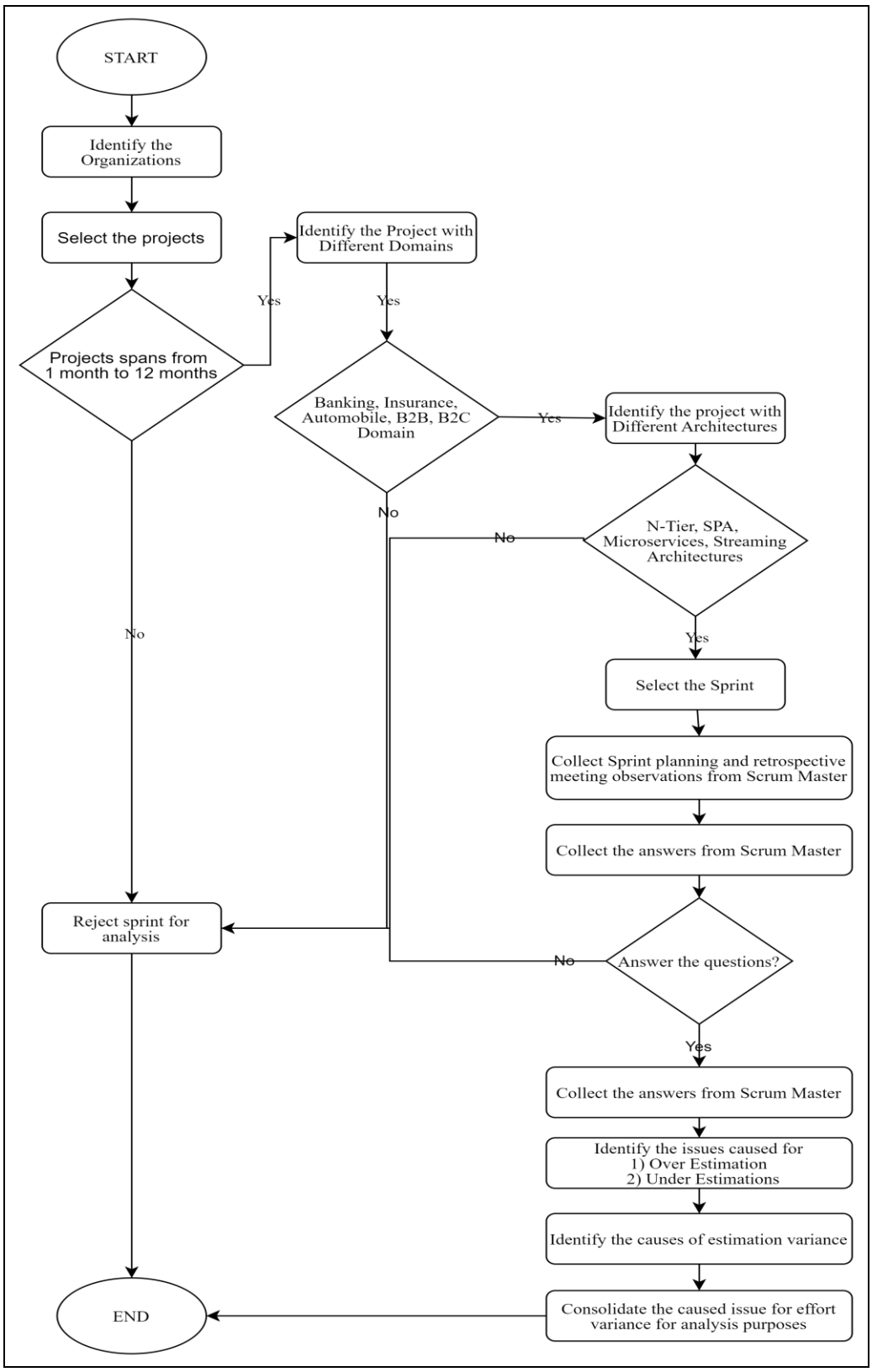


Figure 27: Project Identification Flow Diagram

5.4 Linear Proportions of Weights

The weights of factors for Project Level and Story Level factors are calculated as linearly proportional (L refers to attribute Low, M refers to attribute Moderate, and H refers to attribute High)

$$L = x + 1, M = 1 \text{ and } H = 1 - x$$

OR

$$L = x - 1, M = 1 \text{ and } H = x + 1$$

For Project Level factors – AC, CI/ CD, and ACC factors and Story Level factors – RE applies that "Low" requires more effort than attribute "High" (L > H). Therefore, the weight of attribute "Low" is higher than the weight of attribute "High."

For Project Level factors – TDD factors and Story Level factors – FC and TC apply that "Low" requires less effort than attribute "High" (L < H). Therefore, the weight of the attribute "Low" is less than that of "High."

5.5 Treatments applied to Sprints.

Different PLFs and SLFs are considered for calculating the Story points using the WECOFE model. Treatment 1 to 3 is believed to validate the behaviour of the WECOFE model for the projects selected for this thesis. The experiment was made to compare the efforts for multiple treatments. Three treatments with all factors are chosen, and their details are given in the below sections.

5.5.1 Treatment 1

Effort (story point) estimation using the below-factored values and applying the WECOFE formula to selected projects. Calculated the MMRE using the WECOFE and observed that most sprints are estimated as more effort than actual effort spent. For Org 1, 31 cases out of 40 sprints evaluated more measures more significant than 10%. For Org 2, 08 cases out of 15 sprints estimated more efforts greater than 10%. For Org 3, 35 cases out of 54 sprints estimated more efforts greater than 10%.

Project Level Factors	Low	Moderate	High
Architecture Capability (AC)	1.3	1	0.8

Build Automation (CI/ CD)	1.2	1.1	1
Automated Code Generation (ACC)	1	0.8	0.6
Test Driven Development (TDD)	1	1.1	1.12
Story Level Factors	**Low**	**Moderate**	**High**
Functional Complexity (FC)	0.8	1	1.2
Technical Complexity (TC)	0.8	1	1.2
Resource Maturity (RM)	1.1	1	0.9

S. No	Spring Name	No of Stories	Actual Story Points	Estimated Story Points	Story Points from WECOFE	MMRE - Existing	MMRE - WECOFE
Org 1							
1	Victorious Sprint 1	12	53	43	53	0.17	0.00
2	Victorious Sprint 2	36	152	126	131	0.17	0.13
3	Victorious Sprint 3	46	211	171	183	0.16	0.13
4	Victorious Sprint 4	7	31	27	26	0.13	0.17
5	Squirtle Sprint 1	16	77	62	71	0.19	0.07
6	Squirtle Sprint 2	51	213	168	187	0.20	0.11
7	Squirtle Sprint 3	21	96	84	84	0.11	0.12
8	Squirtle Sprint 4	32	151	130	131	0.11	0.12
9	Blazer Sprint 6	16	59	49	52	0.17	0.11
10	Blazer Sprint 7	30	105	86	94	0.23	0.08
11	Fireballs Sprint 1	45	133	90	139	0.30	(0.08)
12	Fireballs Sprint 2	23	61	66	53	(0.30)	0.11
13	Fireballs Sprint 3	31	88	63	73	0.16	0.26
14	Fireballs Sprint 4	119	254	238	243	0.04	0.02
15	Fireballs Sprint 5	60	158	120	119	0.21	0.22
16	Fireballs Sprint 6	15	36	30	30	0.13	0.13
17	Trailblazers Sprint 7	6	42	63	35	(0.56)	0.16
18	Trailblazers Sprint 8	6	34	54	27	(0.64)	0.21
19	Charged Sprint 22	10	69	58	59	0.13	0.15
20	Charged Sprint 23	10	68	60	59	0.09	0.14
21	TITAN-1	25	82	78	75	0.02	0.08
22	TITAN-2	33	96	74	81	0.10	0.10
23	TITAN-3	16	44	28	32	0.33	0.24
24	TITAN-4	30	72	48	60	0.30	0.13
25	TITAN-5	44	87	64	89	0.25	(0.05)
26	TITAN-6	15	38	28	30	0.26	0.13
27	TITAN-7	18	94	110	72	(0.18)	0.23
28	TITAN-8	17	85	108	68	(0.27)	0.20
29	TITAN-9	9	53	60	43	(0.13)	0.19
30	TITAN-10	22	91	86	73	0.04	0.18
31	TITAN-11	14	62	51	52	0.14	0.16

S. No	Spring Name	No of Stories	Actual Story Points	Estimated Story Points	Story Points from WECOFE	MMRE - Existing	MMRE - WECOFE
32	TITAN-12	2	11	11	8	0.10	0.29
33	TITAN-13	44	181	160	157	(0.02)	0.10
34	TITAN-14	12	43	50	40	(0.21)	0.06
35	TITAN-15	75	241	274	211	(0.12)	0.09
36	TITAN-16	17	61	54	43	0.13	0.30
37	TITAN-17	4	19	20	16	(0.03)	0.16
38	TITAN-18	11	36	29	24	0.18	0.32
39	TITAN-19	10	38	38	27	(0.00)	0.31
40	TITAN-20	8	50	61	43	(0.23)	0.14
Org 2							
1	Lords Sprint 1	1	8	6	6	0.25	0.25
2	Lords Sprint 2	2	12	10	10	0.17	0.17
3	Lords Sprint 3	2	12	10	10	0.17	0.17
4	Lords Sprint 4	1	3	4	3	(0.33)	0.00
5	Lords Sprint 5	2	9	9	6	(0.08)	0.33
6	Lords Sprint 6	7	15	21	17	(0.38)	(0.01)
7	Lords Sprint 7	14	53	47	39	0.10	0.25
8	Buzzers Sprint 1	7	26	22	24	0.17	0.07
9	Buzzers Sprint 2	30	105	87	94	0.22	0.08
10	Parts Packing Sprint 1	4	19	16	17	0.15	0.10
11	Parts Packing Sprint 2	2	12	10	9	0.17	0.25
12	Parts Packing Sprint 3	2	11	10	9	0.08	0.18
13	Parts Packing Sprint 4	1	3	3	3	0.00	0.00
14	Parts Packing Sprint 5	2	8	8	7	0.00	0.10
15	Parts Packing Sprint 6	6	19	17	14	0.11	0.26
Org 3							
1	TABS-1	7	0	15	15	(0.05)	0.00
2	TABS-2	5	12	16	11	(0.45)	0.10
3	TABS-3	3	10	8	8	0.22	0.23
4	TABS -4	3	10	12	8	(0.33)	0.17
5	TABS-5	5	11	14	10	(0.20)	0.07
6	TABS-6	4	4	4	4	0.00	0.00
7	TABS-7	6	6	7	6	(0.17)	0.00
8	TABS-8	8	16	15	13	(0.04)	0.11
9	Sunrise Sprint 1	7	18	15	15	0.13	0.13
10	Sunrise Sprint 2	27	128	105	100	0.15	0.21
11	Sunrise Sprint 3	23	68	57	56	0.16	0.16
12	Sunrise Sprint 4	5	13	17	12	(0.40)	0.04
13	Sunrise Sprint 5	17	63	48	59	0.21	0.06
14	Sunrise Sprint 6	4	12	9	10	0.25	0.17
15	Sunrise Sprint 7	2	6	6	6	0.00	0.00
16	Sunrise Sprint 8	41	166	147	136	0.10	0.15
17	Sunrise Sprint 9	10	52	47	43	0.08	0.17
18	Sunrise Sprint 10	6	25	23	20	0.12	0.20

S. No	Spring Name	No of Stories	Actual Story Points	Estimated Story Points	Story Points from WECOFE	MMRE - Existing	MMRE - WECOFE
19	Sunrise Sprint 11	3	8	8	6	0.00	0.22
20	Sunrise Sprint 12	1	3	3	2	0.00	0.33
21	Continentals-1	10	29	21	21	0.22	0.21
22	Continentals-2	13	52	47	43	0.10	0.13
23	Continentals-3	25	119	113	103	0.03	0.13
24	Continentals-4	15	75	64	64	0.11	0.13
25	Continentals-5	15	54	42	51	0.20	0.04
26	Continentals-6	19	91	84	75	0.12	0.14
27	Continentals-7	14	79	69	61	0.13	0.20
28	Continentals-8	14	59	51	49	0.12	0.14
29	Continentals-9	15	68	61	56	0.10	0.18
30	Continentals-10	17	73	65	60	0.14	0.18
31	Continentals-11	13	59	62	50	(0.04)	0.13
32	Continentals-12	21	94	77	70	0.22	0.24
33	Continentals-13	21	90	84	76	0.12	0.13
34	Continentals-14	17	63	57	56	0.11	0.07
35	Continentals-15	22	73	NA	63	NA	0.09
36	Continentals-16	16	70	NA	61	NA	0.09
37	Continentals-17	18	69	NA	57	NA	0.12
38	Continentals-18	24	68	NA	56	NA	0.13
39	Continentals-19	16	61	NA	47	NA	0.20
40	Continentals-20	25	77	NA	61	NA	0.16
41	Continentals-21	23	62	NA	51	NA	0.14
42	Continentals-22	28	75	NA	62	NA	0.12
43	Continentals-23	15	35	NA	29	NA	0.12
44	Continentals-24	15	57	NA	46	NA	0.11
45	Spartans Sprint 1	11	34	NA	24	NA	0.15
46	Spartans Sprint 2	6	18	NA	18	NA	0.00
47	Spartans Sprint 3	9	36	NA	31	NA	0.12
48	Spartans Sprint 4	8	28	NA	23	NA	0.14
49	Spartans Sprint 5	11	29	NA	27	NA	0.04
50	Spartans Sprint 6	8	31	NA	27	NA	0.10
51	Spartans Sprint 7	8	22	NA	21	NA	0.01
52	Spartans Sprint 8	15	48	NA	41	NA	0.06
53	Spartans Sprint 9	16	55	NA	44	NA	0.16
54	Spartans Sprint 10	9	28	NA	23	NA	0.18

5.5.2 Treatment 2

Effort (story point) estimation using the below-factored values and applying the WECOFE formula to selected projects. Calculated the MMRE using the WECOFE and observed that most sprints are estimated to be less effort than the actual effort

spent. For Org 1, 40 cases out of 40 sprints estimated less effort. For Org 2, 15 cases out of 15 sprints evaluated less effort. For Org 3, 54 cases out of 54 sprints estimated less effort by using the WECOFE model. Clearly stated that these treatment values are not appropriate for calculating the story point for the given sprints.

Project Level Factors	Low	Moderate	High
Architecture Capability (AC)	1.2	1.1	1
Build Automation (CI/ CD)	1.3	1.2	1
Automated Code Generation (ACC)	1	0.8	0.6
Test Driven Development (TDD)	1	1.1	1.12
Story Level Factors	**Low**	**Moderate**	**High**
Functional Complexity (FC)	1.1	1.2	1.3
Technical Complexity (TC)	1	1.1	1.2
Resource Maturity (RM)	1	0.9	0.8

S. No	Spring Name	No of Stories	Actual Story Points	Estimated Story Points	Story Points from WECOFE	MMRE - Existing	MMRE - WECOFE
Org 1							
1	Victorious Sprint 1	12	53	43	68	0.17	(0.29)
2	Victorious Sprint 2	36	152	126	202	0.17	(0.34)
3	Victorious Sprint 3	46	211	171	252	0.16	(0.20)
4	Victorious Sprint 4	7	31	27	38	0.13	(0.24)
5	Squirtle Sprint 1	16	77	62	104	0.19	(0.38)
6	Squirtle Sprint 2	51	213	168	267	0.20	(0.26)
7	Squirtle Sprint 3	21	96	84	115	0.11	(0.21)
8	Squirtle Sprint 4	32	151	130	192	0.11	(0.29)
9	Blazer Sprint 6	16	59	49	79	0.17	(0.34)
10	Blazer Sprint 7	30	105	86	135	0.23	(0.32)
11	Fireballs Sprint 1	45	133	90	186	0.30	(0.45)
12	Fireballs Sprint 2	23	61	66	80	(0.30)	(0.40)
13	Fireballs Sprint 3	31	88	122	73	0.16	(0.41)
14	Fireballs Sprint 4	119	254	238	376	0.04	(0.50)
15	Fireballs Sprint 5	60	158	120	219	0.21	(0.41)
16	Fireballs Sprint 6	15	36	30	52	0.13	(0.47)
17	Trailblazers Sprint 7	6	42	63	52	(0.56)	(0.25)
18	Trailblazers Sprint 8	6	34	54	45	(0.64)	(0.33)
19	Charged Sprint 22	10	69	58	81	0.13	(0.19)
20	Charged Sprint 23	10	68	60	81	0.09	(0.20)
21	TITAN-1	25	82	78	122	0.02	(0.51)
22	TITAN-2	33	96	74	127	0.10	(0.39)
23	TITAN-3	16	44	28	58	0.33	(0.34)

S. No	Spring Name	No of Stories	Actual Story Points	Estimated Story Points	Story Points from WECOFE	MMRE - Existing	MMRE - WECOFE
24	TITAN-4	30	72	48	100	0.30	(0.42)
25	TITAN-5	44	87	64	132	0.25	(0.56)
26	TITAN-6	15	38	28	54	0.26	(0.50)
27	TITAN-7	18	94	110	126	(0.18)	(0.35)
28	TITAN-8	17	85	108	119	(0.27)	(0.41)
29	TITAN-9	9	53	60	69	(0.13)	(0.31)
30	TITAN-10	22	91	86	121	0.04	(0.37)
31	TITAN-11	14	62	51	79	0.14	(0.29)
32	TITAN-12	2	11	11	13	0.10	(0.23)
33	TITAN-13	44	181	160	229	(0.02)	(0.34)
34	TITAN-14	12	43	50	59	(0.21)	(0.37)
35	TITAN-15	75	241	274	327	(0.12)	(0.40)
36	TITAN-16	17	61	54	79	0.13	(0.33)
37	TITAN-17	4	19	20	24	(0.03)	(0.29)
38	TITAN-18	11	36	29	47	0.18	(0.35)
39	TITAN-19	10	38	38	48	(0.00)	(0.28)
40	TITAN-20	8	50	61	63	(0.23)	(0.28)
Org 2							
1	Lords Sprint 1	1	8	6	11	0.25	(0.38)
2	Lords Sprint 2	2	12	10	16	0.17	(0.33)
3	Lords Sprint 3	2	12	10	16	0.17	(0.33)
4	Lords Sprint 4	1	3	4	4	(0.33)	(0.33)
5	Lords Sprint 5	2	9	9	11	(0.08)	(0.25)
6	Lords Sprint 6	7	23	21	17	(0.38)	(0.50)
7	Lords Sprint 7	14	53	47	66	0.10	(0.28)
8	Buzzers Sprint 1	7	26	22	34	0.17	(0.31)
9	Buzzers Sprint 2	30	105	87	135	0.22	(0.32)
10	Parts Packing Sprint 1	4	19	16	23	0.15	(0.21)
11	Parts Packing Sprint 2	2	12	10	15	0.17	(0.25)
12	Parts Packing Sprint 3	2	11	10	16	0.08	(0.45)
13	Parts Packing Sprint 4	1	3	3	4	0.00	(0.33)
14	Parts Packing Sprint 5	2	8	8	10	0.00	(0.27)
15	Parts Packing Sprint 6	6	19	17	24	0.11	(0.28)
Org 3							
1	TABS-1	7	0	15	20	(0.05)	(0.43)
2	TABS-2	5	12	16	15	(0.45)	(0.32)
3	TABS-3	3	10	8	12	0.22	(0.18)
4	TABS -4	3	10	12	11	(0.33)	(0.08)
5	TABS-5	5	11	14	16	(0.20)	(0.60)
6	TABS-6	4	4	4	8	0.00	(1.00)
7	TABS-7	6	6	7	12	(0.17)	(1.00)
8	TABS-8	8	16	15	25	(0.04)	(0.76)
9	Sunrise Sprint 1	7	18	15	23	0.13	(0.32)
10	Sunrise Sprint 2	27	128	105	163	0.15	(0.27)
11	Sunrise Sprint 3	23	68	57	79	0.16	(0.19)

S. No	Spring Name	No of Stories	Actual Story Points	Estimated Story Points	Story Points from WECOFE	MMRE - Existing	MMRE - WECOFE
12	Sunrise Sprint 4	5	13	17	18	(0.40)	(0.44)
13	Sunrise Sprint 5	17	63	48	86	0.21	(0.35)
14	Sunrise Sprint 6	4	12	9	16	0.25	(0.33)
15	Sunrise Sprint 7	2	6	6	8	0.00	(0.33)
16	Sunrise Sprint 8	41	166	147	225	0.10	(0.46)
17	Sunrise Sprint 9	10	52	47	69	0.08	(0.33)
18	Sunrise Sprint 10	6	25	23	33	0.12	(0.42)
19	Sunrise Sprint 11	3	8	8	11	0.00	(0.39)
20	Sunrise Sprint 12	1	3	3	4	0.00	(0.33)
21	Continentals-1	10	29	21	33	0.22	(0.34)
22	Continentals-2	13	52	47	65	0.10	(0.45)
23	Continentals-3	25	119	113	149	0.03	(0.28)
24	Continentals-4	15	75	64	94	0.11	(0.26)
25	Continentals-5	15	54	42	74	0.20	(0.40)
26	Continentals-6	19	91	84	107	0.12	(0.24)
27	Continentals-7	14	79	69	92	0.13	(0.20)
28	Continentals-8	14	59	51	81	0.12	(0.47)
29	Continentals-9	15	68	61	93	0.10	(0.41)
30	Continentals-10	17	73	65	96	0.14	(0.42)
31	Continentals-11	13	59	62	73	(0.04)	(0.31)
32	Continentals-12	21	94	77	112	0.22	(0.30)
33	Continentals-13	21	90	84	116	0.12	(0.39)
34	Continentals-14	17	63	57	85	0.11	(0.47)
35	Continentals-15	22	73	NA	93	NA	(0.48)
36	Continentals-16	16	70	NA	87	NA	(0.35)
37	Continentals-17	18	69	NA	87	NA	(0.36)
38	Continentals-18	24	68	NA	98	NA	(0.55)
39	Continentals-19	16	61	NA	78	NA	(0.39)
40	Continentals-20	25	77	NA	105	NA	(0.51)
41	Continentals-21	23	62	NA	88	NA	(0.50)
42	Continentals-22	28	75	NA	110	NA	(0.63)
43	Continentals-23	15	35	NA	53	NA	(0.67)
44	Continentals-24	15	57	NA	78	NA	(0.56)
45	Spartans Sprint 1	11	34	NA	40	NA	(0.47)
46	Spartans Sprint 2	6	18	NA	26	NA	(0.49)
47	Spartans Sprint 3	9	36	NA	51	NA	(0.46)
48	Spartans Sprint 4	8	28	NA	31	NA	(0.29)
49	Spartans Sprint 5	11	29	NA	40	NA	(0.48)
50	Spartans Sprint 6	8	31	NA	37	NA	(0.41)
51	Spartans Sprint 7	8	22	NA	32	NA	(0.63)
52	Spartans Sprint 8	15	48	NA	62	NA	(0.47)
53	Spartans Sprint 9	16	55	NA	67	NA	(0.34)
54	Spartans Sprint 10	9	28	NA	37	NA	(0.38)

5.5.3 Treatment 3

Effort (story point) estimation using the below-factored values and applying the WECOFE formula to selected projects. Calculated the MMRE using the WECOFE and observed that most sprints are estimated to be less than the actual effort spent. For Org 1, 40 cases out of 40 sprints estimated more close steps towards actuals. For Org 2, 15 cases out of 15 sprints evaluated more close efforts towards actuals. For Org 3, 54 cases out of 54 sprints estimated more immediate steps toward actuals by using the WECOFE model. Clearly stated that these treatment values are more accurate for calculating the story point for the given sprints.

Project Level Factors	Low	Moderate	High
Architecture Pattern Capability (APC)	1.2	1	0.9
Build Automation (CI/ CD)	1.2	1.1	1
Automated Code Generation (ACC)	1	0.8	0.6
Test Driven Development (TDD)	1	1.1	1.12
Story Level Factors	**Low**	**Moderate**	**High**
Functional Complexity (FC)	1	1.1	1.2
Technical Complexity (TC)	0.8	1	1.2
Resource Maturity (RM)	1.2	1	0.8

S. No	Spring Name	No of Stories	Actual Story Points	Existing - Estimated Story Points	Proposed - Story Points WECOFE	MMRE - Existing	MMRE - Proposed WECOFE
Org 1							
1	Victorious Sprint 1	12	53	43	53	0.17	0.00
2	Victorious Sprint 2	36	152	126	148	0.17	0.02
3	Victorious Sprint 3	46	211	171	205	0.16	0.03
4	Victorious Sprint 4	7	31	27	31	0.13	(0.01)
5	Squirtle Sprint 1	16	77	62	78	0.19	(0.03)
6	Squirtle Sprint 2	51	213	168	211	0.20	0.01
7	Squirtle Sprint 3	21	96	84	94	0.11	0.02
8	Squirtle Sprint 4	32	151	130	152	0.11	(0.01)
9	Blazer Sprint 6	16	59	49	60	0.17	(0.01)
10	Blazer Sprint 7	30	105	86	106	0.23	(0.02)
11	Fireballs Sprint 1	45	133	90	137	0.30	(0.05)
12	Fireballs Sprint 2	23	61	66	61	(0.30)	(0.02)
13	Fireballs Sprint 3	31	88	91	73	0.16	(0.05)
14	Fireballs Sprint 4	119	254	238	258	0.04	(0.03)

S. No	Spring Name	No of Stories	Actual Story Points	Existing - Estimated Story Points	Proposed - Story Points WECOFE	MMRE - Existing	MMRE - Proposed WECOFE
15	Fireballs Sprint 5	60	158	120	160	0.21	(0.02)
16	Fireballs Sprint 6	15	36	30	37	0.13	(0.03)
17	Trailblazers Sprint 7	6	42	63	41	(0.56)	0.02
18	Trailblazers Sprint 8	6	34	54	33	(0.64)	0.03
19	Charged Sprint 22	10	69	58	68	0.13	0.01
20	Charged Sprint 23	10	68	60	68	0.09	0.00
21	TITAN-1	25	82	78	82	0.02	(0.00)
22	TITAN-2	33	96	74	94	0.10	(0.01)
23	TITAN-3	16	44	28	42	0.33	0.04
24	TITAN-4	30	72	48	70	0.30	0.02
25	TITAN-5	44	87	64	89	0.25	(0.05)
26	TITAN-6	15	38	28	39	0.26	(0.07)
27	TITAN-7	18	94	110	90	(0.18)	0.04
28	TITAN-8	17	85	108	85	(0.27)	(0.00)
29	TITAN-9	9	53	60	52	(0.13)	0.02
30	TITAN-10	22	91	86	90	0.04	0.01
31	TITAN-11	14	62	51	63	0.14	(0.01)
32	TITAN-12	2	11	11	10	0.10	0.06
33	TITAN-13	44	181	160	179	(0.02)	(0.00)
34	TITAN-14	12	43	50	44	(0.21)	(0.02)
35	TITAN-15	75	241	274	238	(0.12)	0.01
36	TITAN-16	17	61	54	60	0.13	(0.00)
37	TITAN-17	4	19	20	19	(0.03)	(0.05)
38	TITAN-18	11	36	29	35	0.18	(0.01)
39	TITAN-19	10	38	38	37	(0.00)	0.03
40	TITAN-20	8	50	61	51	(0.23)	(0.03)
Org 2							
1	Lords Sprint 1	1	8	6	8	0.25	0.00
2	Lords Sprint 2	2	12	10	12	0.17	0.00
3	Lords Sprint 3	2	12	10	12	0.17	0.00
4	Lords Sprint 4	1	3	4	3	(0.33)	0.00
5	Lords Sprint 5	2	9	9	8	(0.08)	0.08
6	Lords Sprint 6	7	16	21	17	(0.38)	(0.04)
7	Lords Sprint 7	14	53	47	51	0.10	0.03
8	Buzzers Sprint 1	7	26	22	26	0.17	0.00
9	Buzzers Sprint 2	30	105	87	106	0.22	(0.02)
10	Parts Packing Sprint 1	4	19	16	18	0.15	0.06
11	Parts Packing Sprint 2	2	12	10	11	0.17	0.08
12	Parts Packing Sprint 3	2	11	10	11	0.08	0.00
13	Parts Packing Sprint 4	1	3	3	3	0.00	0.00
14	Parts Packing Sprint 5	2	8	8	8	0.00	0.00
15	Parts Packing Sprint 6	6	19	17	19	0.11	0.00
Org 3							
1	TABS-1	7	13	15	15	(0.05)	0.00

S. No	Spring Name	No of Stories	Actual Story Points	Existing - Estimated Story Points	Proposed - Story Points WECOFE	MMRE - Existing	MMRE - Proposed WECOFE
2	TABS-2	5	12	16	12	(0.45)	0.00
3	TABS-3	3	10	8	10	0.22	0.00
4	TABS -4	3	10	12	10	(0.33)	0.00
5	TABS-5	5	11	14	11	(0.20)	0.00
6	TABS-6	4	4	4	4	0.00	0.00
7	TABS-7	6	6	7	6	(0.17)	0.00
8	TABS-8	8	16	15	16	(0.04)	0.00
9	Sunrise Sprint 1	7	18	15	17	0.13	0.05
10	Sunrise Sprint 2	27	128	105	125	0.15	0.02
11	Sunrise Sprint 3	23	68	57	68	0.16	0.00
12	Sunrise Sprint 4	5	13	17	13	(0.40)	0.00
13	Sunrise Sprint 5	17	63	48	65	0.21	(0.02)
14	Sunrise Sprint 6	4	12	9	12	0.25	0.00
15	Sunrise Sprint 7	2	6	6	6	0.00	0.00
16	Sunrise Sprint 8	41	166	147	164	0.10	0.01
17	Sunrise Sprint 9	10	52	47	52	0.08	0.00
18	Sunrise Sprint 10	6	25	23	25	0.12	0.00
19	Sunrise Sprint 11	3	8	8	8	0.00	0.00
20	Sunrise Sprint 12	1	3	3	3	0.00	0.00
21	Continentals-1	10	29	21	26	0.22	0.07
22	Continentals-2	13	52	47	50	0.10	0.03
23	Continentals-3	25	119	113	121	0.03	(0.01)
24	Continentals-4	15	75	64	76	0.11	(0.01)
25	Continentals-5	15	54	42	56	0.20	(0.06)
26	Continentals-6	19	91	84	89	0.12	0.02
27	Continentals-7	14	79	69	72	0.13	0.07
28	Continentals-8	14	59	51	59	0.12	(0.01)
29	Continentals-9	15	68	61	69	0.10	(0.01)
30	Continentals-10	17	73	65	74	0.14	(0.01)
31	Continentals-11	13	59	62	58	(0.04)	0.01
32	Continentals-12	21	94	77	86	0.22	0.06
33	Continentals-13	21	90	84	89	0.12	0.01
34	Continentals-14	17	63	57	62	0.11	0.01
35	Continentals-15	22	73	NA	73	NA	(0.02)
36	Continentals-16	16	70	NA	71	NA	(0.05)
37	Continentals-17	18	69	NA	67	NA	0.00
38	Continentals-18	24	68	NA	70	NA	(0.04)
39	Continentals-19	16	61	NA	60	NA	(0.01)
40	Continentals-20	25	77	NA	76	NA	(0.02)
41	Continentals-21	23	62	NA	63	NA	(0.02)
42	Continentals-22	28	75	NA	77	NA	(0.05)
43	Continentals-23	15	35	NA	36	NA	(0.01)
44	Continentals-24	15	57	NA	58	NA	(0.05)
45	Spartans Sprint 1	11	34	NA	28	NA	0.05

S. No	Spring Name	No of Stories	Actual Story Points	Existing - Estimated Story Points	Proposed - Story Points WECOFE	MMRE - Existing	MMRE - Proposed WECOFE
46	Spartans Sprint 2	6	18	NA	19	NA	(0.03)
47	Spartans Sprint 3	9	36	NA	37	NA	(0.02)
48	Spartans Sprint 4	8	29	NA	29	NA	(0.02)
49	Spartans Sprint 5	11	29	NA	30	NA	(0.05)
50	Spartans Sprint 6	8	31	NA	30	NA	0.02
51	Spartans Sprint 7	8	22	NA	24	NA	(0.08)
52	Spartans Sprint 8	15	48	NA	48	NA	(0.06)
53	Spartans Sprint 9	16	55	NA	54	NA	(0.03)
54	Spartans Sprint 10	9	28	NA	29	NA	(0.06)

5.6 Data Calibration Using Statistical t-Test.

This section employs various metrics for data calibration using the statistical t-test. These metrics include FC for Functional Complexity, TC for Technical Complexity, and RM for Resource Maturity. Additionally, RE represents Raw Estimations, CF stands for the Final Calculated Complexity Factor, and ESP denotes Estimated Story Points. The metrics WE and AE are used for WECOFE and Actual Story Points, respectively. Lastly, MRE-A and MRE-W signify the MRE values for Actual and WECOFE Story Points.

T-tests are used to perform hypothesis tests that assess the means of one or two groups. T-distribution is used to calculate the significance level and degrees of freedom. The t-distribution is used to sample t-values when the null hypothesis is true. Significance Level (Alpha α): Choose the t-distribution value that contains the significance level of the test. It is taken as 0.05 for calculating the one- or two-tailed t-test. If the P value is less than or equal to the significant level of 0.05, reject the null hypothesis. The sprint project is substantial enough evidence to conclude the two means are different. Calculate the P one and two tails using the populations from Estimated Story points, Estimated -WECOFE, and Actual Efforts. This demarked the mean difference between WECOFE and Estimated Story Points against Actual Efforts. For this, we can reject or accept the population.

<u>Organization 1 Sprint Projects:</u>

Victorious Sprint 1

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.583333333	4.416666667	4.416666667
Variance	1.174242424	2.810606061	2.628787879
Observations	12	12	12
Pearson Correlation	0.93568388	0.96711425	
Hypothesized Mean Difference	0	0	
df	11	11	
t Stat	-4.021998333	0	
P(T<=t) one-tail	0.001004624	0.5	
t Critical one-tail	1.795884819	1.795884819	
P(T<=t) two-tail	0.002009248	1	
t Critical two-tail	2.20098516	2.20098516	

Estimated P (T<=t) one-tail is 0.001004624 <= 0.05 significant value. So, the Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.05 = 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual story efforts.

Victorious Sprint 2

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.5	4.111111111	4.222222222
Variance	1.8	1.473015873	1.606349206
Observations	36	36	36
Pearson Correlation	0.840128516	0.967918062	
Hypothesized Mean Difference	0	0	
df	35	35	
t Stat	-5.847285819	-2.091650066	
P(T<=t) one-tail	6.13588E-07	0.021896579	
t Critical one-tail	1.689572458	1.689572458	
P(T<=t) two-tail	1.22718E-06	0.043793158	
t Critical two-tail	2.030107928	2.030107928	

Estimated P (T<=t) one-tail is 6.13588E-07 <= 0.05 significant value. So, the Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.021896579 <= 0.05 significant value, Estimated - WECOFE story points are Rejected with Actual story efforts.

Victorious Sprint 3

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.717391304	4.456521739	4.586956522
Variance	1.185024155	1.498067633	1.492270531
Observations	46	46	46

Pearson Correlation	0.394886072	0.961229593	
Hypothesized Mean Difference	0	0	
df	45	45	
t Stat	-4.623599486	-2.598076211	
P(T<=t) one-tail	1.5922E-05	0.006313572	
t Critical one-tail	1.679427393	1.679427393	
P(T<=t) two-tail	3.18441E-05	0.012627143	
t Critical two-tail	2.014103389	2.014103389	

Estimated P (T<=t) one-tail is 1.5922E-05 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.006313572 <= 0.05 significant value, Estimated - WECOFE story points are Rejected with Actual efforts.

Victorious Sprint 4

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.857142857	4.428571429	4.428571429
Variance	1.142857143	0.285714286	0.619047619
Observations	7	7	7
Pearson Correlation	0.67936622	0.67936622	
Hypothesized Mean Difference	0	0	
df	6	6	
t Stat	-1.921537846	0	
P(T<=t) one-tail	0.051523087	0.5	
t Critical one-tail	1.943180281	1.943180281	
P(T<=t) two-tail	0.103046173	1	
t Critical two-tail	2.446911851	2.446911851	

Estimated P (T<=t) one-tail is 0.051523087 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.05 = 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Squirtle Sprint 1

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.875	4.875	4.8125
Variance	2.916666667	2.783333333	3.3625
Observations	16	16	16
Pearson Correlation	0.907399608	0.972463284	
Hypothesized Mean Difference	0	0	
df	15	15	
t Stat	-4.858127067	0.564932683	
P(T<=t) one-tail	0.000104364	0.290235484	

t Critical one-tail	1.753050356	1.753050356	
P(T<=t) two-tail	0.000208729	0.580470968	
t Critical two-tail	2.131449546	2.131449546	

Estimated P (T<=t) one-tail is 0.000104364 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.290235484 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Squirtle Sprint 2

	Estimated Story Points	***Estimates -WECOFE***	***Actual Effort (SP)***
Mean	3.294117647	4.137254902	4.176470588
Variance	1.331764706	1.480784314	1.468235294
Observations	51	51	51
Pearson Correlation	0.76309179	0.973413069	
Hypothesized Mean Difference	0	0	
df	50	50	
t Stat	-7.721980009	-1	
P(T<=t) one-tail	2.24312E-10	0.161062823	
t Critical one-tail	1.675905025	1.675905025	
P(T<=t) two-tail	4.48624E-10	0.322125645	
t Critical two-tail	2.008559112	2.008559112	

Estimated P (T<=t) one-tail is 2.24312E-10 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.161062823 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Squirtle Sprint 3

	Estimated Story Points	***Estimates -WECOFE***	***Actual Effort (SP)***
Mean	4	4.476190476	4.571428571
Variance	2.4	1.661904762	1.657142857
Observations	21	21	21
Pearson Correlation	0.702008612	0.972741317	
Hypothesized Mean Difference	0	0	
df	20	20	
t Stat	-2.335496832	-1.4509525	
P(T<=t) one-tail	0.015023324	0.081148917	
t Critical one-tail	1.724718243	1.724718243	
P(T<=t) two-tail	0.030046647	0.162297833	
t Critical two-tail	2.085963447	2.085963447	

Estimated P (T<=t) one-tail is 0.015023324 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P

(T<=t) one-tail is 0.081148917 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Squirtle Sprint 4

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	4.0625	4.75	4.71875
Variance	1.286290323	2.258064516	2.144153226
Observations	32	32	32
Pearson Correlation	0.496528546	0.963913319	
Hypothesized Mean Difference	0	0	
df	31	31	
t Stat	-2.78151795	0.441552436	
P(T<=t) one-tail	0.004561729	0.330938929	
t Critical one-tail	1.695518783	1.695518783	
P(T<=t) two-tail	0.009123458	0.661877858	
t Critical two-tail	2.039513446	2.039513446	

Estimated P (T<=t) one-tail is 0.004561729 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.330938929 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Blazer Sprint 6

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.0625	3.75	3.6875
Variance	2.329166667	1.533333333	1.1625
Observations	16	16	16
Pearson Correlation	0.620380415	0.986191084	
Hypothesized Mean Difference	0	0	
df	15	15	
t Stat	-2.076136996	1	
P(T<=t) one-tail	0.027743562	0.166585068	
t Critical one-tail	1.753050356	1.753050356	
P(T<=t) two-tail	0.055487125	0.333170136	
t Critical two-tail	2.131449546	2.131449546	

Estimated P (T<=t) one-tail is 0.027743562 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.166585068 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Blazer Sprint 7

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*

Mean	2.866666667	3.533333333	3.5
Variance	4.395402299	1.36091954	1.637931034
Observations	30	30	30
Pearson Correlation	0.861052602	0.970034681	
Hypothesized Mean Difference	0	0	
df	29	29	
t Stat	-2.91861398	0.570826328	
P(T<=t) one-tail	0.003365127	0.286257282	
t Critical one-tail	1.699127027	1.699127027	
P(T<=t) two-tail	0.006730254	0.572514564	
t Critical two-tail	2.045229642	2.045229642	

Estimated P (T<=t) one-tail is 0.003365127 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.286257282 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Fireballs Sprint 1

	Estimated Story Points	***Estimates -WECOFE***	***Actual Effort (SP)***
Mean	2	3.044444444	2.955555556
Variance	0	0.088888889	0.17979798
Observations	45	45	45
Pearson Correlation	#DIV/0!	0.735083188	
Hypothesized Mean Difference	0	0	
df	44	44	
t Stat	-15.11714556	2.071879081	
P(T<=t) one-tail	2.45507E-19	0.022084865	
t Critical one-tail	1.680229977	1.680229977	
P(T<=t) two-tail	4.91013E-19	0.044169729	
t Critical two-tail	2.015367574	2.015367574	

Estimated P (T<=t) one-tail is 2.45507E-19 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.022084865 <= 0.05 significant value, Estimated - WECOFE story points are Rejected with Actual efforts.

Fireballs Sprint 2

	Estimated Story Points	***Estimates -WECOFE***	***Actual Effort (SP)***
Mean	2.869565217	2.652173913	2.652173913
Variance	0.664031621	1.328063241	1.418972332
Observations	23	23	23
Pearson Correlation	0.372579735	0.934324717	
Hypothesized Mean Difference	0	0	
df	22	22	
t Stat	0.894102122	0	

P(T<=t) one-tail	0.190472387	0.5	
t Critical one-tail	1.717144374	1.717144374	
P(T<=t) two-tail	0.380944775	1	
t Critical two-tail	2.073873068	2.073873068	

Estimated P (T<=t) one-tail is 0.190472387 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.05 = 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Fireballs Sprint 3

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.35483871	2.935483871	2.838709677
Variance	0.23655914	0.062365591	0.139784946
Observations	31	31	31
Pearson Correlation	0.325221818	0.598849472	
Hypothesized Mean Difference	0	0	
df	30	30	
t Stat	-5.303300859	1.792842914	
P(T<=t) one-tail	4.94595E-06	0.04154366	
t Critical one-tail	1.697260887	1.697260887	
P(T<=t) two-tail	9.89189E-06	0.083087321	
t Critical two-tail	2.042272456	2.042272456	

Estimated P (T<=t) one-tail is 4.94595E-06 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.04154366 <= 0.05 significant value, Estimated - WECOFE story points are Rejected with Actual efforts.

Fireballs Sprint 4

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2	2.168067227	2.117647059
Variance	0	0.157954707	0.121635095
Observations	119	119	119
Pearson Correlation	#DIV/0!	0.834375073	
Hypothesized Mean Difference	0	0	
df	118	118	
t Stat	-3.67980755	2.503095429	
P(T<=t) one-tail	0.000176575	0.00683949	
t Critical one-tail	1.657869522	1.657869522	
P(T<=t) two-tail	0.00035315	0.01367898	
t Critical two-tail	1.980272249	1.980272249	

Estimated P (T<=t) one-tail is 0.000176575 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P

(T<=t) one-tail is 0.00683949 <= 0.05 significant value, Estimated - WECOFE story points are Rejected with Actual efforts.

Fireballs Sprint 5

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2	2.666666667	2.633333333
Variance	0	0.225988701	0.236158192
Observations	60	60	60
Pearson Correlation	#DIV/0!	0.782585581	
Hypothesized Mean Difference	0	0	
df	59	59	
t Stat	-10.09500326	0.814199821	
P(T<=t) one-tail	9.01163E-15	0.209402309	
t Critical one-tail	1.671093032	1.671093032	
P(T<=t) two-tail	1.80233E-14	0.418804619	
t Critical two-tail	2.000995378	2.000995378	

Estimated P (T<=t) one-tail is 9.01163E-15 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.209402309 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Fireballs Sprint 6

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2	2.466666667	2.4
Variance	0	0.266666667	0.257142857
Observations	15	15	15
Pearson Correlation	#DIV/0!	0.872871561	
Hypothesized Mean Difference	0	0	
df	14	14	
t Stat	-3.055050463	1	
P(T<=t) one-tail	0.004281769	0.167140972	
t Critical one-tail	1.761310136	1.761310136	
P(T<=t) two-tail	0.008563538	0.334281943	
t Critical two-tail	2.144786688	2.144786688	

Estimated P (T<=t) one-tail is 0.004281769 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 1 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Trailblazers Sprint 7

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	10.5	6.833333333	7
Variance	7.5	0.566666667	1.2

Observations	6	6	6
Pearson Correlation	-0.666666667	0.9701425	
Hypothesized Mean Difference	0	0	
df	5	5	
t Stat	2.405701888	-1	
P(T<=t) one-tail	0.030594039	0.181608734	
t Critical one-tail	2.015048373	2.015048373	
P(T<=t) two-tail	0.061188078	0.363217468	
t Critical two-tail	2.570581836	2.570581836	

Estimated P (T<=t) one-tail is 0.030594039 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.181608734 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Trailblazers Sprint 8

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	9	5.5	5.666666667
Variance	19.2	0.3	0.266666667
Observations	6	6	6
Pearson Correlation	-0.707106781	0.707106781	
Hypothesized Mean Difference	0	0	
df	5	5	
t Stat	1.714985851	-1	
P(T<=t) one-tail	0.073504586	0.181608734	
t Critical one-tail	2.015048373	2.015048373	
P(T<=t) two-tail	0.147009171	0.363217468	
t Critical two-tail	2.570581836	2.570581836	

Estimated P (T<=t) one-tail is 0.073504586 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.181608734 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Charged Sprint 22

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	5.8	6.8	6.9
Variance	4.177777778	0.4	0.766666667
Observations	10	10	10
Pearson Correlation	-0.509090959	0.963086825	
Hypothesized Mean Difference	0	0	
df	9	9	
t Stat	-1.337227482	-1	
P(T<=t) one-tail	0.106980057	0.171718198	
t Critical one-tail	1.833112933	1.833112933	

P(T<=t) two-tail	0.213960113	0.343436396	
t Critical two-tail	2.262157163	2.262157163	

Estimated P (T<=t) one-tail is 0.106980057 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.171718198 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Charged Sprint 23

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	6	6.8	6.8
Variance	3.333333333	0.844444444	0.4
Observations	10	10	10
Pearson Correlation	-0.673575314	0.87942698	
Hypothesized Mean Difference	0	0	
df	9	9	
t Stat	-1.100038196	0	
P(T<=t) one-tail	0.149933493	0.5	
t Critical one-tail	1.833112933	1.833112933	
P(T<=t) two-tail	0.299866986	1	
t Critical two-tail	2.262157163	2.262157163	

Estimated P (T<=t) one-tail is 0.149933493 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.05 = 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-1

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.12	3.28	3.28
Variance	0.11	0.46	0.46
Observations	25	25	25
Pearson Correlation	-0.155593979	0.90942029	
Hypothesized Mean Difference	0	0	
df	24	24	
t Stat	-1	0	
P(T<=t) one-tail	0.163643441	0.5	
t Critical one-tail	1.71088208	1.71088208	
P(T<=t) two-tail	0.327286881	1	
t Critical two-tail	2.063898562	2.063898562	

Estimated P (T<=t) one-tail is 0.163643441 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.05 = 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-2

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.242424242	2.848484848	2.909090909
Variance	1.501893939	0.570075758	0.835227273
Observations	33	33	33
Pearson Correlation	-0.147117171	0.930458817	
Hypothesized Mean Difference	0	0	
df	32	32	
t Stat	-2.34520788	-1	
P(T<=t) one-tail	0.012690259	0.162406357	
t Critical one-tail	1.693888748	1.693888748	
P(T<=t) two-tail	0.025380517	0.324812714	
t Critical two-tail	2.036933343	2.036933343	

Estimated P (T<=t) one-tail is 0.012690259 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.162406357 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-3

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	1.75	2.625	2.75
Variance	0.2	0.25	0.333333333
Observations	16	16	16
Pearson Correlation	-0.25819889	0.808290377	
Hypothesized Mean Difference	0	0	
df	15	15	
t Stat	-4.898979486	-1.463850109	
P(T<=t) one-tail	9.63648E-05	0.081937807	
t Critical one-tail	1.753050356	1.753050356	
P(T<=t) two-tail	0.00019273	0.163875614	
t Critical two-tail	2.131449546	2.131449546	

Estimated P (T<=t) one-tail is 9.63648E-05 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.081937807 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-4

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	1.6	2.333333333	2.4
Variance	0.455172414	0.229885057	0.317241379
Observations	30	30	30
Pearson Correlation	0.027223275	0.893819357	
Hypothesized Mean Difference	0	0	

df	29	29	
t Stat	-5.053838581	-1.439245834	
P(T<=t) one-tail	1.09202E-05	0.080394104	
t Critical one-tail	1.699127027	1.699127027	
P(T<=t) two-tail	2.18404E-05	0.160788208	
t Critical two-tail	2.045229642	2.045229642	

Estimated P (T<=t) one-tail is 1.09202E-05 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.080394104 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-5

	Estimated Story Points	***Estimates -WECOFE***	***Actual Effort (SP)***
Mean	1.454545455	2.022727273	1.977272727
Variance	0.393234672	0.022727273	0.069238901
Observations	44	44	44
Pearson Correlation	0.345940684	0.599573788	
Hypothesized Mean Difference	0	0	
df	43	43	
t Stat	-5.875155375	1.4309504	
P(T<=t) one-tail	2.7765E-07	0.079836112	
t Critical one-tail	1.681070703	1.681070703	
P(T<=t) two-tail	5.55299E-07	0.159672223	
t Critical two-tail	2.016692199	2.016692199	

Estimated P (T<=t) one-tail is 2.7765E-07 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.079836112 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-6

	Estimated Story Points	***Estimates -WECOFE***	***Actual Effort (SP)***
Mean	1.866666667	2.6	2.533333333
Variance	0.40952381	0.257142857	0.40952381
Observations	15	15	15
Pearson Correlation	0.709302326	0.924473452	
Hypothesized Mean Difference	0	0	
df	14	14	
t Stat	-5.291502622	1	
P(T<=t) one-tail	5.69568E-05	0.167140972	
t Critical one-tail	1.761310136	1.761310136	
P(T<=t) two-tail	0.000113914	0.334281943	
t Critical two-tail	2.144786688	2.144786688	

Estimated P (T<=t) one-tail is 5.69568E-05 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.167140972 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-7

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	6.111111111	5	5.222222222
Variance	0.575163399	0	0.183006536
Observations	18	18	18
Pearson Correlation	-0.080582296	#DIV/0!	
Hypothesized Mean Difference	0	0	
df	17	17	
t Stat	4.189079505	-2.20389266	
P(T<=t) one-tail	0.000307986	0.02080237	
t Critical one-tail	1.739606726	1.739606726	
P(T<=t) two-tail	0.000615972	0.041604739	
t Critical two-tail	2.109815578	2.109815578	

Estimated P (T<=t) one-tail is 0.000307986 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.02080237 <= 0.05 significant value, Estimated - WECOFE story points are Rejected with Actual efforts.

TITAN-8

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	6.352941176	5	5
Variance	0.617647059	0	0.125
Observations	17	17	17
Pearson Correlation	0.449867705	#DIV/0!	
Hypothesized Mean Difference	0	0	
df	16	16	
t Stat	7.947589515	0	
P(T<=t) one-tail	3.01922E-07	0.5	
t Critical one-tail	1.745883676	1.745883676	
P(T<=t) two-tail	6.03845E-07	1	
t Critical two-tail	2.119905299	2.119905299	

Estimated P (T<=t) one-tail is 3.01922E-07 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.05 = 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-9

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	6.666666667	5.777777778	5.888888889
Variance	7.25	0.444444444	0.361111111
Observations	9	9	9
Pearson Correlation	0.360518342	0.866719057	
Hypothesized Mean Difference	0	0	
df	8	8	
t Stat	0.91914503	-1	
P(T<=t) one-tail	0.192447612	0.173296754	
t Critical one-tail	1.859548038	1.859548038	
P(T<=t) two-tail	0.384895225	0.346593507	
t Critical two-tail	2.306004135	2.306004135	

Estimated P (T<=t) one-tail is 0.192447612 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.173296754 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-10

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.909090909	4.090909091	4.136363636
Variance	2.562770563	1.896103896	1.837662338
Observations	22	22	22
Pearson Correlation	0.664269837	0.962436742	
Hypothesized Mean Difference	0	0	
df	21	21	
t Stat	-0.865407476	-0.56839856	
P(T<=t) one-tail	0.198297141	0.287896364	
t Critical one-tail	1.720742903	1.720742903	
P(T<=t) two-tail	0.396594282	0.575792729	
t Critical two-tail	2.079613845	2.079613845	

Estimated P (T<=t) one-tail is 0.198297141 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.287896364 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-11

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.642857143	4.5	4.428571429
Variance	1.324175824	1.807692308	1.494505495
Observations	14	14	14
Pearson Correlation	0.171854023	0.982799506	
Hypothesized Mean Difference	0	0	
df	13	13	

t Stat	-1.923844191	1	
P(T<=t) one-tail	0.03827374	0.167780639	
t Critical one-tail	1.770933396	1.770933396	
P(T<=t) two-tail	0.07654748	0.335561278	
t Critical two-tail	2.160368656	2.160368656	

Estimated P (T<=t) one-tail is 0.03827374 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.167780639 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-12

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	5.5	5	5.5
Variance	24.5	8	12.5
Observations	2	2	2
Pearson Correlation	1	1	
Hypothesized Mean Difference	0	0	
df	1	1	
t Stat	0	-1	
P(T<=t) one-tail	0.5	0.25	
t Critical one-tail	6.313751515	6.313751515	
P(T<=t) two-tail	1	0.5	
t Critical two-tail	12.70620474	12.70620474	

Estimated P (T<=t) one-tail is 0.05 = 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.05 = 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-13

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.636363636	4.068181818	4.113636364
Variance	9.073995772	4.29756871	4.75422833
Observations	44	44	44
Pearson Correlation	0.342806591	0.991219001	
Hypothesized Mean Difference	0	0	
df	43	43	
t Stat	-1.036733914	-1	
P(T<=t) one-tail	0.152827524	0.161452446	
t Critical one-tail	1.681070703	1.681070703	
P(T<=t) two-tail	0.305655048	0.322904892	
t Critical two-tail	2.016692199	2.016692199	

Estimated P (T<=t) one-tail is 0.152827524 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P

(T<=t) one-tail is 0.161452446 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-14

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	4.166666667	3.666666667	3.583333333
Variance	2.515151515	2.060606061	1.71969697
Observations	12	12	12
Pearson Correlation	0.38612142	0.981956944	
Hypothesized Mean Difference	0	0	
df	11	11	
t Stat	1.246320232	1	
P(T<=t) one-tail	0.119267827	0.169400348	
t Critical one-tail	1.795884819	1.795884819	
P(T<=t) two-tail	0.238535653	0.338800696	
t Critical two-tail	2.20098516	2.20098516	

Estimated P (T<=t) one-tail is 0.119267827 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.169400348 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-15

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.653333333	3.173333333	3.213333333
Variance	4.959279279	2.874954955	3.061981982
Observations	75	75	75
Pearson Correlation	0.896595645	0.989383312	
Hypothesized Mean Difference	0	0	
df	74	74	
t Stat	3.748221336	-1.348952235	
P(T<=t) one-tail	0.000175353	0.090732886	
t Critical one-tail	1.665706893	1.665706893	
P(T<=t) two-tail	0.000350705	0.181465771	
t Critical two-tail	1.992543495	1.992543495	

Estimated P (T<=t) one-tail is 0.000175353 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.090732886 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-16

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.176470588	3.529411765	3.588235294
Variance	3.904411765	1.514705882	1.882352941

Observations	17	17	17
Pearson Correlation	0.7431617	0.951476023	
Hypothesized Mean Difference	0	0	
df	16	16	
t Stat	-1.28069019	-0.565685425	
P(T<=t) one-tail	0.109278307	0.289727558	
t Critical one-tail	1.745883676	1.745883676	
P(T<=t) two-tail	0.218556615	0.579455117	
t Critical two-tail	2.119905299	2.119905299	

Estimated P (T<=t) one-tail is 0.109278307 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.289727558 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-17

	Estimated Story Points	***Estimates -WECOFE***	***Actual Effort (SP)***
Mean	5	4.75	4.75
Variance	8	2.25	4.25
Observations	4	4	4
Pearson Correlation	0.914659121	0.943194097	
Hypothesized Mean Difference	0	0	
df	3	3	
t Stat	0.397359707	0	
P(T<=t) one-tail	0.358842822	0.5	
t Critical one-tail	2.353363435	2.353363435	
P(T<=t) two-tail	0.717685644	1	
t Critical two-tail	3.182446305	3.182446305	

Estimated P (T<=t) one-tail is 0.358842822 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.05 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-18

	Estimated Story Points	***Estimates -WECOFE***	***Actual Effort (SP)***
Mean	2.636363636	3.181818182	3.272727273
Variance	2.054545455	0.363636364	1.018181818
Observations	11	11	11
Pearson Correlation	0.351985519	0.896421457	
Hypothesized Mean Difference	0	0	
df	10	10	
t Stat	-1.472461067	-0.559016994	
P(T<=t) one-tail	0.085829002	0.294224669	
t Critical one-tail	1.812461123	1.812461123	

P(T<=t) two-tail	0.171658003	0.588449338	
t Critical two-tail	2.228138852	2.228138852	

Estimated P (T<=t) one-tail is 0.085829002 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.294224669 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-19

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.8	3.7	3.8
Variance	7.288888889	2.233333333	2.177777778
Observations	10	10	10
Pearson Correlation	0.60238451	0.977407496	
Hypothesized Mean Difference	0	0	
df	9	9	
t Stat	0	-1	
P(T<=t) one-tail	0.5	0.171718198	
t Critical one-tail	1.833112933	1.833112933	
P(T<=t) two-tail	1	0.343436396	
t Critical two-tail	2.262157163	2.262157163	

Estimated P (T<=t) one-tail is 0.5 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.171718198 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TITAN-20

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	7.625	6.375	6.25
Variance	1.125	0.553571429	0.785714286
Observations	8	8	8
Pearson Correlation	0.569802882	0.920601614	
Hypothesized Mean Difference	0	0	
df	7	7	
t Stat	4.245147417	1	
P(T<=t) one-tail	0.001907972	0.175308331	
t Critical one-tail	1.894578605	1.894578605	
P(T<=t) two-tail	0.003815944	0.350616663	
t Critical two-tail	2.364624252	2.364624252	

Estimated P (T<=t) one-tail is 0.001907972 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.175308331 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

For Organization 1 total sprint analyzed was 40. Out of which the 11 sprints estimated story point data is Accepted with Actual Efforts, and 34 sprints Estimates-WECOFE story points data is Accepted with Actual Efforts by comparing data using t-test one-tail distribution. The WECOFE model has more accurate results compared to existing effort estimation models.

Organization 2 Sprint Projects:

Lords Sprint 2

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	5	6	6
Variance	0	0	0
Observations	2	2	2
Pearson Correlation	#DIV/0!	#DIV/0!	
Hypothesized Mean Difference	0	0	
df	1	1	
t Stat	#DIV/0!	#DIV/0!	
P(T<=t) one-tail	#DIV/0!	#DIV/0!	
t Critical one-tail	#DIV/0!	#DIV/0!	
P(T<=t) two-tail	#DIV/0!	#DIV/0!	
t Critical two-tail	#DIV/0!	#DIV/0!	

Estimated P (T<=t) one-tail is ∞ >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Lords Sprint 3

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	5	6	6
Variance	0	0	0
Observations	2	2	2
Pearson Correlation	#DIV/0!	#DIV/0!	
Hypothesized Mean Difference	0	0	
df	1	1	
t Stat	#DIV/0!	#DIV/0!	
P(T<=t) one-tail	#DIV/0!	#DIV/0!	
t Critical one-tail	#DIV/0!	#DIV/0!	
P(T<=t) two-tail	#DIV/0!	#DIV/0!	
t Critical two-tail	#DIV/0!	#DIV/0!	

Estimated P (T<=t) one-tail is ∞ >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail

is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Lords Sprint 5

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	4.5	4	4.5
Variance	0.5	2	4.5
Observations	2	2	2
Pearson Correlation	1	1	
Hypothesized Mean Difference	0	0	
df	1	1	
t Stat	0	-1	
P(T<=t) one-tail	0.5	0.25	
t Critical one-tail	6.313751515	6.313751515	
P(T<=t) two-tail	1	0.5	
t Critical two-tail	12.70620474	12.70620474	

Estimated P (T<=t) one-tail is 0.05 = 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.05 = 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Lords Sprint 6

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3	2.285714286	2.428571429
Variance	1	0.904761905	1.285714286
Observations	7	7	7
Pearson Correlation	0.881917104	0.949248189	
Hypothesized Mean Difference	0	0	
df	6	6	
t Stat	2.828427125	-1	
P(T<=t) one-tail	0.015009873	0.177958842	
t Critical one-tail	1.943180281	1.943180281	
P(T<=t) two-tail	0.030019745	0.355917684	
t Critical two-tail	2.446911851	2.446911851	

Estimated P (T<=t) one-tail is 0.015009873 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.177958842 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Lords Sprint 7

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.357142857	3.642857143	3.785714286
Variance	0.862637363	1.324175824	1.412087912

Observations	14	14	14
Pearson Correlation	0.911034245	0.952298857	
Hypothesized Mean Difference	0	0	
df	13	13	
t Stat	-3.122498999	-1.471960144	
P(T<=t) one-tail	0.004044373	0.082411723	
t Critical one-tail	1.770933396	1.770933396	
P(T<=t) two-tail	0.008088745	0.164823445	
t Critical two-tail	2.160368656	2.160368656	

Estimated P (T<=t) one-tail is 0.004044373 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.082411723 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Buzzers Sprint 1

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.142857143	3.714285714	3.714285714
Variance	1.80952381	1.238095238	1.238095238
Observations	7	7	7
Pearson Correlation	0.811263073	1	
Hypothesized Mean Difference	0	0	
df	6	6	
t Stat	-1.921537846	#DIV/0!	
P(T<=t) one-tail	0.051523087	#DIV/0!	
t Critical one-tail	1.943180281	#DIV/0!	
P(T<=t) two-tail	0.103046173	#DIV/0!	
t Critical two-tail	2.446911851	#DIV/0!	

Estimated P (T<=t) one-tail is 0.051523087 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Buzzers Sprint 2

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.9	3.533333333	3.5
Variance	4.437931034	1.36091954	1.637931034
Observations	30	30	30
Pearson Correlation	0.863311835	0.970034681	
Hypothesized Mean Difference	0	0	
df	29	29	
t Stat	-2.757161901	0.570826328	
P(T<=t) one-tail	0.00499065	0.286257282	
t Critical one-tail	1.699127027	1.699127027	

P(T<=t) two-tail	0.0099813	0.572514564	
t Critical two-tail	2.045229642	2.045229642	

Estimated P (T<=t) one-tail is 0.00499065 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.286257282 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Parts Packing Sprint 1

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	4	4.5	4.75
Variance	1.333333333	3	2.25
Observations	4	4	4
Pearson Correlation	0.962250449	0.962250449	
Hypothesized Mean Difference	0	0	
df	3	3	
t Stat	-3	-1	
P(T<=t) one-tail	0.028834443	0.195501109	
t Critical one-tail	2.353363435	2.353363435	
P(T<=t) two-tail	0.057668886	0.391002219	
t Critical two-tail	3.182446305	3.182446305	

Estimated P (T<=t) one-tail is 0.028834443 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.195501109 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Parts Packing Sprint 2

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	5	5.5	6
Variance	0	0.5	0
Observations	2	2	2
Pearson Correlation	#DIV/0!	#DIV/0!	
Hypothesized Mean Difference	0	0	
df	1	1	
t Stat	#DIV/0!	-1	
P(T<=t) one-tail	#DIV/0!	0.25	
t Critical one-tail	#DIV/0!	6.313751515	
P(T<=t) two-tail	#DIV/0!	0.5	
t Critical two-tail	#DIV/0!	12.70620474	

Estimated P (T<=t) one-tail is ∞ >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.25 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Parts Packing Sprint 3

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	5	5.5	5.5
Variance	0	0.5	0.5
Observations	2	2	2
Pearson Correlation	#DIV/0!	1	
Hypothesized Mean Difference	0	0	
df	1	1	
t Stat	-1	#DIV/0!	
P(T<=t) one-tail	0.25	#DIV/0!	
t Critical one-tail	6.313751515	#DIV/0!	
P(T<=t) two-tail	0.5	#DIV/0!	
t Critical two-tail	12.70620474	#DIV/0!	

Estimated P (T<=t) one-tail is 0.25 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Parts Packing Sprint 5

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	4	4	4
Variance	2	2	2
Observations	2	2	2
Pearson Correlation	1	1	
Hypothesized Mean Difference	0	0	
df	1	1	
t Stat	#DIV/0!	#DIV/0!	
P(T<=t) one-tail	#DIV/0!	#DIV/0!	
t Critical one-tail	#DIV/0!	#DIV/0!	
P(T<=t) two-tail	#DIV/0!	#DIV/0!	
t Critical two-tail	#DIV/0!	#DIV/0!	

Estimated P (T<=t) one-tail is ∞ >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Parts Packing Sprint 6

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.833333333	3.166666667	3.166666667
Variance	0.966666667	0.166666667	0.166666667
Observations	6	6	6
Pearson Correlation	0.581318359	1	
Hypothesized Mean Difference	0	0	

df	5	5	
t Stat	-1	#DIV/0!	
P(T<=t) one-tail	0.181608734	#DIV/0!	
t Critical one-tail	2.015048373	#DIV/0!	
P(T<=t) two-tail	0.363217468	#DIV/0!	
t Critical two-tail	2.570581836	#DIV/0!	

Estimated P (T<=t) one-tail is 0.181608734 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

For Organization 2 total sprint analyzed was 12. Out of which the 03 sprints estimated story point data is Accepted with Actual Efforts, and 12 sprints Estimates-WECOFE story points data is Accepted with Actual Efforts by comparing data using t-test one-tail distribution. The WECOFE model has more accurate results compared to existing effort estimation models.

Organization 3 Sprint Projects:

TABS-1

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.142857143	2.142857143	2.142857143
Variance	0.80952381	0.80952381	0.80952381
Observations	7	7	7
Pearson Correlation	0.588235294	1	
Hypothesized Mean Difference	0	0	
df	6	6	
t Stat	0	#DIV/0!	
P(T<=t) one-tail	0.5	#DIV/0!	
t Critical one-tail	1.943180281	#DIV/0!	
P(T<=t) two-tail	1	#DIV/0!	
t Critical two-tail	2.446911851	#DIV/0!	

Estimated P (T<=t) one-tail is 0.5 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TABS-2

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.2	2.4	2.4
Variance	1.2	1.3	1.3

Observations	5	5	5
Pearson Correlation	0.920736884	1	
Hypothesized Mean Difference	0	0	
df	4	4	
t Stat	4	#DIV/0!	
P(T<=t) one-tail	0.008065045	#DIV/0!	
t Critical one-tail	2.131846786	#DIV/0!	
P(T<=t) two-tail	0.01613009	#DIV/0!	
t Critical two-tail	2.776445105	#DIV/0!	

Estimated P (T<=t) one-tail is 0.008065045 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TABS-3

	Estimated Story Points	***Estimates -WECOFE***	***Actual Effort (SP)***
Mean	2.666666667	3.333333333	3.333333333
Variance	4.333333333	2.333333333	2.333333333
Observations	3	3	3
Pearson Correlation	0.838627869	1	
Hypothesized Mean Difference	0	0	
df	2	2	
t Stat	-1	#DIV/0!	
P(T<=t) one-tail	0.211324865	#DIV/0!	
t Critical one-tail	2.91998558	#DIV/0!	
P(T<=t) two-tail	0.422649731	#DIV/0!	
t Critical two-tail	4.30265273	#DIV/0!	

Estimated P (T<=t) one-tail is 0.211324865 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

TABS-4

	Estimated Story Points	***Estimates -WECOFE***	***Actual Effort (SP)***
Mean	4	3.333333333	3.333333333
Variance	1	1.333333333	1.333333333
Observations	3	3	3
Pearson Correlation	0	1	
Hypothesized Mean Difference	0	0	
df	2	2	
t Stat	0.755928946	#DIV/0!	
P(T<=t) one-tail	0.26429774	#DIV/0!	
t Critical one-tail	2.91998558	#DIV/0!	

P(T<=t) two-tail	0.528595479	#DIV/0!	
t Critical two-tail	4.30265273	#DIV/0!	

Estimated P (T<=t) one-tail is 0.26429774 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

TABS-5

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.8	2.2	2.2
Variance	3.2	1.2	1.2
Observations	5	5	5
Pearson Correlation	0.918558654	1	
Hypothesized Mean Difference	0	0	
df	4	4	
t Stat	1.5	#DIV/0!	
P(T<=t) one-tail	0.104	#DIV/0!	
t Critical one-tail	2.131846786	#DIV/0!	
P(T<=t) two-tail	0.208	#DIV/0!	
t Critical two-tail	2.776445105	#DIV/0!	

Estimated P (T<=t) one-tail is 0.104 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

TABS-6

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	1	1	1
Variance	0	0	0
Observations	4	4	4
Pearson Correlation	#DIV/0!	#DIV/0!	
Hypothesized Mean Difference	0	0	
df	3	3	
t Stat	#DIV/0!	#DIV/0!	
P(T<=t) one-tail	#DIV/0!	#DIV/0!	
t Critical one-tail	#DIV/0!	#DIV/0!	
P(T<=t) two-tail	#DIV/0!	#DIV/0!	
t Critical two-tail	#DIV/0!	#DIV/0!	

Estimated P (T<=t) one-tail is ∞ >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

TABS-7

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	1.166666667	1	1
Variance	0.166666667	0	0
Observations	6	6	6
Pearson Correlation	#DIV/0!	#DIV/0!	
Hypothesized Mean Difference	0	0	
df	5	5	
t Stat	1	#DIV/0!	
P(T<=t) one-tail	0.181608734	#DIV/0!	
t Critical one-tail	2.015048373	#DIV/0!	
P(T<=t) two-tail	0.363217468	#DIV/0!	
t Critical two-tail	2.570581836	#DIV/0!	

Estimated P (T<=t) one-tail is 0.181608734 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

TABS-8

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	1.875	2	2
Variance	1.839285714	2.285714286	2.285714286
Observations	8	8	8
Pearson Correlation	0.905752919	1	
Hypothesized Mean Difference	0	0	
df	7	7	
t Stat	-0.551677284	#DIV/0!	
P(T<=t) one-tail	0.299165578	#DIV/0!	
t Critical one-tail	1.894578605	#DIV/0!	
P(T<=t) two-tail	0.598331156	#DIV/0!	
t Critical two-tail	2.364624252	#DIV/0!	

Estimated P (T<=t) one-tail is 0.299165578 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Sunrise Sprint 1

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.142857143	2.428571429	2.571428571
Variance	0.142857143	0.619047619	0.619047619
Observations	7	7	7
Pearson Correlation	0.800640769	0.884615385	
Hypothesized Mean Difference	0	0	

df	6	6	
t Stat	-2.121320344	-1	
P(T<=t) one-tail	0.039070375	0.177958842	
t Critical one-tail	1.943180281	1.943180281	
P(T<=t) two-tail	0.078140749	0.355917684	
t Critical two-tail	2.446911851	2.446911851	

Estimated P (T<=t) one-tail is 0.039070375 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.177958842 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts.

Sunrise Sprint 2

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.888888889	4.62962963	4.740740741
Variance	3.102564103	3.011396011	2.891737892
Observations	27	27	27
Pearson Correlation	0.619204391	0.943726719	
Hypothesized Mean Difference	0	0	
df	26	26	
t Stat	-2.928278157	-1	
P(T<=t) one-tail	0.003499916	0.163263511	
t Critical one-tail	1.70561792	1.70561792	
P(T<=t) two-tail	0.006999832	0.326527022	
t Critical two-tail	2.055529439	2.055529439	

Estimated P (T<=t) one-tail is 0.003499916 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.163263511 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Sunrise Sprint 3

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.47826087	2.956521739	2.956521739
Variance	0.806324111	0.316205534	0.316205534
Observations	23	23	23
Pearson Correlation	0.493151629	1	
Hypothesized Mean Difference	0	0	
df	22	22	
t Stat	-2.902421512	#DIV/0!	
P(T<=t) one-tail	0.004129681	#DIV/0!	
t Critical one-tail	1.717144374	#DIV/0!	
P(T<=t) two-tail	0.008259361	#DIV/0!	
t Critical two-tail	2.073873068	#DIV/0!	

Estimated P (T<=t) one-tail is 0.004129681 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Sunrise Sprint 4

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.4	2.6	2.6
Variance	0.8	1.8	1.8
Observations	5	5	5
Pearson Correlation	1	1	
Hypothesized Mean Difference	0	0	
df	4	4	
t Stat	4	#DIV/0!	
P(T<=t) one-tail	0.008065045	#DIV/0!	
t Critical one-tail	2.131846786	#DIV/0!	
P(T<=t) two-tail	0.01613009	#DIV/0!	
t Critical two-tail	2.776445105	#DIV/0!	

Estimated P (T<=t) one-tail is 0.008065045 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Sunrise Sprint 5

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.823529412	3.823529412	3.705882353
Variance	0.779411765	1.654411765	1.220588235
Observations	17	17	17
Pearson Correlation	0.392009297	0.972775326	
Hypothesized Mean Difference	0	0	
df	16	16	
t Stat	-3.273268354	1.460593487	
P(T<=t) one-tail	0.002390513	0.081742743	
t Critical one-tail	1.745883676	1.745883676	
P(T<=t) two-tail	0.004781026	0.163485487	
t Critical two-tail	2.119905299	2.119905299	

Estimated P (T<=t) one-tail is 0.002390513 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.081742743 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Sunrise Sprint 6

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.25	3	3
Variance	0.25	0	0
Observations	4	4	4
Pearson Correlation	#DIV/0!	#DIV/0!	
Hypothesized Mean Difference	0	0	
df	3	3	
t Stat	-3	#DIV/0!	
P(T<=t) one-tail	0.028834443	#DIV/0!	
t Critical one-tail	2.353363435	#DIV/0!	
P(T<=t) two-tail	0.057668886	#DIV/0!	
t Critical two-tail	3.182446305	#DIV/0!	

Estimated P (T<=t) one-tail is 0.028834443 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Sunrise Sprint 7

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3	3	3
Variance	0	0	0
Observations	2	2	2
Pearson Correlation	#DIV/0!	#DIV/0!	
Hypothesized Mean Difference	0	0	
df	1	1	
t Stat	#DIV/0!	#DIV/0!	
P(T<=t) one-tail	#DIV/0!	#DIV/0!	
t Critical one-tail	#DIV/0!	#DIV/0!	
P(T<=t) two-tail	#DIV/0!	#DIV/0!	
t Critical two-tail	#DIV/0!	#DIV/0!	

Estimated P (T<=t) one-tail is ∞ >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Sunrise Sprint 8

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.585365854	4	4.048780488
Variance	3.898780488	3.85	4.097560976
Observations	41	41	41
Pearson Correlation	0.943405771	0.994498239	
Hypothesized Mean Difference	0	0	
df	40	40	

t Stat	-4.399610024	-1.432229748	
P(T<=t) one-tail	3.91746E-05	0.079923443	
t Critical one-tail	1.683851013	1.683851013	
P(T<=t) two-tail	7.83491E-05	0.159846886	
t Critical two-tail	2.02107539	2.02107539	

Estimated P (T<=t) one-tail is 3.91746E-05 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.079923443 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Sunrise Sprint 9

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	4.7	5.2	5.2
Variance	2.9	1.733333333	1.733333333
Observations	10	10	10
Pearson Correlation	0.624436085	1	
Hypothesized Mean Difference	0	0	
df	9	9	
t Stat	-1.167748416	#DIV/0!	
P(T<=t) one-tail	0.136456108	#DIV/0!	
t Critical one-tail	1.833112933	#DIV/0!	
P(T<=t) two-tail	0.272912215	#DIV/0!	
t Critical two-tail	2.262157163	#DIV/0!	

Estimated P (T<=t) one-tail is 0.136456108 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Sunrise Sprint 10

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.833333333	4.166666667	4.166666667
Variance	6.966666667	4.966666667	4.966666667
Observations	6	6	6
Pearson Correlation	0.957680021	1	
Hypothesized Mean Difference	0	0	
df	5	5	
t Stat	-1	#DIV/0!	
P(T<=t) one-tail	0.181608734	#DIV/0!	
t Critical one-tail	2.015048373	#DIV/0!	
P(T<=t) two-tail	0.363217468	#DIV/0!	
t Critical two-tail	2.570581836	#DIV/0!	

Estimated P (T<=t) one-tail is 0.181608734 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P

(T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Sunrise Sprint 11

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.666666667	2.666666667	2.666666667
Variance	0.333333333	0.333333333	0.333333333
Observations	3	3	3
Pearson Correlation	1	1	
Hypothesized Mean Difference	0	0	
df	2	2	
t Stat	#DIV/0!	#DIV/0!	
P(T<=t) one-tail	#DIV/0!	#DIV/0!	
t Critical one-tail	#DIV/0!	#DIV/0!	
P(T<=t) two-tail	#DIV/0!	#DIV/0!	
t Critical two-tail	#DIV/0!	#DIV/0!	

Estimated P (T<=t) one-tail is ∞ >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is ∞ >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-1

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.1	2.6	2.9
Variance	1.655555556	2.044444444	2.988888889
Observations	10	10	10
Pearson Correlation	0.804186173	0.97088703	
Hypothesized Mean Difference	0	0	
df	9	9	
t Stat	-2.449489743	-1.963961012	
P(T<=t) one-tail	0.018393749	0.040563094	
t Critical one-tail	1.833112933	1.833112933	
P(T<=t) two-tail	0.036787498	0.138184755	
t Critical two-tail	2.262157163	2.262157163	

Estimated P (T<=t) one-tail is 0.018393749 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.040563094 <= 0.05 significant value, Estimated - WECOFE story points are Rejected with Actual efforts

Continentals-2

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.615384615	3.846153846	4
Variance	8.08974359	6.641025641	7.333333333

Observations	13	13	13
Pearson Correlation	0.94128235	0.991125283	
Hypothesized Mean Difference	0	0	
df	12	12	
t Stat	-1.443375673	-1.477097892	
P(T<=t) one-tail	0.087254375	0.082703353	
t Critical one-tail	1.782287556	1.782287556	
P(T<=t) two-tail	0.174508751	0.165406706	
t Critical two-tail	2.17881283	2.17881283	

Estimated P (T<=t) one-tail is 0.087254375 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.082703353 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-3

	Estimated Story Points	***Estimates -WECOFE***	***Actual Effort (SP)***
Mean	4.52	4.84	4.76
Variance	5.676666667	4.723333333	4.523333333
Observations	25	25	25
Pearson Correlation	0.86436688	0.991940782	
Hypothesized Mean Difference	0	0	
df	24	24	
t Stat	-1	1.444630237	
P(T<=t) one-tail	0.163643441	0.080745951	
t Critical one-tail	1.71088208	1.71088208	
P(T<=t) two-tail	0.327286881	0.161491902	
t Critical two-tail	2.063898562	2.063898562	

Estimated P (T<=t) one-tail is 0.163643441 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.080745951 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-4

	Estimated Story Points	***Estimates -WECOFE***	***Actual Effort (SP)***
Mean	4.266666667	5.066666667	5
Variance	2.066666667	3.066666667	2.857142857
Observations	15	15	15
Pearson Correlation	0.676080804	0.989365033	
Hypothesized Mean Difference	0	0	
df	14	14	
t Stat	-2.219103108	1	
P(T<=t) one-tail	0.02175607	0.167140972	
t Critical one-tail	1.761310136	1.761310136	

P(T<=t) two-tail	0.04351214	0.334281943	
t Critical two-tail	2.144786688	2.144786688	

Estimated P (T<=t) one-tail is 0.02175607 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.167140972 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-5

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	2.8	3.733333333	3.6
Variance	0.885714286	1.495238095	1.257142857
Observations	15	15	15
Pearson Correlation	0.595683397	0.854413929	
Hypothesized Mean Difference	0	0	
df	14	14	
t Stat	-3.292219567	0.806946585	
P(T<=t) one-tail	0.002672192	0.216596489	
t Critical one-tail	1.761310136	1.761310136	
P(T<=t) two-tail	0.005344384	0.433192978	
t Critical two-tail	2.144786688	2.144786688	

Estimated P (T<=t) one-tail is 0.002672192 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.216596489 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-6

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	4.421052632	4.684210526	4.789473684
Variance	7.14619883	4.67251462	5.064327485
Observations	19	19	19
Pearson Correlation	0.957506391	0.990592136	
Hypothesized Mean Difference	0	0	
df	18	18	
t Stat	-1.933206698	-1.45521375	
P(T<=t) one-tail	0.034548787	0.081414427	
t Critical one-tail	1.734063607	1.734063607	
P(T<=t) two-tail	0.069097573	0.162828855	
t Critical two-tail	2.10092204	2.10092204	

Estimated P (T<=t) one-tail is 0.034548787 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.081414427 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-7

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	4.928571429	5.142857143	5.642857143
Variance	4.994505495	2.43956044	3.93956044
Observations	14	14	14
Pearson Correlation	0.878222816	0.93579961	
Hypothesized Mean Difference	0	0	
df	13	13	
t Stat	-2.5	-2.463060427	
P(T<=t) one-tail	0.013294391	0.014252217	
t Critical one-tail	1.770933396	1.770933396	
P(T<=t) two-tail	0.026588783	0.028504435	
t Critical two-tail	2.160368656	2.160368656	

Estimated P (T<=t) one-tail is 0.013294391 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.014252217 <= 0.05 significant value, Estimated - WECOFE story points are Rejected with Actual efforts

Continentals-8

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.642857143	4.214285714	4.214285714
Variance	3.785714286	3.873626374	4.181318681
Observations	14	14	14
Pearson Correlation	0.948756573	0.981616847	
Hypothesized Mean Difference	0	0	
df	13	13	
t Stat	-3.308680767	0	
P(T<=t) one-tail	0.002826263	0.5	
t Critical one-tail	1.770933396	1.770933396	
P(T<=t) two-tail	0.005652527	1	
t Critical two-tail	2.160368656	2.160368656	

Estimated P (T<=t) one-tail is 0.002826263 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.5 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-9

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	4.066666667	4.6	4.533333333
Variance	3.923809524	2.685714286	2.552380952
Observations	15	15	15
Pearson Correlation	0.732795781	0.987592727	
Hypothesized Mean Difference	0	0	

df	14	14	
t Stat	-1.333117426	1	
P(T<=t) one-tail	0.101890749	0.167140972	
t Critical one-tail	1.761310136	1.761310136	
P(T<=t) two-tail	0.203781498	0.334281943	
t Critical two-tail	2.144786688	2.144786688	

Estimated P (T<=t) one-tail is 0.101890749 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.167140972 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-10

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.611111111	4.111111111	4.055555556
Variance	6.016339869	4.692810458	4.408496732
Observations	18	18	18
Pearson Correlation	0.941040429	0.994381178	
Hypothesized Mean Difference	0	0	
df	17	17	
t Stat	-2.20389266	1	
P(T<=t) one-tail	0.02080237	0.165666381	
t Critical one-tail	1.739606726	1.739606726	
P(T<=t) two-tail	0.041604739	0.331332762	
t Critical two-tail	2.109815578	2.109815578	

Estimated P (T<=t) one-tail is 0.02080237 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.165666381 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-11

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	4.769230769	4.461538462	4.538461538
Variance	6.358974359	3.935897436	4.435897436
Observations	13	13	13
Pearson Correlation	0.919699792	0.992583492	
Hypothesized Mean Difference	0	0	
df	12	12	
t Stat	0.821583836	-1	
P(T<=t) one-tail	0.213667931	0.168524529	
t Critical one-tail	1.782287556	1.782287556	
P(T<=t) two-tail	0.427335862	0.337049058	
t Critical two-tail	2.17881283	2.17881283	

Estimated P (T<=t) one-tail is 0.213667931 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.168524529 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-12

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.5	3.909090909	4.272727273
Variance	10.26190476	5.61038961	7.064935065
Observations	22	22	22
Pearson Correlation	0.8836285	0.926888117	
Hypothesized Mean Difference	0	0	
df	21	21	
t Stat	-2.40073588	-1.701925887	
P(T<=t) one-tail	0.012854111	0.051764465	
t Critical one-tail	1.720742903	1.720742903	
P(T<=t) two-tail	0.025708221	0.10352893	
t Critical two-tail	2.079613845	2.079613845	

Estimated P (T<=t) one-tail is 0.012854111 <= 0.05 significant value. So, Estimated story points are Rejected with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.051764465 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-13

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	4	4.238095238	4.285714286
Variance	9.8	5.79047619	6.114285714
Observations	21	21	21
Pearson Correlation	0.936595581	0.987965536	
Hypothesized Mean Difference	0	0	
df	20	20	
t Stat	-1.100963765	-0.567961834	
P(T<=t) one-tail	0.141993497	0.28819117	
t Critical one-tail	1.724718243	1.724718243	
P(T<=t) two-tail	0.283986995	0.57638234	
t Critical two-tail	2.085963447	2.085963447	

Estimated P (T<=t) one-tail is 0.141993497 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.28819117 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-14

	Estimated Story Points	*Estimates -WECOFE*	*Actual Effort (SP)*
Mean	3.352941176	3.647058824	3.705882353
Variance	6.367647059	4.992647059	4.970588235
Observations	17	17	17
Pearson Correlation	0.897239217	0.994098377	
Hypothesized Mean Difference	0	0	
df	16	16	
t Stat	-1.305427904	-1	
P(T<=t) one-tail	0.105103969	0.166097492	
t Critical one-tail	1.745883676	1.745883676	
P(T<=t) two-tail	0.210207938	0.332194985	
t Critical two-tail	2.119905299	2.119905299	

Estimated P (T<=t) one-tail is 0.105103969 >= 0.05 significant value. So, Estimated story points are Accepted with Actual story point efforts. Estimated - WECOFE P (T<=t) one-tail is 0.166097492 >= 0.05 significant value, Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-15

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	3.318181818	3.318181818
Variance	5.37012987	5.751082251
Observations	22	22
Pearson Correlation	0.983449861	
Hypothesized Mean Difference	0	
df	21	
t Stat	0	
P(T<=t) one-tail	0.5	
t Critical one-tail	1.720742903	
P(T<=t) two-tail	1	
t Critical two-tail	2.079613845	

Estimated - WECOFE P (T<=t) one-tail is 0.5 >= 0.05 significant value. Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-16

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	4.4375	4.375
Variance	4.395833333	5.316666667
Observations	16	16
Pearson Correlation	0.984270654	
Hypothesized Mean Difference	0	
df	15	
t Stat	0.564932683	
P(T<=t) one-tail	0.290235484	
t Critical one-tail	1.753050356	

P(T<=t) two-tail	0.580470968	
t Critical two-tail	2.131449546	

Estimated - WECOFE P (T<=t) one-tail is 0.290235484 >= 0.05 significant value.

Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-17

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	3.722222222	3.833333333
Variance	3.27124183	3.794117647
Observations	18	18
Pearson Correlation	0.937816797	
Hypothesized Mean Difference	0	
df	17	
t Stat	-0.696932052	
P(T<=t) one-tail	0.247633045	
t Critical one-tail	1.739606726	
P(T<=t) two-tail	0.495266091	
t Critical two-tail	2.109815578	

Estimated - WECOFE P (T<=t) one-tail is 0.247633045 >= 0.05 significant value.

Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-18

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	2.8	2.72
Variance	2.333333333	2.376666667
Observations	25	25
Pearson Correlation	0.983764212	
Hypothesized Mean Difference	0	
df	24	
t Stat	1.444630237	
P(T<=t) one-tail	0.080745951	
t Critical one-tail	1.71088208	
P(T<=t) two-tail	0.161491902	
t Critical two-tail	2.063898562	

Estimated - WECOFE P (T<=t) one-tail is 0.080745951 >= 0.05 significant value.

Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-19

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	3.75	3.8125
Variance	3.933333333	4.295833333
Observations	16	16
Pearson Correlation	0.977151052	
Hypothesized Mean Difference	0	
df	15	

t Stat	-0.564932683	
P(T<=t) one-tail	0.290235484	
t Critical one-tail	1.753050356	
P(T<=t) two-tail	0.580470968	
t Critical two-tail	2.131449546	

Estimated - WECOFE P (T<=t) one-tail is 0.290235484 >= 0.05 significant value.

Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-20

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	2.923076923	2.961538462
Variance	2.073846154	2.678461538
Observations	26	26
Pearson Correlation	0.949117705	
Hypothesized Mean Difference	0	
df	25	
t Stat	-0.371647073	
P(T<=t) one-tail	0.356643511	
t Critical one-tail	1.708140761	
P(T<=t) two-tail	0.713287022	
t Critical two-tail	2.059538553	

Estimated - WECOFE P (T<=t) one-tail is 0.356643511 >= 0.05 significant value.

Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-21

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	2.739130435	2.695652174
Variance	1.656126482	1.675889328
Observations	23	23
Pearson Correlation	0.986968725	
Hypothesized Mean Difference	0	
df	22	
t Stat	1	
P(T<=t) one-tail	0.164091631	
t Critical one-tail	1.717144374	
P(T<=t) two-tail	0.328183262	
t Critical two-tail	2.073873068	

Estimated - WECOFE P (T<=t) one-tail is 0.164091631 >= 0.05 significant value.

Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-22

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	2.655172414	2.586206897
Variance	2.805418719	2.822660099
Observations	29	29

Pearson Correlation	0.950113868	
Hypothesized Mean Difference	0	
df	28	
t Stat	0.700876644	
P(T<=t) one-tail	0.24458203	
t Critical one-tail	1.701130934	
P(T<=t) two-tail	0.48916406	
t Critical two-tail	2.048407142	

Estimated - WECOFE P (T<=t) one-tail is 0.24458203 >= 0.05 significant value. Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-23

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	2.4	2.333333333
Variance	2.542857143	2.095238095
Observations	15	15
Pearson Correlation	0.990248676	
Hypothesized Mean Difference	0	
df	14	
t Stat	1	
P(T<=t) one-tail	0.167140972	
t Critical one-tail	1.761310136	
P(T<=t) two-tail	0.334281943	
t Critical two-tail	2.144786688	

Estimated - WECOFE P (T<=t) one-tail is 0.167140972 >= 0.05 significant value. Estimated - WECOFE story points are Accepted with Actual efforts

Continentals-24

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	3.866666667	3.8
Variance	6.123809524	6.6
Observations	15	15
Pearson Correlation	0.984222447	
Hypothesized Mean Difference	0	
df	14	
t Stat	0.564076075	
P(T<=t) one-tail	0.290813418	
t Critical one-tail	1.761310136	
P(T<=t) two-tail	0.581626837	
t Critical two-tail	2.144786688	

Estimated - WECOFE P (T<=t) one-tail is 0.290813418 >= 0.05 significant value then the Estimated - WECOFE story points are Accepted with Actual efforts

Spartans Sprint 1

	Estimates -WECOFE	*Actual Effort (SP)*

Mean	3	3.090909091
Variance	3.8	3.490909091
Observations	11	11
Pearson Correlation	0.988419791	
Hypothesized Mean Difference	0	
df	10	
t Stat	-1	
P(T<=t) one-tail	0.170446566	
t Critical one-tail	1.812461123	
P(T<=t) two-tail	0.340893132	
t Critical two-tail	2.228138852	

Estimated - WECOFE P (T<=t) one-tail is 0.170446566 >= 0.05 significant value.

Estimated - WECOFE story points are Accepted with Actual efforts

Spartans Sprint 2

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	3.166666667	3
Variance	2.566666667	1.6
Observations	6	6
Pearson Correlation	0.986927542	
Hypothesized Mean Difference	0	
df	5	
t Stat	1	
P(T<=t) one-tail	0.181608734	
t Critical one-tail	2.015048373	
P(T<=t) two-tail	0.363217468	
t Critical two-tail	2.570581836	

Estimated - WECOFE P (T<=t) one-tail is 0.181608734 >= 0.05 significant value.

Estimated - WECOFE story points are Accepted with Actual efforts

Spartans Sprint 3

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	4.111111111	4
Variance	2.861111111	2.5
Observations	9	9
Pearson Correlation	0.981503701	
Hypothesized Mean Difference	0	
df	8	
t Stat	1	
P(T<=t) one-tail	0.173296754	
t Critical one-tail	1.859548038	
P(T<=t) two-tail	0.346593507	
t Critical two-tail	2.306004135	

Estimated - WECOFE P (T<=t) one-tail is 0.173296754 >= 0.05 significant value.

Estimated - WECOFE story points are Accepted with Actual efforts

Spartans Sprint 4

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	3.625	3.5
Variance	2.267857143	2.857142857
Observations	8	8
Pearson Correlation	0.942396885	
Hypothesized Mean Difference	0	
df	7	
t Stat	0	
P(T<=t) one-tail	0.5	
t Critical one-tail	1.894578605	
P(T<=t) two-tail	1	
t Critical two-tail	2.364624252	

Estimated - WECOFE P (T<=t) one-tail is 0.5 >= 0.05 significant value. Estimated - WECOFE story points are Accepted with Actual efforts

Spartans Sprint 5

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	2.727272727	2.636363636
Variance	0.818181818	0.854545455
Observations	11	11
Pearson Correlation	0.945875706	
Hypothesized Mean Difference	0	
df	10	
t Stat	1	
P(T<=t) one-tail	0.170446566	
t Critical one-tail	1.812461123	
P(T<=t) two-tail	0.340893132	

Estimated - WECOFE P (T<=t) one-tail is 0.170446566 >= 0.05 significant value. Estimated - WECOFE story points are Accepted with Actual efforts

Spartans Sprint 6

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	3.333333333	3.444444444
Variance	3.5	3.777777778
Observations	9	9
Pearson Correlation	0.985450884	
Hypothesized Mean Difference	0	
df	8	
t Stat	-1	
P(T<=t) one-tail	0.173296754	
t Critical one-tail	1.859548038	
P(T<=t) two-tail	0.346593507	
t Critical two-tail	2.306004135	

Estimated - WECOFE P (T<=t) one-tail is 0.173296754 >= 0.05 significant value. Estimated - WECOFE story points are Accepted with Actual efforts

Spartans Sprint 7

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	3	2.75
Variance	3.142857143	2.785714286
Observations	8	8
Pearson Correlation	0.965609099	
Hypothesized Mean Difference	0	
df	7	
t Stat	1.527525232	
P(T<=t) one-tail	0.08523533	
t Critical one-tail	1.894578605	
P(T<=t) two-tail	0.170470661	
t Critical two-tail	2.364624252	

Estimated - WECOFE P (T<=t) one-tail is 0.08523533 >= 0.05 significant value. Estimated - WECOFE story points are Accepted with Actual efforts

Spartans Sprint 8

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	3.2	3.2
Variance	3.028571429	3.6
Observations	15	15
Pearson Correlation	0.960472144	
Hypothesized Mean Difference	0	
df	14	
t Stat	0	
P(T<=t) one-tail	0.5	
t Critical one-tail	1.761310136	
P(T<=t) two-tail	1	
t Critical two-tail	2.144786688	

Estimated - WECOFE P (T<=t) one-tail is 0.5 >= 0.05 significant value. Estimated - WECOFE story points are Accepted with Actual efforts

Spartans Sprint 9

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	3.375	3.4375
Variance	1.716666667	3.0625
Observations	16	16
Pearson Correlation	0.941320425	
Hypothesized Mean Difference	0	
df	15	
t Stat	-0.367607311	
P(T<=t) one-tail	0.359150628	

t Critical one-tail	1.753050356	
P(T<=t) two-tail	0.718301257	
t Critical two-tail	2.131449546	

Estimated - WECOFE P (T<=t) one-tail is 0.359150628 >= 0.05 significant value. Estimated - WECOFE story points are Accepted with Actual efforts

Spartans Sprint 10

	Estimates -WECOFE	*Actual Effort (SP)*
Mean	3.222222222	3.111111111
Variance	4.194444444	4.361111111
Observations	9	9
Pearson Correlation	0.987200321	
Hypothesized Mean Difference	0	
df	8	
t Stat	1	
P(T<=t) one-tail	0.173296754	
t Critical one-tail	1.859548038	
P(T<=t) two-tail	0.346593507	
t Critical two-tail	2.306004135	

Estimated - WECOFE P (T<=t) one-tail is 0.173296754 >= 0.05 significant value. Estimated - WECOFE story points are Accepted with Actual efforts.

For Organization 3 total sprint analyzed was 53. Out of 53 sprints 20 sprints are calculated only the WECOFE model and all the data sets are Accepted with Actual efforts. 33 sprints are calculated efforts with existing effort estimation and WECOFE and compared with t-distribution for Acceptance (identical data sets). 16 sprints estimated story point data is Accepted with Actual Efforts, and 31 sprints Estimates-WECOFE story points data is Accepted with Actual Efforts by comparing data using t-test one-tail distribution. The WECOFE model has more accurate results compared to existing effort estimation models.

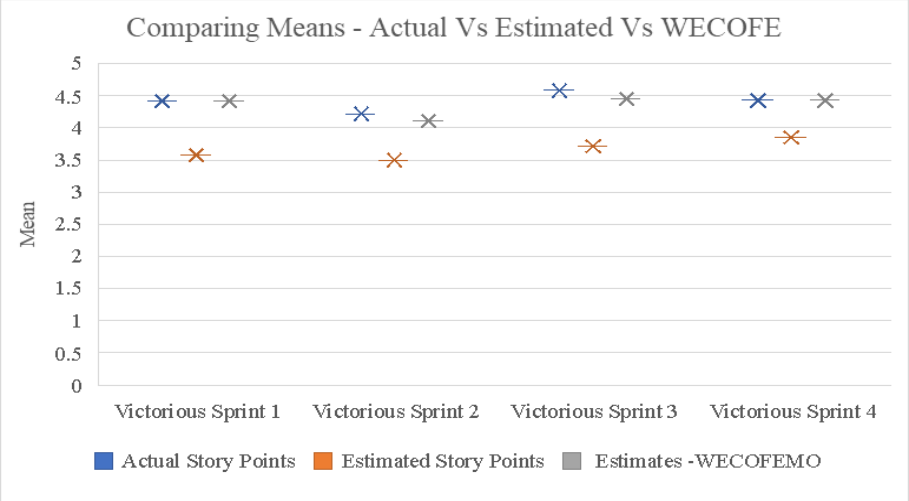
5.7 Model Validation

All the sprints validate their means with Actual story points, estimates, and the WECOFE model. The below section provided the Means and variance of the different sprints to compare the results. The Estimated-WECOFE is closer to Actual Story Points than Estimated Story Points by using an existing model.

Organization 1 Sprint Projects:

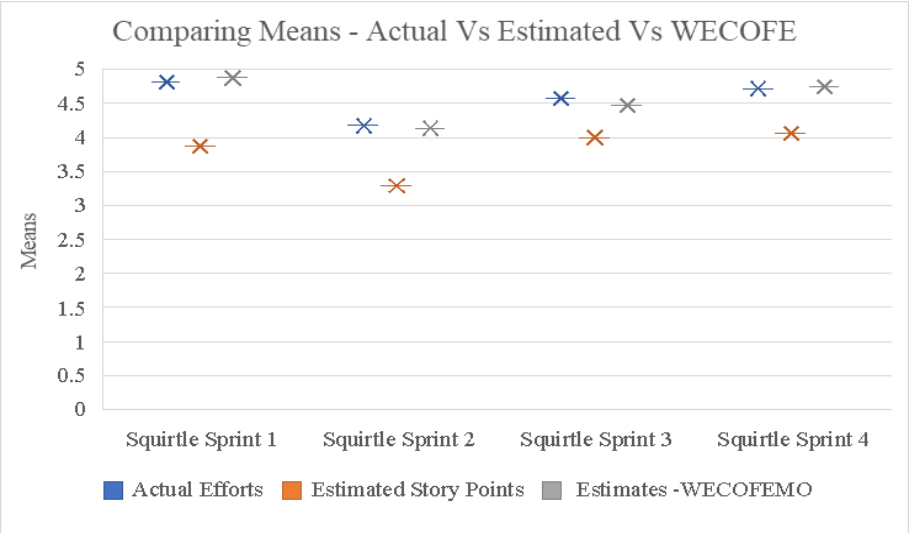
Victorious

Sprint Name	Mean			Variance		
	Actual Story Points	Estimated Story Points	Estimates - WECOFE	Actual Story Points	Estimated Story Points	Estimates - WECOFE
Victorious Sprint 1	4.416666667	3.583333333	4.416666667	2.628787879	1.174242424	2.810606061
Victorious Sprint 2	4.222222222	3.5	4.111111111	1.606349206	1.8	1.473015873
Victorious Sprint 3	4.586956522	3.717391304	4.456521739	1.492270531	1.185024155	1.498067633
Victorious Sprint 4	4.428571429	3.857142857	4.428571429	0.619047619	1.142857143	0.285714286



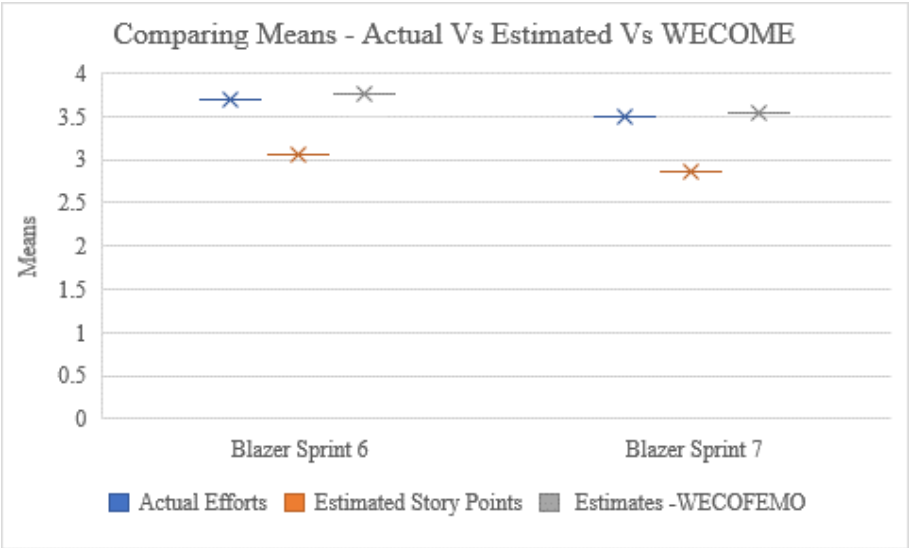
Squirtle

Sprint Name	Mean			Variance		
	Actual Story Points	Estimated Story Points	Estimates - WECOFE	Actual Story Points	Estimated Story Points	Estimates - WECOFE
Squirtle Sprint 1	4.8125	3.875	4.875	3.3625	2.916666667	2.783333333
Squirtle Sprint 2	4.176470588	3.294117647	4.137254902	1.468235294	1.331764706	1.480784314
Squirtle Sprint 3	4.571428571	4	4.476190476	1.657142857	2.4	1.657142857
Squirtle Sprint 4	4.71875	4.0625	4.75	2.144153226	1.286290323	2.258064516



Blazer

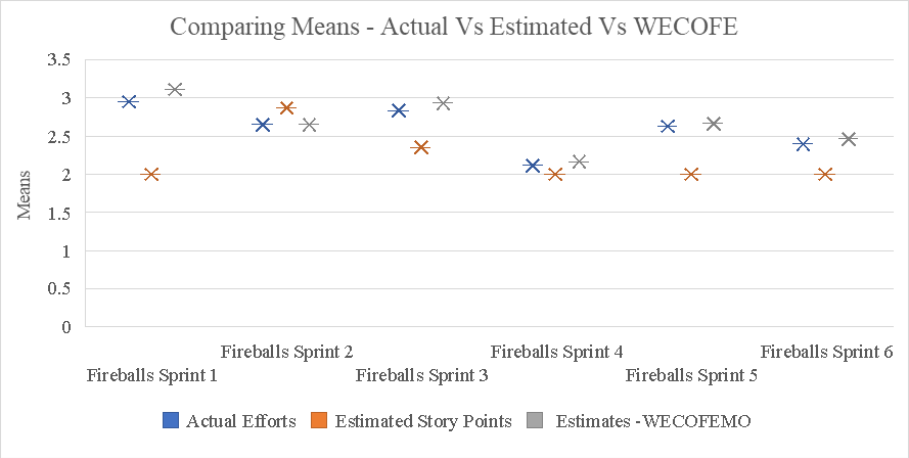
Sprint Name	Mean			Variance		
	Actual Story Points	Estimated Story Points	Estimates - WECOFE	Actual Story Points	Estimated Story Points	Estimates - WECOFE
Blazer Sprint 6	3.6875	3.0625	3.75	1.1625	2.329166667	1.533333333
Blazer Sprint 7	3.5	2.866666667	3.533333333	1.637931034	4.395402299	1.36091954



Fireballs

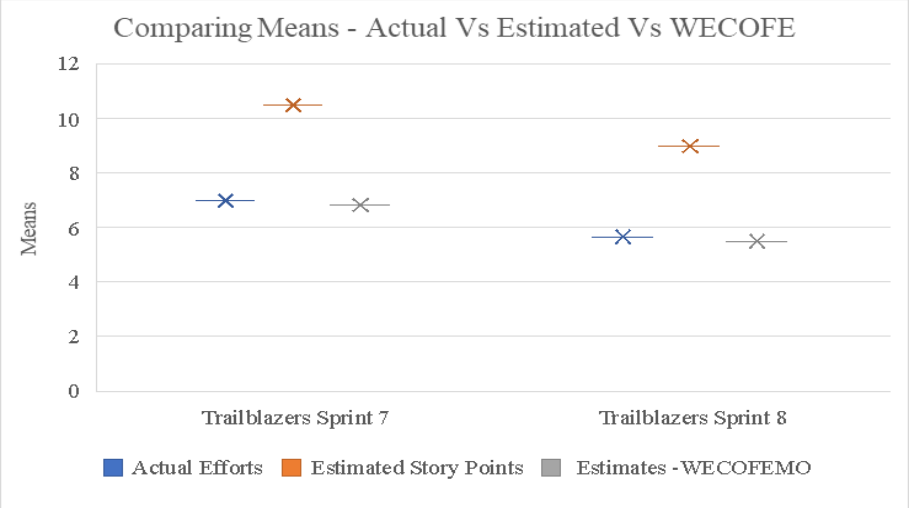
Sprint Name	Mean			Variance		
	Actual Story Points	Estimated Story Points	Estimates - WECOFE	Actual Story Points	Estimated Story Points	Estimates - WECOFE
Fireballs Sprint 1	2.955555556	2	3.111111111	0.17979798	0	0.101010101
Fireballs Sprint 2	2.652173913	2.869565217	2.652173913	1.418972332	0.664031621	1.328063241
Fireballs Sprint 3	2.838709677	2.35483871	2.935483871	0.139784946	0.23655914	0.062365591

Fireballs Sprint 4	2.117647059	2	2.168067227	0.121635095	0	0.157954707
Fireballs Sprint 5	2.633333333	2	2.666666667	0.236158192	0	0.225988701
Fireballs Sprint 6	2.4	2	2.466666667	0.257142857	0	0.266666667



Trailblazers

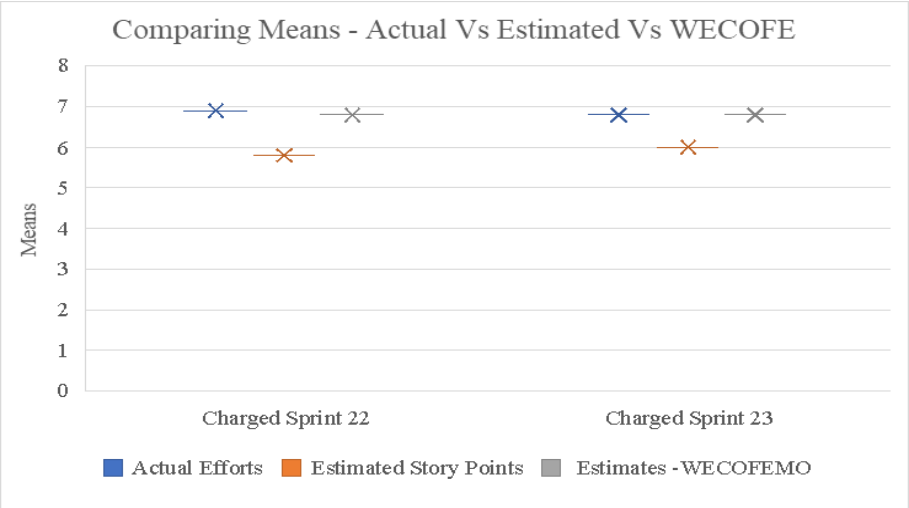
Sprint Name	Mean			Variance		
	Actual Story Points	Estimated Story Points	Estimates - WECOFE	Actual Story Points	Estimated Story Points	Estimates - WECOFE
Trailblazers Sprint 7	7	10.5	6.833333333	1.2	7.5	0.566666667
Trailblazers Sprint 8	5.666666667	9	5.5	0.266666667	19.2	0.3



Charged

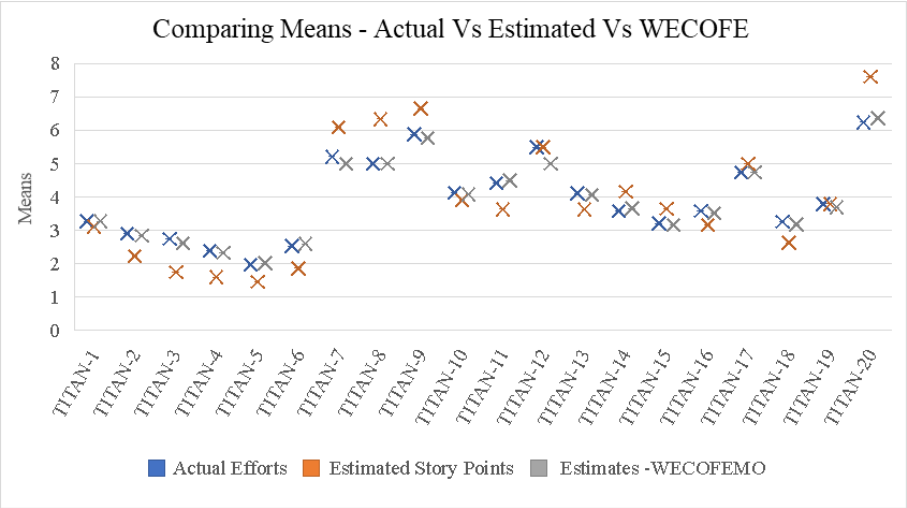
Sprint Name	Mean			Variance		
	Actual Story Points	Estimated Story Points	Estimates - WECOFE	Actual Story Points	Estimated Story Points	Estimates - WECOFE
Charged Sprint 22	6.9	5.8	6.8	0.766666667	4.177777778	0.4

Charged Sprint 23	6.8	6	6.8	0.4	3.333333333	0.844444444



TITAN

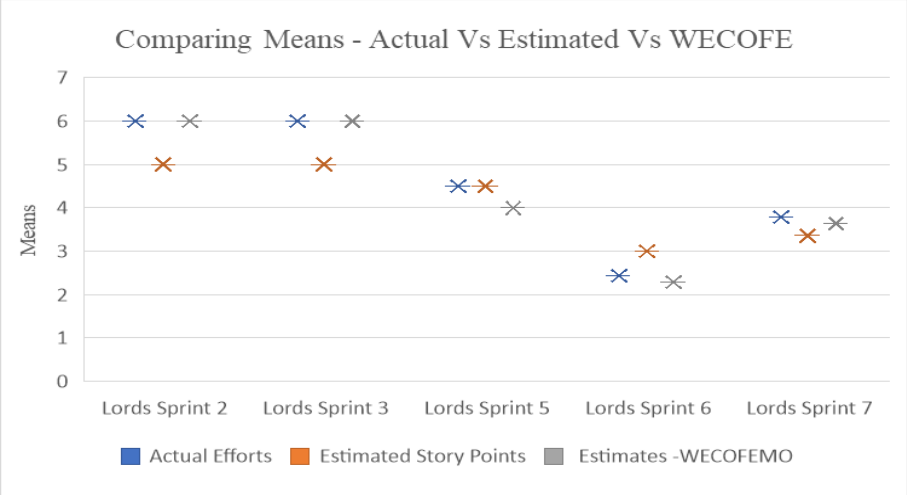
Sprint name	Mean			Variance		
	Actual Efforts	Estimated Story Points	Estimates - WECOFE	Actual Efforts	Estimated Story Points	Estimates - WECOFE
TITAN-1	3.28	3.12	3.28	0.46	0.11	0.46
TITAN-2	2.909090909	2.242424242	2.848484848	0.835227273	1.501893939	0.570075758
TITAN-3	2.75	1.75	2.625	0.333333333	0.2	0.25
TITAN-4	2.4	1.6	2.333333333	0.317241379	0.455172414	0.229885057
TITAN-5	1.977272727	1.454545455	2.022727273	0.069238901	0.393234672	0.022727273
TITAN-6	2.533333333	1.866666667	2.6	0.40952381	0.40952381	0.257142857
TITAN-7	5.222222222	6.111111111	5	0.183006536	0.575163399	0
TITAN-8	5	6.352941176	5	0.125	0.617647059	0
TITAN-9	5.888888889	6.666666667	5.777777778	0.361111111	7.25	0.444444444
TITAN-10	4.136363636	3.909090909	4.090909091	1.837662338	2.562770563	1.896103896
TITAN-11	4.428571429	3.642857143	4.5	1.494505495	1.324175824	1.807692308
TITAN-12	5.5	5.5	5	12.5	24.5	8
TITAN-13	4.113636364	3.636363636	4.068181818	4.75422833	9.073995772	4.29756871
TITAN-14	3.583333333	4.166666667	3.666666667	1.71969697	2.515151515	2.060606061
TITAN-15	3.213333333	3.653333333	3.173333333	3.061981982	4.959279279	2.874954955
TITAN-16	3.588235294	3.176470588	3.529411765	1.882352941	3.904411765	1.514705882
TITAN-17	4.75	5	4.75	4.25	8	2.25
TITAN-18	3.272727273	2.636363636	3.181818182	1.018181818	2.054545455	0.363636364
TITAN-19	3.8	3.8	3.7	2.177777778	7.288888889	2.233333333
TITAN-20	6.25	7.625	6.375	0.785714286	1.125	0.553571429



Organization 2 Sprint Projects:

Lords

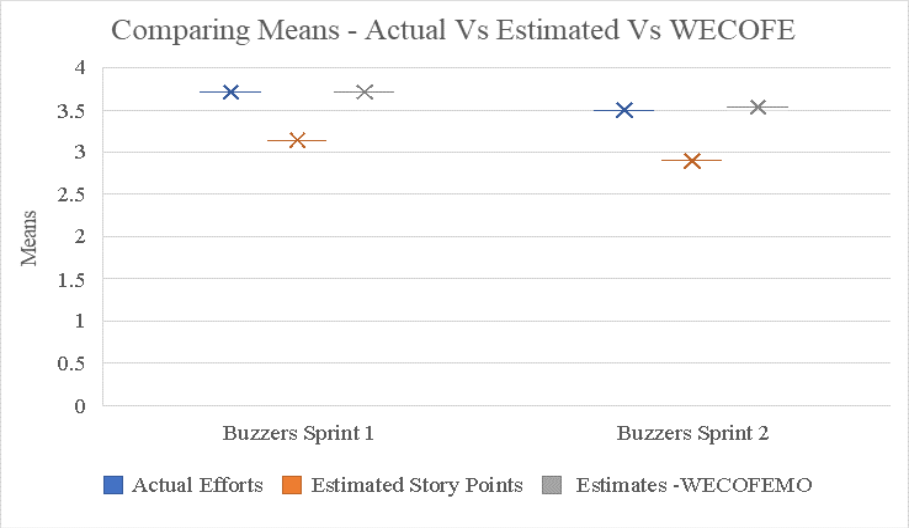
Sprint name	Mean			Variance		
	Actual Efforts	Estimated Story Points	Estimates - WECOFE	Actual Efforts	Estimated Story Points	Estimates - WECOFE
Lords Sprint 2	6	5	6	0	0	0
Lords Sprint 3	6	5	6	0	0	0
Lords Sprint 5	4.5	4.5	4	4.5	0.5	2
Lords Sprint 6	2.428571429	3	2.285714286	1.285714286	1	0.904761905
Lords Sprint 7	3.785714286	3.357142857	3.642857143	1.412087912	0.862637363	1.324175824



Buzzers

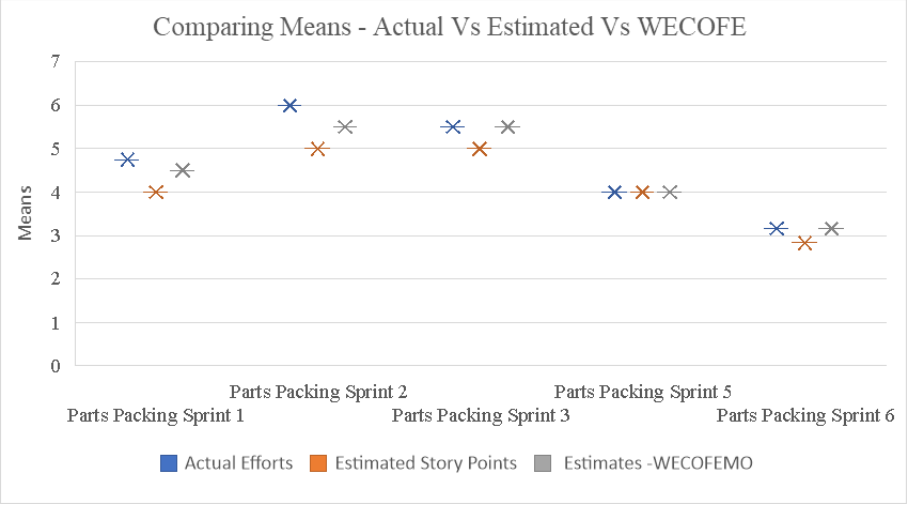
Sprint name	Mean			Variance		
	Actual Efforts	Estimated Story Points	Estimates - WECOFE	Actual Efforts	Estimated Story Points	Estimates - WECOFE
Buzzers Sprint 1	3.714285714	3.142857143	3.714285714	1.238095238	1.80952381	1.238095238

Buzzers Sprint 2	3.5	2.9	3.533333333	1.637931034	4.437931034	1.36091954



Parts Packing

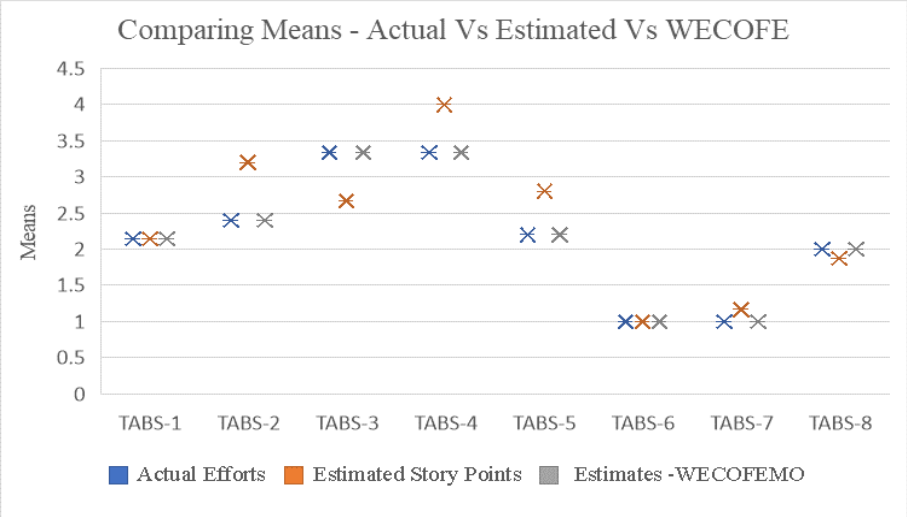
Sprint name	Mean			Variance		
	Actual Efforts	Estimated Story Points	Estimates - WECOFE	Actual Efforts	Estimated Story Points	Estimates - WECOFE
Parts Packing Sprint 1	4.75	4	4.5	2.25	1.333333333	3
Parts Packing Sprint 2	6	5	5.5	0	0	0.5
Parts Packing Sprint 3	5.5	5	5.5	0.5	0	0.5
Parts Packing Sprint 5	4	4	4	2	2	2
Parts Packing Sprint 6	3.166666667	2.833333333	3.166666667	0.166666667	0.966666667	0.166666667



Organization 3 Sprint Projects:

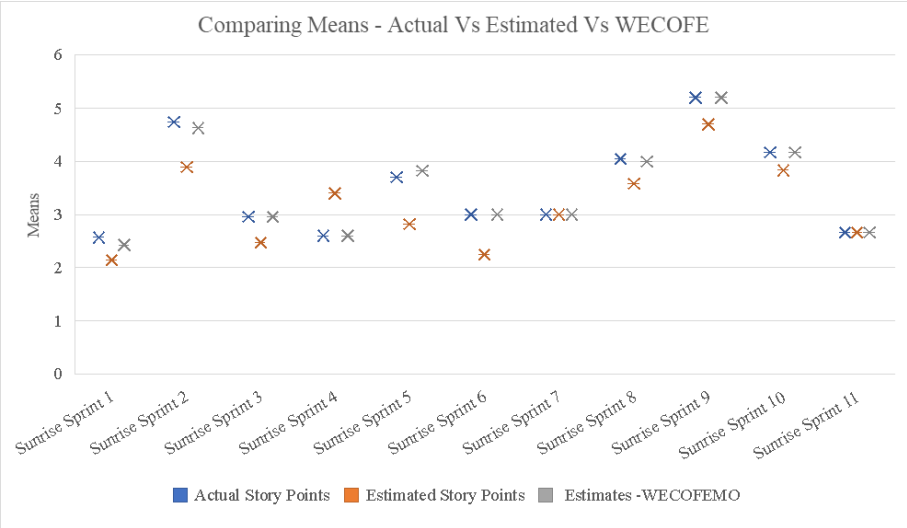
TABS

Sprint Name	Mean			Variance		
	Actual Story Points	Estimated Story Points	Estimates - WECOFE	Actual Story Points	Estimated Story Points	Estimates - WECOFE
TABS-1	2.142857143	2.142857143	2.142857143	0.80952381	0.80952381	0.80952381
TABS-2	2.4	3.2	2.4	1.3	1.2	1.3
TABS-3	3.333333333	2.666666667	3.333333333	2.333333333	4.333333333	2.333333333
TABS-4	3.333333333	4	3.333333333	1.333333333	1	1.333333333
TABS-5	2.2	2.8	2.2	1.2	3.2	1.2
TABS-6	1	1	1	0	0	0
TABS-7	1	1.166666667	1	0	0.166666667	0
TABS-8	2	1.875	2	2.285714286	1.839285714	2.285714286



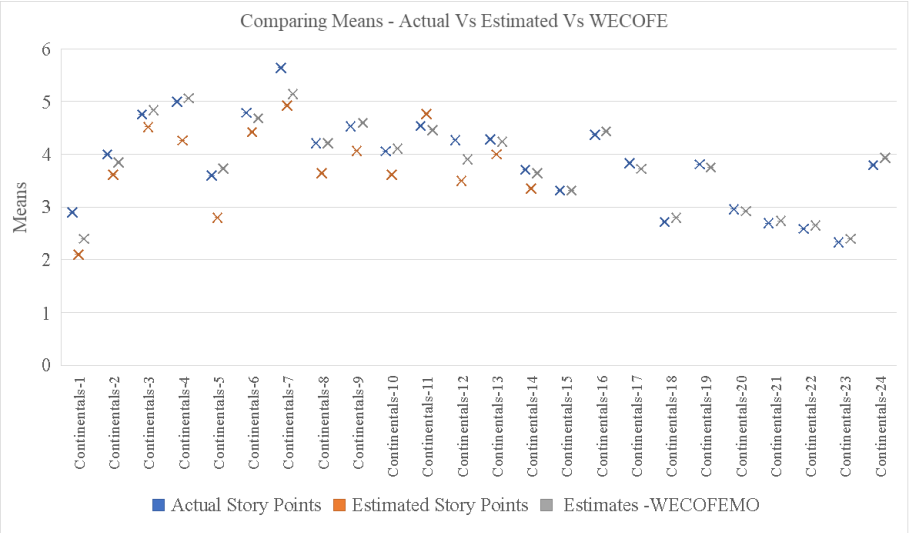
Sunrise

Sprint Name	Mean			Variance		
	Actual Story Points	Estimated Story Points	Estimates - WECOFE	Actual Story Points	Estimated Story Points	Estimates - WECOFE
Sunrise Sprint 1	2.571428571	2.142857143	2.428571429	0.619047619	0.142857143	0.619047619
Sunrise Sprint 2	4.740740741	3.888888889	4.62962963	2.891737892	3.102564103	3.011396011
Sunrise Sprint 3	2.956521739	2.47826087	2.956521739	0.316205534	0.806324111	0.316205534
Sunrise Sprint 4	2.6	3.4	2.6	1.8	0.8	1.8
Sunrise Sprint 5	3.705882353	2.823529412	3.823529412	1.220588235	0.779411765	1.654411765
Sunrise Sprint 6	3	2.25	3	0	0	0
Sunrise Sprint 7	3	3	3	0	0	0
Sunrise Sprint 8	4.048780488	3.585365854	4	4.097560976	3.898780488	3.85
Sunrise Sprint 9	5.2	4.7	5.2	1.733333333	2.9	1.733333333
Sunrise Sprint 10	4.166666667	3.833333333	4.166666667	4.966666667	6.966666667	4.966666667
Sunrise Sprint 11	2.666666667	2.666666667	2.666666667	0.333333333	0.333333333	0.333333333



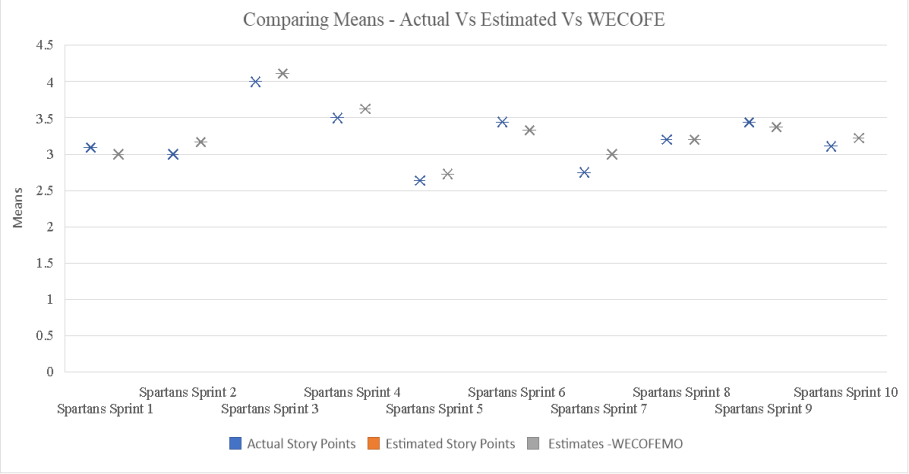
Continentals

Sprint Name	Mean			Variance		
	Actual Story Points	Estimated Story Points	Estimates - WECOFE	Actual Story Points	Estimated Story Points	Estimates - WECOFE
Continentals-1	2.9	2.1	2.4	2.988888889	1.655555556	1.377777778
Continentals-2	4	3.615384615	3.846153846	7.333333333	8.08974359	6.641025641
Continentals-3	4.76	4.52	4.84	4.523333333	5.676666667	4.723333333
Continentals-4	5	4.266666667	5.066666667	2.857142857	2.066666667	3.066666667
Continentals-5	3.6	2.8	3.733333333	1.257142857	0.885714286	1.495238095
Continentals-6	4.789473684	4.421052632	4.684210526	5.064327485	7.14619883	4.67251462
Continentals-7	5.642857143	4.928571429	5.142857143	3.93956044	4.994505495	2.43956044
Continentals-8	4.214285714	3.642857143	4.214285714	4.181318681	3.785714286	3.873626374
Continentals-9	4.533333333	4.066666667	4.6	2.552380952	3.923809524	2.685714286
Continentals-10	4.055555556	3.611111111	4.111111111	4.408496732	6.016339869	4.692810458
Continentals-11	4.538461538	4.769230769	4.461538462	4.435897436	6.358974359	3.935897436
Continentals-12	4.272727273	3.5	3.909090909	7.064935065	10.26190476	5.61038961
Continentals-13	4.285714286	4	4.238095238	6.114285714	9.8	5.79047619
Continentals-14	3.705882353	3.352941176	3.647058824	4.970588235	6.367647059	4.992647059
Continentals-15	3.318181818		3.318181818	5.751082251		5.37012987
Continentals-16	4.375		4.4375	5.316666667		4.395833333
Continentals-17	3.833333333		3.722222222	3.794117647		3.27124183
Continentals-18	2.72		2.8	2.376666667		2.333333333
Continentals-19	3.8125		3.75	4.295833333		3.933333333
Continentals-20	2.961538462		2.923076923	2.678461538		2.073846154
Continentals-21	2.695652174		2.739130435	1.675889328		1.656126482
Continentals-22	2.586206897		2.655172414	2.822660099		2.805418719
Continentals-23	2.333333333		2.4	2.095238095		2.542857143
Continentals-24	3.8		3.933333333	6.6		5.923809524



Spartans

Sprint Name	Mean			Variance		
	Actual Story Points	Estimated Story Points	Estimates - WECOFE	Actual Story Points	Estimated Story Points	Estimates - WECOFE
Spartans Sprint 1	3.090909091		3	3.490909091		3.8
Spartans Sprint 2	3		3.166666667	1.6		2.566666667
Spartans Sprint 3	4		4.111111111	2.5		2.861111111
Spartans Sprint 4	3.5		3.625	2.857142857		2.267857143
Spartans Sprint 5	2.636363636		2.727272727	0.854545455		0.818181818
Spartans Sprint 6	3.444444444		3.333333333	3.777777778		3.5
Spartans Sprint 7	2.75		3	2.785714286		3.142857143
Spartans Sprint 8	3.2		3.2	3.6		3.028571429
Spartans Sprint 9	3.4375		3.375	3.0625		1.716666667
Spartans Sprint 10	3.111111111		3.222222222	4.361111111		4.194444444



Chapter 6 – Findings and Discussions

Findings:

The statistical analysis conducted across various sprints provides a comprehensive understanding of the estimation techniques and their effectiveness in Agile development. The metrics examined include the Mean, Variance, Observations, and t Critical two-tail values for Estimated Story Points, Estimates -WECOFE, and Actual Story Point Effort (SP).

Key Metrics:

- Mean: Represents the average value of the estimated or actual effort.
- Variance: Indicates the spread or dispersion of the data points.
- Observations: The number of data points considered for the analysis.
- T-Critical two-tail: A statistical measure used to assess the reliability of the estimates.

Discussions:

- Alignment Between Estimates and Actual Effort: One of the most striking findings is the close alignment between the mean values of Estimates -WECOFE and Actual Effort (SP). This suggests that the WECOFE estimation method is highly accurate and reliable, as it closely mirrors the actual effort expended.
- Variance in Estimates: A higher variance in Estimates -WECOFE compared to Estimated Story Points could indicate greater complexity or unpredictability in the tasks. This is an essential consideration for project managers when planning future sprints.
- Statistical Significance: The t Critical two-tail values for both Estimated Story Points and Estimates -WECOFE indicate these metrics' statistical significance. This adds a layer of reliability and confidence to these estimation methods.
- Sample Size and Reliability: The number of observations for each metric provides a reasonable sample size, lending credibility to the analysis. A larger

sample size would further enhance the reliability of these findings.

- Comparative Analysis: The close alignment between different estimation techniques and actual efforts suggests that Agile teams can flexibly choose between these methods based on their project's specific needs and complexities.
- Implications for Future Projects: The findings serve as a valuable benchmark for future Agile projects. Teams can use this data to refine their estimation techniques, thereby improving the accuracy and reliability of project planning.
- Risk Mitigation: Understanding the variance and other statistical metrics can help identify potential risks and uncertainties, enabling proactive risk mitigation strategies.
- Continuous Improvement: These statistical insights pave the way for constant improvement in Agile practices, particularly in effort estimation and project planning.

By synthesizing these findings, Agile teams and project managers can make more informed decisions, enhancing the overall efficiency and effectiveness of project execution.

The proposed model is successful in different project sizes with varying experiences of resources in the team. The model provides accurate estimations for considering the internal elements in the factors:

- Changes in Code / Complexity code.
- Functional / Data Complexity / Design Complexity
- Integration into other systems (Internal / External).
- SSL, Encryption, Database creation, and batch jobs configuration.
- Code reusability, Internal processing complexity, Cross-platform requirements, and response time.
- Familiarity with the project, application experience, programming language experience, and domain knowledge.
- Non-Functional Requirements

For this estimation model, the team can get the advantages of:

- Project estimations
- Decision making
- Resource acceptability
- Accurate Story point calculation
- Flexible and easily adopted to consume the model
- The team focusses on defined work.
- Allocate the work based on the complexity identified

Chapter 7 – Conclusion

Summary of Findings

The comprehensive statistical analysis presented in Chapter 6 offers valuable insights into the effectiveness of various estimation techniques in Agile development. The model has validated in Section 5.7 for all the three Organization projects considered for this analysis. Done the three different treatments analysis of the agile project data for analysis and clearly identified the factors defined in Treatment 3 is accurate in estimations while compared to Treatment 1 and Treatment 2. The MMRE proposed values almost equivalent to MMRE existing in Treatment 3. The metrics such as Mean, Variance, Observations, and t Critical two-tail values were examined for Estimated Story Points, Estimates -WECOFE, and Actual Effort (SP).

Key Takeaways

- High Accuracy of WECOFE: The WECOFE estimation method has proven highly accurate, as evidenced by its close alignment with Actual Effort (SP).
- Statistical Reliability: The t Critical two-tail values indicate that the data is statistically significant, adding a layer of confidence to the estimation methods used.
- Risk Assessment: The variance in estimates provides an understanding of the potential risks and uncertainties, enabling better risk mitigation strategies.

Implications for Future Projects

- Choice of Estimation Techniques: The findings suggest that Agile teams can choose between different estimation techniques based on their project's specific needs and complexities.
- Benchmarking: The statistical data serves as a valuable benchmark for future Agile projects, aiding in the refinement of estimation techniques.
- Risk Management: Understanding the statistical metrics can help proactively identify and mitigate potential risks, thereby enhancing project outcomes.

Recommendations

- Further Research: It would be beneficial to extend this research to more sprints

and projects to validate these findings further. Project development has changed drastically in the last one to two years for using GenAI models to generate codebase. The team has to adopt the new Factors on the above model to support the GenAI-related project journey.

- Training and Skill Development: Agile teams should consider training programs focused on statistical analysis and risk management to improve their estimation accuracy.
- Tool Integration: Advanced project management and statistical analysis tools can automate the data collection and analysis, making it more efficient.

Final Thoughts:

The statistical analysis has validated the effectiveness of existing estimation techniques and opened avenues for continuous improvement in Agile practices. By leveraging these insights, Agile teams can aspire to achieve higher efficiency and effectiveness in project execution, delivering more excellent value to stakeholders.

Chapter 8 – Future Work

The statistical analysis conducted in this project has provided valuable insights into the effectiveness of various estimation techniques in Agile development. While the findings are promising, there are several avenues for future work to enhance the understanding and application of these techniques.

Extension to Multiple Sprints and Projects

- Longitudinal Study: Conduct a longitudinal study spanning multiple sprints and projects to validate the current findings on a larger scale.
- Cross-Team Analysis: Extend the research to include various Agile teams within the organization to assess the generalizability of the results.

Advanced Statistical Methods

- Machine Learning Models: Utilize machine learning algorithms to predict effort estimates based on historical data.
- Sensitivity Analysis: Perform sensitivity analysis to understand how different variables impact the accuracy of calculations.

Tool Development

- Automated Estimation Tool: Develop a tool that automates the estimation process by incorporating the statistical methods validated in this project.
- Integration with Existing Tools: Work on integrating the developed methods with existing project management software.

Skill Development and Training

- Training Programs: Implement training programs focused on advanced statistical analysis and risk management.
- Certification: Encourage team members to obtain certificates in Agile estimation techniques.

Risk Management

- Risk Assessment Framework: Develop a comprehensive risk assessment

framework incorporating the statistical metrics analyzed in this project.

- Proactive Monitoring: Implement real-time monitoring systems to track variance and other risk indicators.

User Experience and Stakeholder Involvement

- Feedback Loops: Establish feedback loops with stakeholders to refine the estimation process continuously.
- Client-Side Tools: Develop client-side tools that allow stakeholders to track the progress and accuracy of estimates in real-time.

Documentation and Knowledge Sharing

- Case Studies: Publish case studies to share the findings and best practices with the broader Agile community.
- Webinars and Workshops: Conduct webinars and workshops to disseminate the knowledge gained from this project.

By pursuing these avenues for future work, the project aims to contribute significantly to the field of Agile development, particularly in the realm of effort estimation and project planning.

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Chapter 10 – Appendix

10.1 Appendix A

Below are the details of the sprints for calculating the WECOFE estimations. The complete dataset is stored in Google Drive and can be accessed upon request: https://drive.google.com/drive/u/0/folders/17Pgq1fr7TDkgGyDDK9toLNd5K4_clPl9

For each sprint, the Project level and Story level Factors are different based on the project and resource capability. Table 12 represents the Organization 1 projects,

Table 12 – Organization 1 Project Details

Organization	Organization - 1
Project Name	Victorious
Industry	Core Banking
Sprint Cycle	2 Weeks
Project Duration	2 Months
Start Date	Aug-20 to Sept-20
Total Sprints	4
Technologies Used	Java, J2EE, Spring Boot, Tomcat
Architecture	Microservices

Victorious Project

Project Name	Victorious Sprint 1	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Low	1.2
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Victorious Sprint 1

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Victorious-6093	Business Logic + Rest Services	Low	Moderate	High	6	1	5	6.00	6.00	0.17	0.00
Victorious-6094	Business Logic + External Integration	Low	Moderate	Moderate	6	1.2	5	8.00	7.00	0.29	-0.14
Victorious-6095	External Integration	Low	Low	Moderate	3	1	3	3.00	3.00	0.00	0.00
Victorious-6096	Business Logic	Low	Low	Moderate	3	1	3	3.00	3.00	0.00	0.00
Victorious-6085	External Integration	Low	Low	Moderate	3	1	3	3.00	3.00	0.00	0.00
Victorious-6086	Business Logic	Low	Moderate	Moderate	3	1.2	3	4.00	4.00	0.25	0.00
Victorious-6087	External Integration	Low	Moderate	Moderate	3	1.2	3	4.00	4.00	0.25	0.00
Victorious-6088	Business Logic + Rest Services	Low	Low	Moderate	6	1	5	6.00	6.00	0.17	0.00
Victorious-6089	Business Logic	Low	Low	Moderate	3	1	3	3.00	3.00	0.00	0.00
Victorious-6090	Business Logic + External Integration	Low	Low	Moderate	6	1	5	6.00	7.00	0.29	0.14
Victorious-6091	Business Logic	Moderate	Moderate	Moderate	3	1.3	3	4.00	4.00	0.25	0.00
Victorious-6092	Business Logic	Low	Low	Moderate	3	1	2	3.00	3.00	0.33	0.00

Project Name	Victorious Sprint 2	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Victorious Sprint 2

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Victorious-6057	Business Logic + Rest Services	Low	Low	Moderate	6	0.9	5	6	6	0.17	0.00
Victorious-6058	UI + Business Logic	Moderate	High	High	5	1.2	5	6	6	0.17	0.00
Victorious-6063	Business Logic	Low	Low	High	3	0.7	3	3	4	0.25	0.25
Victorious-6064	Business Logic	Low	Low	High	3	0.7	3	3	3	0.00	0.00
Victorious-6065	Business Logic	Low	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Victorious-6066	Business Logic	Moderate	Moderate	Moderate	3	1.2	3	4	4	0.25	0.00
Victorious-6067	Business Logic	Moderate	Moderate	Moderate	3	1.2	3	4	4	0.25	0.00
Victorious-6068	Business Logic	Moderate	Moderate	High	3	1	3	3	3	0.00	0.00
Victorious-6069	Rest Service	Moderate	Low	Moderate	3	1	2	3	3	0.33	0.00
Victorious-6070	External Integration	Moderate	Moderate	Moderate	3	1.2	5	4	5	0.00	0.20
Victorious-6071	External Integration	Moderate	Moderate	Moderate	3	1.2	3	4	4	0.25	0.00
Victorious-6072	External Integration	Low	Low	Moderate	3	0.9	3	3	3	0.00	0.00
Victorious-6073	External Integration	Low	Low	High	3	0.7	3	3	3	0.00	0.00
Victorious-6074	External Integration	Low	Low	Moderate	3	0.9	3	3	3	0.00	0.00
Victorious-6075	External Integration	Moderate	Moderate	Moderate	3	1.2	3	4	4	0.25	0.00
Victorious-6076	External Integration	Moderate	Moderate	Moderate	3	1.2	3	4	4	0.25	0.00
Victorious-6077	Business Logic + External Integration	Low	Low	Moderate	6	0.9	5	6	6	0.17	0.00
Victorious-6078	Business Logic + External Integration	Low	Low	Moderate	6	0.9	5	6	6	0.17	0.00
Victorious-6079	Business Logic +	Low	Low	Moderate	5	0.9	5	5	5	0.00	0.00

	DAO										
Victorious-6080	Business Logic + DAO	Low	Low	Moderate	5	0.9	5	5	5	0.00	0.00
Victorious-6081	Business Logic + DAO	Low	Low	Moderate	5	0.9	2	5	5	0.60	0.00
Victorious-6082	Business Logic + Rest Services	Low	Low	High	6	0.7	3	5	5	0.40	0.00
Victorious-6083	External Integration	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Victorious-6084	External Integration	Low	Low	Moderate	3	0.9	3	3	3	0.00	0.00
Victorious-6085	UI + Business Logic + DAO	Low	Low	Moderate	7	0.9	8	7	8	0.00	0.13
Victorious-6086	External Integration	Low	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Victorious-6087	External Integration	Low	Moderate	Moderate	3	1.1	2	4	4	0.50	0.00
Victorious-6088	External Integration	Low	Low	Moderate	3	0.9	3	3	3	0.00	0.00
Victorious-6089	Business Logic + External Integration	Moderate	Low	Moderate	6	1	5	6	6	0.17	0.00
Victorious-6090	Business Logic + Rest Services	Low	Low	Moderate	6	0.9	5	6	6	0.17	0.00
Victorious-6091	External Integration	Low	Low	High	3	0.7	2	3	3	0.33	0.00
Victorious-6092	Business Logic	Moderate	High	High	3	1.2	5	4	4	-0.25	0.00
Victorious-6093	External Integration	Moderate	Moderate	High	3	1	2	3	3	0.33	0.00
Victorious-6094	External Integration	Moderate	Low	Moderate	3	1	2	3	3	0.33	0.00
Victorious-6095	External Integration	Moderate	Low	High	3	0.8	3	3	3	0.00	0.00
Victorious-6096	External Integration	Low	Low	Moderate	3	0.9	3	3	4	0.25	0.25

Project Name	Victorious Sprint 3 to Victorious Sprint 4	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Victorious Sprint 3

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Victorious-6017	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
Victorious-6018	UI + Business Logic	Moderate	High	High	5	1.1	5	6	6	0.17	0.00
Victorious-6019	UI + Business Logic	Low	Low	Moderate	5	0.8	3	4	4	0.25	0.00
Victorious-6020	Business Logic + Rest Services	High	High	High	6	1.2	5	8	8	0.38	0.00
Victorious-6023	Business Logic	High	High	Moderate	3	1.4	5	5	5	0.00	0.00
Victorious-6024	Business Logic	Moderate	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
Victorious-6057	Business Logic	Moderate	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
Victorious-6058	Business Logic	Low	Moderate	High	3	0.8	2	3	3	0.33	0.00
Victorious-6059	Rest Service	Moderate	Low	Moderate	3	0.9	3	3	3	0.00	0.00
Victorious-6060	UI + Business Logic	Moderate	Moderate	High	5	0.9	3	5	5	0.40	0.00
Victorious-6061	External Integration	Moderate	Moderate	Moderate	3	1.1	2	4	4	0.50	0.00
Victorious-6062	External Integration	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
Victorious-6063	External Integration	Moderate	Moderate	High	3	0.9	3	3	3	0.00	0.00
Victorious-6064	External Integration	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00
Victorious-6065	External Integration	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Victorious-6066	External Integration	Moderate	High	Moderate	3	1.3	3	4	5	0.40	0.20
Victorious-6067	Business Logic + External Integration	Low	Low	Moderate	6	0.8	3	5	5	0.40	0.00
Victorious-6068	Business Logic + External Integration	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
Victorious-6069	UI + Business Logic	Low	Moderate	High	5	0.8	5	4	5	0.00	0.20
Victorious-6070	UI + Business Logic	Low	Moderate	Moderate	5	1	5	5	5	0.00	0.00
Victorious-6071	UI + Business Logic	Moderate	High	High	5	1.1	5	6	6	0.17	0.00
Victorious-6072	UI + Business	Low	Low	Moderate	5	0.8	3	4	4	0.25	0.00

	Logic										
Victorious-6073	Business Logic + Rest Services	High	High	High	6	1.2	5	8	8	0.38	0.00
Victorious-6074	Business Logic	High	High	Moderate	3	1.4	5	5	5	0.00	0.00
Victorious-6075	Business Logic	Moderate	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
Victorious-6076	Business Logic	Moderate	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
Victorious-6077	Business Logic	Low	Moderate	High	3	0.8	2	3	3	0.33	0.00
Victorious-6078	Rest Service	Moderate	Low	Moderate	3	0.9	3	3	3	0.00	0.00
Victorious-6079	UI + Business Logic	Moderate	Moderate	High	5	0.9	3	5	5	0.40	0.00
Victorious-6080	External Integration	Moderate	Moderate	Moderate	3	1.1	2	4	4	0.50	0.00
Victorious-6081	External Integration	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
Victorious-6082	External Integration	Moderate	Moderate	High	3	0.9	3	3	3	0.00	0.00
Victorious-6083	External Integration	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00
Victorious-6084	External Integration	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Victorious-6085	External Integration	Moderate	High	Moderate	3	1.3	3	4	5	0.40	0.20
Victorious-6086	Business Logic + External Integration	Low	Low	Moderate	6	0.8	3	5	5	0.40	0.00
Victorious-6087	Business Logic + External Integration	Low	Moderate	Moderate	6	1	3	6	6	0.50	0.00
Victorious-6088	UI + Business Logic	Low	Moderate	High	5	0.8	5	4	5	0.00	0.20
Victorious-6089	UI + Business Logic	Low	Moderate	Moderate	5	1	3	5	5	0.40	0.00
Victorious-6090	External Integration	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Victorious-6091	External Integration	Moderate	High	Moderate	3	1.3	3	4	5	0.40	0.20
Victorious-6092	Business Logic + External Integration	Low	Low	Moderate	6	0.8	3	5	5	0.40	0.00
Victorious-6093	Business Logic + External	Low	Moderate	Moderate	6	1	3	6	6	0.50	0.00

	Integration										
Victorious-6094	UI + Business Logic	Low	Moderate	High	5	0.8	5	4	5	0.00	0.20
Victorious-6095	UI + Business Logic	Low	Moderate	Moderate	5	1	3	5	5	0.40	0.00
Victorious-6096	UI + Business Logic	Low	Moderate	Moderate	5	1	4	5	5	0.20	0.00

Victorious Sprint 4

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Victorious-6352	UI + Business Logic	Low	Low	Moderate	5	0.8	3	4	4	0.25	0.00
Victorious-6354	Business Logic + Rest Services	Low	Moderate	High	6	0.8	5	5	6	0.17	0.17
Victorious-6639	UI + Business Logic	Low	Low	Low	5	1	5	5	4	-0.25	-0.25
Victorious-6646	Business Logic + DAO	Low	Low	Moderate	5	0.8	3	4	4	0.25	0.00
Victorious-6717	Business Logic	High	High	Moderate	3	1.4	5	5	5	0.00	0.00
Victorious-7031	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Victorious-7037	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00

Squirtle Project

Organization	Organization - 1
Project Name	Squirtle
Industry	Core Banking
Sprint Cycle	3 Weeks
Project Duration	4 Months
Start Date	Dec-18 to Apr-21
Total Sprints	4
Technologies Used	Java, J2EE, Spring Boot, Tomcat
Architecture	Microservices

Project Name	Squirtle Sprint 1 to Squirtle Sprint 4	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Squirtle Sprint 1

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Squirtle-148	Business Logic + Rest Services	Low	Moderate	High	6	0.9	5	6	6	0.17	0.00
Squirtle-149	Business Logic + External Integration	Low	Moderate	Moderate	6	1.1	4	7	7	0.43	0.00

Squirtle-150	External Integration	Moderate	Moderate	Moderate	3	1.2	3	4	4	0.25	0.00
Squirtle-151	Business Logic	Low	Low	Moderate	3	0.9	3	3	3	0.00	0.00
Squirtle-152	External Integration	Moderate	Low	Moderate	3	1	3	3	3	0.00	0.00
Squirtle-153	Business Logic	Low	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Squirtle-154	External Integration	Low	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Squirtle-155	Business Logic + Rest Services	Moderate	Moderate	High	6	1	5	6	6	0.17	0.00
Squirtle-156	Business Logic	Moderate	Low	Moderate	3	1	3	3	3	0.00	0.00
Squirtle-157	Business Logic + External Integration	Low	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00
Squirtle-158	Business Logic	Moderate	Moderate	Moderate	3	1.2	3	4	4	0.25	0.00
Squirtle-159	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Squirtle-160	UI + Business Logic + DAO	High	Moderate	High	7	1.1	9	8	9	0.00	0.11
Squirtle-207	Rest Service	Low	Moderate	Moderate	3	1.1	2	4	3	0.33	-0.33
Squirtle-232	Business Logic + DAO	Low	Moderate	Moderate	5	1.1	5	6	6	0.17	0.00
Squirtle-233	Business Logic + External Integration	Low	Low	Moderate	6	0.9	4	6	5	0.20	-0.20

Squirtle Sprint 2

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Squirtle-148	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
Squirtle-149	UI + Business Logic	Moderate	High	High	5	1.1	5	6	6	0.17	0.00
Squirtle-150	UI + Business Logic	Low	Low	Moderate	5	0.8	3	4	4	0.25	0.00
Squirtle-151	Business Logic + Rest Services	Low	Low	High	6	0.6	3	4	4	0.25	0.00
Squirtle-152	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
Squirtle-153	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Squirtle-154	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Squirtle-156	Business Logic	Moderate	Moderate	High	3	0.9	3	3	3	0.00	0.00
Squirtle-159	Rest Service	Moderate	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Squirtle-203	UI + Business Logic	Moderate	Moderate	High	5	0.9	4	5	5	0.20	0.00

Squirtle-208	External Integration	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Squirtle-209	External Integration	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Squirtle-212	External Integration	High	Moderate	High	3	1	3	3	3	0.00	0.00
Squirtle-213	External Integration	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
Squirtle-214	External Integration	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Squirtle-217	External Integration	Moderate	Moderate	Moderate	3	1.1	3	4	5	0.40	0.20
Squirtle-233	Business Logic + External Integration	Low	Moderate	Moderate	6	1	4	6	6	0.33	0.00
Squirtle-234	Business Logic + External Integration	Low	Moderate	Moderate	6	1	4	6	6	0.33	0.00
Squirtle-247	UI + Business Logic	Low	Moderate	Moderate	5	1	4	5	5	0.20	0.00
Squirtle-248	UI + Business Logic	Low	Moderate	Moderate	5	1	4	5	5	0.20	0.00
Squirtle-256	UI + Business Logic	Low	Moderate	Moderate	5	1	2	5	5	0.60	0.00
Squirtle-155	Business Logic + Rest Services	Low	Moderate	High	6	0.8	3	5	5	0.40	0.00
Squirtle-157	External Integration	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Squirtle-158	External Integration	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
Squirtle-160	UI + Business Logic + DAO	Moderate	Moderate	Moderate	7	1.1	9	8	8	-0.13	0.00
Squirtle-161	External Integration	Moderate	Moderate	Moderate	3	1.1	4	4	5	0.20	0.20
Squirtle-162	External Integration	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Squirtle-163	External Integration	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
Squirtle-164	Business Logic + External Integration	Moderate	Low	Moderate	6	0.9	4	6	6	0.33	0.00

Squirtle-165	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	4	6	6	0.33	0.00
Squirtle-207	External Integration	Low	High	High	3	1	2	3	3	0.33	0.00
Squirtle-210	Business Logic	Moderate	High	High	3	1.1	4	4	4	0.00	0.00
Squirtle-211	External Integration	Moderate	Moderate	High	3	0.9	2	3	3	0.33	0.00
Squirtle-215	External Integration	Moderate	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Squirtle-216	External Integration	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
Squirtle-218	External Integration	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Squirtle-219	UI + Business Logic	Low	Moderate	High	5	0.8	4	4	4	0.00	0.00
Squirtle-220	UI + Business Logic	Low	Moderate	Moderate	5	1	4	5	5	0.20	0.00
Squirtle-221	Rest Service	Low	Moderate	Moderate	3	1	4	3	4	0.00	0.25
Squirtle-222	UI + Business Logic	Low	Moderate	Moderate	5	1	5	5	5	0.00	0.00
Squirtle-223	UI + Business Logic	Low	Moderate	Moderate	5	1	3	5	4	0.25	-0.25
Squirtle-224	UI + Business Logic	Low	Moderate	Moderate	5	1	3	5	5	0.40	0.00
Squirtle-225	UI + Business Logic	Low	Moderate	High	5	0.8	3	4	4	0.25	0.00
Squirtle-232	External Integration	Low	Moderate	High	3	0.8	3	3	3	0.00	0.00
Squirtle-235	External Integration	Moderate	Moderate	High	3	0.9	3	3	3	0.00	0.00
Squirtle-236	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Squirtle-237	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Squirtle-238	Business Logic + External Integration	Low	Moderate	High	6	0.8	4	5	5	0.20	0.00
Squirtle-239	Business Logic + External Integration	Low	High	High	6	1	3	6	6	0.50	0.00
Squirtle-246	External Integration	Low	Moderate	High	3	0.8	2	3	3	0.33	0.00
Squirtle-249	External	Low	High	High	3	1	2	3	3	0.33	0.00

	Integration										

Squirtle Sprint 3

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Squirtle-155	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	4	6	6	0.33	0.00
Squirtle-157	UI + Business Logic	Moderate	High	High	5	1.1	6	6	6	0.00	0.00
Squirtle-158	UI + Business Logic	Low	Low	Moderate	5	0.8	3	4	4	0.25	0.00
Squirtle-160	Business Logic + Rest Services	High	High	High	6	1.2	9	8	8	-0.13	0.00
Squirtle-161	Business Logic	High	High	Moderate	3	1.4	4	5	5	0.20	0.00
Squirtle-164	Business Logic	Moderate	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
Squirtle-165	Business Logic	Moderate	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
Squirtle-172	Business Logic	Low	Moderate	High	3	0.8	2	3	3	0.33	0.00
Squirtle-182	Rest Service	Moderate	Low	Moderate	3	0.9	3	3	3	0.00	0.00
Squirtle-183	UI + Business Logic	Moderate	Moderate	High	5	0.9	3	5	5	0.40	0.00
Squirtle-207	External Integration	Moderate	Moderate	Moderate	3	1.1	2	4	4	0.50	0.00
Squirtle-211	External Integration	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
Squirtle-215	External Integration	Moderate	Moderate	High	3	0.9	3	3	3	0.00	0.00
Squirtle-216	External Integration	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
Squirtle-221	External Integration	Moderate	Moderate	Moderate	3	1.1	4	4	4	0.00	0.00
Squirtle-223	External Integration	Moderate	High	Moderate	3	1.3	3	4	5	0.40	0.20
Squirtle-225	Business Logic + External Integration	Low	Low	Moderate	6	0.8	3	5	5	0.40	0.00
Squirtle-228	Business Logic + External Integration	Low	Moderate	Moderate	6	1	4	6	6	0.33	0.00
Squirtle-232	UI + Business Logic	Low	Moderate	High	5	0.8	5	4	5	0.00	0.20
Squirtle-236	UI + Business Logic	Low	Moderate	Moderate	5	1	5	5	5	0.00	0.00
Squirtle-237	UI + Business	Low	Moderate	Moderate	5	1	4	5	5	0.20	0.00

	Logic										

Squirtle Sprint 4

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Squirtle-162	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	3	5	4	0.25	-0.25
Squirtle-163	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	4	6	6	0.33	0.00
Squirtle-166	UI + Business Logic	Low	Low	Moderate	5	0.8	4	4	4	0.00	0.00
Squirtle-167	Business Logic + DAO	Low	Low	Moderate	5	0.8	3	4	4	0.25	0.00
Squirtle-168	Business Logic	High	High	Moderate	3	1.4	5	5	5	0.00	0.00
Squirtle-169	Business Logic	Moderate	Moderate	Moderate	3	1.1	6	4	4	-0.50	0.00
Squirtle-170	UI + Business Logic	Moderate	Moderate	Moderate	5	1.1	5	6	6	0.17	0.00
Squirtle-173	UI + Business Logic	Low	Moderate	High	5	0.8	4	4	4	0.00	0.00
Squirtle-178	Business Logic	Moderate	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
Squirtle-181	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00
Squirtle-186	UI + Business Logic	Low	Moderate	Moderate	5	1	3	5	5	0.40	0.00
Squirtle-189	UI + Business Logic	Low	Moderate	Moderate	5	1	5	5	5	0.00	0.00
Squirtle-190	External Integration	Moderate	Moderate	High	3	0.9	2	3	3	0.33	0.00
Squirtle-199	External Integration	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
Squirtle-205	External Integration	Moderate	Moderate	Moderate	3	1.1	4	4	4	0.00	0.00
Squirtle-218	Business Logic	Moderate	High	Moderate	3	1.3	4	4	5	0.20	0.20
Squirtle-219	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	4	6	5	0.20	-0.20
Squirtle-220	Business Logic + External Integration	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
Squirtle-222	UI + Business Logic	Low	Moderate	High	5	0.8	4	4	5	0.20	0.20
Squirtle-224	UI + Business Logic	Low	Moderate	Moderate	5	1	6	5	5	-0.20	0.00
Squirtle-226	UI + Business	Low	Moderate	High	5	0.8	3	4	4	0.25	0.00

	Logic										
Squirtle-227	UI + Business Logic	Low	Moderate	Moderate	5	1	3	5	5	0.40	0.00
Squirtle-230	Business Logic	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
Squirtle-235	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Squirtle-238	Business Logic	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
Squirtle-246	Business Logic + DAO	Low	Moderate	Moderate	5	1	6	5	5	-0.20	0.00
Squirtle-249	UI + Business Logic	Low	Moderate	High	5	0.8	4	4	4	0.00	0.00
Squirtle-255	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Squirtle-615	UI + Business Logic + DAO	Low	Moderate	Moderate	7	1	5	7	7	0.29	0.00
Squirtle-2240	UI + Business Logic	Low	Moderate	Moderate	5	1	3	5	5	0.40	0.00
Squirtle-2344	UI+ Business Logic + Rest Services	Low	High	Moderate	8	1.2	5	10	10	0.50	0.00
Squirtle-2344	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	5	0.00	-0.20

Blazer Project

Organization	Organization - 1
Project Name	Blazer
Industry	Core Banking
Sprint Cycle	3 Weeks
Project Duration	2 Months
Start Date	Apr-20 to May-20
Total Sprints	2
Technologies Used	Java, J2EE, Tomcat
Architecture	Single Page Application (SPA)

Project Name	Blazer Sprint 6	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Blazer Sprint 6

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Blazer-18661	Business Logic	Low	Low	Moderate	3	0.9	1	3	3	0.67	0.00
Blazer-18678	Business Logic	Low	Moderate	Moderate	3	1.1	2	4	4	0.50	0.00
Blazer-18836	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Blazer-19012	UI + Business Logic	Moderate	Moderate	Moderate	5	1.2	5	6	6	0.17	0.00
Blazer-19027	External	Low	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00

	Integration										
Blazer-19077	Business Logic	Low	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
Blazer-19102	External Integration	Low	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Blazer-26558	Business Logic	Low	Low	High	3	0.7	1	3	3	0.67	0.00
Blazer-27375	Business Logic	Moderate	Low	Moderate	3	1	3	3	3	0.00	0.00
Blazer-27419	Business Logic + External Integration	Low	Moderate	Moderate	6	1.1	5	7	6	0.17	-0.17
Blazer-27420	External Integration	Low	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
Blazer-27427	Business Logic	Low	Low	Moderate	3	0.9	5	3	3	-0.67	0.00
Blazer-27870	External Integration	Low	Moderate	High	3	0.9	3	3	3	0.00	0.00
Blazer-27871	External Integration	Low	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Blazer-27873	Business Logic	Low	Low	Moderate	3	0.9	1	3	3	0.67	0.00
Blazer-27886	UI Page	Low	Low	Moderate	2	0.9	2	2	2	0.00	0.00

Project Name	Blazer Sprint 7	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Blazer Sprint 7

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Blazer-18843	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Blazer-19013	Business Logic + DAO	Low	Low	Moderate	5	0.8	3	4	4	0.25	0.00
Blazer-19014	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Blazer-19015	UI + Business Logic	Moderate	Moderate	Moderate	5	1.1	8	6	6	-0.33	0.00
Blazer-19016	Business Logic + External Integration	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
Blazer-19017	Business Logic	Moderate	Moderate	Moderate	3	1.1	8	4	4	-1.00	0.00
Blazer-19028	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
Blazer-19030	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Blazer-19032	Business Logic	Moderate	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Blazer-19033	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00

Blazer-19034	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Blazer-19035	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Blazer-19036	Business Logic	Low	Moderate	High	3	0.8	2	3	3	0.33	0.00
Blazer-19037	Business Logic	Low	Moderate	Low	3	1.2	2	4	4	0.50	0.00
Blazer-19038	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Blazer-19039	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Blazer-19041	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Blazer-19042	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Blazer-19043	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Blazer-19044	Business Logic	Low	Moderate	Moderate	3	1	2	3	2	0.00	-0.50
Blazer-19046	Business Logic	Low	Moderate	Moderate	3	1	1	3	3	0.67	0.00
Blazer-19047	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Blazer-19048	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
Blazer-19049	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Blazer-19080	Business Logic + DAO	Low	Moderate	Moderate	5	1	3	5	4	0.25	-0.25
Blazer-19644	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Blazer-26475	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Blazer-26622	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	8	0.00	0.13
Blazer-27685	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Blazer-27687	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00

Fireballs Project

Organization	Organization - 1
Project Name	Fireballs
Industry	Core Banking
Sprint Cycle	2 Weeks
Project Duration	3 Months
Start Date	Sept-19 to Dec-19
Total Sprints	6
Technologies Used	Java, J2EE, Tomcat
Architecture	N-Tier application

Project Name	Fireballs Sprint 1 to Fireballs Sprint 2	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Fireballs Sprint 1

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Fireballs-19397	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19398	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00

Fireballs-19399	Business Logic	Moderate	Low	High	3	0.8	2	3	3	0.33	0.00
Fireballs-19400	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19401	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19402	Business Logic	Moderate	Low	High	3	0.8	2	3	3	0.33	0.00
Fireballs-19403	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19404	Business Logic	Low	Low	Moderate	3	1.2	2	3	3	0.33	0.00
Fireballs-19405	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19406	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19407	Business Logic	Moderate	Low	High	3	0.8	2	3	3	0.33	0.00
Fireballs-19408	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19409	Business Logic	Moderate	Moderate	Moderate	3	1.2	2	4	3	0.33	-0.33
Fireballs-19410	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19411	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19412	Business Logic	Moderate	Low	High	3	0.8	2	3	3	0.33	0.00
Fireballs-19413	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19414	Business Logic	Moderate	Moderate	Moderate	3	1.2	2	4	4	0.50	0.00
Fireballs-19415	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19416	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19417	Business Logic	Moderate	Low	High	3	0.8	2	3	3	0.33	0.00
Fireballs-19418	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19419	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19420	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19421	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19422	Business Logic	Moderate	Low	High	3	0.8	2	3	3	0.33	0.00
Fireballs-19423	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19424	Business Logic	Moderate	Low	Moderate	3	1	2	3	2	0.00	-0.50
Fireballs-19425	UI Page	Low	Low	Moderate	3	0.9	2	2	1	-1.00	-1.00
Fireballs-19426	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19427	Business Logic	Moderate	Low	High	3	0.8	2	3	3	0.33	0.00
Fireballs-19432	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19433	Business Logic	Moderate	Moderate	Moderate	3	1.2	2	4	4	0.50	0.00
Fireballs-19434	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19435	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19436	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
IGIINDIA-19437	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19438	Business Logic	Low	Low	Moderate	3	1.1	2	3	3	0.33	0.00
Fireballs-19439	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19440	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19441	Business Logic	Moderate	Low	High	3	0.8	2	3	3	0.33	0.00
Fireballs-19442	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00

Fireballs-19468	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19471	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19860	Business Logic	Low	Low	Moderate	3	0.9	2	3	2	0.00	-0.50

Fireballs Sprint 2

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Fireballs-19443	Business Logic	Low	Low	Moderate	3	0.9	3	3	3	0.00	0.00
Fireballs-19444	Business Logic	Low	Low	Moderate	3	0.9	3	3	4	0.25	0.25
Fireballs-19445	DB Changes	Low	Moderate	Moderate	1	1.1	2	2	2	0.00	0.00
Fireballs-19447	Business Logic	Low	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
Fireballs-19448	Business Logic	Low	Low	Moderate	3	0.9	3	3	3	0.00	0.00
Fireballs-19449	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19450	Business Logic	Low	Low	Moderate	3	0.9	5	3	3	-0.67	0.00
Fireballs-19451	DB Changes	Low	Low	Moderate	1	0.9	3	1	1	-2.00	0.00
Fireballs-19452	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Fireballs-19453	Business Logic	Low	Low	Moderate	3	0.9	3	3	2	-0.50	-0.50
Fireballs-19454	DB Changes	Low	Moderate	Moderate	1	1.1	3	2	2	-0.50	0.00
Fireballs-19455	DB Changes	Low	Low	Moderate	1	0.9	2	1	1	-1.00	0.00
Fireballs-19456	Business Logic	Moderate	Moderate	Moderate	3	1.2	5	4	4	-0.25	0.00
Fireballs-19457	UI Page	Low	Moderate	Moderate	2	1.1	3	3	2	-0.50	-0.50
Fireballs-19458	UI Page	Low	Low	Moderate	2	0.9	2	2	2	0.00	0.00
Fireballs-19459	UI + Business Logic	Low	Low	Moderate	5	0.9	3	5	5	0.40	0.00
Fireballs-19460	UI Page	Low	Moderate	Moderate	2	1.1	3	3	3	0.00	0.00
Fireballs-19461	UI Page	Low	Low	Moderate	2	0.9	2	2	2	0.00	0.00
Fireballs-19462	UI Page	Low	Low	Moderate	2	0.9	3	2	3	0.00	0.33
Fireballs-19469	DB Changes	Low	Low	Moderate	1	0.9	3	1	1	-2.00	0.00
Fireballs-19470	DB Changes	Low	Low	Moderate	1	0.9	2	1	1	-1.00	0.00
Fireballs-19472	Business Logic + DAO	Low	Low	Moderate	5	0.9	3	5	5	0.40	0.00
Fireballs-19861	DB Changes	Low	Moderate	Moderate	1	1.1	3	2	2	-0.50	0.00

Project Name	Fireballs Sprint 3 to Fireballs Sprint 6	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Fireballs Sprint 3

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Fireballs-19446	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-19466	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00

Fireballs-20181	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20182	Rest Service	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Fireballs-20183	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Fireballs-20184	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20185	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20186	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20187	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20701	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20702	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20703	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20706	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20709	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20711	Rest Service	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Fireballs-20717	Rest Service	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Fireballs-20718	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20719	Rest Service	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Fireballs-20720	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20721	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20728	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Fireballs-20729	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Fireballs-20735	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20736	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20751	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Fireballs-20752	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Fireballs-20753	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Fireballs-20876	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Fireballs-20882	Business Logic	Low	Low	Moderate	3	0.8	2	3	2	0.00	-0.50
Fireballs-20885	Business Logic	Low	Low	Moderate	3	0.8	2	3	2	0.00	-0.50
Fireballs-20886	Business Logic	Low	Moderate	Moderate	3	1	2	3	2	0.00	-0.50

Fireballs Sprint 4

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Fireballs-19873	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-19874	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20704	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20705	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20707	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20708	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20710	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20712	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
Fireballs-20713	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00

Fireballs-20714	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
Fireballs-20715	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
Fireballs-20716	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
Fireballs-20722	Business Logic	Low	Low	Moderate	3	0.8	2	3	2	0.00	-0.50
Fireballs-20723	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20724	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20725	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20726	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20727	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
Fireballs-20730	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20733	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20734	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20737	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20738	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20739	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20740	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20741	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20742	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
Fireballs-20743	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20744	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20745	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20746	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20747	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20748	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20749	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20750	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
Fireballs-20754	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
Fireballs-20877	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20879	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-20884	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21339	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21341	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-21342	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21343	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-21344	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21633	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21634	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21635	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21636	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21637	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21638	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00

Fireballs-21640	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
Fireballs-21641	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
Fireballs-21642	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
Fireballs-21643	Business Logic	Low	Moderate	Moderate	3	1	2	3	2	0.00	-0.50
Fireballs-21644	Business Logic	Low	Moderate	Moderate	3	1	2	3	2	0.00	-0.50
Fireballs-21645	Business Logic	Low	Moderate	Moderate	3	1	2	3	2	0.00	-0.50
Fireballs-21646	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21647	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21650	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21651	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21652	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21654	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21655	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21656	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21657	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21658	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21659	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21661	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21662	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21663	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21664	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21666	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-21667	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21668	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21669	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21670	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21671	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-21672	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21673	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21675	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21676	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21677	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21678	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21679	Business Logic	Moderate	Low	Moderate	3	0.9	2	3	2	0.00	-0.50
Fireballs-21680	Business Logic	Low	Low	Moderate	3	0.8	2	3	2	0.00	-0.50
Fireballs-21681	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-21682	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21683	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21684	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21685	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21687	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00

Fireballs-21688	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21689	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21690	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21691	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-21692	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21693	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21694	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21695	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21696	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21697	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-21698	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22130	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22131	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22132	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22183	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22184	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22185	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22186	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22187	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22188	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22189	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22190	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22191	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22192	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22193	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22194	Business Logic	Moderate	Moderate	Moderate	3	1.1	2	4	4	0.50	0.00
Fireballs-22195	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22279	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00

Fireballs Sprint 5

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Fireballs-21639	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-21649	UI Page	Low	Low	Moderate	2	0.8	2	2	3	0.33	0.33
Fireballs-21674	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22232	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22233	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22234	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22235	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22236	UI Page	Low	Low	Moderate	2	0.8	2	2	3	0.33	0.33
Fireballs-22237	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22238	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00

Fireballs-22239	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22240	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22241	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22242	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
Fireballs-22243	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22244	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22245	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22246	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22247	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
Fireballs-22250	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22251	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22252	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22253	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22254	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22255	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22256	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22257	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-22258	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22260	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
Fireballs-22261	UI Page	Low	Low	High	2	0.6	2	2	2	0.00	0.00
Fireballs-22263	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
Fireballs-22264	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
Fireballs-22265	Rest Service	Low	Low	High	3	0.6	2	2	2	0.00	0.00
Fireballs-22266	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22267	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22268	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
Fireballs-22269	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
Fireballs-22270	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22271	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22272	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22273	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
Fireballs-22278	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-23292	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-23293	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-23295	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-23296	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-23297	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-23298	Rest Service	Low	Low	Moderate	3	0.8	2	3	2	0.00	-0.50
Fireballs-23299	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-23300	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-23302	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00

Fireballs-23303	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-23304	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-23305	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-23306	Business Logic	Low	Low	Moderate	3	0.8	2	3	2	0.00	-0.50
Fireballs-23307	Business Logic	Low	Low	Moderate	3	0.8	2	3	2	0.00	-0.50
Fireballs-23308	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
Fireballs-23309	Business Logic	Low	Low	Moderate	3	0.8	2	3	2	0.00	-0.50
Fireballs-23310	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-23315	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00

Fireballs Sprint 6

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Fireballs-19428	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-19429	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-19430	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-20190	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-21686	Business Logic	Low	Low	Moderate	3	0.8	2	3	2	0.00	-0.50
Fireballs-22182	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-22196	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Fireballs-24502	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-24503	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-24506	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-24507	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-24508	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-24509	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-24746	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Fireballs-25183	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00

Trailblazers Project

Organization	Organization - 1
Project Name	Trailblazers
Industry	Core Banking
Sprint Cycle	2 Weeks
Project Duration	1 Months
Start Date	Apr-20 to may-20
Total Sprints	2
Technologies Used	Java, J2EE, Tomcat
Architecture	Single Page Application (SPA)

Project Name	Trailblazers Sprint 7	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Trailblazers Sprint 7

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W

Trailblazers-1900	Business Logic + Rest Services	Low	Low	Moderate	6	0.9	13	6	6	-1.17	0.00
Trailblazers-1904	Business Logic + Rest Services	Low	Moderate	Moderate	6	1.1	13	7	7	-0.86	0.00
Trailblazers-1908	Business Logic + Rest Services	Low	Low	Moderate	6	0.9	13	6	6	-1.17	0.00
Trailblazers-1910	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.2	8	8	9	0.11	0.11
Trailblazers-1914	Business Logic + Rest Services	Low	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
Trailblazers-1915	Business Logic + Rest Services	Low	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00

Project Name	Trailblazers Sprint 8	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Trailblazers Sprint 8

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Trailblazers-1904	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	13	5	5	-1.60	0.00
Trailblazers-1900	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	13	5	5	-1.60	0.00
Trailblazers-1908	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	13	5	6	-1.17	0.17
Trailblazers-1910	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
Trailblazers-1914	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
Trailblazers-1915	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00

Charged Project

Organization	Organization - 1
Project Name	Charged
Industry	Core Banking
Sprint Cycle	2 Weeks
Project Duration	1 Months
Start Date	Oct-20 to Nov-20
Total Sprints	2
Technologies Used	Java, J2EE, Tomcat
Architecture	Single Page Application (SPA)

Project Name	Charged Sprint 22 to Charged Sprint 23	

Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Charged Sprint 22

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
CHARGED-1716	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00
CHARGED-1718	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00
CHARGED-1722	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00
CHARGED-1723	Business Logic + Rest Services	Moderate	High	Moderate	6	1.3	5	8	9	0.44	0.11
CHARGED-2013	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
CHARGED-2187	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00
CHARGED-2190	Business Logic + Rest Services	Moderate	Low	Moderate	6	0.9	8	6	6	-0.33	0.00
CHARGED-2191	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00
CHARGED-2192	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	3	7	7	0.57	0.00
CHARGED-2193	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	3	7	7	0.57	0.00

Charged Sprint 23

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
CHARGED-1716	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00
CHARGED-1718	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00
CHARGED-1722	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00
CHARGED-1723	Business Logic + Rest Services	Moderate	High	Low	6	1.5	5	9	8	0.38	-0.13
CHARGED-2013	Business Logic + Rest Services	Moderate	Moderate	High	6	0.9	8	6	7	-0.14	0.14
CHARGED-2187	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00

CHARGED-2190	Business Logic + Rest Services	Moderate	Low	Moderate	6	0.9	8	6	6	-0.33	0.00
CHARGED-2191	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00
CHARGED-2192	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00
CHARGED-2193	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	3	7	7	0.57	0.00

TITAN Project

Organization	Organization - 1
Project Name	TITAN
Industry	Core Banking
Sprint Cycle	2 Weeks
Project Duration	10 Months
Start Date	Dec-19 to Jan-21
Total Sprints	20
Technologies Used	Java, J2EE, JMS, Tomcat
Architecture	N-Tier Application

Project Name	TITAN 1 to TITAN 2	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Low	1.2
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

TITAN 1

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-53980	UI Page	Low	Moderate	Moderate	2	1.2	3	3	3	0.00	0.00
TITAN-IN-53981	UI Page	Low	Moderate	Moderate	2	1.2	3	3	3	0.00	0.00
TITAN-IN-53985	UI + Business Logic	Low	Moderate	Moderate	5	1.2	3	6	6	0.50	0.00
TITAN-IN-53983	UI Page	Low	Moderate	Moderate	2	1.2	3	3	3	0.00	0.00
TITAN-IN-54038	Business Logic	Low	Low	Moderate	3	1	4	3	3	-0.33	0.00
TITAN-IN-54069	Business Logic	Low	Low	Moderate	3	1	4	3	3	-0.33	0.00
TITAN-IN-54070	Business Logic	Low	Low	Moderate	3	1	4	3	3	-0.33	0.00
TITAN-IN-54583	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54584	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54585	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54586	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54587	Business Logic	Low	Moderate	Moderate	3	1.2	3	4	4	0.25	0.00
TITAN-IN-54588	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54591	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54593	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54594	Business Logic	Low	Moderate	Moderate	3	1.2	3	4	3	0.00	-0.33

TITAN-IN-54595	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54597	Business Logic	Low	Low	Moderate	3	1	3	3	4	0.25	0.25
TITAN-IN-54598	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54599	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54300	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54301	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54588	Business Logic	Low	Moderate	Moderate	3	1.2	3	4	4	0.25	0.00
TITAN-IN-54589	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54590	Business Logic	Moderate	Moderate	Moderate	3	1.3	3	4	4	0.25	0.00

TITAN 2

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-53981	UI Page	Low	Low	Moderate	2	1	3	2	2	-0.50	0.00
TITAN-IN-53985	UI Page	Low	Low	Moderate	2	1	3	2	2	-0.50	0.00
TITAN-IN-53983	UI Page	Low	Low	Moderate	2	1	4	2	2	-1.00	0.00
TITAN-IN-54038	Business Logic	Low	Moderate	Moderate	3	1.2	1	4	4	0.75	0.00
TITAN-IN-54069	Business Logic	Low	Moderate	Moderate	3	1.2	1	4	5	0.80	0.20
TITAN-IN-54070	Business Logic	Low	Moderate	Moderate	3	1.2	1	4	4	0.75	0.00
TITAN-IN-54074	UI Page	Low	Low	Moderate	2	1	1	2	2	0.50	0.00
TITAN-IN-54583	UI Page	Moderate	Moderate	Moderate	2	1.3	1	3	3	0.67	0.00
TITAN-IN-54584	UI Page	Moderate	High	Moderate	2	1.5	1	3	3	0.67	0.00
TITAN-IN-54585	UI Page	Low	Moderate	Moderate	2	1.2	1	3	3	0.67	0.00
TITAN-IN-54586	Business Logic	Low	Moderate	Moderate	3	1.2	2	4	4	0.50	0.00
TITAN-IN-54587	UI Page	Low	Moderate	Moderate	2	1.2	1	3	4	0.75	0.25
TITAN-IN-54588	Business Logic	Low	Low	Moderate	3	1	4	3	3	-0.33	0.00
TITAN-IN-54591	Business Logic	Low	Low	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-54593	Business Logic	Low	Moderate	Moderate	3	1.2	4	4	4	0.00	0.00
TITAN-IN-54594	UI Page	Low	Low	Moderate	2	1	4	2	1	-3.00	-1.00
TITAN-IN-54595	UI Page	Low	Low	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-54597	UI Page	Moderate	Low	Moderate	2	1.1	4	3	3	-0.33	0.00
TITAN-IN-54598	Business Logic	Low	Moderate	Moderate	3	1.2	4	4	4	0.00	0.00
TITAN-IN-54599	Business Logic	Low	Low	Moderate	3	1	3	3	4	0.25	0.25
TITAN-IN-54300	Business Logic	Low	Low	Moderate	3	1	4	3	3	-0.33	0.00
TITAN-IN-54301	UI Page	Low	Moderate	Moderate	2	1.2	3	3	3	0.00	0.00
TITAN-IN-54305	UI Page	Low	Moderate	Moderate	2	1.2	1	3	3	0.67	0.00
TITAN-IN-54303	UI Page	Low	Low	Moderate	2	1	1	2	2	0.50	0.00
TITAN-IN-54304	UI Page	Low	Low	Moderate	2	1	1	2	2	0.50	0.00
TITAN-IN-54305	UI Page	Low	Moderate	Moderate	2	1.2	1	3	3	0.67	0.00
TITAN-IN-54306	UI Page	Low	Low	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-54307	UI Page	Low	Low	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-54588	UI Page	Low	Low	Moderate	2	1	4	2	2	-1.00	0.00

TITAN-IN-54589	UI Page	Low	Low	Moderate	2	1	1	2	2	0.50	0.00
TITAN-IN-54590	Business Logic	Low	Moderate	Moderate	3	1.2	2	4	4	0.50	0.00
TITAN-IN-54595	Business Logic	Low	Low	Moderate	3	1	2	3	3	0.33	0.00
TITAN-IN-53980	Business Logic	Low	Low	Moderate	3	1	2	3	3	0.33	0.00

Project Name	TITAN 3 to TITAN 20	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

TITAN 3

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-55465	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55466	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55468	UI Page	Low	Low	Moderate	2	0.8	3	2	2	-0.50	0.00
TITAN-IN-55513	UI Page	Low	Low	Moderate	2	0.8	1.5	2	2	0.25	0.00
TITAN-IN-55514	Business Logic	Low	Low	Moderate	3	0.8	1.5	3	3	0.50	0.00
TITAN-IN-55515	Business Logic	Low	Low	Moderate	3	0.8	1.5	3	3	0.50	0.00
TITAN-IN-55516	Business Logic	Low	Low	Moderate	3	0.8	1.5	3	3	0.50	0.00
TITAN-IN-55517	Business Logic	Low	Low	Moderate	3	0.8	1.5	3	4	0.63	0.25
TITAN-IN-55518	Business Logic	Low	Low	Moderate	3	0.8	1.5	3	3	0.50	0.00
TITAN-IN-55519	Business Logic	Low	Low	Moderate	3	0.8	1.5	3	3	0.50	0.00
TITAN-IN-55550	Business Logic	Low	Low	Moderate	3	0.8	1.5	3	3	0.50	0.00
TITAN-IN-55551	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-55555	Business Logic	Low	Low	High	3	0.6	2	2	3	0.33	0.33
TITAN-IN-55554	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
TITAN-IN-55561	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-55790	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00

TITAN 4

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-55464	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-55467	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55469	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55471	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55474	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55475	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00

TITAN-IN-55510	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-55516	Business Logic	Low	Low	Moderate	3	0.8	1.5	3	4	0.63	0.25
TITAN-IN-55517	Business Logic	Low	Low	Moderate	3	0.8	1.5	3	3	0.50	0.00
TITAN-IN-55519	Business Logic	Low	Low	Moderate	3	0.8	1.5	3	3	0.50	0.00
TITAN-IN-55550	DAO	Low	Low	Moderate	2	0.8	1.5	2	2	0.25	0.00
TITAN-IN-55561	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-55790	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-55580	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55599	UI Page	Low	Low	Moderate	2	0.8	0.5	2	2	0.75	0.00
TITAN-IN-55301	UI Page	Low	Low	Moderate	2	0.8	1.5	2	2	0.25	0.00
TITAN-IN-55305	UI Page	Low	Low	Moderate	2	0.8	0.5	2	2	0.75	0.00
TITAN-IN-55304	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55305	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55306	Business Logic	Low	Low	Moderate	3	0.8	1.5	3	3	0.50	0.00
TITAN-IN-55308	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
TITAN-IN-55310	UI Page	Low	Low	Moderate	2	0.8	1	2	3	0.67	0.33
TITAN-IN-55311	UI Page	Low	Low	Moderate	2	0.8	1.5	2	2	0.25	0.00
TITAN-IN-55315	UI Page	Low	Low	Moderate	2	0.8	0.5	2	2	0.75	0.00
TITAN-IN-55314	UI Page	Low	Low	Moderate	2	0.8	3.5	2	2	-0.75	0.00
TITAN-IN-55477	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
TITAN-IN-55478	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55551	UI Page	Low	Low	Moderate	2	0.8	1.5	2	2	0.25	0.00
TITAN-IN-55555	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-56804	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00

TITAN 5

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-55354	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55337	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55338	UI Page	Low	Low	Moderate	2	0.8	1	2	1	0.00	-1.00
TITAN-IN-55339	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55340	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55341	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55345	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55343	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55344	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55345	UI Page	Low	Low	Moderate	2	0.8	2	2	1	-1.00	-1.00
TITAN-IN-55346	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55347	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55348	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55349	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00

TITAN-IN-55350	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55351	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55355	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55353	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55354	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55355	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55356	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55358	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55360	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55361	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55368	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55370	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55373	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55477	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55551	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55555	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-56804	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55578	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55579	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55580	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55599	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55301	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55305	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55305	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55306	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55308	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55310	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55311	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55315	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55314	Business Logic	Low	Low	Moderate	3	0.8	4	3	3	-0.33	0.00

TITAN 6

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-55354	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55337	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-55338	UI Page	Low	Low	Moderate	2	0.8	1	2	1	0.00	-1.00
TITAN-IN-55339	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55340	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55341	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-55345	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-55373	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00

TITAN-IN-55477	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-55551	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-55555	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-57354	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-57355	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-57356	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-57693	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00

TITAN 7

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-57693	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	6	0.00	0.17
TITAN-IN-57694	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57695	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57696	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57697	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	4	5	5	0.20	0.00
TITAN-IN-57698	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	6	0.00	0.17
TITAN-IN-57699	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57700	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57701	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57705	Business Logic + External Integration	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57703	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	7	5	5	-0.40	0.00
TITAN-IN-57704	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	7	5	5	-0.40	0.00
TITAN-IN-57705	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	8	5	5	-0.60	0.00
TITAN-IN-57706	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	6	0.00	0.17
TITAN-IN-57707	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57708	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00

TITAN-IN-57709	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	6	0.00	0.17
TITAN-IN-57710	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00

TITAN 8

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-57711	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57715	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57713	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57714	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	8	5	5	-0.60	0.00
TITAN-IN-57715	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	8	5	6	-0.33	0.17
TITAN-IN-57717	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57718	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57719	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57750	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57751	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	4	-0.50	-0.25
TITAN-IN-57755	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57753	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57754	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57755	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57756	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-57759	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	5	-0.20	0.00
TITAN-IN-58911	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	8	5	5	-0.60	0.00

TITAN 9

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-57354	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00
TITAN-IN-57355	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	8	5	5	-0.60	0.00
TITAN-IN-57356	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	9	7	7	-0.29	0.00
TITAN-IN-57618	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	10	6	6	-0.67	0.00
TITAN-IN-58578	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	2	6	6	0.67	0.00

TITAN-IN-59164	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	3	5	5	0.40	0.00
TITAN-IN-57716	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00
TITAN-IN-57757	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	6	6	6	0.00	0.00
TITAN-IN-57758	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	6	5	6	0.00	0.17

TITAN 10

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-57893	UI + Business Logic	Low	Moderate	Moderate	5	1	5	5	5	0.00	0.00
TITAN-IN-57896	UI + Business Logic	Low	Low	Moderate	5	0.8	4	4	4	0.00	0.00
TITAN-IN-57897	UI + Business Logic	Low	Low	Moderate	5	0.8	4	4	4	0.00	0.00
TITAN-IN-57899	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-57904	UI + Business Logic	Low	Low	Moderate	5	0.8	4	4	4	0.00	0.00
TITAN-IN-57894	UI + Business Logic	Moderate	Moderate	Moderate	5	1.1	4	6	5	0.20	-0.20
TITAN-IN-57895	UI + Business Logic	Low	Moderate	Moderate	5	1	4	5	5	0.20	0.00
TITAN-IN-57898	UI + Business Logic	Moderate	Moderate	Moderate	5	1.1	5	6	6	0.17	0.00
TITAN-IN-57900	UI + Business Logic	Low	Low	Moderate	5	0.8	4	4	4	0.00	0.00
TITAN-IN-57901	UI + Business Logic	Low	Low	Moderate	5	0.8	3	4	4	0.25	0.00
TITAN-IN-57905	UI + Business Logic	Moderate	Moderate	Moderate	5	1.1	3	6	6	0.50	0.00
TITAN-IN-57903	UI + Business Logic	Low	Moderate	Moderate	5	1	4	5	5	0.20	0.00
TITAN-IN-57905	UI + Business Logic	Low	Low	Moderate	5	0.8	3	4	4	0.25	0.00
TITAN-IN-57906	UI + Business Logic	Low	Low	Moderate	5	0.8	5	4	4	-0.25	0.00
TITAN-IN-57907	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-58587	UI + Business Logic	Low	Low	Moderate	5	0.8	5	4	5	0.00	0.20
TITAN-IN-58588	UI + Business	Low	Moderate	Moderate	5	1	5	5	5	0.00	0.00

	Logic										
TITAN-IN-58589	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-59576	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-59577	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-59655	UI + Business Logic	Low	Low	Moderate	5	0.8	9	4	5	-0.80	0.20
TITAN-IN-59885	UI + Business Logic	Moderate	Moderate	Moderate	5	1.1	5	6	6	0.17	0.00

TITAN 11

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-57894	Business Logic + DAO	Low	Low	Moderate	5	0.8	4	4	4	0.00	0.00
TITAN-IN-57895	Business Logic + DAO	Low	Moderate	Moderate	5	1	4	5	5	0.20	0.00
TITAN-IN-57898	Business Logic + DAO	Moderate	Low	Moderate	5	0.9	5	5	5	0.00	0.00
TITAN-IN-57900	Business Logic + DAO	Low	Moderate	Moderate	5	1	4	5	5	0.20	0.00
TITAN-IN-57901	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	3	7	7	0.57	0.00
TITAN-IN-57905	Business Logic	Moderate	Moderate	High	3	0.9	3	3	3	0.00	0.00
TITAN-IN-57903	Business Logic	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
TITAN-IN-57905	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
TITAN-IN-57906	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
TITAN-IN-58587	Business Logic + DAO	Low	Low	Moderate	5	0.8	5	4	4	-0.25	0.00
TITAN-IN-58588	Business Logic + DAO	Low	Moderate	Moderate	5	1	5	5	5	0.00	0.00
TITAN-IN-59576	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-59577	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	2	7	6	0.67	-0.17
TITAN-IN-59885	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00

TITAN 12

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-57907	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-59655	UI + Business Logic + DAO	Low	Moderate	Moderate	7	1	9	7	8	-0.13	0.13

TITAN 13

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W

TITAN-IN-59657	Business Logic + Rest Services + External Integration	Low	Moderate	Moderate	9	1	12	9	9	-0.33	0.00
TITAN-IN-59658	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-59659	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-59630	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
TITAN-IN-59634	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
TITAN-IN-59635	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00
TITAN-IN-30448	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
TITAN-IN-30961	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	4	7	7	0.43	0.00
TITAN-IN-31439	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	1	6	7	0.86	0.14
TITAN-IN-31440	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	1	6	6	0.83	0.00
TITAN-IN-31441	UI Page	Low	Moderate	Moderate	2	1	1	2	2	0.50	0.00
TITAN-IN-31445	UI Page	Low	Moderate	Moderate	2	1	1	2	2	0.50	0.00
TITAN-IN-31443	UI Page	Low	Moderate	Moderate	2	1	1	2	2	0.50	0.00
TITAN-IN-31444	UI Page	Low	Moderate	Moderate	2	1	1	2	2	0.50	0.00
TITAN-IN-31445	Business Logic	Low	Moderate	Moderate	3	1	1	3	2	0.50	-0.50
TITAN-IN-31446	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
TITAN-IN-31447	Business Logic	Low	Moderate	Moderate	3	1	1	3	3	0.67	0.00
TITAN-IN-31448	Business Logic	Low	Moderate	Moderate	3	1	1	3	3	0.67	0.00
TITAN-IN-31449	Business Logic	Moderate	Moderate	Moderate	3	1.1	1	4	4	0.75	0.00
TITAN-IN-31450	Business Logic	Moderate	Moderate	Moderate	3	1.1	1	4	4	0.75	0.00
TITAN-IN-31451	Business Logic	Moderate	Moderate	Moderate	3	1.1	1	4	4	0.75	0.00
TITAN-IN-31455	Business Logic	Low	Moderate	Moderate	3	1	1	3	3	0.67	0.00
TITAN-IN-31453	Business Logic	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00
TITAN-IN-31454	Business Logic	Low	Moderate	Moderate	3	1	6	3	3	-1.00	0.00
TITAN-IN-31455	Business Logic	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
TITAN-IN-31456	Business Logic + External Integration	Low	Moderate	Moderate	6	1	4	6	6	0.33	0.00
TITAN-IN-31457	Business Logic	Low	Moderate	Moderate	3	1	9	3	3	-2.00	0.00
TITAN-IN-31458	Business Logic	Low	Moderate	Moderate	3	1	7	3	3	-1.33	0.00
TITAN-IN-31459	Administrative Activities	Low	Low	Moderate	1	0.8	5	1	1	-4.00	0.00

TITAN-IN-31460	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	7	6	6	-0.17	0.00
TITAN-IN-31461	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	9	6	6	-0.50	0.00
TITAN-IN-31465	Business Logic + Rest Services + External Integration	Moderate	Moderate	Moderate	9	1.1	6	10	11	0.45	0.09
TITAN-IN-31463	Business Logic	Moderate	Moderate	Moderate	3	1.1	4	4	4	0.00	0.00
TITAN-IN-31464	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	2	7	7	0.71	0.00
TITAN-IN-31465	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
TITAN-IN-31997	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	1	6	6	0.83	0.00
TITAN-IN-31999	Business Logic	Low	Moderate	Moderate	3	1	1	3	3	0.67	0.00
TITAN-IN-35003	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
TITAN-IN-35013	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	1	0.00	0.00
TITAN-IN-35014	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	1	0.00	0.00
TITAN-IN-35016	Business Logic	Low	Moderate	Moderate	3	1	10	3	3	-2.33	0.00
TITAN-IN-35018	Business Logic	Low	Low	Moderate	3	0.8	10	3	3	-2.33	0.00
TITAN-IN-35478	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
TITAN-IN-35479	Business Logic	Low	Moderate	Moderate	3	1	5	3	4	-0.25	0.25

TITAN 14

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-35399	UI Page	Low	Moderate	Moderate	2	1	1	2	2	0.50	0.00
TITAN-IN-35310	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-39635	Business Logic	Low	Low	Moderate	3	0.8	6	3	3	-1.00	0.00
TITAN-IN-39636	Business Logic	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00

TITAN-IN-39637	Business Logic + External Integration	Low	Moderate	Moderate	6	1	6	6	6	0.00	0.00
TITAN-IN-39630	Business Logic	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00
TITAN-IN-39634	Business Logic	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00
TITAN-IN-39635	Business Logic	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
TITAN-IN-30448	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-30955	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	3	6	6	0.50	0.00
TITAN-IN-30956	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	6	6	5	-0.20	-0.20
TITAN-IN-30957	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00

TITAN 15

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-59656	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
TITAN-IN-59657	Business Logic + Rest Services + External Integration	Low	Moderate	Moderate	9	1	12	9	9	-0.33	0.00
TITAN-IN-60955	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-60956	UI + Business Logic	Low	Moderate	Moderate	5	1	6	5	5	-0.20	0.00
TITAN-IN-60957	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-60958	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-60959	Business Logic	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00
TITAN-IN-60960	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-60961	Business Logic	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
TITAN-IN-60965	Business Logic	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
TITAN-IN-60966	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00

TITAN-IN-60964	Business Logic	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00
TITAN-IN-60965	UI Page	Low	Low	Moderate	2	0.8	3	2	2	-0.50	0.00
TITAN-IN-60967	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-61469	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-61440	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-61444	Business Logic	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00
TITAN-IN-61445	Business Logic	Low	Low	Moderate	3	0.8	5	3	3	-0.67	0.00
TITAN-IN-61446	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-61447	Business Logic	Low	Low	Moderate	3	0.8	4	3	3	-0.33	0.00
TITAN-IN-61448	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-61449	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-61450	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-61451	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-61455	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-61456	Business Logic + Rest Services	Moderate	Low	Moderate	6	0.9	5	6	6	0.17	0.00
TITAN-IN-61454	Business Logic + Rest Services	Moderate	Low	Moderate	6	0.9	6	6	5	-0.20	-0.20
TITAN-IN-61457	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	9	5	5	-0.80	0.00
TITAN-IN-61458	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	7	5	6	-0.17	0.17
TITAN-IN-61459	Business Logic	Low	Low	Moderate	3	0.8	5	3	3	-0.67	0.00
TITAN-IN-61460	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	7	5	6	-0.17	0.17
TITAN-IN-61461	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	9	5	6	-0.50	0.17
TITAN-IN-61465	Business Logic	Low	Low	Moderate	3	0.8	4	3	3	-0.33	0.00
TITAN-IN-61466	Business Logic	Low	Low	Moderate	3	0.8	6	3	3	-1.00	0.00
TITAN-IN-61464	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-61465	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	6	0.17	0.17
TITAN-IN-61466	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-61467	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-61471	Business Logic	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
TITAN-IN-61476	Business Logic + External Integration	Low	Moderate	Moderate	6	1	4	6	6	0.33	0.00
TITAN-IN-61474	Business Logic + External Integration	Low	Moderate	Moderate	6	1	7	6	6	-0.17	0.00

TITAN-IN-61475	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-61477	Business Logic	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
TITAN-IN-61478	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-61991	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-61996	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
TITAN-IN-61995	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-61997	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65006	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-65005	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
TITAN-IN-65008	Business Logic	Low	Low	Moderate	3	0.8	5	3	3	-0.67	0.00
TITAN-IN-65010	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-65015	Business Logic + Rest Services + External Integration	Low	Moderate	Moderate	9	1	8	9	9	0.11	0.00
TITAN-IN-65016	Business Logic + Rest Services + External Integration	Low	Moderate	Moderate	9	1	10	9	9	-0.11	0.00
TITAN-IN-65050	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	7	6	6	-0.17	0.00
TITAN-IN-65054	UI Page	Low	Moderate	Moderate	2	1	2	2	2	0.00	0.00
TITAN-IN-65056	UI Page	Low	Moderate	Moderate	2	1	1	2	2	0.50	0.00
TITAN-IN-65171	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-65175	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65176	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65174	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65175	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65176	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65178	UI Page	Low	Low	Moderate	2	0.8	3	2	2	-0.50	0.00
TITAN-IN-65179	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65180	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65181	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65185	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65186	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65185	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65186	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65187	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65188	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65189	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
TITAN-IN-65190	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00

TITAN 16

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-29625	Business Logic + External Integration	Moderate	Moderate	Moderate	6	1.1	9	7	7	-0.29	0.00
TITAN-IN-29664	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
TITAN-IN-60448	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-60966	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-61441	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-61442	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-61446	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-61455	Business Logic	Low	Low	Moderate	3	0.8	4	3	3	-0.33	0.00
TITAN-IN-61456	Business Logic	Low	Low	Moderate	3	0.8	4	3	3	-0.33	0.00
TITAN-IN-61468	Business Logic	Low	Low	Moderate	3	0.8	2	3	4	0.50	0.25
TITAN-IN-61469	Business Logic	Low	Low	Moderate	3	0.8	1	3	2	0.50	-0.50
TITAN-IN-61999	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-62009	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
TITAN-IN-62016	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
TITAN-IN-62014	Business Logic	Low	Low	Moderate	3	0.8	5	3	3	-0.67	0.00
TITAN-IN-62018	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-62022	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	4	5	6	0.33	0.17

TITAN 17

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-59655	Business Logic + External Integration	Moderate	Moderate	High	6	0.9	9	6	7	-0.29	0.14
TITAN-IN-59664	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
TITAN-IN-60448	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	3	0.00	-0.33
TITAN-IN-60966	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00

TITAN 18

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-61446	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TITAN-IN-61455	Business Logic	Low	Low	Moderate	3	0.8	4	3	3	-0.33	0.00
TITAN-IN-61456	Business Logic	Low	Low	Moderate	3	0.8	4	3	3	-0.33	0.00
TITAN-IN-61468	Business Logic	Low	Low	Moderate	3	0.8	2	3	4	0.50	0.25
TITAN-IN-61469	Business Logic	Low	Low	Moderate	3	0.8	1	3	2	0.50	-0.50
TITAN-IN-61999	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00

TITAN-IN-62009	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
TITAN-IN-62016	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
TITAN-IN-62014	Business Logic	Low	Low	Moderate	3	0.8	5	3	3	-0.67	0.00
TITAN-IN-62018	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TITAN-IN-62022	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	4	5	6	0.33	0.17

TITAN 19

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-59625	Business Logic + External Integration	Moderate	Moderate	Moderate	6	1.1	9	7	7	-0.29	0.00
TITAN-IN-66016	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
TITAN-IN-66016	Business Logic	Low	Low	Moderate	3	0.8	5	3	3	-0.67	0.00
TITAN-IN-66017	Business Logic	Low	Low	Moderate	3	0.8	5	3	3	-0.67	0.00
TITAN-IN-66018	Business Logic	Low	Low	Moderate	3	0.8	5	3	3	-0.67	0.00
TITAN-IN-66021	Business Logic	Low	Low	Moderate	3	0.8	5	3	3	-0.67	0.00
TITAN-IN-66026	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
TITAN-IN-66024	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
TITAN-IN-66025	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
TITAN-IN-66026	Business Logic	Low	Low	Moderate	3	0.8	1	3	4	0.75	0.25

TITAN 20

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TITAN-IN-65745	Business Logic + External Integration	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
TITAN-IN-65746	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00
TITAN-IN-65749	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	5	-0.60	-0.20
TITAN-IN-65750	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
TITAN-IN-65751	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00
TITAN-IN-65752	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
TITAN-IN-65756	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
TITAN-IN-65754	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00

Table 13 – Organization 2 Project Details

Organization	Organization - 2
Project Name	Lords
Industry	Core Banking
Sprint Cycle	2 Weeks
Project Duration	4 Months
Start Date	Aug-20 to Nov-20
Total Sprints	7
Technologies Used	Java, J2EE, Tomcat
Architecture	Single Page Application (SPA)

Lords Project

Project Name	Lords Sprint 1 to Lords Sprint 3	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Lords Sprint 1

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Lords-167	UI + Business Logic + Rest Services	Low	Low	Moderate	8	0.9	6	8	8	0.25	0.00

Lords Sprint 2

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Lords-167	Business Logic + Rest Services	Low	Low	Moderate	6	0.9	5	6	6	0.17	0.00
Lords-168	Business Logic + Rest Services	Low	Low	Moderate	6	0.9	5	6	6	0.17	0.00

Lords Sprint 3

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Lords-167	Business Logic + Rest Services	Low	Low	Moderate	6	0.9	5	6	6	0.17	0.00
Lords-168	Business Logic + Rest Services	Low	Low	Moderate	6	0.9	5	6	6	0.17	0.00

Project Name	Lords Sprint 4 to Lords Sprint 7	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Lords Sprint 4

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Lords-291	Business Logic	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00

Lords Sprint 5

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Lords-167	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	6	0.17	0.17
Lords-291	Business Logic	Low	Low	Moderate	3	0.8	4	3	3	-0.33	0.00

Lords Sprint 6

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Lords-167	Business Logic	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
Lords-282	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Lords-291	Administrative Activities	Low	Low	Moderate	1	0.8	2	1	1	-1.00	0.00
Lords-344	Administrative Activities	Low	Low	Moderate	1	1.4	2	1	1	-1.00	0.00
Lords-439	Rest Service	Low	Low	High	3	0.6	2	2	2	0.00	0.00
Lords-446	Business Logic	Low	Low	Moderate	3	0.8	4	3	3	-0.33	0.00
Lords-474	Business Logic	Moderate	Low	Moderate	3	1.1	3	4	4	0.00	0.25

Lords Sprint 7

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Lords-282	Reports	Low	Low	High	4	0.6	2	3	3	0.33	0.00
Lords-494	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
Lords-167	Business Logic	Low	Moderate	Low	3	1.2	3	4	4	0.25	0.00
Lords-168	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Lords-291	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
Lords-327	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Lords-328	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Lords-344	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
Lords-439	UI + Business Logic	Low	Moderate	Moderate	5	1	4	5	5	0.20	0.00
Lords-446	UI + Business Logic	Low	Moderate	Moderate	5	1	4	5	5	0.20	0.00
Lords-474	UI + Business Logic	Low	Low	Moderate	5	0.8	4	4	4	0.00	0.00
Lords-573	UI + Business Logic	Low	Low	Moderate	5	0.8	4	4	4	0.00	0.00
Lords-575	Business Logic	Low	Low	Moderate	3	0.8	4	3	4	0.00	0.25
Lords-576	Business Logic	Moderate	Moderate	Moderate	3	1.1	4	4	5	0.20	0.20

Buzzers Project

Organization	Organization - 2
Project Name	Buzzers
Industry	Core Banking
Sprint Cycle	2 Weeks

Project Duration	1 Months
Start Date	Jun-20 to Jul-20
Total Sprints	2
Technologies Used	Java, J2EE, Tomcat
Architecture	Single Page Application (SPA)

Project Name	Buzzers Sprint 1	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Buzzers Sprint 1

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Buzzers-30436	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Buzzers-30439	Business Logic	Low	Moderate	High	3	0.9	2	3	3	0.33	0.00
Buzzers-30451	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Buzzers-30452	UI + Business Logic	Moderate	Moderate	Moderate	5	1.2	5	6	6	0.17	0.00
Buzzers-30509	External Integration	Low	Low	Moderate	3	0.9	3	3	3	0.00	0.00
Buzzers-30730	Business Logic	Low	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
Buzzers-30731	External Integration	Low	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00

Project Name	Buzzers Sprint 2	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Buzzers Sprint 2

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
Buzzers-30314	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Buzzers-30438	Business Logic + DAO	Low	Low	Moderate	5	0.8	3	4	4	0.25	0.00
Buzzers-30453	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
Buzzers-30454	UI + Business Logic	Moderate	Moderate	Moderate	5	1.1	8	6	6	-0.33	0.00
Buzzers-30455	Business Logic + External Integration	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
Buzzers-30457	Business Logic	Moderate	Moderate	Moderate	3	1.1	8	4	4	-1.00	0.00
Buzzers-30505	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00

Buzzers-30573	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Buzzers-30729	Business Logic	Moderate	Low	Moderate	3	0.9	2	3	3	0.33	0.00
Buzzers-30741	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Buzzers-30747	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Buzzers-30751	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
Buzzers-30755	Business Logic	Low	Moderate	High	3	0.8	2	3	3	0.33	0.00
Buzzers-30756	Business Logic	Low	Moderate	Low	3	1.2	2	4	4	0.50	0.00
Buzzers-30757	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Buzzers-30758	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Buzzers-30778	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Buzzers-30850	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Buzzers-30851	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Buzzers-30855	Business Logic	Low	Moderate	Moderate	3	1	2	3	2	0.00	-0.50
Buzzers-30895	Business Logic	Low	Moderate	Moderate	3	1	1	3	3	0.67	0.00
Buzzers-30943	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Buzzers-30947	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
Buzzers-30949	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Buzzers-30954	Business Logic + DAO	Low	Moderate	Moderate	5	1	4	5	4	0.00	-0.25
Buzzers-30972	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Buzzers-30991	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Buzzers-31011	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	8	0.00	0.13
Buzzers-31034	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
Buzzers-31079	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00

Parts Packing Project

Organization	Organization - 2
Project Name	Parts Packing
Industry	Automobile
Sprint Cycle	2 Weeks
Project Duration	4 Months
Start Date	May-20 to Aug-20
Total Sprints	8
Technologies Used	Java, J2EE, WebLogic
Architecture	N-Tier Application

Project Name	Parts Packing Sprint 1 to Parts Packing Sprint 3	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Parts Packing Sprint 1

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W

PP-167	Business Logic + DAO	Moderate	Moderate	Moderate	5	1.2	5	6	6	0.17	0.00
PP-1681	Business Logic	Low	Low	Moderate	3	0.9	3	3	3	0.00	0.00
PP-1682	Business Logic	Low	Low	Moderate	3	0.9	3	3	4	0.25	0.25
PP-1683	UI + Business Logic	Moderate	Moderate	Moderate	5	1.2	5	6	6	0.17	0.00

Parts Packing Sprint 2

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
PP-167	UI + Business Logic + DAO	Low	Low	Moderate	7	0.9	5	6	6	0.17	0.00
PP-168	Business Logic + DAO	Low	Low	Moderate	5	0.9	5	5	6	0.17	0.17

Parts Packing Sprint 3

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
PP-1671	UI + Business Logic	Low	Low	Moderate	5	0.9	5	5	5	0.00	0.00
PP-1685	UI + Business Logic + DAO	Low	Low	Moderate	7	0.9	5	6	6	0.17	0.00

Project Name	Parts Packing Sprint 4 to Parts Packing Sprint 6	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Parts Packing Sprint 4

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
PP-291	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00

Parts Packing Sprint 5

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
PP-167	Business Logic + DAO	Low	Moderate	Moderate	5	1	5	5	5	0.00	0.00
PP-291	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00

Parts Packing Sprint 6

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
PP-167	Business Logic	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
PP-282	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
PP-291	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
PP-344	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00

PP-439	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
PP-474	Business Logic	Moderate	Moderate	Moderate	3	1.1	4	4	4	0.00	0.00

Table 14 – Organization 3 Project Details

Organization	Organization - 3
Project Name	TABS
Industry	Trading System
Sprint Cycle	2 Weeks
Project Duration	4 Months
Start Date	Mar-21 to Jul-21
Total Sprints	8
Technologies Used	Java, J2EE, Spring boot, Tomcat
Architecture	Microservices

TABS Project

Project Name	TABS 1 to TABS 3	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

TABS 1

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TAB-5131	External Integration	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
TAB-5135	Onboarding New Software	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
TAB-5157	Business Logic	Moderate	Low	High	3	0.8	3	3	3	0.00	0.00
TAB-5160	DB Changes	Low	Low	Moderate	1	0.9	1	1	1	0.00	0.00
TAB-5163	DB Changes	Moderate	Moderate	Moderate	1	1.2	3	2	2	-0.50	0.00
TAB-5166	Administrative Activities	Low	Low	Moderate	1	0.9	1	1	1	0.00	0.00
TAB-5167	DB Changes	Moderate	Moderate	Moderate	1	1.2	3	2	2	-0.50	0.00

TABS 2

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TAB-5266	External Integration	Low	Low	Moderate	3	0.9	3	3	3	0.00	0.00
TAB-5267	DB Changes	Low	Moderate	Moderate	1	1.1	3	2	2	-0.50	0.00
TAB-5269	DB Changes	Low	Low	Moderate	1	0.9	2	1	1	-1.00	0.00
TAB-5270	Business Logic	Moderate	Moderate	Moderate	3	1.2	5	4	4	-0.25	0.00
TAB-5271	DB Changes	Moderate	Moderate	Moderate	1	1.2	3	2	2	-0.50	0.00

TABS 3

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TAB-5568	Business Logic +	Low	Low	Moderate	5	0.9	5	5	5	0.00	0.00

	DAO										
TAB-5301	Rest Service	Low	Low	Moderate	3	0.9	1	3	3	0.67	0.00
TAB-5365	DB Changes	Low	Moderate	Moderate	1	1.1	2	2	2	0.00	0.00

Project Name	TABS 4 to TABS 8	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

TABS 4

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TAB-5155	Business Logic + DAO	Low	Low	Moderate	5	0.8	3	4	4	0.25	0.00
TAB-5599	Rest Service	Moderate	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
TAB-5300	DB Changes	Moderate	Moderate	Low	1	1.3	4	2	2	-1.00	0.00

TABS 5

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TAB-5140	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
TAB-5305	Rest Service	Low	Moderate	Moderate	3	1	4	3	3	-0.33	0.00
TAB-5445	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
TAB-5473	Business Logic	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00
TAB-5474	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00

TABS 6

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TAB-5577	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
TAB-5475	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
TAB-5488	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
TAB-5504	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00

TABS 7

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TAB-5494	Administrative Activities	Low	Low	Moderate	1	0.8	2	1	1	-1.00	0.00
TAB-5499	Administrative	Low	Moderate	Moderate	1	1	1	1	1	0.00	0.00

	Activities										
TAB-5550	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
TAB-5555	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	1	0.00	0.00
TAB-5553	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
TAB-5554	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00

TABS 8

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
TAB-5493	Business Logic + External Integration	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
TAB-5505	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	1	0.00	0.00
TAB-5555	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TAB-5593	Administrative Activities	Low	Moderate	Moderate	1	1	2	1	1	-1.00	0.00
TAB-5596	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
TAB-5601	Rest Service	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
TAB-5605	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
TAB-5603	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00

Sunrise Project

Organization	Organization - 3
Project Name	Sunrise
Industry	Trading System
Sprint Cycle	2 Weeks
Project Duration	6 Months
Start Date	Jun-21 to Dec-21
Total Sprints	12
Technologies Used	Java, J2EE, Spring boot, JMS, Kafka, Tomcat
Architecture	Microservices and Event Driven

Project Name	Sunrise Sprint 1 to Sunrise Sprint 2	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Sunrise Sprint 1

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
SunriseSB-675	UI Page	Low	Low	Moderate	2	0.9	2	2	2	0.00	0.00
SunriseSB-676	UI Page	Low	Low	Moderate	2	0.9	2	2	2	0.00	0.00
SunriseSB-677	UI Page	Low	Moderate	Moderate	2	1.1	2	3	3	0.33	0.00
SunriseSB-678	UI Page	Low	Low	Moderate	2	0.9	2	2	2	0.00	0.00
SunriseSB-679	UI Page	Low	Low	Moderate	2	0.9	2	2	2	0.00	0.00
SunriseSB-680	Business Logic	Low	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
SunriseSB-682	UI Page	Low	Low	Moderate	2	0.9	2	2	3	0.33	0.33

Sunrise Sprint 2

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
SunriseSB-888	UI + Business Logic + DAO	Low	Low	Moderate	7	0.9	5	7	7	0.29	0.00
SunriseSB-852	UI + Business Logic + DAO	Low	Low	Moderate	7	0.9	5	7	7	0.29	0.00
SunriseSB-856	UI + Business Logic	Low	Low	Moderate	5	0.9	5	5	4	-0.25	-0.25
SunriseSB-856	UI Page	Low	Moderate	Moderate	2	1.1	1	3	3	0.67	0.00
SunriseSB-859	UI Page	Low	Moderate	Moderate	2	1.1	2	3	3	0.33	0.00
SunriseSB-860	UI Page	Low	Moderate	Moderate	2	1.1	5	3	5	0.00	0.40
ISunriseSB-862	UI Page	Low	Low	Moderate	2	0.9	1	2	2	0.50	0.00
ISunriseSB-865	UI + Business Logic	Moderate	Moderate	Moderate	5	1.2	5	6	6	0.17	0.00
SunriseSB-866	UI + Business Logic	Low	Low	Moderate	5	0.9	5	5	5	0.00	0.00
SunriseSB-675	UI + Business Logic + DAO	Low	Low	Moderate	7	0.9	5	7	7	0.29	0.00
SunriseSB-676	UI + Business Logic	Low	Moderate	Moderate	5	1.1	5	6	6	0.17	0.00
SunriseSB-678	UI + Business Logic	Low	Low	Moderate	5	0.9	5	5	5	0.00	0.00
SunriseSB-680	UI + Business Logic	Low	Moderate	Moderate	5	1.1	5	6	6	0.17	0.00
SunriseSB-686	UI + Business Logic	Low	Moderate	Moderate	5	1.1	5	6	6	0.17	0.00
SunriseSB-688	UI + Business Logic	Low	Moderate	Moderate	5	1.1	5	6	6	0.17	0.00
SunriseSB-686	UI + Business Logic	Low	Low	Moderate	5	0.9	5	5	6	0.17	0.17
SunriseSB-687	UI + Business Logic	Moderate	Moderate	Moderate	5	1.2	1	6	6	0.83	0.00

SunriseSB-882	UI Page	Low	Low	Moderate	2	0.9	1	2	2	0.50	0.00
SunriseSB-888	UI + Business Logic + DAO	Low	Low	Moderate	7	0.9	5	7	7	0.29	0.00
SunriseSB-852	UI + Business Logic	Low	Low	Moderate	5	0.9	5	5	4	-0.25	-0.25
SunriseSB-856	UI Page	Low	Moderate	Moderate	2	1.1	5	3	3	-0.67	0.00
SunriseSB-856	UI Page	Low	Moderate	Moderate	2	1.1	1	3	3	0.67	0.00
SunriseSB-859	UI Page	Low	Moderate	Moderate	2	1.1	2	3	3	0.33	0.00
SunriseSB-860	UI Page	Low	Low	Moderate	2	0.9	5	2	2	-1.50	0.00
SunriseSB-862	UI Page	Low	Low	Moderate	2	0.9	1	2	3	0.67	0.33
SunriseSB-865	UI + Business Logic	Low	Low	Moderate	5	0.9	5	5	6	0.17	0.17
SunriseSB-866	UI + Business Logic	Low	Low	Moderate	5	0.9	5	5	5	0.00	0.00

Project Name	Sunrise Sprint 3 to Sunrise Sprint 12	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Sunrise Sprint 3

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
SunriseSB-777	UI Page	Low	Low	Moderate	2	0.8	3	2	2	-0.50	0.00
SunriseSB-781	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
SunriseSB-744	UI Page	Moderate	Moderate	Moderate	2	1.1	1	3	3	0.67	0.00
SunriseSB-777	UI Page	Moderate	Moderate	Moderate	2	1.1	3	3	3	0.00	0.00
SunriseSB-778	UI Page	Moderate	Moderate	Moderate	2	1.1	3	3	3	0.00	0.00
SunriseSB-789	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-794	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-798	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
ISunriseSB-799	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
MANSB-798	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
SunriseSB-799	UI Page	Moderate	Moderate	Moderate	2	1.1	1	3	3	0.67	0.00
SunriseSB-800	UI Page	Moderate	Moderate	Moderate	2	1.1	3	3	3	0.00	0.00
SunriseSB-807	UI Page	Moderate	Moderate	Moderate	2	1.1	3	3	3	0.00	0.00
MANS8-807	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-808	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-807	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
SunriseSB-812	UI Page	Low	Low	Moderate	2	0.8	1	2	2	0.50	0.00
SunriseSB-817	UI Page	Moderate	Moderate	Moderate	2	1.1	1	3	3	0.67	0.00
SunriseSB-818	UI Page	Moderate	Moderate	Moderate	2	1.1	3	3	3	0.00	0.00

SunriseSB-819	UI Page	Moderate	Moderate	Moderate	2	1.1	3	3	3	0.00	0.00
SunriseSB-872	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-877	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-878	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00

Sunrise Sprint 4

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
SunriseSB-797	UI Page	Low	Low	Moderate	2	0.8	3	2	2	-0.50	0.00
SunriseSB-831	UI Page	Low	Low	Moderate	2	0.8	3	2	2	-0.50	0.00
SunriseSB-888	UI Page	Low	Low	Moderate	2	0.8	3	2	2	-0.50	0.00
SunriseSB-889	UI Page	Low	Moderate	Moderate	2	1	3	2	2	-0.50	0.00
SunriseSB-724	UI + Business Logic	Low	Moderate	Moderate	5	1	5	5	5	0.00	0.00

Sunrise Sprint 5

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
SunriseSB-897	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-898	Business Logic	Moderate	High	Moderate	3	1.3	3	4	4	0.25	0.00
SunriseSB-728	Business Logic	Moderate	High	Moderate	3	1.3	3	4	4	0.25	0.00
SunriseSB-780	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	3	6	6	0.50	0.00
SunriseSB-508	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ISunriseSB-810	Business Logic	Low	Moderate	Moderate	3	1	1	3	3	0.67	0.00
SunriseSB-812	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-885	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
SunriseSB-890	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
SunriseSB-898	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-890	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-833	External Integration	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-888	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	3	6	6	0.50	0.00
SunriseSB-8971	External Integration	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-898	External Integration	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-900	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	3	6	5	0.40	-0.20
SunriseSB-904	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	5	0.00	-0.20

Sunrise Sprint 6

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W

SunriseS8-533	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseS8-698	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
SunriseSE-930	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
SunriseSB-934	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00

Sunrise Sprint 7

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
SunriseSB-757	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-882	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00

Sunrise Sprint 7

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
SunriseSB-886	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-897	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
SunriseSB-1007	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
SunriseSB-1016	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
SunriseSB-1017	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-1023	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
SunriseSB-1038	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
SunriseSB-1042	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	8	0.00	0.13
SunriseSB-1045	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-1046	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-1047	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
SunriseSB-1052	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-1053	Business Logic + Rest Services	Low	Low	High	6	0.6	3	4	4	0.25	0.00
SunriseSB-1057	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
SunriseSB-1059	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
SunriseSB-1060	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
SunriseSB-1063	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-1065	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	3	5	5	0.40	0.00

SunriseSB-1066	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
SunriseSB-1074	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
SunriseSB-1077	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-1080	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-1084	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
SunriseSB-1085	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-1088	Business Logic + Rest Services	Low	Low	High	6	0.6	3	4	4	0.25	0.00
SunriseSB-1091	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
SunriseSB-1092	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
SunriseSB-1094	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
SunriseSB-1095	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-1100	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	3	5	5	0.40	0.00
SunriseSB-1101	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
SunriseSB-1102	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
SunriseSB-1103	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
SunriseSB-1104	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-1105	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
SunriseSB-1106	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
SunriseSB-1108	Business Logic + Rest Services	Low	Low	High	6	0.6	3	4	4	0.25	0.00
SunriseSB-1109	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
MANSB-1111	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
SunriseSB-1113	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
SunriseSB-1116	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	6	0.17	0.17

Sunrise Sprint 9

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
SunriseSB-1041	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-1079	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
SunriseSB-1099	Business Logic	Low	Low	Moderate	3	0.8	5	3	3	-0.67	0.00
SunriseSB-1120	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
SunriseSB-1129	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
SunriseSB-1133	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	2	5	5	0.60	0.00
SunriseSB-1141 .	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
SunriseSB-1149	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-1152	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-1168	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00

Sunrise Sprint 10

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
SunriseSB-1193	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
SunriseSB-1237	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
SunriseSB-1238 .	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
SunriseSB-1239	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
SunriseSB-1282 .	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
SunriseSB-1286	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00

Sunrise Sprint 11

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
SunriseSB-1048	UI Page	Low	Low	Moderate	2	0.8	2	2	2	0.00	0.00
SunriseSB-1336 .	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
SunriseSB-1346 .	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00

Sunrise Sprint 12

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
SunriseSB-1463	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00

Table 15 – Continentals Project

Organization	Organization - 3
Project Name	Continentals
Industry	Trading System
Sprint Cycle	2 Weeks
Project Duration	12 Months
Start Date	Jun-21 to Aug-22
Total Sprints	24
Technologies Used	Java, J2EE, Spring boot, JMS, Kafka, Tomcat
Architecture	Microservices and Event Driven

Project Name	Continentals 1 to Continentals 2	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Continentals 1

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-9	Administrative Activities	Low	Low	Moderate	1	0.9	1	1	1	0.00	0.00
ContinentalsSB-13	Administrative Activities	Low	Low	Moderate	1	0.9	1	1	1	0.00	0.00
ContinentalsSB-18	Business Logic	Low	Moderate	Moderate	3	1.1	2	4	4	0.50	0.00
ContinentalsSB-19	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00
ContinentalsSB-32	Administrative Activities	Low	Low	Moderate	1	0.9	1	1	1	0.00	0.00
ContinentalsSB-33	Administrative Activities	Low	Moderate	Moderate	1	1.1	3	2	3	0.00	0.33
ContinentalsSB-35	Administrative Activities	Low	Moderate	Moderate	1	1.1	1	2	2	0.50	0.00
ContinentalsSB-107	Business Logic	High	High	Moderate	3	1	3	5	6	0.50	0.17
ContinentalsSB-108	Business Logic	Moderate	Moderate	Moderate	3	1.2	5	4	5	0.00	0.20
ContinentalsSB-109	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00

Continentals 2

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-10	Administrative Activities	Low	Low	Moderate	1	0.9	1	1	1	0.00	0.00
ContinentalsSB-14	Administrative Activities	Low	Low	Moderate	1	0.9	1	1	1	0.00	0.00
ContinentalsSB-28	Administrative	Low	Low	Moderate	1	0.9	1	1	1	0.00	0.00

	Activities										
ContinentalsSB-131	Business Logic	Low	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
ContinentalsSB-153	Business Logic + External Integration	Low	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
ContinentalsSB-160	Business Logic + External Integration	Low	Moderate	Moderate	6	1.1	8	7	8	0.00	0.13
ContinentalsSB-169	Administrative Activities	Low	Low	Moderate	1	0.9	1	1	1	0.00	0.00
ContinentalsSB-172	Business Logic	Moderate	Moderate	Moderate	3	1.2	5	4	5	0.00	0.20
ContinentalsSB-181	Business Logic + Rest Services	Moderate	High	Moderate	6	1.4	8	9	9	0.11	0.00
ContinentalsSB-183	Business Logic	Low	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
ContinentalsSB-202	Business Logic	Low	Moderate	Moderate	3	1.1	2	4	4	0.50	0.00
ContinentalsSB-203	Business Logic	Low	Moderate	Moderate	3	1.1	2	4	4	0.50	0.00
ContinentalsSB-204	Business Logic	Low	Low	Moderate	3	0.9	2	3	3	0.33	0.00

Project Name	Continentals 3 to Continentals 24	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Continentals 3

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-36	Onboarding New Software	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
ContinentalsSB-37	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
ContinentalsSB-105	UI + Business Logic + Rest Services + DAO	Moderate	Moderate	Moderate	10	1.1	13	11	11	-0.18	0.00
ContinentalsSB-106	UI + Business Logic + DAO	Moderate	Moderate	Moderate	7	1.1	8	8	8	0.00	0.00
ContinentalsSB-	UI + Business	Moderate	Moderate	Moderate	7	1.1	8	8	8	0.00	0.00

122	Logic + DAO										
ContinentalsSB-123	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-124	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-130	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
ContinentalsSB-184	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-291	Business Logic	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00
ContinentalsSB-293	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00
ContinentalsSB-294	Business Logic	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00
ContinentalsSB-304	Business Logic + Rest Services	Low	Moderate	High	6	0.8	5	5	5	0.00	0.00
ContinentalsSB-307	Business Logic + Rest Services	Low	Low	High	6	0.6	5	4	4	-0.25	0.00
ContinentalsSB-309	Business Logic	Moderate	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
ContinentalsSB-310	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00
ContinentalsSB-314	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
ContinentalsSB-315	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
ContinentalsSB-316	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
ContinentalsSB-317	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	3	6	5	0.40	-0.20
ContinentalsSB-318	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	6	0.17	-0.17
ContinentalsSB-320	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
ContinentalsSB-335	Business Logic + External Integration	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
ContinentalsSB-352	Business Logic + External Integration	Low	Low	Moderate	6	0.8	3	5	5	0.40	0.00

ContinentalsSB-359	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00

Continentals 4

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-126	Onboarding New Software	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
ContinentalsSB-127	Testing - Business	Moderate	High	Moderate	2	1.3	3	3	3	0.00	0.00
ContinentalsSB-129	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	3	7	7	0.57	0.00
ContinentalsSB-132	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	3	6	6	0.50	0.00
ContinentalsSB-163	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-187	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-195	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-199	External Integration	Moderate	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
ContinentalsSB-263	Business Logic + External Integration	Low	High	Moderate	6	1.2	8	8	8	0.00	0.00
ContinentalsSB-275	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-292	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-297	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-299	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-300	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
ContinentalsSB-301	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	6	0.17	-0.17

Continentals 5

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-125	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-179	Business Logic	Moderate	High	Moderate	3	1.3	3	4	4	0.25	0.00

ContinentalsSB-180	Business Logic	Moderate	High	Moderate	3	1.3	3	4	4	0.25	0.00
ContinentalsSB-182	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	3	6	6	0.50	0.00
ContinentalsSB-185	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-186	Business Logic	Low	Moderate	Moderate	3	1	1	3	3	0.67	0.00
ContinentalsSB-200	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-201	Business Logic	Low	Low	Moderate	3	0.8	2	3	2	0.00	-0.50
ContinentalsSB-205	Business Logic	Low	Low	Moderate	3	0.8	1	3	2	0.50	-0.50
ContinentalsSB-259	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-267	Business Logic	Low	Moderate	Moderate	3	1	3	3	4	0.25	0.25
ContinentalsSB-279	External Integration	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-283	External Integration	Low	Moderate	Moderate	3	1	3	3	4	0.25	0.25
ContinentalsSB-287	Business Logic + External Integration	Low	Moderate	Moderate	6	1	3	6	5	0.40	-0.20
ContinentalsSB-295	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	5	0.00	-0.20

Continentals 6

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-255	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-327	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-331	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsSB-332	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsSB-349	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-384	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00

ContinentalsSB-388	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	6	0.17	0.17
ContinentalsSB-394	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	8	0.00	0.13
ContinentalsSB-401	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-402	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-464	Business Logic + Rest Services	Low	High	Moderate	6	1.2	8	8	8	0.00	0.00
ContinentalsSB-467	Business Logic + Rest Services	Low	High	Moderate	6	1.2	8	8	8	0.00	0.00
ContinentalsSB-479	Business Logic + Rest Services	Low	High	Moderate	6	1.2	8	8	8	0.00	0.00
ContinentalsSB-482	Business Logic + Rest Services	Low	High	Moderate	6	1.2	8	8	8	0.00	0.00
ContinentalsSB-530	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-569	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-582	Business Logic	Low	Moderate	Moderate	3	1	1	3	3	0.67	0.00
ContinentalsSB-588	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-609	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00

Continentals 7

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-337	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-350	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-351	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
ContinentalsSB-385	Business Logic	Moderate	Moderate	Moderate	3	1.1	5	4	5	0.00	0.20
ContinentalsSB-386	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-470	Business Logic + External Integration	Moderate	Moderate	Moderate	6	1.1	8	7	8	0.00	0.13

ContinentalsSB-473	Business Logic + External Integration	Low	Moderate	Moderate	6	1	8	6	8	0.00	0.25
ContinentalsSB-529	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	8	0.00	0.13
ContinentalsSB-542	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-553	Business Logic + External Integration	Low	Moderate	Moderate	6	1	8	6	8	0.00	0.25
ContinentalsSB-566	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-567	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-568	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	3	6	6	0.50	0.00
ContinentalsSB-587	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	3	6	6	0.50	0.00

Continentals 8

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-387	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-434	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
ContinentalsSB-535	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsSB-564	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
ContinentalsSB-590	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-591	Business Logic + External Integration	Low	Low	Moderate	6	0.8	3	5	5	0.40	0.00
ContinentalsSB-592	Business Logic	Low	Low	High	3	0.6	2	2	2	0.00	0.00
ContinentalsSB-608	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	8	0.00	0.13
ContinentalsSB-641	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-647	Business Logic + External	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00

	Integration										
ContinentalsSB-680	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
ContinentalsSB-684	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	5	0.00	-0.20
ContinentalsSB-706	Business Logic + Rest Services	Low	Low	High	6	0.6	3	4	4	0.25	0.00
ContinentalsSB-707	Business Logic + Rest Services	Low	Low	High	6	0.6	3	4	4	0.25	0.00

Continentals 9

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsS8-381	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-448	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
ContinentalsSB-531	Business Logic	Low	Low	Moderate	3	0.8	5	3	3	-0.67	0.00
ContinentalsSB-570	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
ContinentalsS8-593	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00
ContinentalsSS-646	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	2	5	5	0.60	0.00
ContinentalsSS-702	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsS8-713	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	7	0.29	0.00
ContinentalsS8-714	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
ContinentalsS8-715	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
M5GGENS8-732	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsS8-767	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	5	0.00	-0.20
ContinentalsS8-769	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
ContinentalsS8-774	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
ContinentalsSB-819	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00

Continentals 10

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-544	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
M5GGENSB-661	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
ContinentalsSB-662	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsSB-696	Business Logic + External Integration	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
ContinentalsSB-766	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsS8-772	Business Logic + External Integration	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
ContinentalsSB-777	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-779	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	5	7	6	0.17	-0.17
ContinentalsSB-789	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
ContinentalsSB-800	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	3	5	5	0.40	0.00
ContinentalsSB-824	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
ContinentalsSB-430	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-438	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsSB-854	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsSB-861	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsS3-865	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
ContinentalsSB-915	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
ContinentalsSB-917	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00

Continentals 11

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-493	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
ContinentalsSB-538	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsS8-545	Business Logic + Rest Services	Moderate	Low	Moderate	6	0.9	5	6	6	0.17	0.00
ContinentalsSB-694	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00
ContinentalsSB-695	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
ContinentalsSB-716	Business Logic	Moderate	Moderate	High	3	0.9	3	3	3	0.00	0.00
ContinentalsS8-717	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-743	Business Logic	Moderate	Moderate	Moderate	3	1.1	3	4	4	0.25	0.00
ContinentalsS8-775	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
ContinentalsSB-783	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsSB-825	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
ContinentalsSB-832	Business Logic	Low	Moderate	Moderate	3	1	5	3	3	-0.67	0.00
ContinentalsSB-864	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	8	0.00	0.13

Continentals 12

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-537	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
ContinentalsSB-659	Business Logic	Low	Moderate	Moderate	3	1	1	3	3	0.67	0.00
ContinentalsSB-660	Business Logic	Moderate	Moderate	Moderate	3	1.1	5	4	4	-0.25	0.00
ContinentalsSB-665	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	2	6	6	0.67	0.00
ContinentalsSB-771	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
ContinentalsSB-	Business Logic	Moderate	Moderate	High	3	0.9	5	3	3	-0.67	0.00

780											
ContinentalsSB-939	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsSB-960	Business Logic + Rest Services + External Integration	Low	Moderate	Moderate	9	1	8	9	9	0.11	0.00
ContinentalsSB-983	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	5	0.80	0.80
ContinentalsSB-992	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsSB-1009	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
ContinentalsSB-1016	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
ContinentalsSB-1024	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	8	0.00	0.25
ContinentalsSB-1040	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
ContinentalsSB-1046	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-1047	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
ContinentalsSB-1085	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
ContinentalsSB-1098	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsSB-1099	Business Logic + Rest Services+External Integration	Moderate	Moderate	Moderate	9	1.1	13	10	12	-0.08	0.17
ContinentalsSB-1105	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
ContinentalsSB-1107	Business Logic	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00
ContinentalsSB-1125	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00

Continentals 13

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-546	Business Logic + External	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00

	Integration										
ContinentalsSB-663	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-664	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
ContinentalsSB-776	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-778	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-821	Business Logic + Rest Services + External Integration	Moderate	Moderate	Moderate	9	1.1	13	10	11	-0.18	0.09
ContinentalsSB-925	Business Logic	Moderate	Moderate	Moderate	3	1.1	8	4	5	-0.60	0.20
ContinentalsSB-991	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	8	7	7	-0.14	0.00
ContinentalsSB-1017	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-1020	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-1074	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-1075	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-1104	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-1146	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-1147	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-1157	Business Logic	Low	Low	Moderate	3	0.8	3	3	3	0.00	0.00
ContinentalsSB-1158	Business Logic + Rest Services + External Integration	Low	Low	Moderate	9	0.8	8	8	7	-0.14	-0.14
ContinentalsSB-1166	Business Logic	Low	Low	Moderate	3	0.8	1	3	3	0.67	0.00
ContinentalsSB-1191	External Integration	Low	Low	Moderate	3	0.8	2	3	3	0.33	0.00

ContinentalsSB-1194	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
ContinentalsSB-1195	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00

Continentals 14

Key	Work Item	FC	TC	RM	RE	CF	ESP	WE	AE	MRE-E	MRE-W
ContinentalsSB-540	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	1	0.00	0.00
ContinentalsSB-1018	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	5	6	6	0.17	0.00
ContinentalsSB-1019	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	5	0.00	0.00
ContinentalsSB-1021	Business Logic + Rest Services + External Integration	Low	Moderate	Moderate	9	1	8	9	9	0.11	0.00
ContinentalsSB-1022	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00
ContinentalsSB-1078	Business Logic	Low	Moderate	Moderate	3	1	2	3	4	0.50	0.25
ContinentalsSB-1091	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-1126	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-1145	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-1161	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	8	6	6	-0.33	0.00
ContinentalsSB-1164	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	1	0.00	0.00
ContinentalsSB-1165	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-1184	Business Logic	Low	Moderate	Moderate	3	1	3	3	3	0.00	0.00
ContinentalsSB-1185	Business Logic	Low	Moderate	Moderate	3	1	2	3	3	0.33	0.00
ContinentalsSB-1193	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	1	0.00	0.00
ContinentalsSB-1196	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	1	0.00	0.00
ContinentalsSB-1203	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	3	5	5	0.40	0.00

Continentals 15

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
ContinentalsSB-539	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	7	8	0.13
ContinentalsSB-	Administrative	Low	Moderate	Moderate	1	1	1	1	0.00

1013	Activities								
ContinentalsSB-1014	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1114	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1151	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1152	Business Logic + Rest Services	Low	High	Moderate	6	1.2	8	8	0.00
ContinentalsSB-1163	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1205	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1210	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1212	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	0.00
ContinentalsSB-1214	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	0.00
ContinentalsSB-1218	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1219	Business Logic + Rest Services	Moderate	High	Moderate	6	1.3	8	8	0.00
ContinentalsSB-1233	Business Logic	Low	Moderate	Moderate	3	1	3	2	-0.50
ContinentalsSB-1234	Administrative Activities	Low	Moderate	Moderate	1	1	1	2	0.50
ContinentalsSB-1235	Business Logic + Rest Services	Low	High	Moderate	6	1.2	8	8	0.00
ContinentalsSB-1251	Business Logic	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1253	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1255	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1268	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1273	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1279	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00

Continentals 16

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
ContinentalsSB-941	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	7	8	0.13
ContinentalsSB-1010	Business Logic	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1026	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1039	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1054	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1056	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1064	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1216	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1217	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1243	Business Logic	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1254	Business Logic + Rest Services	Moderate	High	Moderate	6	1.3	8	8	0.00
ContinentalsSB-1264	Business Logic + Rest Services	Low	High	Moderate	6	1.2	8	8	0.00
ContinentalsSB-1274	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1275	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1291	Business Logic + Rest Services	Low	High	Moderate	6	1.2	8	8	0.00
ContinentalsSB-1294	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00

Continentals 17

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
ContinentalsSB-24	External Integration	Low	Low	High	3	0.6	2	2	0.00
ContinentalsSB-1023	Business Logic + External Integration	Low	High	Moderate	6	1.2	8	8	0.00

ContinentalsSB-1087	Business Logic	Moderate	High	Moderate	3	1.3	4	5	0.20
ContinentalsSB-1111	Business Logic	Low	Moderate	Moderate	3	1	3	2	-0.50
ContinentalsSB-1131	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1134	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1148	Business Logic + External Integration	Moderate	Moderate	Moderate	6	1.1	7	8	0.13
ContinentalsSB-1159	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1201	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1202	Business Logic	Low	Low	Moderate	3	0.8	3	5	0.40
ContinentalsSB-1271	Business Logic + External Integration	Low	Moderate	Moderate	6	1	6	5	-0.20
ContinentalsSB-1281	Business Logic	Low	Low	High	3	0.6	2	2	0.00
ContinentalsSB-1306	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1384	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1389	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1392	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1398	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1407	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00

Continentals 18

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
ContinentalsSB-1055	External Integration	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1062	External Integration	Low	Low	High	3	0.6	2	2	0.00
ContinentalsSB-	External	Low	Low	Moderate	3	0.8	3	3	0.00

1069	Integration								
ContinentalsS6-1072	External Integration	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1079	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1141	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	0.00
ContinentalsSB-1154	Business Logic + Rest Services + External Integration	Low	Low	Moderate	9	0.8	8	8	0.00
ContinentalsSB-1237	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1297	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	0.00
ContinentalsSB-1324	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1332	Business Logic	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1383	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1400	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1404	External Integration	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1414	External Integration	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1415	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1416	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1422	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1425	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1429	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1439	Business Logic	Low	Low	High	3	0.6	2	2	0.00
ContinentalsSB-1470	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00

ContinentalsSB-1490	Business Logic	Low	Low	High	3	0.6	2	2	0.00
ContinentalsSB-1498	Business Logic	Low	Low	High	3	0.6	2	2	0.00
ContinentalsSB-1508	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00

Continentals 19

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
ContinentalsSB-1025	Business Logic + Rest Services + External Integration	Low	Low	Moderate	9	0.8	8	8	0.00
ContinentalsSB-1073	Business Logic + External Integration	Low	Moderate	High	6	0.8	5	5	0.00
ContinentalsSB-1077	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1081	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1088	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1136	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1140	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1153	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsS8-1156	Business Logic + Rest Services + External Integration	Low	Low	Moderate	9	0.8	8	8	0.00
ContinentalsSB-1295	Business Logic	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1337	Business Logic	Moderate	Moderate	Moderate	3	1.1	4	5	0.20
ContinentalsSB-1382	Business Logic	Moderate	Moderate	Moderate	3	1.1	4	5	0.20
ContinentalsSB-1397	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1411	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00

ContinentalsSB-1412	External Integration	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1413	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00

Continentals 20

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
ContinentalsSB-1057	External Integration	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1059	External Integration	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1063	External Integration	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1066	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1071	Business Logic + Rest Services	Moderate	Moderate	Moderate	6	1.1	7	8	0.13
ContinentalsSB-1076	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1089	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1130	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1137	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1142	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1155	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1423	Business Logic	Low	Moderate	Moderate	3	1	3	5	0.40
ContinentalsSB-1440	External Integration	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1458	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1461	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1529	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1557	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00

1562									
ContinentalsSB-1589	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1594	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1596	Business Logic + External Integration	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1597	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1598	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1608	Business Logic + External Integration	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1610	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1611	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00

Continentals 21

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
ContinentalsSB-1133	Testing - Business	Moderate	Moderate	Moderate	2	1.1	3	3	0.00
ContinentalsSB-1135	Testing - Business	Moderate	Moderate	Moderate	2	1.1	3	3	0.00
ContinentalsSB-1250	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1418	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1457	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	0.00
ContinentalsSB-1467	External Integration	Low	Low	High	3	0.6	2	2	0.00
ContinentalsSB-1469	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1510	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1524	External Integration	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1602	Business Logic	Low	Low	High	3	0.6	2	2	0.00

ContinentalsSB-1603	Business Logic	Low	Low	High	3	0.6	2	2	0.00
ContinentalsSB-1612	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1613	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1644	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1655	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1656	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1662	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1663	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1665	Business Logic	Low	Low	High	3	0.6	2	2	0.00
ContinentalsSB-1684	Business Logic	Low	Low	High	3	0.6	2	2	0.00
ContinentalsSB-1686	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1695	DAO	Low	Low	Moderate	2	0.8	2	2	0.00
ContinentalsSB-1701	Business Logic + External Integration	Low	Low	Moderate	6	0.8	5	5	0.00

Continentals 22

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
ContinentalsS8-541	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1053	External Integration	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1058	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1060	Business Logic	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1065	External Integration	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1067	Business Logic + DAO	Low	Moderate	Moderate	5	1	5	5	0.00

ContinentalsSB-1090	Business Logic + External Integration	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1138	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1144	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1160	Business Logic + Rest Services + External Integration	Low	Low	Moderate	9	0.8	8	8	0.00
ContinentalsSB-1204	Business Logic	Low	Low	High	3	0.6	2	3	0.33
ContinentalsSB-1272	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1426	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1427	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1437	Business Logic	Low	Low	High	3	0.6	2	2	0.00
ContinentalsSB-1442	Business Logic	Low	Low	High	3	0.6	2	2	0.00
ContinentalsSB-1443	Business Logic	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1511	Business Logic + External Integration	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1526	Business Logic	Low	Low	High	3	0.6	2	3	0.33
ContinentalsSB-1571	Business Logic	Low	Low	High	3	0.6	2	3	0.33
ContinentalsSB-1599	Business Logic	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1609	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1638	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1646	Business Logic	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1667	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00

ContinentalsSB-1688	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1696	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1709	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1729	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00

Continentals 23

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
ContinentalsSB-1032	Bug - Business Logic	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1086	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	6	5	-0.20
ContinentalsSB-1330	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1399	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1421	External Integration	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1444	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	0.00
ContinentalsSB-1445	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1446	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1463	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1512	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1520	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1521	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1538	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1558	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1570	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00

Continentals 24

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
ContinentalsSB-1452	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1459	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	0.00
ContinentalsSB-1464	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
ContinentalsSB-1670	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsS8-1671	External Integration	Moderate	Moderate	Moderate	3	1.1	4	5	0.20
ContinentalsSB-1677	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
ContinentalsSB-1768	Business Logic + Rest Services + External Integration	Low	Low	Moderate	9	0.8	8	8	0.00
ContinentalsSB-1773	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
ContinentalsSB-1780	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1784	Business Logic	Low	Low	High	3	0.8	2	2	0.00
ContinentalsSB-1785	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
ContinentalsSB-1786	Business Logic	Low	Low	Moderate	3	0.8	3	2	-0.50
ContinentalsSB-1788	Business Logic + Rest Services + External Integration	Low	Low	Moderate	9	0.8	8	8	0.00
ContinentalsSB-1789	Business Logic + Rest Services + External Integration	Low	Low	Moderate	9	0.8	8	8	0.00
ContinentalsSB-1797	Business Logic	Low	Moderate	Moderate	3	1	3	2	-0.50

Organization	Organization - 3
Project Name	Spartans
Industry	Trading System
Sprint Cycle	2 Weeks

Project Duration	5 Months
Start Date	Jan-22 to May-22
Total Sprints	10
Technologies Used	Java, J2EE, Spring boot, JMS, Kafka, Tomcat
Architecture	Microservices and Event Driven

Spartans Project

Project Name	Spartans Sprint 1	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Spartans Sprint 1

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
SpartansSB-7	Business Logic	Moderate	High	Moderate	3	1.4	5	5	0.00
SpartansSB-10	Administrative Activities	Low	Low	Moderate	1	0.9	1	2	0.50
SpartansSB-13	Business Logic	Low	Low	Moderate	3	0.9	3	3	0.00
SpartansSB-16	Administrative Activities	Low	Low	Moderate	1	0.9	1	1	0.00
SpartansSB-22	Administrative Activities	Low	Low	Moderate	1	0.9	1	1	0.00
SpartansSB-33	Business Logic	Low	Moderate	Moderate	3	1.1	4	4	0.00
SpartansSB-51	Administrative Activities	Low	Low	Moderate	1	0.9	1	1	0.00
SpartansSB-11	Business Logic	Low	Low	High	3	0.7	3	3	0.00
SpartansSB-12	Business Logic	Moderate	Low	Moderate	3	1	3	3	0.00
SpartansSB-14	Business Logic + Rest Services	Low	Moderate	Moderate	6	1.1	7	7	0.00
SpartansSB-15	Business Logic	Low	Moderate	Moderate	3	1.1	4	4	0.00

Project Name	Spartans Sprint 2 to Spartans Sprint 10	
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	High	1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1

Spartans Sprint 2

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
SpartansSB-19	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
SpartansSB-44	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-48	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00

SpartansSB-49	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-72	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-75	Business Logic + Rest Services	Low	Moderate	Moderate	6	1	6	5	-0.20

Spartans Sprint 3

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
SpartansSB-18	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
SpartansSB-46	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-84	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-90	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
SpartansSB-103	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
SpartansSB-104	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
SpartansSB-109	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
SpartansSB-12	Business Logic + External Integration	Low	Low	Moderate	7	0.8	6	6	0.00
SpartansSB-15	Business Logic + External Integration	Low	Low	Moderate	7	0.8	6	5	-0.20

Spartans Sprint 4

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
SpartansSB-85	Business Logic	High	High	Moderate	3	1.1	5	5	0.00
SpartansSB-117	Business Logic	High	High	Moderate	3	1.4	5	5	0.00
SpartansSB-118	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
SpartansSB-122	Administrative Activities	Low	High	Moderate	1	1.2	2	2	0.00
SpartansSB-128	DB Changes	Moderate	Moderate	Moderate	2	1.1	3	3	0.00
SpartansSB-131	Business Logic + DAO	Low	Moderate	Moderate	5	1	5	5	0.00
SpartansSB-136	Business Logic	Moderate	High	High	3	1.1	4	5	0.20
SpartansSB-137	External Integration	Low	Low	Moderate	4	0.8	4	3	-0.33

Spartans Sprint 5

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
SpartansSB-15	Business Logic	Low	Moderate	Moderate	3	1	3	2	-0.50

SpartansSB-87	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
SpartansSB-89	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
SpartansSB-95	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	0.00
SpartansSB-121	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-148	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	0.00
SpartansSB-149	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-151	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-152	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-162	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-165	Business Logic	Moderate	Moderate	Moderate	3	1.1	4	4	0.00

Spartans Sprint 6

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
SpartansSB-64	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
SpartansSB-150	Business Logic	High	High	Moderate	3	1.4	5	5	0.00
SpartansSB-182	Business Logic	High	High	Moderate	3	1.4	5	5	0.00
SpartansSB-204	External Integration	Low	High	Moderate	4	1.2	5	5	0.00
SpartansSB-220	Business Logic	Low	Low	Moderate	3	0.8	3	3	0.00
SpartansSB-224	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
SpartansSB-232	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	0.00
SpartansSB-255	Business Logic	Moderate	Moderate	Moderate	3	1.1	4	5	0.20
SpartansSB-266	Business Logic + Rest Services	Low	Moderate	High	6	0.8	5	5	0.00

Spartans Sprint 7

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
SpartansSB-194	Reports	Moderate	Moderate	Moderate	4	1.1	5	5	0.00
SpartansSB-211	Business Logic + DAO	Low	Moderate	Moderate	5	1	5	5	0.00
SpartansSB-222	External Integration	Low	Low	Moderate	4	0.8	4	3	-0.33
SpartansSB-223	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	0.00
SpartansSB-225	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-226	Reports	Low	Moderate	Moderate	4	1	4	3	-0.33
SpartansSB-276	Administrative	Low	Moderate	Moderate	1	1	1	1	0.00

	Activities								
SpartansSB-281	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00

Spartans Sprint 8

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
SpartansSB-63	Onboarding New Software	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-113	UI + Business Logic + Rest Services + DAO	Low	Moderate	High	10	0.8	8	8	0.00
SpartansSB-190	Administrative Activities	Moderate	Moderate	Moderate	1	1.1	2	2	0.00
SpartansSB-219	Onboarding New Software	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-254	DB Changes	Low	Low	Moderate	2	0.8	2	1	-1.00
SpartansSB-261	Reports	Low	Low	High	4	0.6	3	3	0.00
SpartansSB-273	Business Logic	Low	Low	High	3	0.6	2	2	0.00
SpartansSB-285	Onboarding New Software	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-287	Reports	Low	Low	Moderate	4	0.8	4	3	-0.33
SpartansSB-297	Onboarding New Software	Moderate	Moderate	Moderate	3	1.1	4	5	0.20
SpartansSB-302	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00
SpartansSB-305	Business Logic	Moderate	Moderate	Moderate	3	1.1	4	5	0.20
SpartansSB-308	Administrative Activities	Low	Moderate	Moderate	1	1	1	1	0.00
SpartansSB-311	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-314	Reports	Moderate	Moderate	Moderate	4	1.1	5	5	0.00

Spartans Sprint 9

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
SpartansSB-213	Onboarding New Software	Moderate	High	Moderate	3	1.3	4	5	0.20
SpartansSB-218	Reports	Moderate	High	Moderate	4	1.3	6	8	0.25
SpartansSB-299	External Integration	Low	High	Moderate	4	1.2	5	5	0.00
SpartansSB-304	Business Logic + Rest Services	Low	Low	Moderate	6	0.8	5	5	0.00
SpartansSB-315	Testing - Reports	Low	High	Moderate	2	1.2	3	3	0.00
SpartansSB-316	Testing - Reports	Low	Low	Moderate	2	0.8	2	2	0.00
SpartansSB-346	Onboarding New	Low	Low	Moderate	3	0.8	3	3	0.00

	Software								
SpartansSB-358	Onboarding New Software	Low	Low	Moderate	3	0.8	3	3	0.00
SpartansSB-375	Business Logic	Low	Low	Moderate	3	0.8	3	2	-0.50
SpartansSB-391	Business Logic	Low	Moderate	Moderate	3	1	3	2	-0.50
SpartansSB-392	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-407	Business Logic	Low	Moderate	Moderate	3	1	3	3	0.00
SpartansSB-416	Reports	Moderate	Moderate	Moderate	4	1.1	5	5	0.00
SpartansSB-417	Administrative Activities	Moderate	Moderate	Moderate	1	1.1	2	2	0.00
SpartansSB-420	Testing - Business	Moderate	Moderate	Moderate	2	1.1	3	3	0.00
SpartansSB-421	Administrative Activities	Low	Low	Moderate	1	0.8	1	1	0.00

Spartans Sprint 10

Key	Work Item	FC	TC	RM	RE	CF	WE	AE	MRE-W
SpartansSB-208	Administrative Activities	Low	High	Moderate	1	1.2	2	2	0.00
SpartansSB-212	Reports	Low	Low	High	4	0.6	3	3	0.00
SpartansSB-331	Business Logic + Rest Services	Low	High	Moderate	6	1.2	8	8	0.00
SpartansSB-340	Testing - Reports	Low	Low	Moderate	2	0.8	2	2	0.00
SpartansSB-395	Business Logic	Low	Low	Moderate	3	0.8	3	2	-0.50
SpartansSB-411	Testing - Reports	Low	Moderate	Moderate	2	1	2	2	0.00
SpartansSB-423	Business Logic + Rest Services	Low	Low	Moderate	6	1	5	5	0.00
SpartansSB-437	Administrative Activities	Moderate	Moderate	Moderate	1	1.1	2	2	0.00
SpartansSB-438	Testing - Business	Low	Moderate	Moderate	2	1	2	2	0.00

10.2 Appendix B

Experiment purpose created Excel-based estimation template to use for the Sprint Projects. The project teams use Excel to define each sprint's Project Level Factors and Story Level factors. Define the stories in Excel and explain the complexity factor. Based on the factor identified, the template calculates the story points for use. Below are the sections for the template.

Organization-wide, the base efforts are defined in the technical work item section. Below is the sample template for base estimations specified by the Organizations

Work Item	Moderate Estiamtion Points
UI Page	2
Business Logic	3
Rest Service	3
SOAP Service	3
External Integration	3
DAO	1.5
DB Changes	1
UI + Business Logic	5
UI + Business Logic + DAO	6.5
Business Logic + Rest Services	6
Business Logic + DAO	4.5
Business Logic + External Integration	6
UI+Business Logic + Rest Services	8
UI+Business Logic + Rest Services+External Integration	11
UI+Business Logic + Rest Services+DAO	9.5
Bug - UI	1
Bug - Business Logic	1.5
Bug - DAO	1
Bug - Services	1.5
Bug - External Intergration	2

Define the complexity factors in the defined sheet in Excel. These values are fixed. No need to change from the project point of view

Complexity Defination				
Abbrivations	**Project Level Factors**	**Low**	**Moderate**	**High**
AC	Architecture Capability (AC)	1.2	1	0.9
CI/ CD	Build Automation (CI/ CD)	1.2	1.1	1
ACC	Automated Code Generation (ACC)	1	0.8	0.6
TDD	Test Driven Development (TDD)	1	1.1	1.12
	Story Level Factors			
FC	Functional Complexity (FC)	1	1.1	1.2
TC	Technical Complexity (TC)	0.8	1	1.2
RE	Resource Experience (RE)	1.2	1	0.8

Provide the project details and Project Level Maturity Values in the Effort template workbook. These values are defined based on the maturity section for each project-level factor.

Project Name		
Project Dates		
Project Level Maturity		
Architecture Capability (AC)	Moderate	1
Build Automation (CI/ CD)	Moderate	1.1
Automated Code Generation (ACC)	Low	1
Test Driven Development (TDD)	Low	1
	Total Project Level Maturity	**4.1**

Stories are defined in Excel along with the work packet. The developer has to assign the Story specific factor definitions for each story. The Estiamtion-WECOFE is calculated according to the defined factor values.

Key	Summary	Type	Work Item	FC	TC	RE	Raw Estimates	Complexity Factor Estiamtion Points	Estimates -WECOFEMO	Actual Effort (SP)	MRE-WECOFEMO
			Business Logic + Rest Services	High	High	High	6	1.3	8	8	0.00
			Business Logic + External Integration	Low	Low	High	6	0.7	5	5	0.00
			DAO	Moderate	Low	Low	1.5	1.2	2	2	0.00
			Bug - Business Logic	Moderate	Moderate	Moderate	1.5	1.2	2	2	0.00
			DB Changes	Moderate	Moderate	High	1	1	1	2	0.50
			UI Page	Moderate	Moderate	Low	2	1.4	3	2	-0.50
										MMRE	0.00

10.3 Appendix C

Conducted survey on “Usage of Software Architectures and Agile in an Organization” in the July-2020 with the below questioner.

Section 1 comprises of general information like Name, Organization Name, Size of Organization, Domain, Years of Experience, and Role performed in the Organization.

Section 2 & 3 comprises of the below 16 questions answered by the users:

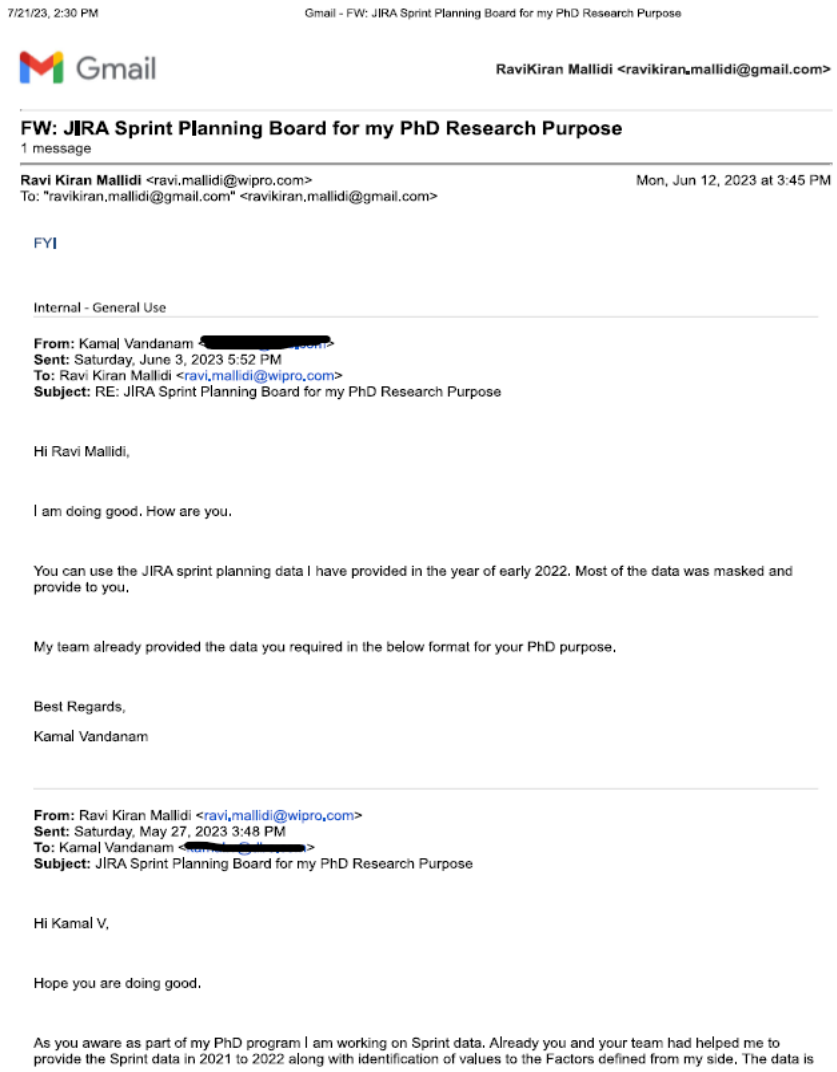
- How many Solutions provide in 2019 and 2020 from you?
- How many of them are Microservices architecture in 2019 and 2020 from you?
- Out of the solutions provided, how many of them are using DevOps with CI/CD pipeline?
- Concerning DevOps, what are the percentage of solutions using the end-to-end automation framework in the CI/CD pipeline?
- How many Solutions are Deployed in the Cloud Platform?
- Did you deploy any solution On-Premises in 2019? How may and any specific Reson?
- According to your organization experience, which are core sectors planning to implement Microservices?
- According to your organization experience, what is the percentage of the Organization(s)/Client preferred choice is customized Microservices Framework like IBM ClodPak for applications?
- Are you observing any growth in Microservices architecture for the last 2-3 years?
- Which technology you prefer to use to implement Microservices?
- What is the Software Life Cycle Methodology your Organization uses?
- How many projects are using Agile / Hybrid Agile in the current scope?

- What is the % of Agile projects which are using Microservices?
- What is the frequency of the release cycle of the Agile / Hybrid Agile?
- What are the estimation techniques used in Scrum projects?
- Any Other Infomation to share

10.4 Appendix D

The section provides the mail communication between myself and the project managers from different Organizations. Based on the emails, the Organization project managers helped me to give the Sprint masked data.

Org 1 communication



7/21/23, 2:30 PM Gmail - FW: JIRA Sprint Planning Board for my PhD Research Purpose

Gmail RaviKiran Mallidi <ravikiran.mallidi@gmail.com>

FW: JIRA Sprint Planning Board for my PhD Research Purpose
1 message

Ravi Kiran Mallidi <ravi.mallidi@wipro.com> Mon, Jun 12, 2023 at 3:45 PM
To: "ravikiran.mallidi@gmail.com" <ravikiran.mallidi@gmail.com>

FYI

Internal - General Use

From: Kamal Vandanam [redacted]
Sent: Saturday, June 3, 2023 5:52 PM
To: Ravi Kiran Mallidi <ravi.mallidi@wipro.com>
Subject: RE: JIRA Sprint Planning Board for my PhD Research Purpose

Hi Ravi Mallidi,

I am doing good. How are you.

You can use the JIRA sprint planning data I have provided in the year of early 2022. Most of the data was masked and provide to you.

My team already provided the data you required in the below format for your PhD purpose.

Best Regards,
Kamal Vandanam

From: Ravi Kiran Mallidi <ravi.mallidi@wipro.com>
Sent: Saturday, May 27, 2023 3:48 PM
To: Kamal Vandanam [redacted]
Subject: JIRA Sprint Planning Board for my PhD Research Purpose

Hi Kamal V,

Hope you are doing good.

As you aware as part of my PhD program I am working on Sprint data. Already you and your team had helped me to provide the Sprint data in 2021 to 2022 along with identification of values to the Factors defined from my side. The data is

very helpful for analyzing defined model as part of my PhD work.

In this context please provide your approval for using the provided data in my PhD work as masked from your side due to ethical constraints.

Looking forward to get the same data what you have provided last year with masked along with values defined for each story. For your reference below is the data format I have shared last time.

Sprint ID	Story Summary	Estimated Story Points	Actual Story Points	Work Item	Functional Complexity	Technical Complexity	Resource Maturity

Regards,
Ravi Kiran Mallidi (Digital)

Org 2 communication

7/21/23, 2:31 PM Gmail - FW: JIRA Sprint Planning Board for my PhD Research Purpose

Gmail RaviKiran Mallidi <ravikiran.mallidi@gmail.com>

FW: JIRA Sprint Planning Board for my PhD Research Purpose
1 message

Ravi Kiran Mallidi <ravi.mallidi@wipro.com> Mon, Jun 12, 2023 at 3:37 PM
To: "ravikiran.mallidi@gmail.com" <ravikiran.mallidi@gmail.com>

FYI

Internal - General Use

From: Kiran Kumar <[redacted]>
Sent: Sunday, May 21, 2023 3:34 PM
To: Ravi Kiran Mallidi <ravi.mallidi@wipro.com>
Subject: RE: JIRA Sprint Planning Board for my PhD Research Purpose

Hi Ravi Kiran,

As told earlier you can consume the JIRA data provided from my side for your PhD thesis work. Along with the PDF files, provided you the data you have requested in below format.

Providing consent to use the JIRA data with proper masking.

Regards,
Kiran Kumar

Internal - General Use

From: Ravi Kiran Mallidi <ravi.mallidi@wipro.com>
Sent: Thu, May 18 12, 2023 4:32 PM
To: Kiran Kumar <[redacted]>
Subject: JIRA Sprint Planning Board for my PhD Research Purpose

Hi Kiran,

Hope you are doing good.

As you aware as part of my PhD program I am working on Sprint data. Already you and your team had helped me to provide the Sprint data in 2021 to 2022 along with identification of values to the Factors defined from my side. The data is very helpful for analyzing defined model as part of my PhD work.

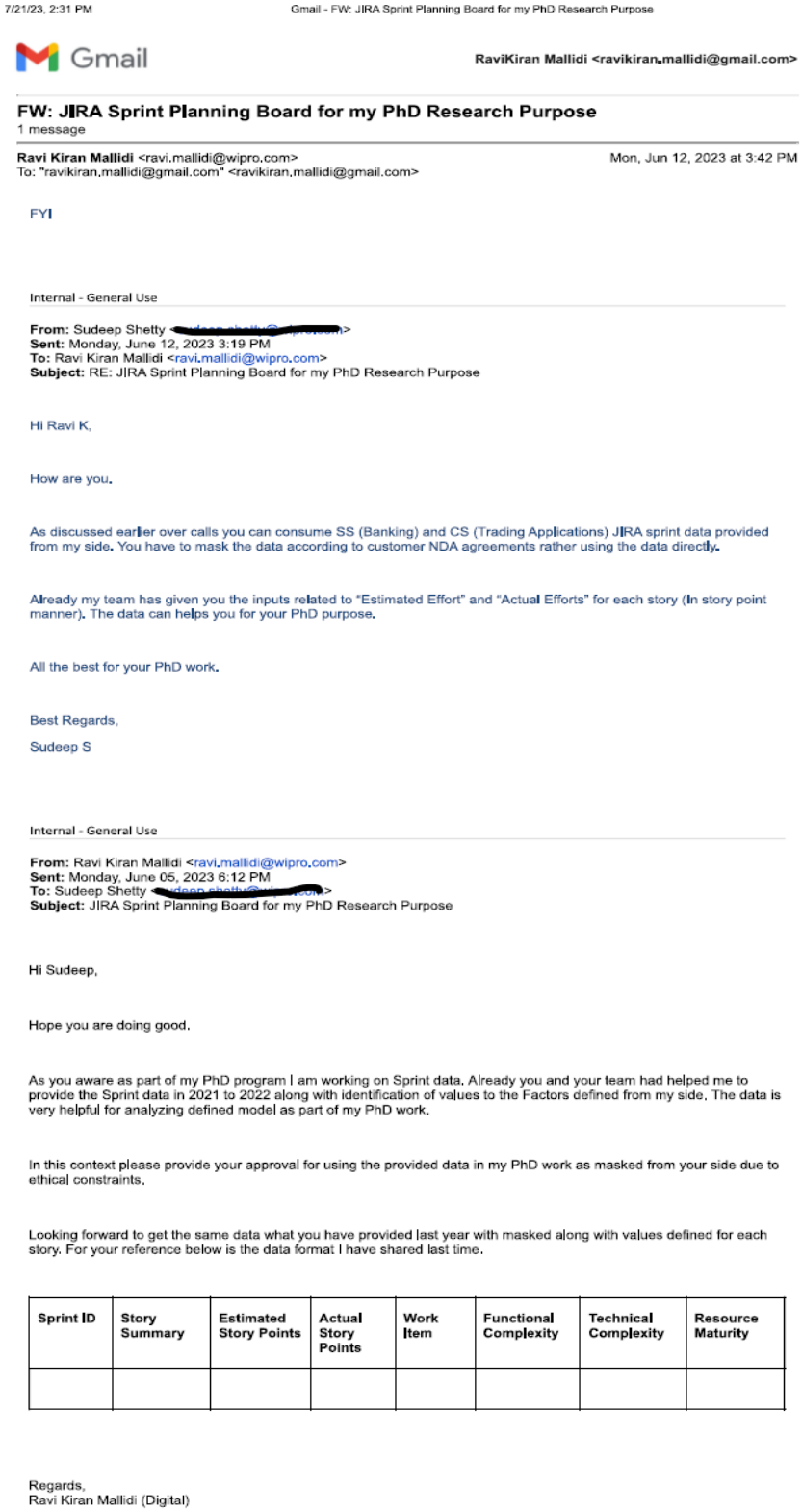
In this context please provide your approval for using the provided data in my PhD work as masked from your side due to ethical constraints.

Looking forward to get the same data what you have provided last year with masked along with values defined for each story. For your reference below is the data format I have shared last time.

Sprint ID	Story Summary	Estimated Story Points	Actual Story Points	Work Item	Functional Complexity	Technical Complexity	Resource Maturity

Regards,
Ravi Kiran Mallidi (Digital)

Org 3 communication



7/21/23, 2:31 PM Gmail - FW: JIRA Sprint Planning Board for my PhD Research Purpose

Gmail RaviKiran Mallidi <ravikiran.mallidi@gmail.com>

FW: JIRA Sprint Planning Board for my PhD Research Purpose
1 message

Ravi Kiran Mallidi <ravi.mallidi@wipro.com> Mon, Jun 12, 2023 at 3:42 PM
To: "ravikiran.mallidi@gmail.com" <ravikiran.mallidi@gmail.com>

FYI

Internal - General Use

From: Sudeep Shetty <[redacted]>
Sent: Monday, June 12, 2023 3:19 PM
To: Ravi Kiran Mallidi <ravi.mallidi@wipro.com>
Subject: RE: JIRA Sprint Planning Board for my PhD Research Purpose

Hi Ravi K,

How are you.

As discussed earlier over calls you can consume SS (Banking) and CS (Trading Applications) JIRA sprint data provided from my side. You have to mask the data according to customer NDA agreements rather using the data directly.

Already my team has given you the inputs related to "Estimated Effort" and "Actual Efforts" for each story (In story point manner). The data can helps you for your PhD purpose.

All the best for your PhD work.

Best Regards,

Sudeep S

Internal - General Use

From: Ravi Kiran Mallidi <ravi.mallidi@wipro.com>
Sent: Monday, June 05, 2023 6:12 PM
To: Sudeep Shetty <[redacted]>
Subject: JIRA Sprint Planning Board for my PhD Research Purpose

Hi Sudeep,

Hope you are doing good.

As you aware as part of my PhD program I am working on Sprint data. Already you and your team had helped me to provide the Sprint data in 2021 to 2022 along with identification of values to the Factors defined from my side. The data is very helpful for analyzing defined model as part of my PhD work.

In this context please provide your approval for using the provided data in my PhD work as masked from your side due to ethical constraints.

Looking forward to get the same data what you have provided last year with masked along with values defined for each story. For your reference below is the data format I have shared last time.

Sprint ID	Story Summary	Estimated Story Points	Actual Story Points	Work Item	Functional Complexity	Technical Complexity	Resource Maturity

Regards,
Ravi Kiran Mallidi (Digital)

Chapter 11 – Publications

This section describes the publications done during the thesis time for the Agile based estimations. The publications includes different Architecture methods along with Agile factors considered.

11.1 Journal Publication Papers

Below Table 16 are the papers published in different journals from April-2020 to July-2024 as part of thesis work.

Table 16 – List of Journal Papers Published

S. No	Name of the Journal	Journal indexing	Title of the Paper	Volume & Issue Number	ISSN /ISBN Number	Web link of journal indexing
1	Suranaree Journal of Science and Technology	Scopus, Web Of Sciences	Agile Estimations Empirical Study Using Weighted Complexity Factors	Volume: 30	ISSN 0858-849X	https://doi.org/10.55766/sujst-2023-04-e0737
2	International journal of electrical and computer engineering systems	Scopus, Web Of Sciences	Legacy Digital Transformation: TCO and ROI Analysis	Volume 12		https://hrcak.srce.hr/en/clanak/380657
3	International Journal of Advanced Computer Technology	Peer Review	Sematic Review On Software Architectures For Web-Based Applications	Volume-X, Issue-III	ISSN:2320-0790	https://ijact.in

4	International Journal of Computer Applications	Peer Review	Study on Agile Story Point Estimation Techniques and Challenges	Volume 174 – No. 13	0975 – 8887	https://www.ijcaonline.org/archives/volume174/number13/31736-2021921014
5	PAIDEUMA JOURNAL	Peer Review	Empirical Study on Software Estimation Techniques	Vol XIII Issue VIII	ISSN NO: 0090-5674	https://paideumajournal.com/gallery/1-aug2020.pdf

11.2 Conference Papers

Below Table 17 are the papers published in different conferences from April-2020 to July-2024 as part of thesis work.

Table 17 – List of Conference Papers Published

S. No	Name of the Conference	Journal indexing	Title of the Paper	Volume & Issue Number	ISSN /ISBN Number	Web link of journal indexing
1	RACS-2022	Scopus	Agile Estimation - Empirical Study on Critical Factors		ISBN: 9781032521954	https://www.routledge.com/Recent-Advances-in-Computing-Sciences-Proceed-in-gs-of-RACS-2022/Sheikh-Sharma-Singh/p/book/9781032521954
2	IEEE Conference - 2nd ASIANCON 2022	Scopus	Streaming Platform Implementation in Banking and Financial Systems		DOI: 10.1109/ASIANCON55314.2022.9909500	https://ieeexplore.ieee.org/document/9909500
3	RACS-2022	Scopus	Automation Using Artificial Intelligence and Machine Learning A Study on Banking		ISBN: 9781032521954	https://www.routledge.com/Recent-Advances-in-Computing-Sciences-Proceed-in-gs-of-RACS-

			and Healthcare			2022/Sheikh-Sharma-Singh/p/book/9781032521954