

Optimization Model for Scrum-based Development

Decision Variables

- x_1 = Developers per project (Integer): $1 \leq x_1 \leq 20$
- x_2 = Sprint length days (Integer): $7 \leq x_2 \leq 28$
- x_3 = User stories per sprint (Integer): $1 \leq x_3 \leq 50$
- x_4 = Budget allocation per sprint (Float): $0 \leq x_4 \leq 100000$
- x_5 = Automation coverage (Float): $0 \leq x_5 \leq 1$
- x_6 = Daily scrum count (Integer): $1 \leq x_6 \leq 3$
- x_7 = Features per release (Integer): $1 \leq x_7 \leq 10$
- x_8 = Tasks per story (Float): $1 \leq x_8 \leq 10$
- x_9 = Test cases per feature (Integer): $0 \leq x_9 \leq 200$
- x_{10} = Retrospective actions per sprint (Integer): $0 \leq x_{10} \leq 20$

Objectives

- $\min F_1(x)$ = Project Duration
- $\max F_2(x)$ = Team Velocity
- $\min F_3(x)$ = Budget Overrun
- $\max F_4(x)$ = Feature Throughput
- $\min F_5(x)$ = Bug Escape Rate
- $\max F_6(x)$ = Stakeholder Satisfaction
- $\min F_7(x)$ = Sprint Backlog Age
- $\max F_8(x)$ = Test Coverage
- $\min F_9(x)$ = Cycle Time
- $\max F_{10}(x)$ = Release Frequency

Constraints

C1: $ProjectCost(x) \leq Budget$	(Must-Match)
C2: $3 \leq x_1 \leq 9$	(Must-Match)
C3: $x_1 \leq AvailableEmployees$	(Must-Match)
C4: $x_2 = 14$	(Must-Match)
C5: $Skill_{testing} \geq 1$	(Must-Match)
C6: $ActiveSprints \leq 3$	(Can-Match)
C7: $Priority_f \geq 3 \quad \forall f \in \text{Features}$	(Must-Match)
C8: $OpenCriticalBugs(\text{releaseDate}) = 0$	(Cannot-Match)
C9: $ReviewsPerSprint \geq 1$	(Must-Match)
C10: $LinkedDocs(f) \geq 1 \quad \forall f \in \text{Features}$	(Can-Match)