

Optimization Model for Scrum-based Software Development

Decision Variables

- x_1 = Team Size (DV1)
- x_2 = Sprint Length in days (DV2)
- x_3 = Features per Sprint (DV3)
- x_4 = Budget Allocation (DV4)
- x_5 = Developer Hours per Week (DV5)
- x_6 = QA Hours per Sprint (DV6)
- x_7 = Code Coverage Target % (DV7)
- x_8 = Defect Density Threshold (DV8)
- x_9 = Story Points Committed (DV9)
- x_{10} = Feedback Sessions per Sprint (DV10)

Objective Functions (Goals)

- $\max f_1(x)$ = Velocity (G1: Maximize Velocity)
- $\min f_2(x)$ = Defect Rate (G2: Minimize Defect Rate)
- $\max f_3(x)$ = Customer Feedback Sessions (G4: Maximize Customer Feedback)
- $\max f_4(x) = x_7$ (G9: Maximize Code Coverage)
- $\min f_5(x)$ = Time-to-Market (G6: Minimize Time-to-Market)

Constraints (Conditions)

- C1: Budget Cap: $x_4 \leq B_{\max}$ (Must match)
- C2: Sprint Duration: $7 \leq x_2 \leq 30$ (Must match)
- C6: Overtime Cap: $x_5 \leq 40$ (Cannot match)
- C10: Defect Density: $x_8 \leq 10$ (Must match)
- DV Bounds: $3 \leq x_1 \leq 9$ (per DV1)
- $1 \leq x_3 \leq 20$ (per DV3)
- $20 \leq x_5 \leq 40$ (per DV5)
- $10 \leq x_6 \leq 80$ (per DV6)
- $0 \leq x_7 \leq 100$ (per DV7)
- $0 \leq x_8 \leq 10$ (per DV8)
- $5 \leq x_9 \leq 50$ (per DV9)
- $1 \leq x_{10} \leq 5$ (per DV10)