Optimization Model for Scrum-Based Software Development

Decision Variables

$$
\begin{aligned}
x_1 &= \text{NumSprints (Total sprints planned)} \\
x_2 &= \text{SprintLength (weeks per sprint)} \\
x_3 &= \text{TeamSize (members per team)} \\
x_4 &= \text{DevCount (number of developers)} \\
x_5 &= \text{QACount (number of QA engineers)} \\
x_6 &= \text{SprintBudget (allocated per sprint)} \\
x_7 &= \text{SPCapacity (planned story points per sprint)} \\
x_8 &= \text{FeaturesPerRelease (features per release)} \\
x_9 &= \text{RetroDuration (minutes per retrospective)} \\
x_{10} &= \text{DailyScrumTime (minutes per daily scrum)}
\end{aligned}
$$

Objectives (Multi-objective)

$$\max\big(v(x) = \text{Velocity}\big), \quad \min\big(b(x) = \text{BugCount}\big), \quad \max\big(s(x) = \text{StakeholderSatisfaction}\big),$$
$$\min\big(t(x) = \text{TimeToMarket}\big), \quad \max\big(f(x) = \text{FeaturesDelivered}\big), \quad \min\big(c(x) = \text{CostVariance}\big),$$
$$\max\big(u(x) = \text{TeamUtilization}\big), \quad \min\big(o(x) = \text{SprintOverrunRate}\big), \quad \max\big(d(x) = \text{DocCoverage}\big), \quad \min$$

Constraints

$$1 \le x_1 \le 20, \tag{1}$$
$$1 \le x_2 \le 4, \tag{2}$$
$$3 \le x_3 \le 9, \tag{3}$$
$$1 \le x_4 \le 8, \tag{4}$$
$$1 \le x_5 \le 4, \tag{5}$$
$$10{,}000 \le x_6 \le 200{,}000, \tag{6}$$
$$20 \le x_7 \le 100, \tag{7}$$
$$1 \le x_8 \le 10, \tag{8}$$
$$30 \le x_9 \le 90, \tag{9}$$
$$15 \le x_{10} \le 30. \tag{10}$$