Optimization Model for Scrum-based Software Development

Decision Variables

$$
\begin{aligned}
x_1 &= \text{Sprint Length (days)} \quad [7, 28],\ x_1 \in \mathbb{Z} \\
x_2 &= \text{Number of Developers per Team} \quad [3, 9],\ x_2 \in \mathbb{Z} \\
x_3 &= \text{Budget Allocation (EUR)} \quad [10\,000, 1\,000\,000],\ x_3 \in \mathbb{R} \\
x_4 &= \text{Story Points Capacity per Sprint} \quad [20, 100],\ x_4 \in \mathbb{Z} \\
x_5 &= \text{Max Concurrent Tasks per Developer} \quad [1, 5],\ x_5 \in \mathbb{Z} \\
x_6 &= \text{Number of Test Environments} \quad [1, 5],\ x_6 \in \mathbb{Z} \\
x_7 &= \text{Standard Meeting Duration (min)} \quad [15, 60],\ x_7 \in \mathbb{Z} \\
x_8 &= \text{Backlog Refinement Sessions per Sprint} \quad [1, 4],\ x_8 \in \mathbb{Z} \\
x_9 &= \text{Releases per Year} \quad [1, 12],\ x_9 \in \mathbb{Z} \\
x_{10} &= \text{Documentation Review Interval (days)} \quad [7, 90],\ x_{10} \in \mathbb{Z}
\end{aligned}
$$

Objectives (Goals)

1. Maximize average story points per sprint:
$$\max Z_1 = x_4.$$
2. Minimize number of unresolved bugs per sprint (modeled abstractly as $B(x)$):
$$\min Z_2 = B(x).$$
3. Maximize stakeholder satisfaction (abstract $S(x)$):
$$\max Z_3 = S(x).$$
4. Minimize average task completion time (abstract $T(x)$):
$$\min Z_4 = T(x).$$

Constraints (Conditions)

$x_3 \le B_{\max}$	(Budget Cap)
$3 \le x_2 \le 9$	(Team Size Range)
$7 \le x_1 \le 28$	(Sprint Duration)
$\text{Availability}(x) \le 1$	(Resource Availability)
$\text{SkillMatch}(x) = 1$	(Skill Coverage)
$\text{Cadence}(x) = 5$	(Daily Scrum Cadence)
$\text{AttendanceRate}(x) \ge 0.7$	(Review Attendance)

Variable Domains

$$\begin{aligned} x_i &\in \mathbb{Z} \quad \text{for } i = 1, 2, 4, 5, 6, 7, 8, 9, 10, \\ x_3 &\in \mathbb{R} \quad \text{for Budget Allocation.} \end{aligned}$$