Optimization Model

Decision Variables

$$
\begin{aligned}
D_1 &= \text{Sprint duration in days (Integer)} \\
D_2 &= \text{Team size (Integer)} \\
D_3 &= \text{Budget allocation (Float)} \\
D_4 &= \text{Story point cap per sprint (Integer)} \\
D_5 &= \text{Estimated effort for a feature (Float)} \\
D_6 &= \text{Max tasks per developer (Integer)} \\
D_7 &= \text{Releases per year (Integer)} \\
D_8 &= \text{Documentation pages per feature (Integer)} \\
D_9 &= \text{Number of test environments (Integer)} \\
D_{10} &= \text{Meeting duration in minutes (Integer)} \\
D_{11} &= \text{Backlog items reviewed per review (Integer)}
\end{aligned}
$$

Objective Functions

$$
\begin{aligned}
&\text{Maximize } z_1 = \text{Velocity} \quad (G1) && (1) \\
&\text{Minimize } z_2 = \text{Bug Count} \quad (G2) && (2) \\
&\text{Maximize } z_3 = \text{Customer Satisfaction} \quad (G3) && (3) \\
&\text{Minimize } z_4 = \text{Sprint Overrun} \quad (G4) && (4) \\
&\text{Maximize } z_5 = \text{Team Utilization} \quad (G5) && (5) \\
&\text{Minimize } z_6 = \text{Cost Variance} \quad (G6) && (6) \\
&\text{Maximize } z_7 = \text{Features Delivered} \quad (G7) && (7) \\
&\text{Minimize } z_8 = \text{Time to Market} \quad (G8) && (8) \\
&\text{Maximize } z_9 = \text{Code Coverage} \quad (G9) && (9) \\
&\text{Minimize } z_{10} = \text{Technical Debt} \quad (G10) && (10) \\
&\text{Maximize } z_{11} = \text{Stakeholder Engagement} \quad (G11) && (11)
\end{aligned}
$$

Constraints (Conditions)

$$5 \leq D_2 \leq 9 \quad \text{(C1: Team Size Limit)} \tag{12}$$

$$D_1 = 14 \quad \text{(C2: Sprint Length = 2 weeks)} \tag{13}$$

$$D_3 \leq \text{Budget} \quad \text{(C3: Budget Ceiling)} \tag{14}$$

$$\sum_{\text{skill } s \in \text{ReqSkills}} x_{\text{team},s} \geq 1 \quad \text{(C4: Skill Coverage)} \tag{15}$$

$$\text{Availability}(e) = 1 \quad \forall e \in \text{Team} \quad \text{(C5)} \tag{16}$$

$$\text{ReleaseDate} \leq \text{PlannedDate} \quad \text{(C6: Release Date Target)} \tag{17}$$

$$\#\{\text{backlog entries}\} \geq \text{Approved} \quad \text{(C7: Backlog Completeness)} \tag{18}$$

$$D_5 \leq 50 \quad \text{(C8: Epic Size Cap)} \tag{19}$$

$$G \geq 1 \quad \forall \text{Sprint Goals} \quad \text{(C9)} \tag{20}$$

$$\text{Doc}(f) \geq 1 \quad \forall f \in \text{Features} \quad \text{(C10)} \tag{21}$$

$$D_{11} \leq 1 \quad \text{(C11: Max Daily Meetings)} \tag{22}$$

$$\text{ResolveTime}(b) \leq 48h \quad \forall b \in \text{Blockers} \quad \text{(C12)} \tag{23}$$

$$\text{ResponseTime} \leq 24h \quad \forall \text{PO} \quad \text{(C13)} \tag{24}$$