Optimization Model for Scrum-Based Software Development

Decision Variables

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\begin{aligned}
x_1 &= \text{TeamAlloc}, \quad \text{integer}, \ 3 \leq x_1 \leq 9 \\
x_2 &= \text{SprintLength}, \quad \text{integer}, \ 10 \leq x_2 \leq 30 \\
x_3 &= \text{StoriesSprint}, \quad \text{integer}, \ 1 \leq x_3 \leq 20 \\
x_4 &= \text{BudgetFeature}, \quad \text{continuous}, \ 1000 \leq x_4 \leq 50000 \\
x_5 &= \text{SPUEstimate}, \quad \text{integer}, \ 1 \leq x_5 \leq 13 \\
x_6 &= \text{TasksPerStory}, \quad \text{integer}, \ 1 \leq x_6 \leq 10 \\
x_7 &= \text{NumReleases}, \quad \text{integer}, \ 1 \leq x_7 \leq 12 \\
x_8 &= \text{DocsPerFeature}, \quad \text{integer}, \ 1 \leq x_8 \leq 10 \\
x_9 &= \text{ParallelSprints}, \quad \text{integer}, \ 1 \leq x_9 \leq 3 \\
x_{10} &= \text{FeatureIncluded}, \quad \text{binary}, \ 0 \leq x_{10} \leq 1 \\
x_{11} &= \text{RoadmapMilestones}, \quad \text{integer}, \ 1 \leq x_{11} \leq 20 \\
x_{12} &= \text{TestCoverage}, \quad \text{continuous}, \ 50 \leq x_{12} \leq 100
\end{aligned}
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Objectives

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\begin{aligned}
\min \ & f_1(x) = \text{DefectRate}(x) \\
\max \ & f_2(x) = \text{Velocity}(x) \\
\max \ & f_3(x) = \text{CustomerSatisfaction}(x) \\
\min \ & f_4(x) = \text{BudgetOverrun}(x) \\
\max \ & f_5(x) = \text{OnTimeDelivery}(x) \\
\max \ & f_6(x) = \text{FeatureThroughput}(x) \\
\min \ & f_7(x) = \text{CycleTime}(x) \\
\max \ & f_8(x) = \text{TeamUtilization}(x) \\
\min \ & f_9(x) = \text{TechnicalDebt}(x) \\
\max \ & f_{10}(x) = \text{RoadmapAlignment}(x) \\
\min \ & f_{11}(x) = \text{SprintScopeChanges}(x) \\
\max \ & f_{12}(x) = \text{DocCoverage}(x)
\end{aligned}
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Constraints

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\begin{aligned}
g_1(x) &: \text{Budget}(x) \leq \text{BudgetLimit} \\
g_2(x) &: 3 \leq x_1 \leq 9 \\
g_3(x) &: x_2 = 14 \\
g_4(x) &: \text{SkillMatch}(x) = 1 \\
g_5(x) &: \text{ReleaseQuarter}(x) \in \{\text{PlannedQuarters}\} \\
g_6(x) &: x_3 \leq \text{StoryPointCap} \\
g_7(x) &: \text{DependencyOrder}(x) = 1 \\
g_8(x) &: \text{Availability}(x) \geq x_3 * \text{AvgEffortPerStory} \\
g_9(x) &: \text{Compliance}(x) = 1 \\
g_{10}(x) &: \text{TechStack}(x) \subseteq \text{ApprovedStack} \\
g_{11}(x) &: \text{StakeholderAttendance}(x) = 1 \\
g_{12}(x) &: \text{DocStandardCompliance}(x) = 1 \\
g_{13}(x) &: \text{TimeZoneOverlap}(x) \geq 4
\end{aligned}
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