

Optimization Model for Scrum-based Software Development

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1 Sets (Entities)

- P : Projects
- T : Teams
- W : Workers
- S : Sprints
- F : Features
- R : Release Plans
- RM : Roadmaps
- DS : Development Snapshots
- B : Blockers

2 Indices

- $p \in P$
- $t \in T$
- $w \in W$
- $s \in S$
- $f \in F$
- $r \in R$
- $rm \in RM$
- $ds \in DS$
- $b \in B$

3 Goals

- G_0 : Maximize project budget $\max \sum_{p \in P} budget_p$
- G_1 : Minimize project duration $\min \sum_{p \in P} project_end_p$
- G_2 : Maximize team velocity $\max \sum_{t \in T} avg_story_points_t$
- G_3 : Minimize blocker severity $\min \sum_{b \in B} severity_b$
- G_4 : Maximize sprint goal achievement $\max \sum_{s \in S} achievement_status_s$
- G_5 : Minimize task effort $\min \sum_{t \in T} effort_t$
- G_6 : Maximize feature priority $\max \sum_{f \in F} priority_f$
- G_7 : Minimize sprint retrospective improvement actions $\min \sum_{s \in S} improvement_actions_s$
- G_8 : Maximize stakeholder influence $\max \sum_{sh \in SH} influence_level_{sh}$
- G_9 : Minimize development snapshot test status $\min \sum_{ds \in DS} test_status_{ds}$
- G_{10} : Maximize release plan status $\max \sum_{r \in R} status_r$
- G_{11} : Maximize roadmap objectives $\max \sum_{rm \in RM} objectives_{rm}$
- G_{12} : Minimize scrum board number of cards $\min \sum_{scb \in SCB} number_of_cards_{scb}$

4 Conditions

- C_0 : Ensure project status is active $status_p = Active$
- C_1 : Ensure team availability is high $team_status_t \geq High$
- C_2 : Ensure worker availability is high $availability_w \geq High$
- C_3 : Ensure sprint goal alignment with project objectives $objective_description_s = ProjectObjective$
- C_4 : Ensure feature priority alignment with project objectives $priority_f \geq High$
- C_5 : Ensure stakeholder relevance to feature $relevance_to_feature_{sh} \geq High$
- C_6 : Ensure release plan inclusion of high-priority features $included_features_r \geq 1$
- C_7 : Ensure roadmap alignment with project objectives $objectives_{rm} = ProjectObjective$
- C_8 : Ensure scrum board configuration is valid $board_type_{scb} = Valid$
- C_9 : Ensure development snapshot quality is high $test_status_{ds} \geq High$
- C_{10} : Ensure blocker resolution is timely $resolved_on_b \leq DueDate$

5 Decision Variables

- D_0 : Project allocation $x_p \in \{0, 1\}$
- D_1 : Team assignment $y_t \in \{0, 1\}$
- D_2 : Worker allocation $z_w \in \{0, 1\}$
- D_3 : Sprint goal selection $w_s \in \{0, 1\}$
- D_4 : Feature inclusion $v_f \in \{0, 1\}$
- D_5 : Release plan inclusion $u_r \in \{0, 1\}$
- D_6 : Roadmap objective selection $t_{rm} \in \{0, 1\}$
- D_7 : Scrum board configuration $s_{scb} \in \{0, 1\}$
- D_8 : Development snapshot creation $d_{ds} \in \{0, 1\}$
- D_9 : Blocker resolution $b_b \in \{0, 1\}$
- D_{10} : Project budget allocation $budget_allocation_p \geq 0$
- D_{11} : Task effort estimation $effort_estimation_t \geq 0$