Optimization Model for Software Development using Scrum

Generated Model

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Contents

1 Sets (Entities)

- Project (P)
- Team (T)
- Worker (W)
- Feature (F)
- Skill (S)
- Role (R)
- ProductOwner (PO)
- ScrumMaster (SM)
- ProductBacklog (PB)
- Sprint (SP)
- SprintPlanning (SPP)
- DailyScrum (DS)

- SprintReview (SR)
- SprintRetrospective (SRE)
- SprintBacklog (SBL)
- SprintGoal (SG)
- Epic (E)
- UserStory (US)
- Task (TSK)
- DevelopmentSnapshot (DEV)
- Blocker (BL)
- Stakeholder (SH)
- Velocity (VEL)
- ReleasePlan (REP)
- Roadmap (RM)
- ScrumBoard (SCB)
- FeatureDocumentation (FED)

2 Indices

- $p \in P$ (Project)
- $t \in T$ (Team)
- $w \in W$ (Worker)
- $f \in F$ (Feature)
- $s \in S$ (Skill)
- $r \in R$ (Role)
- $po \in PO$ (ProductOwner)
- $sm \in SM$ (ScrumMaster)
- $sp \in SP$ (Sprint)
- $sg \in SG$ (SprintGoal)
- $us \in US$ (UserStory)

- $tsk \in TSK$ (Task)
- $dev \in DEV$ (DevelopmentSnapshot)
- $bl \in BL$ (Blocker)
- $sh \in SH$ (Stakeholder)

3 Goals

- G0: maximize_project_budget: $\max \sum_{p \in P} budget_p$
- G1: minimize_project_duration: $\min \sum_{p \in P} (project\_end_p - project\_start_p)$
- G2: maximize_team_velocity: $\max \sum_{t \in T} avg\_story\_points_t$
- G3: minimize_blocker_severity: $\min \sum_{bl \in BL} severity_bl$
- G4: maximize_sprint_goal_achievement: $\max \sum_{sp \in SP} achievement\_of\_goal_sp$
- G5: minimize_task_effort: $\min \sum_{tsk \in TSK} effort_tsk$
- G6: maximize_feature_priority: $\max \sum_{f \in F} priority_f$
- G7: minimize_sprint_retrospective_improvement_actions: $\min \sum_{sre \in SRE} improvement\_actions_sre$
- G8: maximize_stakeholder_satisfaction: $\max \sum_{sh \in SH} influence\_level_sh$
- G9: minimize_development_snapshot_bugs: $\min \sum_{dev \in DEV} test\_status_dev$
- G10: maximize_product_owner_availability: $\max \sum_{po \in PO} availability_po$
- G11: minimize_scrum_master_experience: $\min \sum_{sm \in SM} experience_sm$
- G12: maximize_team_size: $\max \sum_{t \in T} team\_size_t$

4 Conditions

- C0: project_status_condition: $\forall p \in P, status_p = active$
- C1: team_velocity_condition: $\forall t \in T, avg\_story\_points_t \geq threshold$
- C2: blocker_status_condition: $\forall bl \in BL, status_bl = resolved$
- C3: sprint_goal_condition: $\forall sp \in SP, achievement\_of\_goal_sp \geq threshold$
- C4: task_status_condition: $\forall tsk \in TSK, status_tsk = done$
- C5: feature_priority_condition: $\forall f \in F, priority_f = high$
- C6: stakeholder_influence_condition: $\forall sh \in SH, influence\_level_sh = high$

- C7: development_snapshot_test_status_condition: $\forall dev \in DEV, test\_status_dev = passed$
- C8: product_owner_availability_condition: $\forall po \in PO, availability_po \geq threshold$
- C9: scrum_master_experience_condition: $\forall sm \in SM, experience_sm \geq threshold$
- C10: team_size_condition: $\forall t \in T, team\_size_t \geq threshold$
- C11: sprint_retrospective_improvement_actions_condition: $\forall sre \in SRE, improvement\_actions_sre \leq threshold$

5 Decision Variables

- D0: project_start_date: $date \in \{2023-01-01, 2023-01-31\}$
- D1: team_size: $team\_size \in \{1, 10\}$
- D2: sprint_duration: $sprint\_duration \in \{1, 4\}$
- D3: task_effort: $effort \in \{1, 100\}$
- D4: feature_priority: $priority \in \{1, 5\}$
- D5: blocker_severity: $severity \in \{1, 5\}$
- D6: stakeholder_influence_level: $influence\_level \in \{1, 5\}$
- D7: product_owner_availability: $availability \in [0, 1]$
- D8: scrum_master_experience: $experience \in \{1, 10\}$
- D9: development_snapshot_test_status: $test\_status \in \{0, 1\}$
- D10: sprint_goal_achievement: $achievement \in [0, 1]$
- D11: team_velocity: $team\_velocity \in \{1, 100\}$
- D12: sprint_retrospective_improvement_actions: $improvement\_actions \in \{0, 10\}$