Optimization Model for Software Development Process

Generated by Meta AI

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

3 Goals

- G0: Maximize project budget: $\max \sum_{p \in P} budget_p$ maximize_project_budget $= \max \sum_{p \in P} budget_p$
- G1: Minimize project duration: $\min \sum_{p \in P} project\_end_p$ minimize_project_duration $= \min \sum_{p \in P} project\_end_p$
- G2: Maximize team velocity: $\max \sum_{t \in T} avg\_story\_points_t$ maximize_team_velocity $= \max \sum_{t \in T} avg\_story\_points_t$
- G3: Minimize blocker severity: $\min \sum_{bl \in BL} severity_{bl}$ minimize_blocker_severity $= \min \sum_{bl \in BL} severity_{bl}$
- G4: Maximize sprint goal achievement: $\max \sum_{sg \in SG} achievement\_status_{sg}$ maximize_sprint_goal_achievement $= \max \sum_{sg \in SG} achievement\_status_{sg}$
- G5: Minimize task effort: $\min \sum_{tsk \in T \in T} effort_{tsk}$ minimize_task_effort $= \min \sum_{tsk \in T} effort_{tsk}$
- G6: Maximize feature priority: $\max \sum_{f \in F} priority_f$ maximize_feature_priority $= \max \sum_{f \in F} priority_f$
- G7: Minimize sprint retrospective improvement actions: $\min \sum_{sre \in SRE} improvement\_actions_{sre}$ minimize_sprint_retrospective_improvement_actions $= \min \sum_{sre \in SRE} improvement\_actions_{sre}$
- G8: Maximize stakeholder satisfaction: $\max \sum_{sh \in SH} influence\_level_{sh}$ maximize_stakeholder_satisfaction $= \max \sum_{sh \in SH} influence\_level_{sh}$
- G9: Minimize development snapshot bugs: $\min \sum_{dev \in DEV} test\_status_{dev}$ minimize_development_snapshot_bugs $= \min \sum_{dev \in DEV} test\_status_{dev}$
- G10: Maximize release plan features: $\max \sum_{rep \in REP} included\_features_{rep}$ maximize_release_plan_features $= \max \sum_{rep \in REP} included\_features_{rep}$
- G11: Minimize scrum board tasks: $\min \sum_{scb \in SCB} number\_of\_cards_{scb}$ minimize_scrum_board_tasks $= \min \sum_{scb \in SCB} number\_of\_cards_{scb}$
- G12: Maximize product owner availability: $\max \sum_{po \in PO} availability_{po}$ maximize_product_owner_availability $= \max \sum_{po \in PO} availability_{po}$
- G13: Minimize sprint planning duration: $\min \sum_{spp \in SPP} duration\_(min)_{spp}$ minimize_sprint_planning_duration $= \min \sum_{spp \in SPP} duration\_(min)_{spp}$
- G14: Maximize sprint review feedback: $\max \sum_{sr \in SR} feedback\_documentation_{sr}$ maximize_sprint_review_feedback $= \max \sum_{sr \in SR} feedback\_documentation_{sr}$

4 Conditions

- C0: Project status must be active: $status_p = active, \forall p \in P$
- C1: Team size must be greater than 5: $team\_size_t > 5, \forall t \in T$
- C2: Blocker status must be resolved: $status_{bl} = resolved, \forall bl \in BL$
- C3: Sprint goal achievement must be greater than 80
- C4: Task status must be completed: $status_{tsk} = completed, \forall tsk \in TSK$
- C5: Feature priority must be high: $priority_f = high, \forall f \in F$
- C6: Stakeholder influence level must be high: $influence\_level_{sh} = high, \forall sh \in SH$
- C7: Development snapshot test status must be passed: $test\_status_{dev} = passed, \forall dev \in DEV$
- C8: Release plan status must be active: $status_{rep} = active, \forall rep \in REP$
- C9: Scrum board tasks must be less than 10: $number\_of\_cards_{scb} < 10, \forall scb \in SCB$
- C10: Product owner availability must be greater than 80
- C11: Sprint planning duration must be less than 2 hours: $duration\_(min)_{spp} < 120, \forall spp \in SPP$
- C12: Sprint review feedback must be positive: $feedback\_documentation_{sr} > 0, \forall sr \in SR$
- C13: Team velocity must be greater than 50: $avg\_story\_points_t > 50, \forall t \in T$
- C14: Blocker severity must be low: $severity_{bl} < 3, \forall bl \in BL$

5 Decision Variables

- D0: Project budget allocation: $budget\_allocation_p \in [0, 1], \forall p \in P$
- D1: Team size adjustment: $team\_size\_adjustment_t \in \{0, 1, ..., 10\}, \forall t \in T$
- D2: Blocker resolution priority: $blocker\_resolution\_priority_{bl} \in \{1, 2, ..., 5\}, \forall bl \in BL$
- D3: Sprint goal achievement target: $sprint\_goal\_achievement\_target_{sg} \in [0, 1], \forall sg \in SG$
- D4: Task effort estimation: $task\_effort\_estimation_{tsk} \in [0, 100], \forall tsk \in TSK$

- D5: Feature priority level: $feature\_priority\_level_f \in \{1, 2, ..., 5\}, \forall f \in F$
- D6: Stakeholder influence level: $stakeholder\_influence\_level_{sh} \in \{1, 2, ..., 5\}, \forall sh \in SH$
- D7: Development snapshot test coverage: $development\_snapshot\_test\_coverage_{dev} \in [0, 1], \forall dev \in DEV$
- D8: Release plan feature inclusion: $release\_plan\_feature\_inclusion_{rep} \in \{0, 1\}, \forall rep \in REP$
- D9: Scrum board task limit: $scrum\_board\_task\_limit_{scb} \in \{0, 1, ..., 20\}, \forall scb \in SCB$
- D10: Product owner availability target: $product\_owner\_availability\_target_{po} \in [0, 1], \forall po \in PO$
- D11: Sprint planning duration target: $sprint\_planning\_duration\_target_{spp} \in \{0, 1, ..., 120\}, \forall spp \in SPP$
- D12: Sprint review feedback target: $sprint\_review\_feedback\_target_{sr} \in [0, 1], \forall sr \in SR$
- D13: Team velocity target: $team\_velocity\_target_t \in [0, 100], \forall t \in T$
- D14: Blocker severity threshold: $blocker\_severity\_threshold_{bl} \in \{1, 2, ..., 5\}, \forall bl \in BL$