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)
- $e \in E$ (Epic index)
- $us \in US$ (UserStory index)
- $tsk \in TSK$ (Task index)

3 Goals

- G0: Maximize Project Budget   max $\sum_{p \in P} budget_p$
  $subject\,to \quad budget_p \geq 0, \forall p \in P$

- G1: Minimize Sprint Duration   min $\sum_{sp \in SP} duration_{sp}$
  $subject\,to \quad duration_{sp} \geq 0, \forall sp \in SP$

- G2: Maximize Team Velocity   max $\sum_{t \in T} velocity_t$
  $subject\,to \quad velocity_t \geq 0, \forall t \in T$

- G3: Minimize Blocker Severity   min $\sum_{bl \in BL} severity_{bl}$
  $subject\,to \quad severity_{bl} \geq 0, \forall bl \in BL$

- G4: Maximize Feature Completion   max $\sum_{f \in F} completion_f$
  $subject\,to \quad completion_f \in \{0, 1\}, \forall f \in F$

- G5: Minimize Task Effort   min $\sum_{tsk \in TSK} effort_{tsk}$
  $subject\,to \quad effort_{tsk} \geq 0, \forall tsk \in TSK$

- G6: Maximize Stakeholder Satisfaction   max $\sum_{sh \in SH} satisfaction_{sh}$
  $subject\,to \quad satisfaction_{sh} \geq 0, \forall sh \in SH$

- G7: Minimize Sprint Planning Time   min $\sum_{spp \in SPP} time_{spp}$
  $subject\,to \quad time_{spp} \geq 0, \forall spp \in SPP$

- G8: Maximize Development Snapshot Quality   max $\sum_{dev \in DEV} quality_{dev}$
  $subject\,to \quad quality_{dev} \geq 0, \forall dev \in DEV$

- G9: Minimize Release Plan Delay   min $\sum_{rep \in REP} delay_{rep}$
  $subject\,to \quad delay_{rep} \geq 0, \forall rep \in REP$

- G10: Maximize Scrum Board Productivity   max $\sum_{scb \in SCB} productivity_{scb}$
  $subject\,to \in SCB \geq 0, \forall scb \in SCB$

4 Conditions

- C0: Project Status Condition $status_p = active, \forall p \in P$

- C1: Sprint Goal Condition $achievement\_status_{sg} = achievable, \forall sg \in SG$

- C2: Team Availability Condition $availability_t \geq 0, \forall t \in T$

- C3: Feature Priority Condition $priority_f \geq 0, \forall f \in F$

- C4: Blocker Resolution Condition $resolved\_on_{bl} \leq deadline_{bl}, \forall bl \in BL$

- C5: Stakeholder Influence Condition $influence\_level_{sh} \geq 0, \forall sh \in SH$

- C6: Sprint Planning Condition outcome_documentation$_{spp}$ = $thorough, \forall spp \in SPP$
- C7: Development Snapshot Condition test_status$_{dev}$ = $stable, \forall dev \in DEV$
- C8: Release Plan Condition planned_date$_{rep}$ $\leq$ $deadline_{rep}, \forall rep \in REP$
- C9: Scrum Board Condition last_updated$_{scb}$ $\geq$ $threshold, \forall scb \in SCB$
- C10: User Story Condition acceptance_criteria$_{us}$ = $well - defined, \forall us \in US$
- C11: Product Owner Condition availability$_{po}$ $\geq 0, \forall po \in PO$
- C12: Sprint Retrospective Condition improvement_actions$_{sre}$ $\geq 0, \forall sre \in SRE$
- C13: Team Collaboration Condition collaboration_level$_{t}$ $\geq 0, \forall t \in T$
- C14: Velocity Condition avg_story_points$_{vel}$ $\geq 0, \forall vel \in VEL$

5 Decision Variables

* D0: Project Allocation (x_p) x$_p$ $\in \{0, 1\}, \forall p \in P$
* D1: Sprint Duration (d_{sp}) d$_{sp}$ $\in \{1, 2, 3, 4\}, \forall sp \in SP$
* D2: Team Size (s_t) s$_t$ $\in \{3, 4, 5, 6, 7, 8, 9, 10\}, \forall t \in T$
* D3: Feature Priority (p_f) p$_f$ $\in \{1, 2, 3\}, \forall f \in F$
* D4: Blocker Resolution Time (t_{bl}) t$_{bl}$ $\in \{1, 2, 3, 4, 5\}, \forall bl \in BL$
* D5: Stakeholder Influence Level (l_{sh}) l$_{sh}$ $\in \{1, 2, 3, 4, 5\}, \forall sh \in SH$
* D6: Sprint Planning Time (t_{spp}) t$_{spp}$ $\in \{30, 60, 90\}, \forall spp \in SPP$
* D7: Development Snapshot Frequency (f_{dev}) f$_{dev}$ $\in \{1, 2, 3, 4\}, \forall dev \in DEV$
* D8: Release Plan Frequency (f_{rep}) f$_{rep}$ $\in \{1, 2, 3, 4\}, \forall rep \in REP$
* D9: Scrum Board Update Frequency (f_{scb}) f$_{scb}$ $\in \{1, 2, 3, 4\}, \forall scb \in SCB$
* D10: User Story Complexity (c_{us}) c$_{us}$ $\in \{1, 2, 3, 4, 5\}, \forall us \in US$
* D11: Product Owner Availability (a_{po}) a$_{po}$ $\in \{0, 1\}, \forall po \in PO$
* D12: Sprint Retrospective Frequency (f_{sre}) f$_{sre}$ $\in \{1, 2, 3, 4\}, \forall sre \in SRE$
* D13: Team Collaboration Level (l_t) l$_t$ $\in \{1, 2, 3, 4, 5\}, \forall t \in T$
* D14: Velocity Target (v_{vel}) v$_{vel}$ $\in \{10, 20, 30, 40, 50\}, \forall vel \in VEL$