Optimization Model for Scrum Software Development

Generated by Meta AI

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Contents

1 Sets (Entities)

- Project (P)
- Team (T)
- Worker (W)
- Feature (F)
- Skill (S)
- Role (R)
- Product Owner (PO)
- Scrum Master (SM)
- Product Backlog (PB)
- Sprint (SP)
- Sprint Planning (SPP)
- Daily Scrum (DS)

- Sprint Review (SR)

- Sprint Retrospective (SRE)

- Sprint Backlog (SBL)

- Sprint Goal (SG)

- Epic (E)

- User Story (US)

- Task (TSK)

- Development Snapshot (DEV)

- Blocker (BL)

- Stakeholder (SH)

- Velocity (VEL)

- Release Plan (REP)

- Roadmap (RM)

- Scrum Board (SCB)

- Feature Documentation (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)

- $sp \in SP$ (Sprint index)

- $tsk \in TSK$ (Task index)

3   Goals

- $G0$: maximize_project_budget: $\max \sum_{p \in P} budget_p$
- $G1$: minimize_project_duration: $\min \sum_{p \in P} project\_end_p$
- $G2$: maximize_team_size: $\max \sum_{t \in T} team\_size_t$
- $G3$: minimize_task_effort: $\min \sum_{tsk \in TSK} effort_{tsk}$
- $G4$: maximize_feature_priority: $\max \sum_{f \in F} priority_f$
- $G5$: minimize_blocker_severity: $\min \sum_{bl \in BL} severity_{bl}$
- $G6$: maximize_sprint_velocity: $\max \sum_{sp \in SP} avg\_story\_points_{sp}$
- $G7$: minimize_sprint_duration: $\min \sum_{sp \in SP} end\_date_{sp}$
- $G8$: maximize_stakeholder_influence: $\max \sum_{sh \in SH} influence\_level_{sh}$
- $G9$: minimize_development_snapshot_bugs: $\min \sum_{dev \in DEV} test\_status_{dev}$
- $G10$: maximize_product_backlog_entries: $\max \sum_{pb \in PB} number\_of\_entries_{pb}$
- $G11$: minimize_sprint_retrospective_improvement_actions: $\min \sum_{sre \in SRE} improvement\_actions_{sre}$
- $G12$: maximize_scrum_board_columns: $\max \sum_{scb \in SCB} columns\_(todo/done...)_{scb}$
- $G13$: minimize_task_status: $\min \sum_{tsk \in TSK} status_{tsk}$
- $G14$: maximize_feature_documentation_quality: $\max \sum_{fed \in FED} description_{fed}$

4   Conditions

- $C0$: project_status_condition: $\forall p \in P, status_p = active$
- $C1$: team_size_condition: $\forall t \in T, team\_size_t \geq 5$
- $C2$: task_priority_condition: $\forall tsk \in TSK, priority_{tsk} = high$
- $C3$: feature_status_condition: $\forall f \in F, status_f = in\_progress$
- $C4$: blocker_severity_condition: $\forall bl \in BL, severity_{bl} = critical$
- $C5$: sprint_velocity_condition: $\forall sp \in SP, avg\_story\_points_{sp} \geq 10$
- $C6$: stakeholder_influence_condition: $\forall sh \in SH, influence\_level_{sh} = high$
- $C7$: development_snapshot_quality_condition: $\forall dev \in DEV, test\_status_{dev} = good$
- $C8$: product_backlog_entries_condition: $\forall pb \in PB, number\_of\_entries_{pb} \geq 10$

- $C9$: sprint_retrospective_improvement_actions_condition: $\forall sre \in SRE, improvement\_actions_{sre} \leq 5$

- $C10$: scrum_board_columns_condition: $\forall scb \in SCB, columns\_(todo/done...)_{scb} \geq 3$

- $C11$: task_status_condition: $\forall tsk \in TSK, status_{tsk} = in\_progress$

- $C12$: feature_documentation_quality_condition: $\forall fed \in FED, description_{fed} = good$

5 Decision Variables

- $D0$: project_budget_allocation: $0 \leq budget\_allocation_p \leq 100000, \forall p \in P$

- $D1$: team_size_decision: $1 \leq team\_size_t \leq 10, \forall t \in T$

- $D2$: task_priority_decision: $1 \leq priority_{tsk} \leq 5, \forall tsk \in TSK$

- $D3$: feature_status_decision: $status_f \in \{in\_progress, done\}, \forall f \in F$

- $D4$: blocker_severity_decision: $1 \leq severity_{bl} \leq 5, \forall bl \in BL$

- $D5$: sprint_velocity_decision: $1 \leq avg\_story\_points_{sp} \leq 20, \forall sp \in SP$

- $D6$: stakeholder_influence_decision: $1 \leq influence\_level_{sh} \leq 5, \forall sh \in SH$

- $D7$: development_snapshot_quality_decision: $test\_status_{dev} \in \{good, bad\}, \forall dev \in DEV$

- $D8$: product_backlog_entries_decision: $1 \leq number\_of\_entries_{pb} \leq 100, \forall pb \in PB$

- $D9$: sprint_retrospective_improvement_actions_decision: $0 \leq improvement\_actions_{sre} \leq 10, \forall sre \in SRE$

- $D10$: scrum_board_columns_decision: $1 \leq columns\_(todo/done...)_{scb} \leq 10, \forall scb \in SCB$

- $D11$: task_status_decision: $status_{tsk} \in \{in\_progress, done\}, \forall tsk \in TSK$

- $D12$: feature_documentation_quality_decision: $description_{fed} \in \{good, bad\}, \forall fed \in FED$

- $D13$: project_duration_decision: $1 \leq project\_duration_p \leq 365, \forall p \in P$

- $D14$: team_availability_decision: $0 \leq availability_t \leq 100, \forall t \in T$