Optimization Model for Scrum-based Software Development

Generated by Meta AI

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1 Sets (Entities)

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- Teams (T)
- Workers (W)
- Features (F)
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- Roles (R)
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- Product Backlogs (PB)
- Sprints (SP)
- Sprint Plannings (SPP)
- Daily Scrums (DS)

- Sprint Reviews (SR)
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- Blockers (BL)
- Stakeholders (SH)
- Velocities (VEL)
- Release Plans (REP)
- Roadmaps (RM)
- Scrum Boards (SCB)
- Feature Documentations (FED)

2 Indices

- $p \in P$ (Projects)
- $t \in T$ (Teams)
- $w \in W$ (Workers)
- $f \in F$ (Features)
- $s \in S$ (Skills)
- $r \in R$ (Roles)
- $po \in PO$ (Product Owners)
- $sm \in SM$ (Scrum Masters)
- $pb \in PB$ (Product Backlogs)
- $sp \in SP$ (Sprints)
- $sg \in SG$ (Sprint Goals)

- $e \in E$ (Epics)
- $us \in US$ (User Stories)
- $tsk \in TSK$ (Tasks)
- $dev \in DEV$ (Development Snapshots)
- $bl \in BL$ (Blockers)
- $sh \in SH$ (Stakeholders)
- $vel \in VEL$ (Velocities)
- $rep \in REP$ (Release Plans)
- $rm \in RM$ (Roadmaps)

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 $\max \sum_{t \in T} team\_size_t$
- $G3$: Maximize feature priority $\max \sum_{f \in F} priority_f$
- $G4$: Minimize task effort $\min \sum_{tsk \in TSK} effort_{tsk}$
- $G5$: Maximize sprint velocity $\max \sum_{vel \in VEL} avg\_story\_points_{vel}$
- $G6$: Minimize blocker severity $\min \sum_{bl \in BL} severity_{bl}$
- $G7$: Maximize stakeholder influence $\max \sum_{sh \in SH} influence\_level_{sh}$
- $G8$: Minimize sprint planning duration $\min \sum_{spp \in SPP} duration\_(min)_{spp}$
- $G9$: Maximize sprint goal achievement $\max \sum_{sg \in SG} achievement\_status_{sg}$
- $G10$: Minimize development snapshot bugs $\min \sum_{dev \in DEV} test\_status_{dev}$
- $G11$: Maximize feature documentation quality $\max \sum_{fed \in FED} description_{fed}$
- $G12$: Minimize sprint retrospective duration $\min \sum_{sre \in SRE} duration_{sre}$
- $G13$: Maximize team satisfaction $\max \sum_{sre \in SRE} team\_satisfaction_{sre}$
- $G14$: Minimize release plan delay $\min \sum_{rep \in REP} planned\_date_{rep}$

4 Conditions

- $C0$: Project status must be active $status_p = Active \forall p \in P$
- $C1$: Team size must be at least 5 $team\_size_t \geq 5 \forall t \in T$
- $C2$: Feature priority must be high $priority_f \geq High \forall f \in F$
- $C3$: Task status must be in progress $status_{tsk} = InProgress \forall tsk \in TSK$
- $C4$: Sprint velocity must be at least 10 $C5$: Blocker status must be resolved $status_{bl} = Resolved \forall bl \in BL$
- $C6$: Stakeholder influence must be high $influence\_level_{sh} \geq High \forall sh \in SH$
- $C7$: Sprint planning duration must be less than 2 hours $duration\_(min)_{spp} \leq 120 \forall spp \in SPP$
- $C8$: Sprint goal achievement must be 100
- $C9$: Development snapshot quality must be high $test\_status_{dev} \geq High \forall dev \in DEV$
- $C10$: Feature documentation quality must be high $description_{fed} \geq High \forall fed \in FED$
- $C11$: Sprint retrospective duration must be less than 1 hour $duration_{sre} \leq 60 \forall sre \in SRE$
- $C12$: Team satisfaction must be high $team\_satisfaction_{sre} \geq High \forall sre \in SRE$
- $C13$: Release plan status must be on track $status_{rep} = OnTrack \forall rep \in REP$
- $C14$: Roadmap status must be on track $milestones_{rm} = OnTrack \forall rm \in RM$

5 Decision Variables

- $D0$: Project budget allocation $0 \leq budget\_allocation_p \leq 100$
- $D1$: Team size allocation $5 \leq team\_size\_allocation_t \leq 20$
- $D2$: Feature priority level $1 \leq feature\_priority\_level_f \leq 3$
- $D3$: Task effort allocation $0 \leq task\_effort\_allocation_{tsk} \leq 100$
- $D4$: Sprint velocity target $10 \leq sprint\_velocity\_target_{vel} \leq 50$
- $D5$: Blocker resolution priority $1 \leq blocker\_resolution\_priority_{bl} \leq 3$

- $D6$: Stakeholder influence level $1 \leq stakeholder\_influence\_level_{sh} \leq 3$
- $D7$: Sprint planning duration target $30 \leq sprint\_planning\_duration\_target_{spp} \leq 120$
- $D8$: Sprint goal achievement target $0 \leq sprint\_goal\_achievement\_target_{sg} \leq 1$
- $D9$: Development snapshot quality target $0 \leq development\_snapshot\_quality\_target_{dev} \leq 1$
- $D10$: Feature documentation quality target $0 \leq feature\_documentation\_quality\_target_{fed} \leq 1$
- $D11$: Sprint retrospective duration target $30 \leq sprint\_retrospective\_duration\_target_{sre} \leq 90$
- $D12$: Team satisfaction target $0 \leq team\_satisfaction\_target_{sre} \leq 1$
- $D13$: Release plan delay tolerance $0 \leq release\_plan\_delay\_tolerance_{rep} \leq 30$
- $D14$: Roadmap milestone achievement target $0 \leq roadmap\_milestone\_achievement\_target_{rm} \leq 1$