Optimization Model for Scrum Software Development

Generated Model

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Contents

1 Sets (Entities)

- Projects
- Teams
- Workers
- Features
- Tasks
- Sprint Goals
- Stakeholders
- Development Snapshots
- Release Plans
- Roadmaps
- Scrum Boards
- Product Backlogs

- User Stories
- Blockers

2 Indices

- $p \in P$: Projects
- $t \in T$: Teams
- $w \in W$: Workers
- $f \in F$: Features
- $k \in K$: Tasks
- $g \in G$: Sprint Goals
- $s \in S$: Stakeholders
- $d \in D$: Development Snapshots
- $r \in R$: Release Plans
- $m \in M$: Roadmaps
- $b \in B$: Scrum Boards
- $pb \in PB$: Product Backlogs
- $us \in US$: User Stories
- $bl \in BL$: Blockers

3 Goals

- G_0: Maximize project budget $\max \sum_{p \in P} budget_p$
- G_1: Minimize project duration $\min \sum_{p \in P} project\_end_p$
- G_2: Maximize team velocity $\max \sum_{t \in T} avg\_story\_points_t$
- G_3: Minimize blocker severity $\min \sum_{bl \in BL} severity_{bl}$
- G_4: Maximize feature priority $\max \sum_{f \in F} priority_f$
- G_5: Minimize task effort $\min \sum_{k \in K} effort_k$
- G_6: Maximize sprint goal achievement $\max \sum_{g \in G} achievement\_status_g$
- G_7: Minimize sprint retrospective improvement actions $\min \sum_{g \in G} improvement\_actions_g$

- G_8: Maximize stakeholder influence $\max \sum_{s \in S} influence\_level_s$
- G_9: Minimize development snapshot test status $\min \sum_{d \in D} test\_status_d$
- G_{10}: Maximize release plan status $\max \sum_{r \in R} status_r$
- G_{11}: Minimize roadmap milestones $\min \sum_{m \in M} milestones_m$
- G_{12}: Maximize scrum board columns $\max \sum_{b \in B} columns\_todo/done..._b$
- G_{13}: Minimize user story story points $\min \sum_{us \in US} story\_points_{us}$
- G_{14}: Maximize product backlog number of entries $\max \sum_{pb \in PB} number\_of\_entries_{pb}$

4 Conditions

- C_0: Ensure project status is active $status_p = active$
- C_1: Ensure team availability is high $team\_status_t \geq high$
- C_2: Ensure worker availability is high $availability_w \geq high$
- C_3: Ensure feature status is in progress $status_f = in\_progress$
- C_4: Ensure task status is in progress $status_k = in\_progress$
- C_5: Ensure sprint goal achievement status is achieved $achievement\_status_g = achieved$
- C_6: Ensure stakeholder relevance is high $relevance\_to\_feature_s \geq high$
- C_7: Ensure development snapshot deployment target is production $deployment\_target_d = production$
- C_8: Ensure release plan included features are many $included\_features_r \geq many$
- C_9: Ensure roadmap objectives are many $objectives_m \geq many$
- C_{10}: Ensure scrum board last updated is recent $last\_updated_b = recent$
- C_{11}: Ensure product backlog last updated is recent $last\_updated_{pb} = recent$
- C_{12}: Ensure user story acceptance criteria are many $acceptance\_criteria_{us} \geq many$
- C_{13}: Ensure task type is development $type_k = development$
- C_{14}: Ensure blocker status is resolved $status_{bl} = resolved$

5 Decision Variables

- $x_p \in \{0, 1\}$: Project allocation
- $y_t \in \{0, 1, 2\}$: Team assignment
- $z_w \in [0, 1]$: Worker availability
- $p_f \in [1, 10]$: Feature priority
- $e_k \in [1, 100]$: Task effort
- $a_g \in [0, 1]$: Sprint goal achievement
- $i_s \in [1, 10]$: Stakeholder influence
- $t_d \in [0, 1]$: Development snapshot test status
- $s_r \in [0, 1]$: Release plan status
- $m_m \in [1, 10]$: Roadmap milestones
- $c_b \in [1, 10]$: Scrum board columns
- $n_{pb} \in [1, 100]$: Product backlog number of entries
- $sp_{us} \in [1, 10]$: User story story points
- $type_k \in \{development, testing\}$: Task type
- $severity_{bl} \in [1, 10]$: Blocker severity