SCRUM Domain Optimization Model

AI Assistant

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Contents

1 Sets (Entities)

- $Project = \{p | p \text{ is a Project}\}$, with attributes: $id, name, project\_start, project\_end, description, budget, st$
- $Team = \{t | t \text{ is a Team}\}$, with attributes: $id, name, team\_size, team\_start, team\_status, location, team\_ty$
- $Worker = \{w | w \text{ is a Worker}\}$, with attributes: $id, name, first\_name, email, start\_date, status, availabili$
- $Feature = \{f | f \text{ is a Feature}\}$, with attributes: $id, title, description, status, priority, estimated\_effort$
- $Skill = \{s | s \text{ is a Skill}\}$, with attributes: $id, label, description, level, certified, category$
- $Role = \{r | r \text{ is a Role}\}$, with attributes: $id, role\_name, description, area\_of\_responsibility$
- ... (Other entities from the provided list follow the same pattern)

2 Indices

- $p \in Project$
- $t \in Team$
- $w \in Worker$
- $f \in Feature$

- $s \in Skill$
- $r \in Role$
- ... (Indices for all other entities)

3 Goals

- **G0: maximize_team_availability** - Maximize the overall availability of all team workers

$$\text{Maximize} \sum_{w \in Worker} availability_w$$

- **G1: minimize_project_budget** - Minimize the total budget spent on the project

$$\text{Minimize } budget_{p0} \quad \text{for the main project } p0$$

- **G2: maximize_feature_priority** - Maximize the number of high-priority features delivered

$$\text{Maximize} \sum_{f \in Feature} priority_f$$

- **G3: minimize_blocker_severity** - Minimize the severity level of active blockers

$$\text{Minimize} \sum_{b \in Blocker} severity_b$$

- **G4: maximize_velocity_avg** - Maximize the average velocity of the team

$$\text{Maximize } avg\_story\_points_{v0} \quad \text{for the team's velocity } v0$$

- **G5: minimize_sprint_duration** - Minimize the duration of sprint planning meetings

$$\text{Minimize} \sum_{sp \in SprintPlanning} duration\_min_{sp}$$

- **G6: maximize_story_points** - Maximize the sum of story points completed per sprint

$$\text{Maximize} \sum_{us \in UserStory} story\_points_{us}$$

- **G7: minimize_task_effort** - Minimize the total effort estimated for all tasks

$$\text{Minimize} \sum_{tsk \in Task} effort_{tsk}$$

- **G8: maximize_stakeholder_influence** - Maximize engagement from high-influence stakeholders

$$\text{Maximize} \sum_{sh \in Stakeholder} influence\_level_{sh}$$

- **G9: maximize_goal_achievement** - Maximize the achievement status of sprint goals

$$\text{Maximize} \sum_{sg \in SprintGoal} achievement\_status_{sg}$$

4 Conditions

- **C0: project_status_active** - The project status must be 'active'

$$status_{p0} = \text{'active'}$$

- **C1: team_size_minimum** - The team size must be at least 3 members

$$team\_size_t \geq 3 \quad \forall t \in Team$$

- **C2: worker_availability_limit** - An individual worker's availability must be at least 50%

$$availability_w \geq 0.5 \quad \forall w \in Worker$$

- **C3: feature_priority_high** - Critical features must have a 'high' priority

$$priority_{f_{crit}} = \text{'high'} \quad \text{for critical features } f_{crit} \subset Feature$$

- **C4: blocker_severity_critical** - No blocker should have a 'critical' severity

$$severity_b \neq \text{'critical'} \quad \forall b \in Blocker$$

- **C5: sprint_status_closed** - Only consider sprints with status 'closed' for velocity

$$status_{sp} = \text{'closed'} \Rightarrow sp \in Sprint_{velocity}$$

- **C6: story_points_positive** - Story points for a user story must be a positive integer

$$story\_points_{us} \in Z^+ \quad \forall us \in UserStory$$

- **C7: task_effort_max** - The effort for a single task cannot exceed 40 hours

$$effort_{tsk} \leq 40 \quad \forall tsk \in Task$$

- **C8: stakeholder_influence_high** - Key features require a stakeholder with 'high' influence

  $\exists sh \in Stakeholder : (influence\_level_{sh} =$ 'high'$\wedge$is linked to feature $f_{key})$

- **C9: sprint_goal_defined** - Every sprint must have a defined goal

  $\forall sp \in Sprint, \exists sg \in SprintGoal :$ sg is associated with sp$\wedge objective_description_{sg} \neq \emptyset$

5 Decision Variables

- $DV0_{w,tsk}$: assign_worker_to$_task \in \{0, 1\}$ for $w \in Worker$, $tsk \in Task$
- $DV1_{f,sp}$: select_feature_for_sprint $\in \{0, 1\}$ for $f \in Feature$, $sp \in Sprint$
- $DV2_f$: allocated_budget $\in R, 0 \leq DV2_f \leq 1,000,000$ for $f \in Feature$
- $DV3_t$: team_size $\in Z, 3 \leq DV3_t \leq 12$ for $t \in Team$
- $DV4_{sp}$: sprint_duration $\in Z, 7 \leq DV4_{sp} \leq 30$ for $sp \in Sprint$
- $DV5_w$: worker_availability $\in R, 0.5 \leq DV5_w \leq 1.0$ for $w \in Worker$
- $DV6_{us}$: story_point_estimate $\in Z, 1 \leq DV6_{us} \leq 20$ for $us \in UserStory$
- $DV7_{tsk}$: task_effort_estimate $\in Z, 1 \leq DV7_{tsk} \leq 40$ for $tsk \in Task$
- $DV8_b$: blocker_severity_level $\in \{1, 2, 3, 4\}$ for $b \in Blocker$
- $DV9_{sg}$: sprint_goal_achievement $\in R, 0.0 \leq DV9_{sg} \leq 1.0$ for $sg \in SprintGoal$