

# Multi-Agent Planning Ontology

## Metadata

### IRI

<https://purl.org/ai4s/ontology/planning/multi-agent>

### Title

Multi-Agent Planning Ontology

### Creator

Anonymous AI Researcher

### Contributor

This ontology extends the base Planning Ontology available at  
<https://ai4society.github.io/planning-ontology#>

### Date Issued

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### Version Iri

<https://purl.org/ai4s/ontology/planning/multi-agent/v1.0.0>

### Preferred Namespace Uri

[ma:](#)

### Description

An ontology for representing knowledge in Multi-Agent Path Finding (MAPF) problems. This ontology defines concepts such as agents, plans, conflicts, and replanning strategies to support explainable AI in MAPF.

## Classes

### Agent<sup>C</sup>

#### IRI

<https://purl.org/ai4s/ontology/planning/multi-agent#Agent>

**Sub Class Of**

[plan:ProblemObject](#)  
[sosa:Platform](#)

**In Domain Of**

[ma:hasAgentID](#)<sup>dp</sup>  
[ma:hasCapability](#)<sup>op</sup>  
[ma:hasInitialLocation](#)<sup>op</sup>  
[ma:hasGoalLocation](#)<sup>op</sup>  
[ma:executesAction](#)<sup>op</sup>

**In Range Of**

[ma:belongsToAgent](#)<sup>op</sup>  
[ma:hasAgentSet](#)<sup>op</sup>  
[ma:involvesAgents](#)<sup>op</sup>  
[ma:involvesAgentsEvent](#)<sup>op</sup>  
[ma:targetAgent](#)<sup>op</sup>  
[ma:belongsToAgentSegment](#)<sup>op</sup>

## Agent State C

**IRI**

<https://purl.org/ai4s/ontology/planning/multi-agent#AgentState>

**Sub Class Of**

[plan:State](#)

**In Domain Of**

[ma:occursAtTime](#)<sup>op</sup>  
[ma:agentAt](#)<sup>op</sup>

**In Range Of**

[ma:hasInitialStates](#)<sup>op</sup>  
[ma:hasGoalStates](#)<sup>op</sup>

## Agent Sub Plan C

**IRI**

<https://purl.org/ai4s/ontology/planning/multi-agent#AgentSubPlan>

<b>Sub Class Of</b>	<a href="#">plan:Plan</a>
<b>In Domain Of</b>	<a href="#">ma:belongsToAgent</a> <sup>op</sup> <a href="#">ma:hasPlanCost</a> <sup>dp</sup> <a href="#">ma:planData</a> <sup>op</sup>
<b>In Range Of</b>	<a href="#">ma:composedOfSubPlans</a> <sup>op</sup>
<b>Super Class Of</b>	<a href="#">ma:OriginalSubPlan</a> <sup>c</sup> <a href="#">ma:ResolvedSubPlan</a> <sup>c</sup>

## Original Sub Plan <sup>c</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#OriginalSubPlan">https://purl.org/ai4s/ontology/planning/multi-agent#OriginalSubPlan</a>
<b>Sub Class Of</b>	<a href="#">ma:AgentSubPlan</a> <sup>c</sup>
<b>In Range Of</b>	<a href="#">ma:derivesFrom</a> <sup>op</sup>

## Resolved Sub Plan <sup>c</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#ResolvedSubPlan">https://purl.org/ai4s/ontology/planning/multi-agent#ResolvedSubPlan</a>
<b>Sub Class Of</b>	<a href="#">ma:AgentSubPlan</a> <sup>c</sup>
<b>In Domain Of</b>	<a href="#">ma:derivesFrom</a> <sup>op</sup> <a href="#">ma:generatedBy</a> <sup>op</sup> <a href="#">ma:resolvesConflict</a> <sup>op</sup>

## Joint Plan <sup>c</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#JointPlan">https://purl.org/ai4s/ontology/planning/multi-agent#JointPlan</a>
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[agent#JointPlan](#)

**Sub Class Of** [plan:Plan](#)

**In Domain Of**

[ma:planData](#)<sup>op</sup>  
[ma:composedOfSubPlans](#)<sup>op</sup>  
[ma:hasGlobalMakespan](#)<sup>dp</sup>  
[ma:usedAlertSet](#)<sup>op</sup>  
[ma:conflictResolutionProtocol](#)<sup>dp</sup>

## Conflict Constraint<sup>C</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#ConflictConstraint>

**Sub Class Of** [plan:DomainRequirement](#)

**In Domain Of**

[ma:involvesAgents](#)<sup>op</sup>  
[ma:conflictType](#)<sup>dp</sup>  
[ma:forbiddenRegion](#)<sup>op</sup>

**In Range Of** [ma:hasConflictConstraint](#)<sup>op</sup>

## Agent Path Segment<sup>C</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#AgentPathSegment>

**In Domain Of**

[ma:belongsToAgentSegment](#)<sup>op</sup>  
[ma:hasValidTime](#)<sup>op</sup>  
[ma:hasPathSequence](#)<sup>op</sup>

**In Range Of**

[ma:planData](#)<sup>op</sup>  
[ma:observedForbiddenSegment](#)<sup>op</sup>

## Grid Location<sup>C</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#GridLocation">https://purl.org/ai4s/ontology/planning/multi-agent#GridLocation</a>
<b>Description</b>	A structured representation of a grid cell with x and y coordinates.
<b>In Domain Of</b>	<a href="#">ma:xCoordinate</a> <sup>dp</sup> <a href="#">ma:yCoordinate</a> <sup>dp</sup>
<b>In Range Of</b>	<a href="#">ma:hasInitialLocation</a> <sup>op</sup> <a href="#">ma:hasGoalLocation</a> <sup>op</sup> <a href="#">ma:atLocation</a> <sup>op</sup> <a href="#">ma:conflictLocation</a> <sup>op</sup> <a href="#">ma:agentAt</a> <sup>op</sup>

## Agent Policy<sup>C</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#AgentPolicy">https://purl.org/ai4s/ontology/planning/multi-agent#AgentPolicy</a>
<b>In Domain Of</b>	<a href="#">ma:policyName</a> <sup>dp</sup> <a href="#">ma:trainedOnEnvironment</a> <sup>dp</sup> <a href="#">ma:observationChannels</a> <sup>dp</sup> <a href="#">ma:actionSpace</a> <sup>dp</sup>

## Observation Mask Spec<sup>C</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#ObservationMaskSpec">https://purl.org/ai4s/ontology/planning/multi-agent#ObservationMaskSpec</a>
<b>In Domain Of</b>	<a href="#">ma:hasChannel</a> <sup>dp</sup>

## Collision Event<sup>C</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#CollisionEvent>

### In Domain Of

[ma:conflictID](#)<sup>dp</sup>  
[ma:occursAtTime](#)<sup>op</sup>  
[ma:conflictTypeEvent](#)<sup>dp</sup>  
[ma:involvesAgentsEvent](#)<sup>op</sup>  
[ma:conflictLocation](#)<sup>op</sup>

### In Range Of

[ma:resolvesConflict](#)<sup>op</sup>  
[ma:alertsConflict](#)<sup>op</sup>

## Conflict Alert<sup>C</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#ConflictAlert>

### In Domain Of

[ma:selectionRationale](#)<sup>dp</sup>  
[ma:alertID](#)<sup>dp</sup>  
[ma:alertsConflict](#)<sup>op</sup>  
[ma:targetAgent](#)<sup>op</sup>  
[ma:rewindWindow](#)<sup>dp</sup>  
[ma:alertType](#)<sup>dp</sup>  
[ma:staticForbiddenCells](#)<sup>dp</sup>  
[ma:dynamicForbiddenPath](#)<sup>dp</sup>

### In Range Of

[ma:usedAlertSet](#)<sup>op</sup>  
[ma:triggeredBy](#)<sup>op</sup>

## Replanning Strategy<sup>C</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#ReplanningStrategy>

### In Domain Of

[ma:triggeredBy](#)<sup>op</sup>  
[ma:strategyID](#)<sup>dp</sup>  
[ma:usedStaticReplanning](#)<sup>dp</sup>  
[ma:usedDynamicReplanning](#)<sup>dp</sup>  
[ma:observedForbiddenCells](#)<sup>op</sup>  
[ma:observedForbiddenSegment](#)<sup>op</sup>

## Planner Procedure<sup>C</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#PlannerProcedure>

### In Domain Of

[ma:procedureID](#)<sup>dp</sup>  
[ma:implementsStage](#)<sup>dp</sup>  
[ma:agentSelectionPolicy](#)<sup>dp</sup>  
[ma:rewindWindowDefault](#)<sup>dp</sup>  
[ma:hasRationale](#)<sup>dp</sup>

**In Range Of** [ma:implementsProcedure](#)<sup>op</sup>

## Multi Agent Planner<sup>C</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#MultiAgentPlanner>

**Sub Class Of** [plan:Planner](#)

### In Domain Of

[ma:ofPlannerType](#)<sup>dp</sup>  
[ma:implementsProcedure](#)<sup>op</sup>  
[ma:generatesPlan](#)<sup>op</sup>  
[ma:supportsConflictDetection](#)<sup>dp</sup>

[ma:communicationOverhead](#)<sup>dp</sup>  
[ma:hasPerformanceTradeoff](#)<sup>dp</sup>

## Object Properties

has capability<sup>op</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#hasCapability">https://purl.org/ai4s/ontology/planning/multi-agent#hasCapability</a>
<b>Domain</b>	<a href="#">ma:Agent</a> <sup>c</sup>
<b>Range</b>	<a href="#">cora:Capability</a>

has initial location<sup>op</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#hasInitialLocation">https://purl.org/ai4s/ontology/planning/multi-agent#hasInitialLocation</a>
<b>Domain</b>	<a href="#">ma:Agent</a> <sup>c</sup>
<b>Range</b>	<a href="#">ma:GridLocation</a> <sup>c</sup>

has goal location<sup>op</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#hasGoalLocation">https://purl.org/ai4s/ontology/planning/multi-agent#hasGoalLocation</a>
<b>Domain</b>	<a href="#">ma:Agent</a> <sup>c</sup>
<b>Range</b>	<a href="#">ma:GridLocation</a> <sup>c</sup>

executes action<sup>op</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#executesAction">https://purl.org/ai4s/ontology/planning/multi-agent#executesAction</a>
<b>Domain</b>	<a href="#">ma:Agent</a> <sup>c</sup>
<b>Range</b>	<a href="#">plan:Action</a>

## at location<sup>op</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#atLocation">https://purl.org/ai4s/ontology/planning/multi-agent#atLocation</a>
<b>Domain</b>	<a href="#">Thing</a> <sup>c</sup>
<b>Range</b>	<a href="#">ma:GridLocation</a> <sup>c</sup>

## belongs to agent<sup>op</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#belongsToAgent">https://purl.org/ai4s/ontology/planning/multi-agent#belongsToAgent</a>
<b>Domain</b>	<a href="#">ma:AgentSubPlan</a> <sup>c</sup>
<b>Range</b>	<a href="#">ma:Agent</a> <sup>c</sup>

## plan data<sup>op</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#planData">https://purl.org/ai4s/ontology/planning/multi-agent#planData</a>
<b>Domain</b>	<ul style="list-style-type: none"> <li><a href="#">ma:AgentSubPlan</a><sup>c</sup></li> <li><a href="#">ma:JointPlan</a><sup>c</sup></li> </ul>
<b>Range</b>	<a href="#">ma:AgentPathSegment</a> <sup>c</sup>

## composed of sub plans<sup>op</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#composedOfSubPlans>

**Domain** [ma:JointPlan](#)<sup>c</sup>

**Range** [ma:AgentSubPlan](#)<sup>c</sup>

used alert set<sup>op</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#usedAlertSet>

**Domain** [ma:JointPlan](#)<sup>c</sup>

**Range** [ma:ConflictAlert](#)<sup>c</sup>

has agent set<sup>op</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#hasAgentSet>

**Domain** [plan:PlanningProblem](#)

**Range** [ma:Agent](#)<sup>c</sup>

has initial states<sup>op</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#hasInitialStates>

**Domain** [plan:PlanningProblem](#)

**Range** [ma:AgentState](#)<sup>c</sup>

has goal states<sup>op</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#hasGoalStates>

agent#hasGoalStates

**Domain** [plan:PlanningProblem](#)

**Range** [ma:AgentState](#)<sup>c</sup>

has conflict constraint<sup>op</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#hasConflictConstraint>

**Domain** [plan:PlanningProblem](#)

**Range** [ma:ConflictConstraint](#)<sup>c</sup>

involves agents<sup>op</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#involvesAgents>

**Domain** [ma:ConflictConstraint](#)<sup>c</sup>

**Range** [ma:Agent](#)<sup>c</sup>

forbidden region<sup>op</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#forbiddenRegion>

**Domain** [ma:ConflictConstraint](#)<sup>c</sup>

**Range** [plan:Region](#)

derives from<sup>op</sup>

**IRI** <https://purl.org/ai4s/ontology/planning/multi-agent#derivesFrom>

<b>Sub Property Of</b>	<a href="#">was derived from<sup>op</sup></a>
<b>Domain</b>	<a href="#">ma:ResolvedSubPlan<sup>c</sup></a>
<b>Range</b>	<a href="#">ma:OriginalSubPlan<sup>c</sup></a>

generated by<sup>op</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#generatedBy">https://purl.org/ai4s/ontology/planning/multi-agent#generatedBy</a>
<b>Sub Property Of</b>	<a href="#">was generated by<sup>op</sup></a>
<b>Domain</b>	<a href="#">ma:ResolvedSubPlan<sup>c</sup></a>
<b>Range</b>	<a href="#">Activity<sup>c</sup></a>

resolves conflict<sup>op</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#resolvesConflict">https://purl.org/ai4s/ontology/planning/multi-agent#resolvesConflict</a>
<b>Description</b>	Connects a revised plan to the conflict it solves.
<b>Domain</b>	<a href="#">ma:ResolvedSubPlan<sup>c</sup></a>
<b>Range</b>	<a href="#">ma:CollisionEvent<sup>c</sup></a>

triggered by<sup>op</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#triggeredBy">https://purl.org/ai4s/ontology/planning/multi-agent#triggeredBy</a>
<b>Description</b>	Shows which alert initiated a replanning action.
<b>Domain</b>	<a href="#">ma:ReplanningStrategy<sup>c</sup></a>

<b>Range</b>	<a href="#">ma:ConflictAlert</a> <sup>c</sup>
<hr/>	
<b>occurs at time</b> <sup>op</sup>	
<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#occursAtTime">https://purl.org/ai4s/ontology/planning/multi-agent#occursAtTime</a>
<b>Domain</b>	<ul style="list-style-type: none"> <li>• <a href="#">ma:CollisionEvent</a><sup>c</sup></li> <li>• <a href="#">ma:AgentState</a><sup>c</sup></li> </ul>
<b>Range</b>	<a href="#">time:Instant</a>
<hr/>	
<b>involves agents event</b> <sup>op</sup>	
<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#involvesAgentsEvent">https://purl.org/ai4s/ontology/planning/multi-agent#involvesAgentsEvent</a>
<b>Domain</b>	<a href="#">ma:CollisionEvent</a> <sup>c</sup>
<b>Range</b>	<a href="#">ma:Agent</a> <sup>c</sup>
<hr/>	
<b>conflict location</b> <sup>op</sup>	
<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#conflictLocation">https://purl.org/ai4s/ontology/planning/multi-agent#conflictLocation</a>
<b>Domain</b>	<a href="#">ma:CollisionEvent</a> <sup>c</sup>
<b>Range</b>	<a href="#">ma:GridLocation</a> <sup>c</sup>
<hr/>	
<b>alerts conflict</b> <sup>op</sup>	
<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#alertsConflict">https://purl.org/ai4s/ontology/planning/multi-agent#alertsConflict</a>

<b>Domain</b>	<a href="#">ma:ConflictAlert</a> <sup>c</sup>
<b>Range</b>	<a href="#">ma:CollisionEvent</a> <sup>c</sup>
<hr/>	
target agent <sup>op</sup>	
<hr/>	
<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#targetAgent">https://purl.org/ai4s/ontology/planning/multi-agent#targetAgent</a>
<b>Domain</b>	<a href="#">ma:ConflictAlert</a> <sup>c</sup>
<b>Range</b>	<a href="#">ma:Agent</a> <sup>c</sup>
<hr/>	
belongs to agent segment <sup>op</sup>	
<hr/>	
<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#belongsToAgentSegment">https://purl.org/ai4s/ontology/planning/multi-agent#belongsToAgentSegment</a>
<b>Domain</b>	<a href="#">ma:AgentPathSegment</a> <sup>c</sup>
<b>Range</b>	<a href="#">ma:Agent</a> <sup>c</sup>
<hr/>	
has valid time <sup>op</sup>	
<hr/>	
<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#hasValidTime">https://purl.org/ai4s/ontology/planning/multi-agent#hasValidTime</a>
<b>Domain</b>	<a href="#">ma:AgentPathSegment</a> <sup>c</sup>
<b>Range</b>	<a href="#">time:Interval</a>
<hr/>	
has path sequence <sup>op</sup>	
<hr/>	
<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#hasPathSequence">https://purl.org/ai4s/ontology/planning/multi-agent#hasPathSequence</a>
<b>Domain</b>	<a href="#">ma:AgentPathSegment</a> <sup>c</sup>

**Range****List**

observed forbidden cells<sup>op</sup>

**IRI**

<https://purl.org/ai4s/ontology/planning/multi-agent#observedForbiddenCells>

**Domain**

[ma:ReplanningStrategy](#)<sup>c</sup>

**Range**

[plan:Cell](#)

observed forbidden segment<sup>op</sup>

**IRI**

<https://purl.org/ai4s/ontology/planning/multi-agent#observedForbiddenSegment>

**Domain**

[ma:ReplanningStrategy](#)<sup>c</sup>

**Range**

[ma:AgentPathSegment](#)<sup>c</sup>

implements procedure<sup>op</sup>

**IRI**

<https://purl.org/ai4s/ontology/planning/multi-agent#implementsProcedure>

**Domain**

[ma:MultiAgentPlanner](#)<sup>c</sup>

**Range**

[ma:PlannerProcedure](#)<sup>c</sup>

generates plan<sup>op</sup>

**IRI**

<https://purl.org/ai4s/ontology/planning/multi-agent#generatesPlan>

**Domain**

[ma:MultiAgentPlanner](#)<sup>c</sup>

**Range**

[plan:Plan](#)

## agent at<sup>op</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#agentAt">https://purl.org/ai4s/ontology/planning/multi-agent#agentAt</a>
<b>Domain</b>	<a href="#">ma:AgentState</a> <sup>c</sup>
<b>Range</b>	<a href="#">ma:GridLocation</a> <sup>c</sup>

## Datatype Properties

### has agent id<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#hasAgentID">https://purl.org/ai4s/ontology/planning/multi-agent#hasAgentID</a>
<b>Domain</b>	<a href="#">ma:Agent</a> <sup>c</sup>
<b>Range</b>	<a href="#">xsd:string</a>

### x coordinate<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#xCoordinate">https://purl.org/ai4s/ontology/planning/multi-agent#xCoordinate</a>
<b>Domain</b>	<a href="#">ma:GridLocation</a> <sup>c</sup>
<b>Range</b>	<a href="#">xsd:integer</a>

### y coordinate<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#yCoordinate">https://purl.org/ai4s/ontology/planning/multi-agent#yCoordinate</a>
<b>Domain</b>	<a href="#">ma:GridLocation</a> <sup>c</sup>

**Range**[xsd:integer](#)**has plan cost**<sup>dp</sup>**IRI**<https://purl.org/ai4s/ontology/planning/multi-agent#hasPlanCost>**Domain**[ma:AgentSubPlan](#)<sup>c</sup>**Range**[xsd:decimal](#)**has global makespan**<sup>dp</sup>**IRI**<https://purl.org/ai4s/ontology/planning/multi-agent#hasGlobalMakespan>**Domain**[ma:JointPlan](#)<sup>c</sup>**Range**[xsd:decimal](#)**conflict resolution protocol**<sup>dp</sup>**IRI**<https://purl.org/ai4s/ontology/planning/multi-agent#conflictResolutionProtocol>**Domain**[ma:JointPlan](#)<sup>c</sup>**Range**[xsd:string](#)**conflict type**<sup>dp</sup>**IRI**<https://purl.org/ai4s/ontology/planning/multi-agent#conflictType>**Domain**[ma:ConflictConstraint](#)<sup>c</sup>**Range**[xsd:string](#)

## selection rationale<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#selectionRationale">https://purl.org/ai4s/ontology/planning/multi-agent#selectionRationale</a>
<b>Description</b>	Explains why a specific agent was chosen for a conflict alert.
<b>Domain</b>	<a href="#">ma:ConflictAlert<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## policy name<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#policyName">https://purl.org/ai4s/ontology/planning/multi-agent#policyName</a>
<b>Domain</b>	<a href="#">ma:AgentPolicy<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## trained on environment<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#trainedOnEnvironment">https://purl.org/ai4s/ontology/planning/multi-agent#trainedOnEnvironment</a>
<b>Domain</b>	<a href="#">ma:AgentPolicy<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## observation channels<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#observationChannels">https://purl.org/ai4s/ontology/planning/multi-agent#observationChannels</a>
<b>Domain</b>	<a href="#">ma:AgentPolicy<sup>c</sup></a>

<b>Range</b>	<a href="#">xsd:string</a>
<hr/>	
<b>action space</b> <sup>dp</sup>	
<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#actionSpace">https://purl.org/ai4s/ontology/planning/multi-agent#actionSpace</a>
<b>Domain</b>	<a href="#">ma:AgentPolicy</a> <sup>c</sup>
<b>Range</b>	<a href="#">xsd:string</a>
<hr/>	
<b>has channel</b> <sup>dp</sup>	
<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#hasChannel">https://purl.org/ai4s/ontology/planning/multi-agent#hasChannel</a>
<b>Domain</b>	<a href="#">ma:ObservationMaskSpec</a> <sup>c</sup>
<b>Range</b>	<a href="#">xsd:string</a>
<hr/>	
<b>mask dimension</b> <sup>dp</sup>	
<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#maskDimension">https://purl.org/ai4s/ontology/planning/multi-agent#maskDimension</a>
<b>Domain</b>	<a href="#">ma:ObservationMaskSpec</a> <sup>c</sup>
<b>Range</b>	<a href="#">xsd:string</a>
<hr/>	
<b>conflict id</b> <sup>dp</sup>	
<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#conflictID">https://purl.org/ai4s/ontology/planning/multi-agent#conflictID</a>
<b>Domain</b>	<a href="#">ma:CollisionEvent</a> <sup>c</sup>
<b>Range</b>	<a href="#">xsd:string</a>

## conflict type event<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#conflictTypeEvent">https://purl.org/ai4s/ontology/planning/multi-agent#conflictTypeEvent</a>
<b>Domain</b>	<a href="#">ma:CollisionEvent<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## alert id<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#alertID">https://purl.org/ai4s/ontology/planning/multi-agent#alertID</a>
<b>Domain</b>	<a href="#">ma:ConflictAlert<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## rewind window<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#rewindWindow">https://purl.org/ai4s/ontology/planning/multi-agent#rewindWindow</a>
<b>Domain</b>	<a href="#">ma:ConflictAlert<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:integer</a>

## alert type<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#alertType">https://purl.org/ai4s/ontology/planning/multi-agent#alertType</a>
<b>Domain</b>	<a href="#">ma:ConflictAlert<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## static forbidden cells<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#staticForbiddenCells">https://purl.org/ai4s/ontology/planning/multi-agent#staticForbiddenCells</a>
<b>Domain</b>	<a href="#">ma:ConflictAlert<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## dynamic forbidden path<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#dynamicForbiddenPath">https://purl.org/ai4s/ontology/planning/multi-agent#dynamicForbiddenPath</a>
<b>Domain</b>	<a href="#">ma:ConflictAlert<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## strategy id<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#strategyID">https://purl.org/ai4s/ontology/planning/multi-agent#strategyID</a>
<b>Domain</b>	<a href="#">ma:ReplanningStrategy<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## used static replanning<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#usedStaticReplanning">https://purl.org/ai4s/ontology/planning/multi-agent#usedStaticReplanning</a>
<b>Domain</b>	<a href="#">ma:ReplanningStrategy<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:boolean</a>

## used dynamic replanning<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#usedDynamicReplanning">https://purl.org/ai4s/ontology/planning/multi-agent#usedDynamicReplanning</a>
<b>Domain</b>	<a href="#">ma:ReplanningStrategy<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:boolean</a>

## procedure id<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#procedureID">https://purl.org/ai4s/ontology/planning/multi-agent#procedureID</a>
<b>Domain</b>	<a href="#">ma:PlannerProcedure<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## implements stage<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#implementsStage">https://purl.org/ai4s/ontology/planning/multi-agent#implementsStage</a>
<b>Domain</b>	<a href="#">ma:PlannerProcedure<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## agent selection policy<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#agentSelectionPolicy">https://purl.org/ai4s/ontology/planning/multi-agent#agentSelectionPolicy</a>
<b>Domain</b>	<a href="#">ma:PlannerProcedure<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## rewind window default<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#rewindWindowDefault">https://purl.org/ai4s/ontology/planning/multi-agent#rewindWindowDefault</a>
<b>Domain</b>	<a href="#">ma:PlannerProcedure</a> <sup>c</sup>
<b>Range</b>	<a href="#">xsd:integer</a>

## has rationale<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#hasRationale">https://purl.org/ai4s/ontology/planning/multi-agent#hasRationale</a>
<b>Domain</b>	<a href="#">ma:PlannerProcedure</a> <sup>c</sup>
<b>Range</b>	<a href="#">xsd:string</a>

## of planner type<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#ofPlannerType">https://purl.org/ai4s/ontology/planning/multi-agent#ofPlannerType</a>
<b>Domain</b>	<a href="#">ma:MultiAgentPlanner</a> <sup>c</sup>
<b>Range</b>	<a href="#">xsd:string</a>

## supports conflict detection<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#supportsConflictDetection">https://purl.org/ai4s/ontology/planning/multi-agent#supportsConflictDetection</a>
<b>Domain</b>	<a href="#">ma:MultiAgentPlanner</a> <sup>c</sup>
<b>Range</b>	<a href="#">xsd:boolean</a>

## communication overhead<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#communicationOverhead">https://purl.org/ai4s/ontology/planning/multi-agent#communicationOverhead</a>
<b>Domain</b>	<a href="#">ma:MultiAgentPlanner<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## has performance tradeoff<sup>dp</sup>

<b>IRI</b>	<a href="https://purl.org/ai4s/ontology/planning/multi-agent#hasPerformanceTradeoff">https://purl.org/ai4s/ontology/planning/multi-agent#hasPerformanceTradeoff</a>
<b>Domain</b>	<a href="#">ma:MultiAgentPlanner<sup>c</sup></a>
<b>Range</b>	<a href="#">xsd:string</a>

## Namespaces

**cora**

<http://www.IEEE1872-2015/cora#>

**dct**

<http://purl.org/dc/terms/>

**ma**

<https://purl.org/ai4s/ontology/planning/multi-agent#>

**owl**

<http://www.w3.org/2002/07/owl#>

**plan**

<https://ai4society.github.io/planning-ontology#>

**prov**

<http://www.w3.org/ns/prov#>

**rdf**

<http://www.w3.org/1999/02/22-rdf-syntax-ns#>

**rdfs**

<http://www.w3.org/2000/01/rdf-schema#>

**sosa**

<http://www.w3.org/ns/sosa/>

**time**

<http://www.w3.org/2006/time#>

**vann**

<http://purl.org/vocab/vann/>

**xsd**

<http://www.w3.org/2001/XMLSchema#>

## Legend

<b>c</b>	Classes
<b>op</b>	Object Properties
<b>dp</b>	Datatype Properties