Winter Games University 2011

blog.andreasstiegler.com/wgu2011

Artificial Intelligence in Games

CONTINUED

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Tactical AIs

Tactical AIs

Separate the actual AI processing from ingame content. Tactical AIs might work hand in hand with an underlying situational AI.

Shooters

Multiplayer bots, dynamic AI in singleplayer (henchmen)

Strategy Games

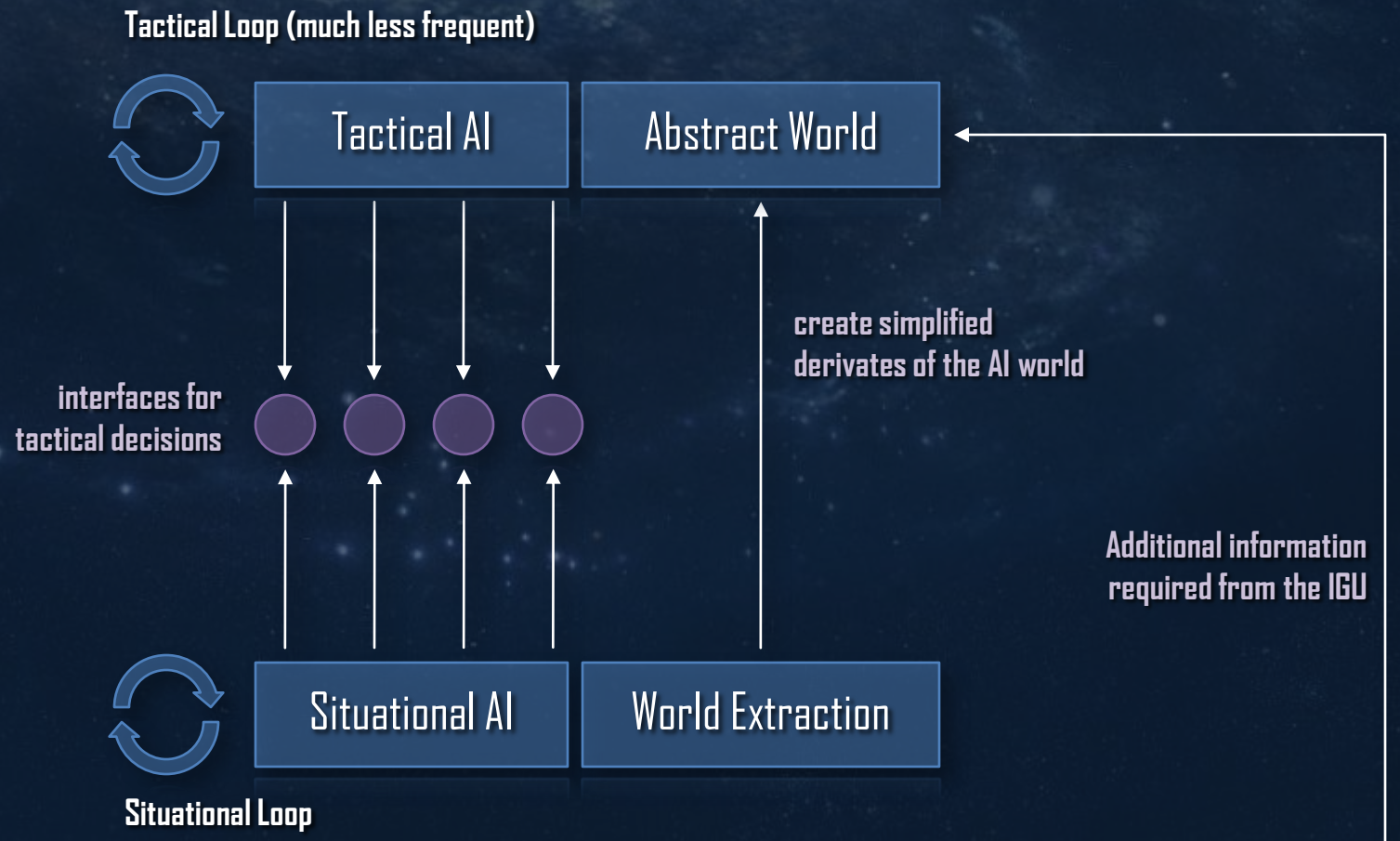
A single unit often works based on simple tactical scripts

Role Play Games

Character interaction and social simulation

Tactical AIs

Let's try to evolve a Situational AI into a Tactical AI



Tactical AIs

A situational AI answers questions like...

- What to do with this weapon?
- What to do if under attack?
- When to reload?

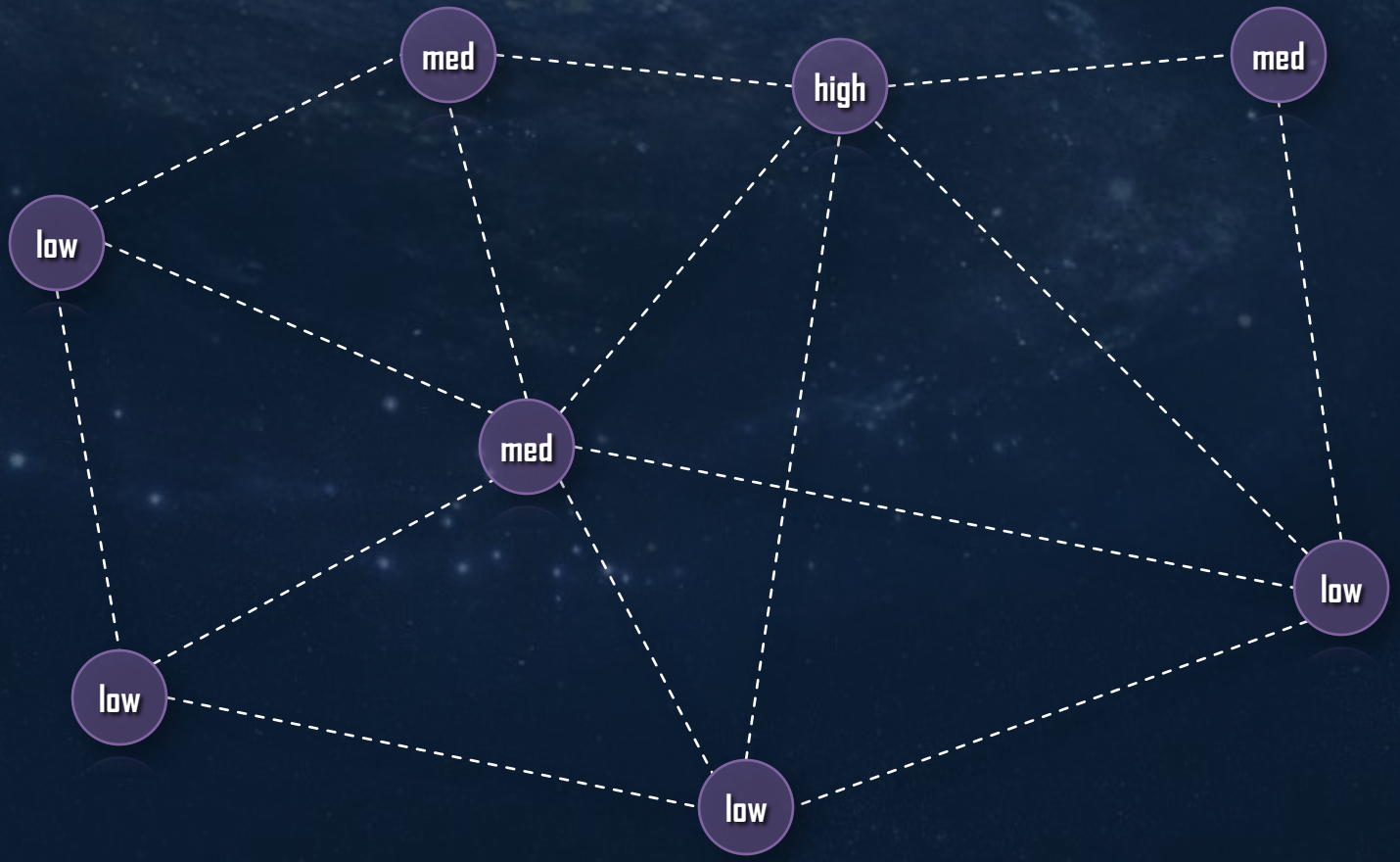
A tactical AI answers questions like...

- Where to strafe, where to run?
- Where to camp?
- Who am I fighting against?
- How to assist my team?

Tactical AIs

A tactical AI has to accumulate memories:

Threat Maps



Tactical AIs

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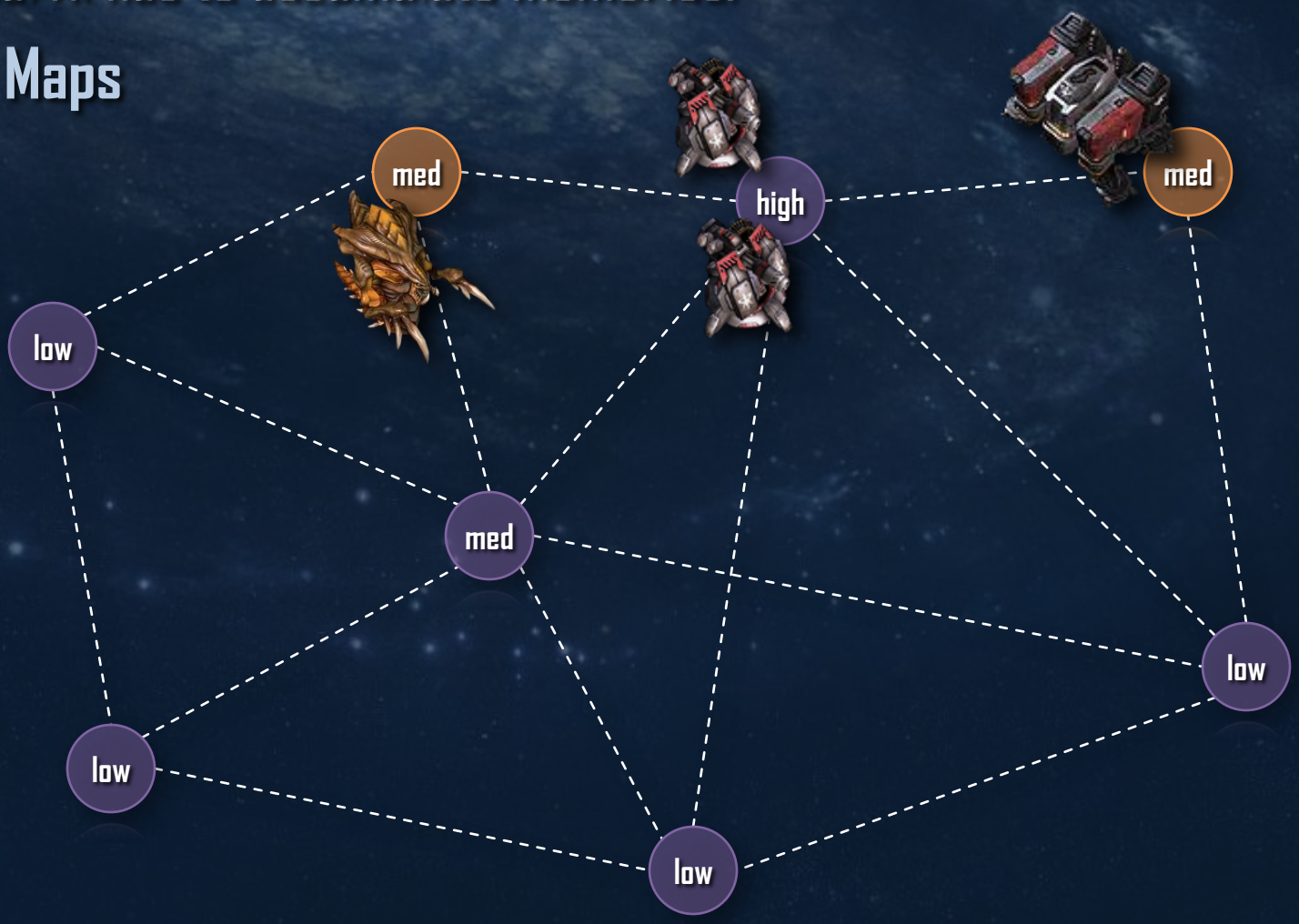

image source: StarCraft II Wings of Liberty, Activision Blizzard

Tactical AIs

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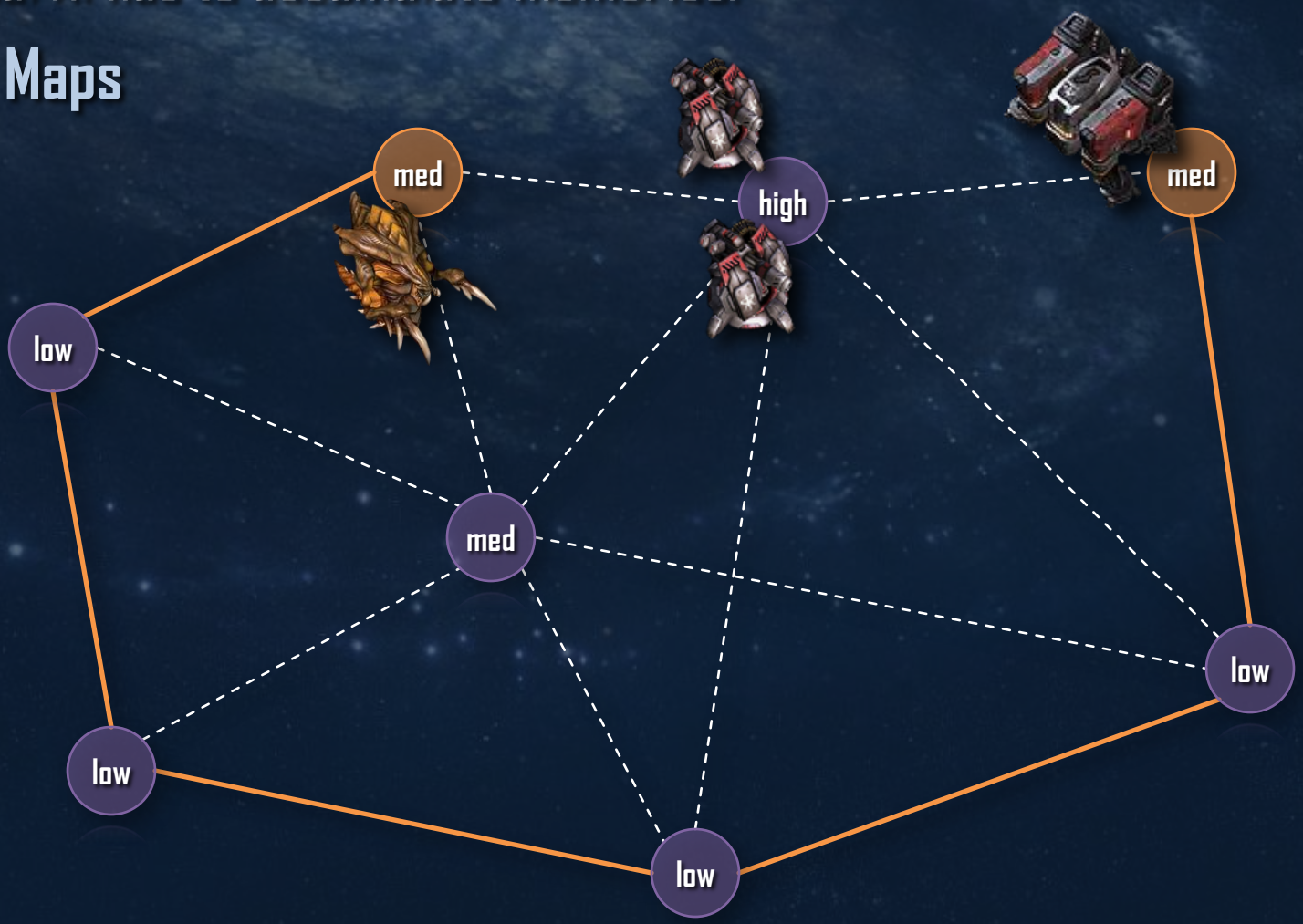


image source: StarCraft II Wings of Liberty, Activision Blizzard

Tactical AIs

A tactical AI has to accumulate memories:

Context Aggregation

Tactical AIs

- More intelligent (?) reactions
- Less vulnerable to dynamic environments
- May adapt to human solving-strategies, at least to a certain degree
- May learn from its own mistakes during a session
- With some adjustments, may also work with unseen content
- Less predictable behavior

Tactical AIs

- A lot more processing overhead runtime
- Memories require memory (my favorite ☺)
- Development time increases with target complexity
- Precompiled content – context parameters – require heuristic testing
- The AI is still bound to its input set of capabilities, although they are less precise now

Strategic AIs

Strategic AIs

Mimic long-term goals and problem-solving-strategies. High abstraction from actual game content

Strategy Games

Player-Level artificial intelligence

Role Play Games

Dynamic artificial storytelling

MMOGs

Dynamic dungeon and encounter design

image source: Fleet Operations, www.fleetops.net

Strategic AIs

The bad news: There are no real-time strategic AIs. Yet.

But development goes on!

AI Seek Demo

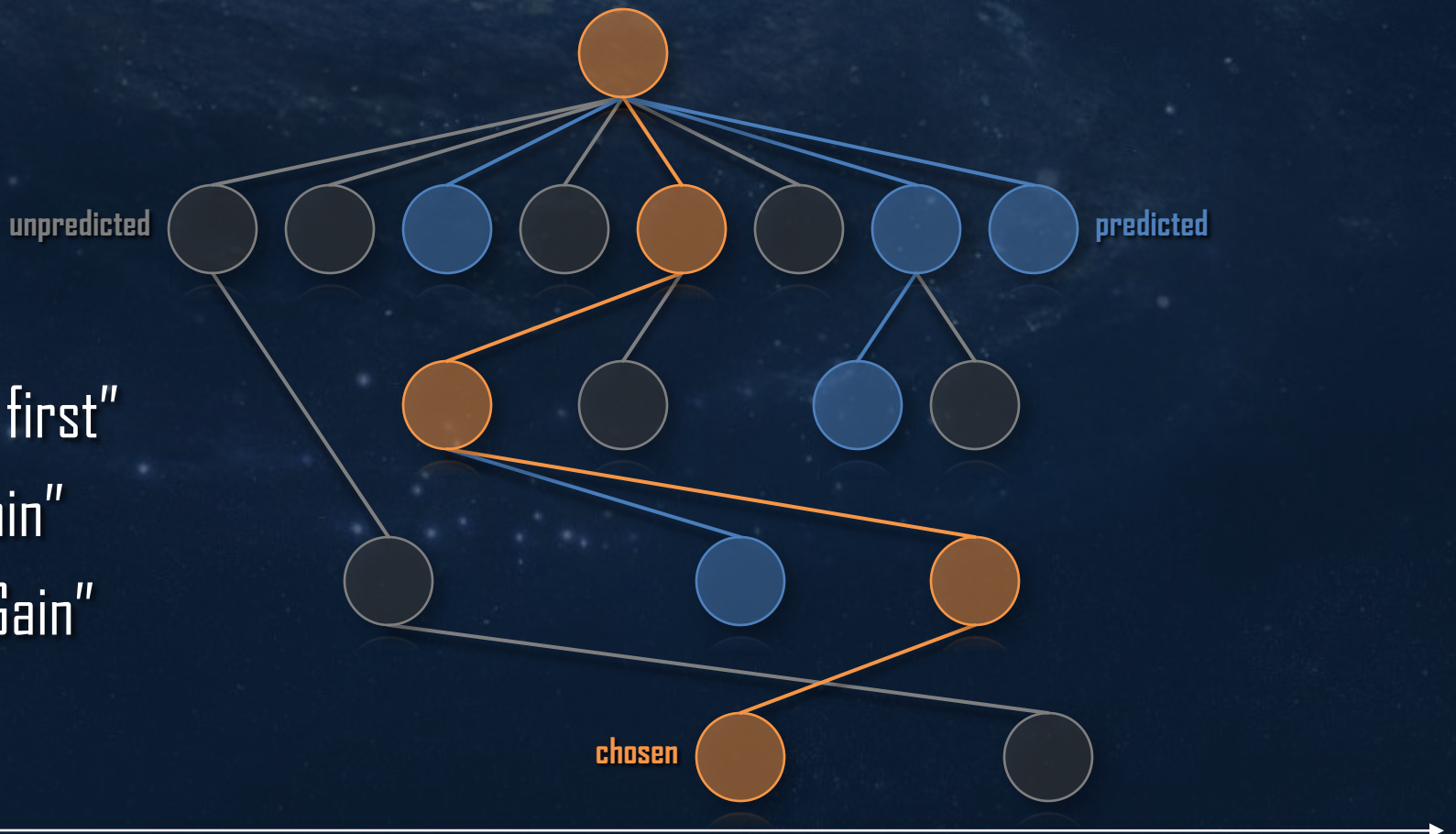
Strategic AIs

The idea behind strategic AIs is to accumulate memories over a whole game session

Just like our brain, the AI has to condense information of past events

Strategic AIs

In order to access – and condense – memories, it is often necessary to also store the reasons for taking a certain decision in the past.



"Safety first"

"Max Gain"

"Risky Gain"

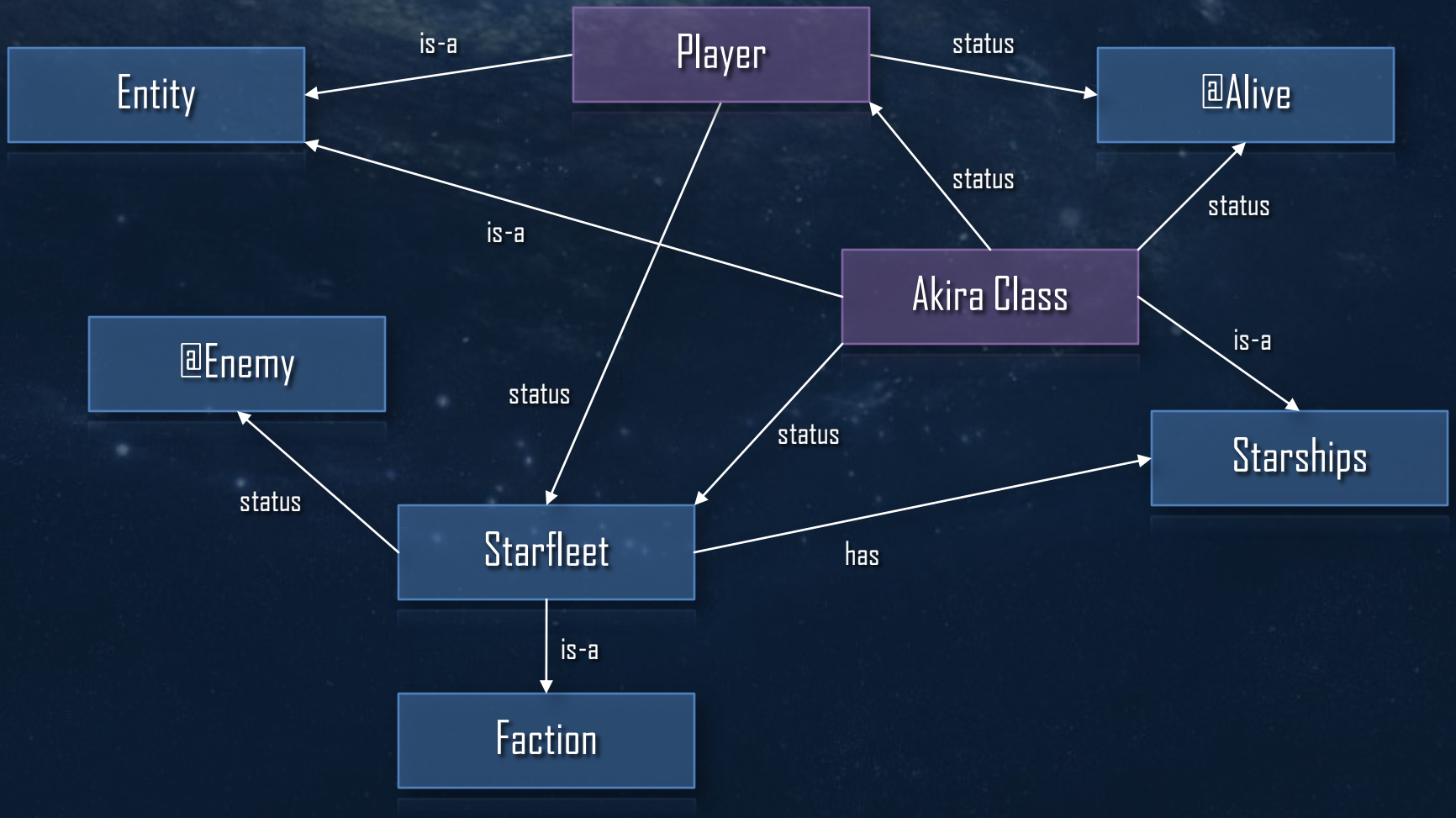
Strategic AIs

In order to evaluate the gain of an action, the AI has to analyze the effects and gains of entities or decisions

As no precompiled rules are used, we require a knowledgebase to accumulate semantics:

Semantic Net

Strategic AIs



Strategic AIs

A semantic net consists of a precompiled knowledge base, usually containing predefined entities and "has" and "is-a" relations

During runtime, entities are added and "status" relations are built

Clustering AIs

Clustering AIs

A good way to achieve complexity within the bounds of a reasonable architecture is to build a player-level AI for multiple AI agents

That's also similar to some concepts of how human brains work (reflection)

- The agents might – but don't necessarily have to – have defined communication channels
- The agents can be of different complexity or type (situational, tactical, …)
- May work on different input
- (May be plugged at runtime)

Custering AIs

Fleet Operations demo

AI input handling

DISCUSSION

Perception → Eval → Do

And that's it with the slides so far...

Any questions?