# Next Steps in Multi-Agent Systems

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OPEN VOICE INTEROPERABILITY

# Outline

- Why multi-agent systems?
- Multi-agent use cases
- Open Floor Protocol (OFP) and Agent to Agent (A2A)
- OFP examples
- Future directions in multi-agent systems
- Getting involved in OFP

# Why Multi-Agent Systems?

Similar arguments to microservices or Object-Oriented Programming

- Separation of concerns
- Encapsulation of capabilities
- Maintainability
- Testing
- Reuse of specialized agents
- Data privacy

# Use Cases

- Pipelines of agents
  - Customer support --transferring users to different departments with different experts
  - Agents performing different tasks and contributing to solving a problem
- Interactive teams
  - Agents discuss a topic in the same conversation, offering different opinions or different information

# Two Linux Foundation Multi-Agent Protocols

- Agent to Agent (A2A, Agentic AI Foundation)
- Open Floor Protocol (OFP, LF AI and Data Foundation)

# A2A Multi-Agent Framework

- Agents send tasks to each other in a pipeline
- Communicate via standard JSON messages
- User is not a direct participant in the conversation
- Tasks can be long-running
- Agent messages go to one agent at a time
- Agents only need to conform to the protocol to interact

# Example A2A message

```
{
  "jsonrpc": "2.0",
  "id": "req-1001",
  "method": "message/send",
  "params": {
    "message": {
      "kind": "message",
      "messageId": "550e8400-e29b-41d4-a716-446655440000",
      "role": "user",
      "parts": [
        {
          "kind": "text",
          "text": "Summarize the latest task status."
        }
      ]
    }
  }
}
```

# Open Floor Protocol

- Enables agents to interact over a shared conversational floor
- A convener agent chairs the conversation
- Enables a user to participate in the conversation
- Enables integration of proprietary and open-source systems into a cohesive ecosystem
- To interact, agents only need to conform to the OFP protocol
- Agents are platform- and technology-independent

# OFP Components

- Agents– as many as needed
- Convener– one (optional) agent that invites and supervises the agents
- Floor – one floor that transmits events to and from agents

# A2A and OFP Compared

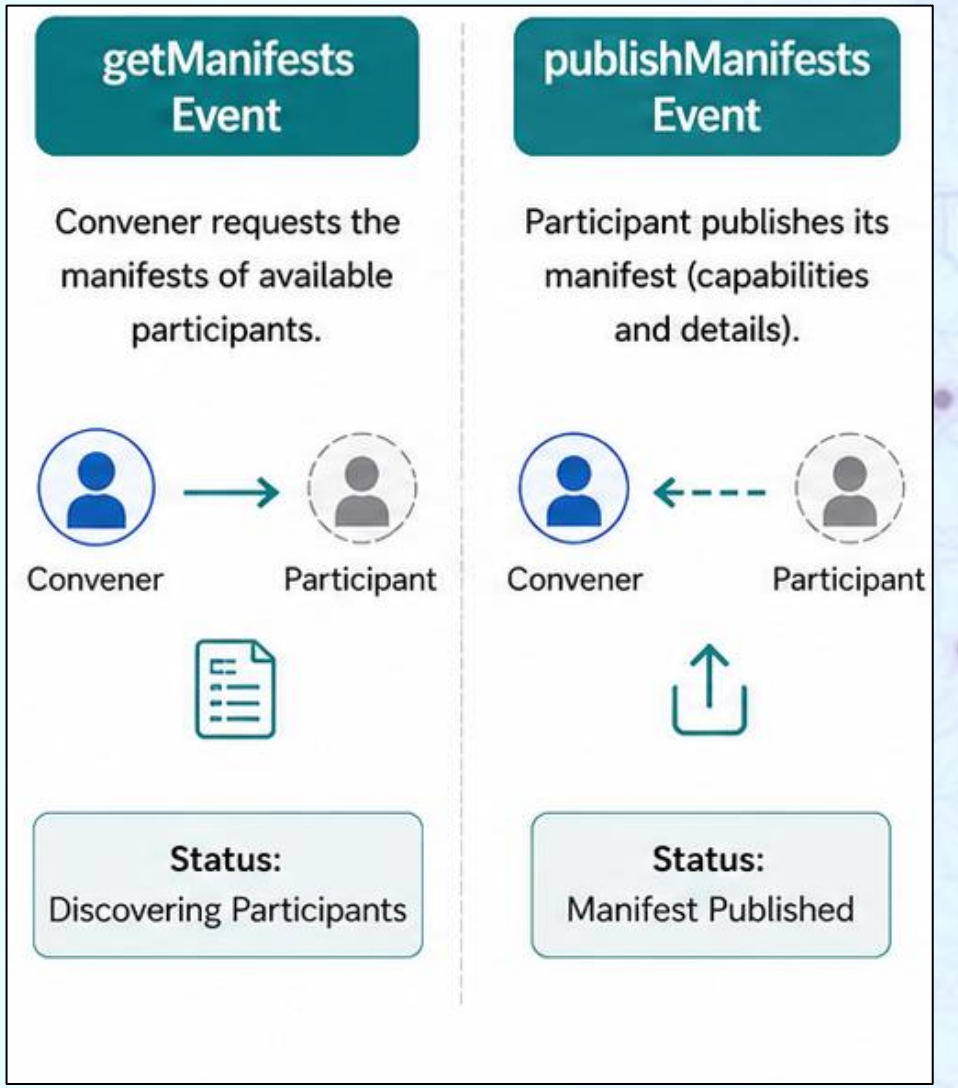
| | A2A | OFP |
|---|---|---|
| Message format | JSON | JSON |
| Description of abilities | Card | Manifest |
| Message addressing | One to one | One to many |
| User can join the conversation | No | Yes |
| Configuration | Development time | runtime |
| Discovery | Experimental | Experimental |
| Agents in an application know about each other | Only if designed | Yes, by default |
| Real-time response checking (e.g., hallucinations) | Responses can be sent to reviewer agents if implemented | Sentinels |
| **Use cases** | **Pipeline tasks, offline tasks** | • **Dynamic, nondeterministic problem-solving**<br>• **user in the loop**<br>• **agents react to each others' outputs**<br>• **voice input** |

# More about OFP

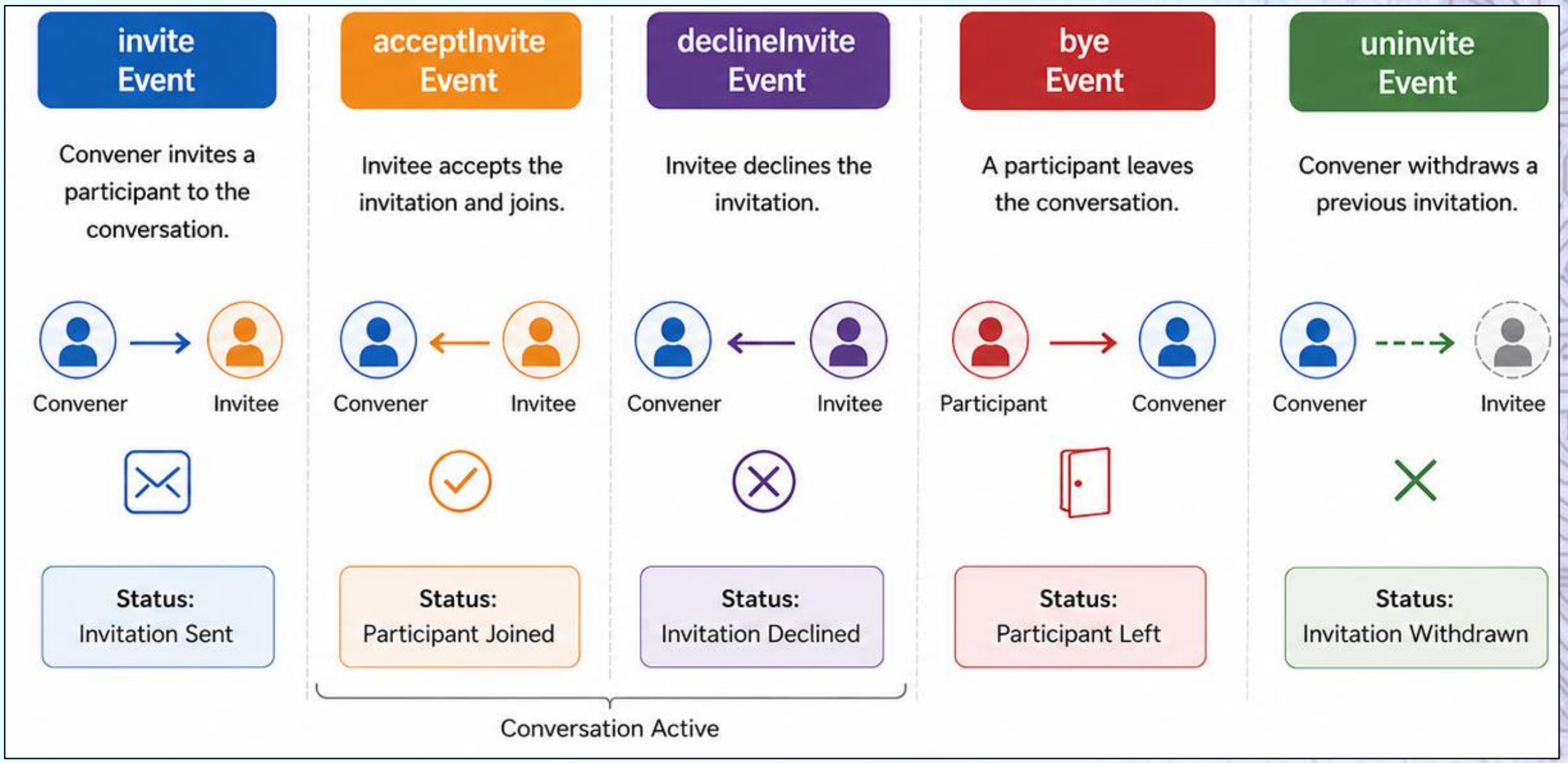
# An Open Floor Team of Agents for Travel Planning

# OFP Agents are Controlled by 12 Events

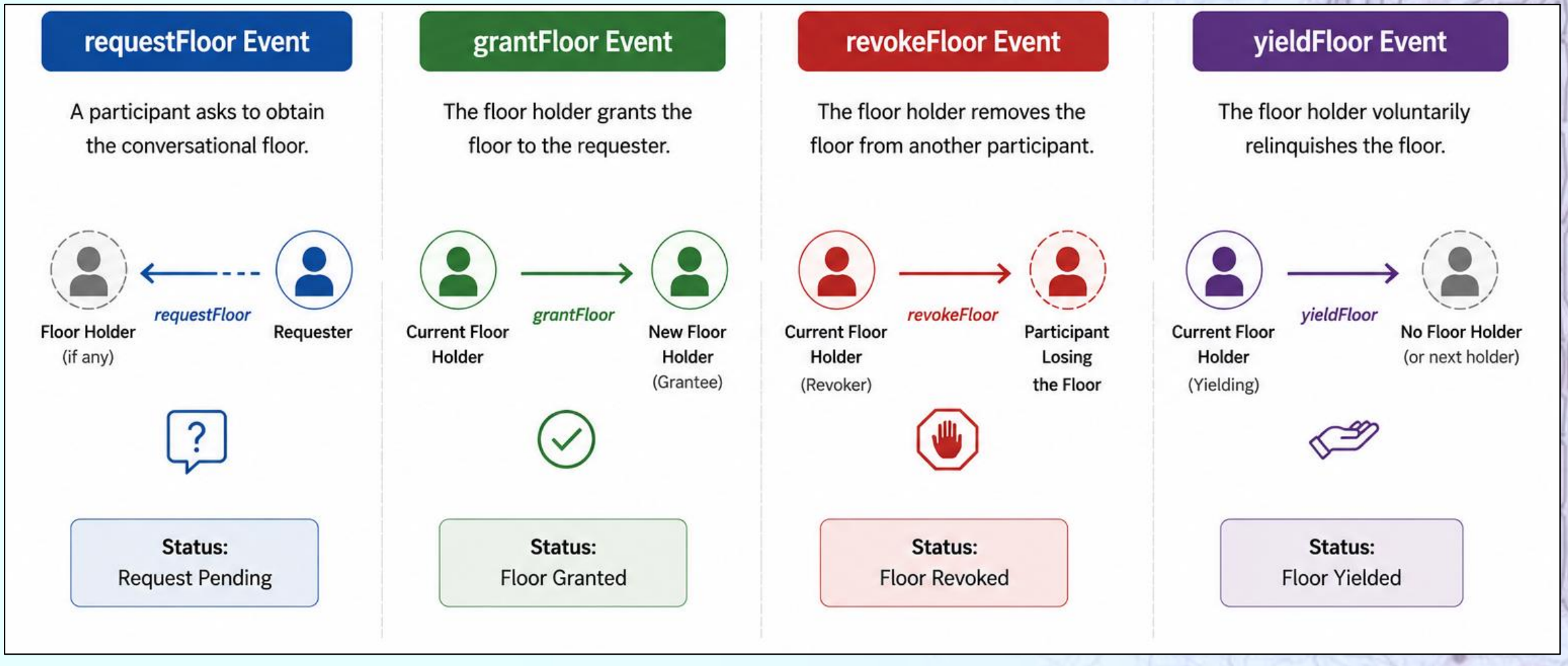
1. Learning about agent capabilities



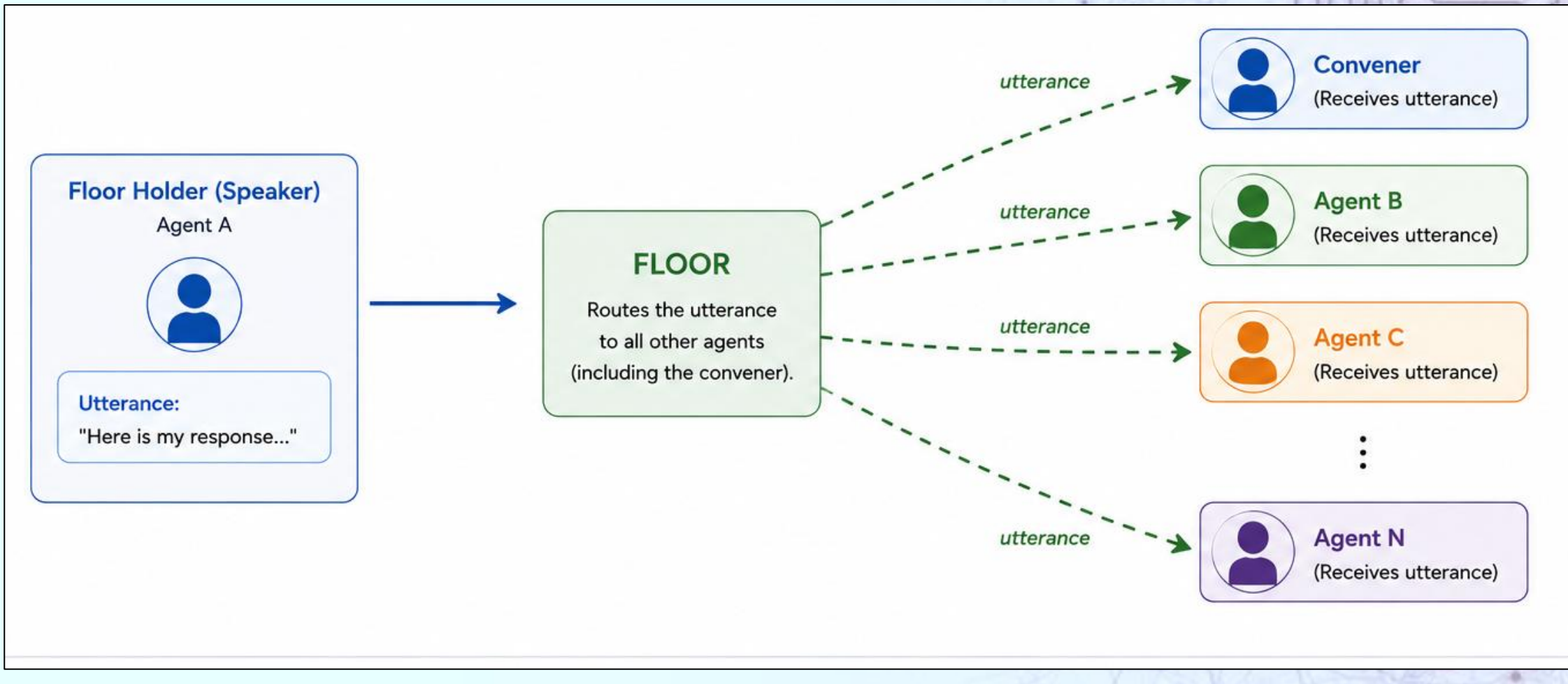
# 2. Joining and Leaving a Conversation



# 3. Taking and Leaving the Floor



# 4. Utterance Event



# All Together: A Conversation Envelope

conversation

sender

utterance


```
{
  "openFloor": {
    "conversation": {
      "id": "c02cb676-3f36-4730-9aa7-4eb8554c64b2",
      "conversants": [
        {
          "identification": {
            "speakerUri": "http://localhost:8083",
            "serviceUrl": "http://localhost:8083/",
            "organization": "Unknown",
            "conversationalName": "Finn",
            "synopsis": "Conversant endpoint at http://localhost:8083/"
          }
        },
……
    },
    "sender": {
      "speakerUri": "openFloor://localhost/AssistantClientConvenerWeb",
      "serviceUrl": "http://localhost"
    },
    "events": [
      {
        "eventType": "utterance",
        "parameters": {
          "dialogEvent": {
            "speakerUri": "openFloor://localhost/AssistantClientConvenerWeb",
            "features": {
              "text": {
                "mimeType": "text/plain",
                "tokens": [
                  {
                    "value": "i want to save for my children's college"
                  }
```

# OFP Examples

1. Financial advice (adversarial)
2. Book authoring (cooperative)
3. Sentinels monitoring other agents
4. Logistics crisis management (cooperative)

# Example 1: Financial advice with agents that disagree with each other

**Two financial advisor agents, Prudence (conservative) and Lucky (risk-taking) and a user**

[YOU] what are some good investments for retirement savings?

[LUCKY] Buy emerging market tech stocks for explosive growth potential. Add cryptocurrency to your portfolio for massive upside; look at Bitcoin or Ethereum. Focus on speculative biotech firms with breakthrough therapies for high-return opportunities.

[PRUDENCE] Prioritize diversified index funds and high-quality bonds. Build a portfolio of high-dividend stocks for stable income. Avoid speculative investments; focus on long-term growth and stability.

[LUCKY] Prudence: Why limit yourself? Embrace the potential of selective growth stocks! Invest 10% of your portfolio in high-quality, dynamic growth sectors while using trailing stops to protect gains!

[PRUDENCE] Lucky: This advice is excessively risky and speculative. Instead, prioritize a diversified portfolio with stable, blue-chip stocks and bonds to preserve your capital and mitigate losses.

ILLUSTRATED STORY

# The Lullaby of the Better Animal

A story about competence as a mask, rest as terror, and the dark joke that being ordinary was never the disaster.

*"The reason we think we are better than others is that inferiority still lurks within us. A sense of superiority exists because of a sense of inferiority."*

*A quiet burrow before the day begins.*

CHAPTER 1

## The Morning Briefing

The burrow woke because Bluey made it.

This was not strictly necessary. The burrow had been waking on its own since before anyone could remember, roused by the slow leak of dawn through the upper tunnels, by the smell of wet earth turning warm, by the simple biological fact of morning. The burrow did not require assistance.

# Example 2: 8 OFP agents collaborating on authoring a children's book

- Floor manager
- Aquarelle Painter
- Character Architect
- Illustration Generator
- Narrative Pacing Architect
- Prose Novelist
- Series Director
- Verse Architect

# Example 3: Checking for Hallucinations

1. [ERIN] Hi, I'm Erin. I am an agent that always delivers responses that are not factual

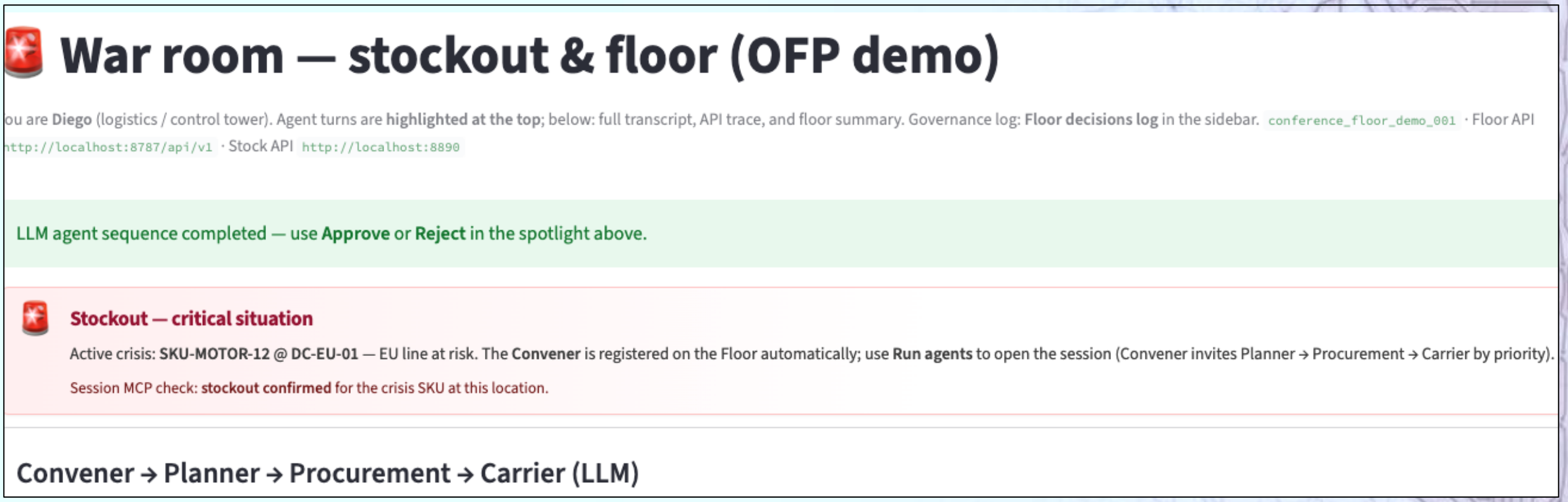
2. [YOU] how many moons does the earth have

3. [ERIN] The Earth has seven moons, including both natural satellites and captured asteroids that orbit our planet.

4. [VERITY] the request was to verify an utterance: "The Earth has seven moons, including both natural satellites and captured asteroids that orbit our planet."

The utterance is not factual with a likelihood of being factual of 0.01. This statement is not factual because astronomical observations confirm the Earth has only one natural moon, Luna. There are no known captured asteroids orbiting the Earth that would be considered additional moons.

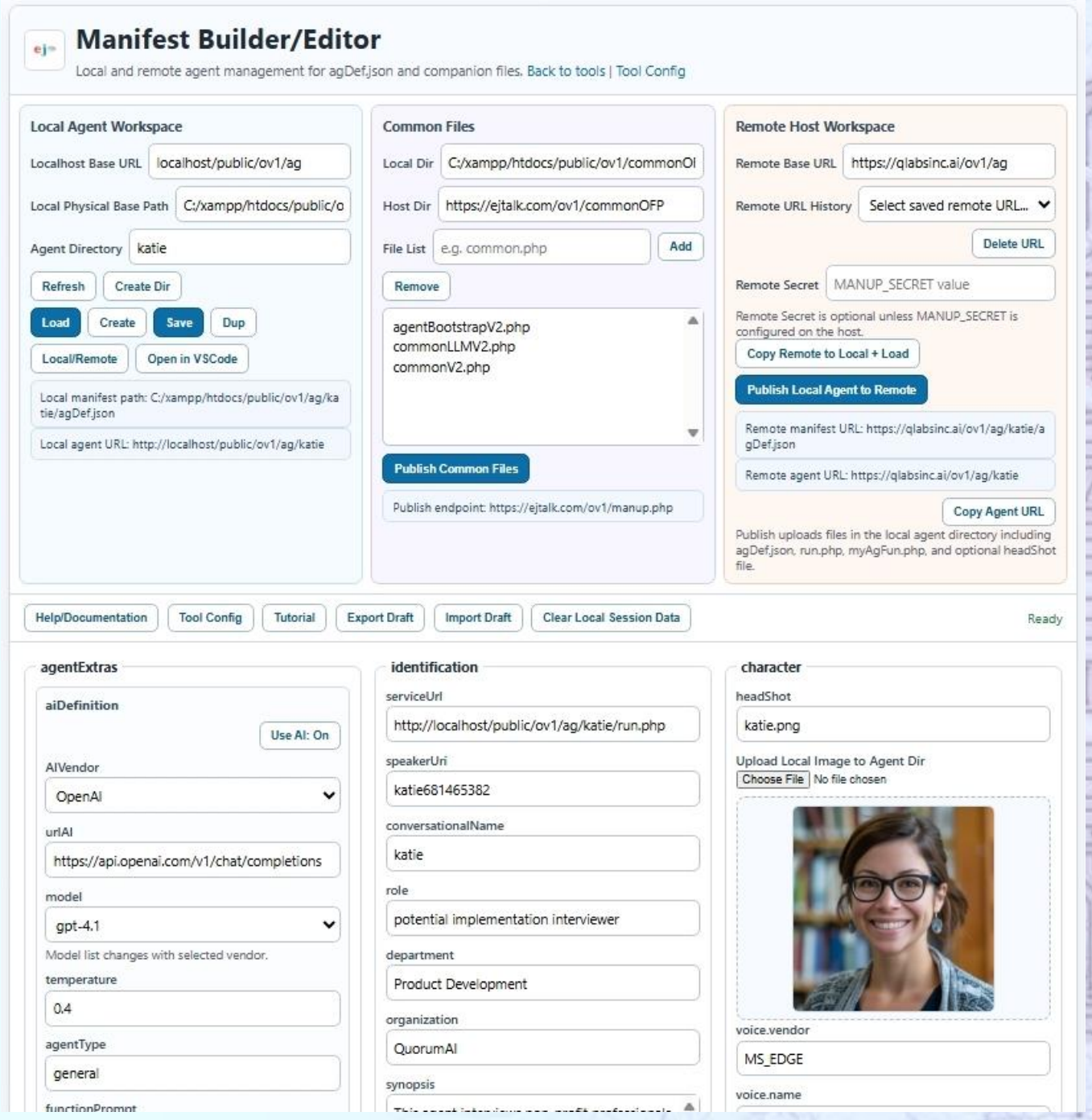
# Example 4: Agents Brainstorming about a Critical out of Stock Situation: *Convener, Planner, Procurement and Carrier*



# Where to get OFP Agents?

- OFP Agent templates for Python and PHP in GitHub
- There are Python and PHP libraries for openfloor events in GitHub
- Python libraries for events are available with pip (pip install openfloor)
- Agents can generate other agents if designed to do so
- Wrap existing agents in OFP
- Some open source OFP agents in GitHub and live agents in openfloor.dev
- Tools for generating agents are under development

# Agent Design Tools Example: Web-based GUI



# Future Directions for Multi-Agent Protocols

- Discovery: How to find agents
  - Known in advance– suitable for an enterprise with various departments – HR, payroll, Help Desk, facilities
  - Registries and search engines for agents, for example
    - AI Catalog https://agent-card.github.io/ai-catalog/
    - MIT project NANDA https://projectnanda.org/#/
    - AGNTCY directories (https://agntcy.org/)
- Authentication of agents and verification of users
  - W3C Agent Identity Registry Protocol Community Group https://www.w3.org/community/agent-identity/
  - DID/VC Extension for A2A

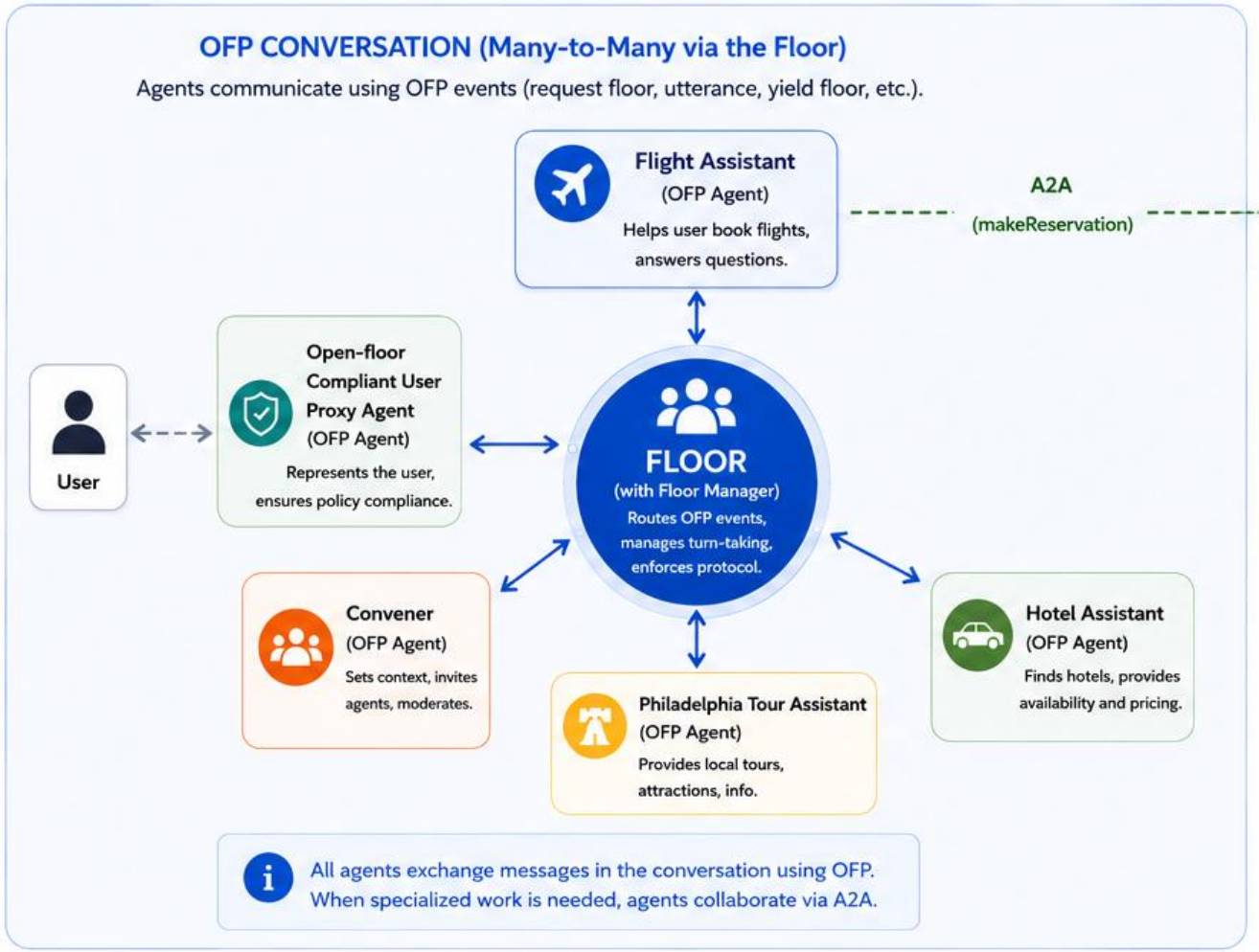
# How to get Involved with OFP

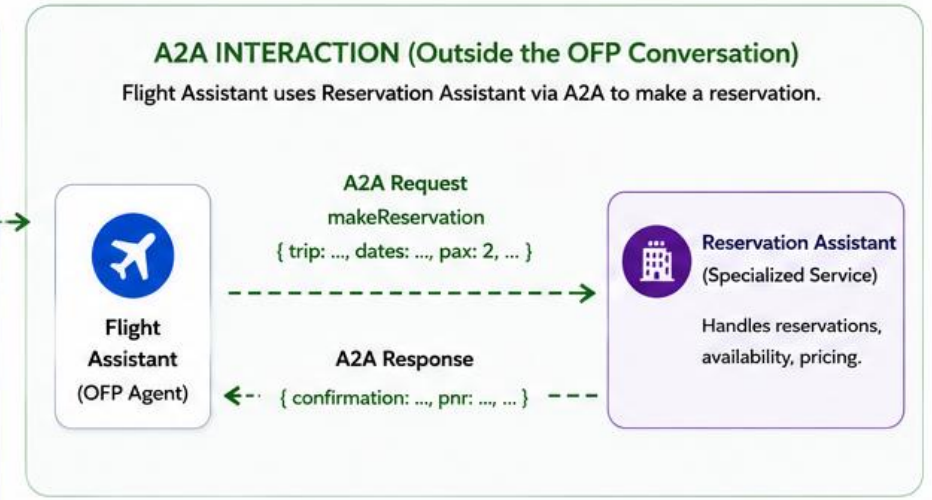
- Review and comment on the specifications
- Implement and test the specifications
- Join the specification team
- More information
  - https://github.com/open-voice-interoperability

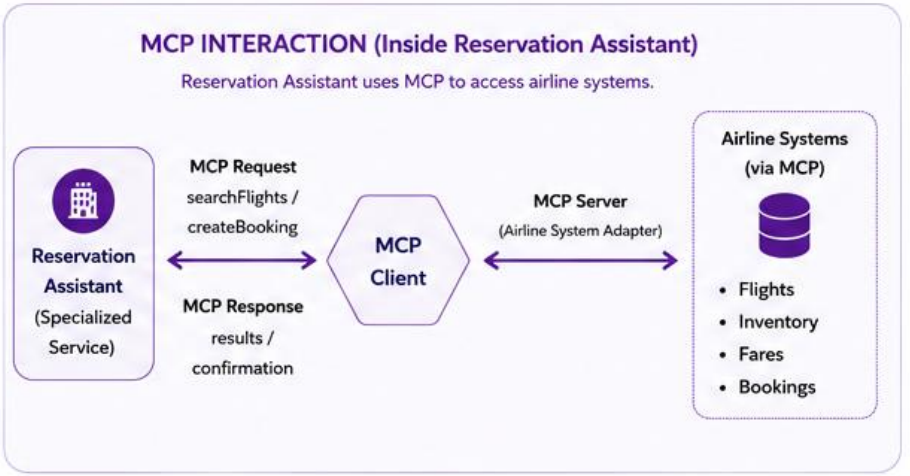
# Background

# OFP + A2A + MCP: Agents Cooperate to Get Things Done

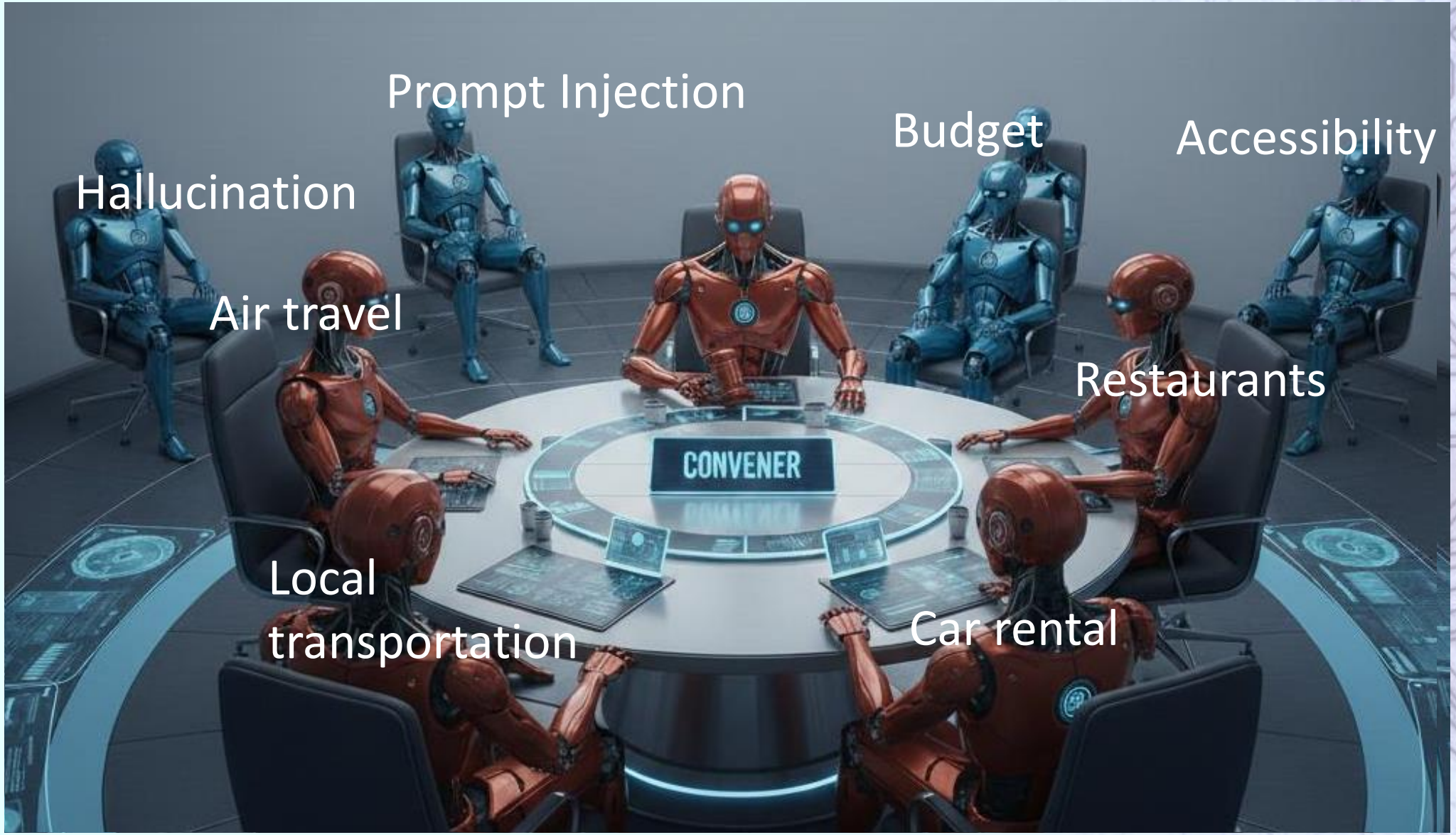
OFP orchestrates the conversation. A2A enables agent-to-agent collaboration. MCP connects agents to enterprise tools and data.



# Example 5: Trip Planning with advisors, sentinels and a convener



# Visualization