Collaborative System Coordination Design for Urban Crisis: Resolution Using Multi-Agent Technology

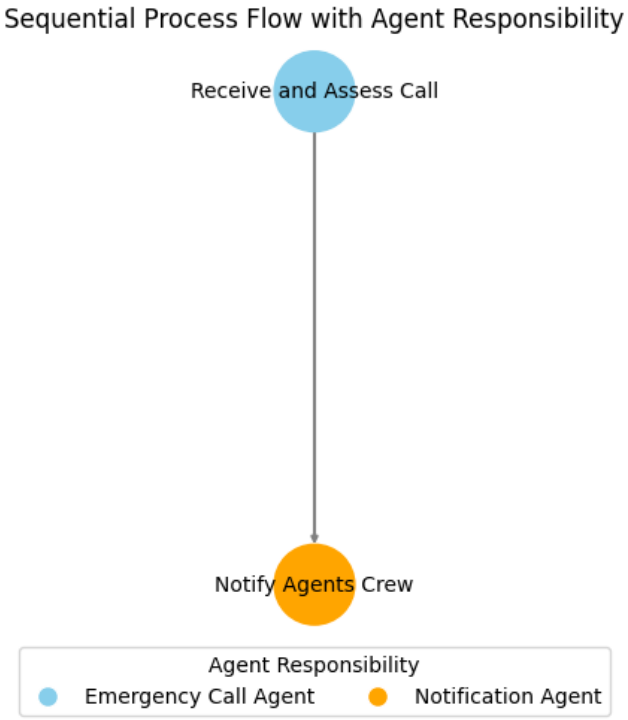
Team 05

December 8, 2024

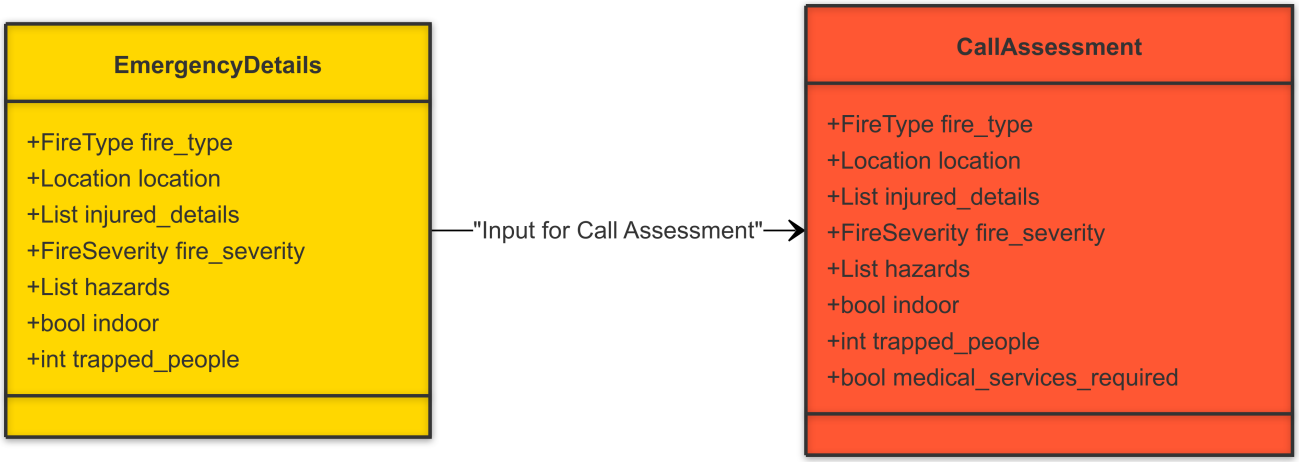
Introduction

- **Objective**: Design the cooperation and coordination mechanisms that will be used to solve the emergency response for fire-related emergencies in Lloret de Mar, Girona.
- **Teams Involved**:
  - Emergency Services
  - Firefighters
  - Medical Services
  - Public Communications
  - *Forensics*
- **Overview**:
  - For each crew: process definition and Pydantic outputs.
  - Agent interactions: flows and routers.

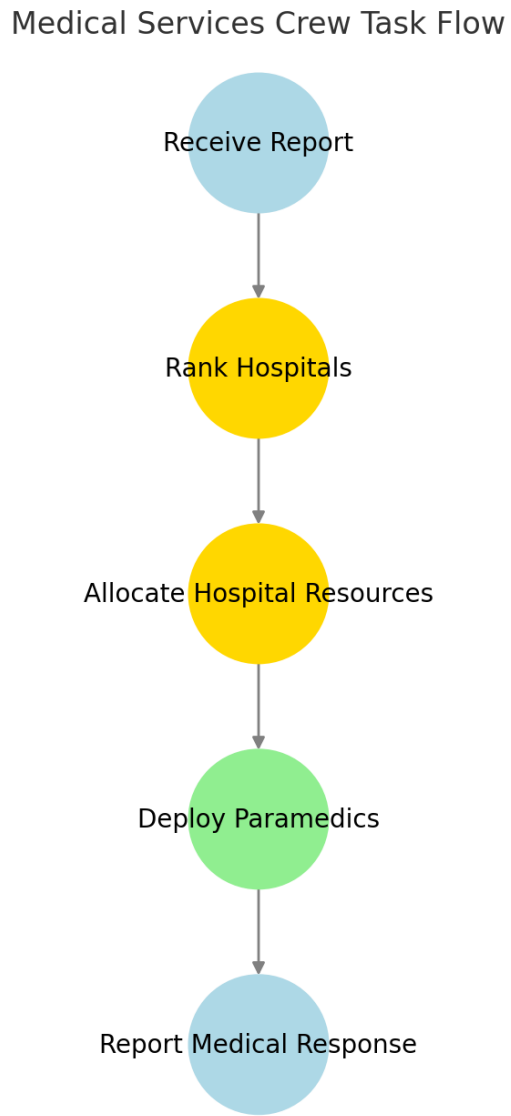
Emergency Services Process and Outputs



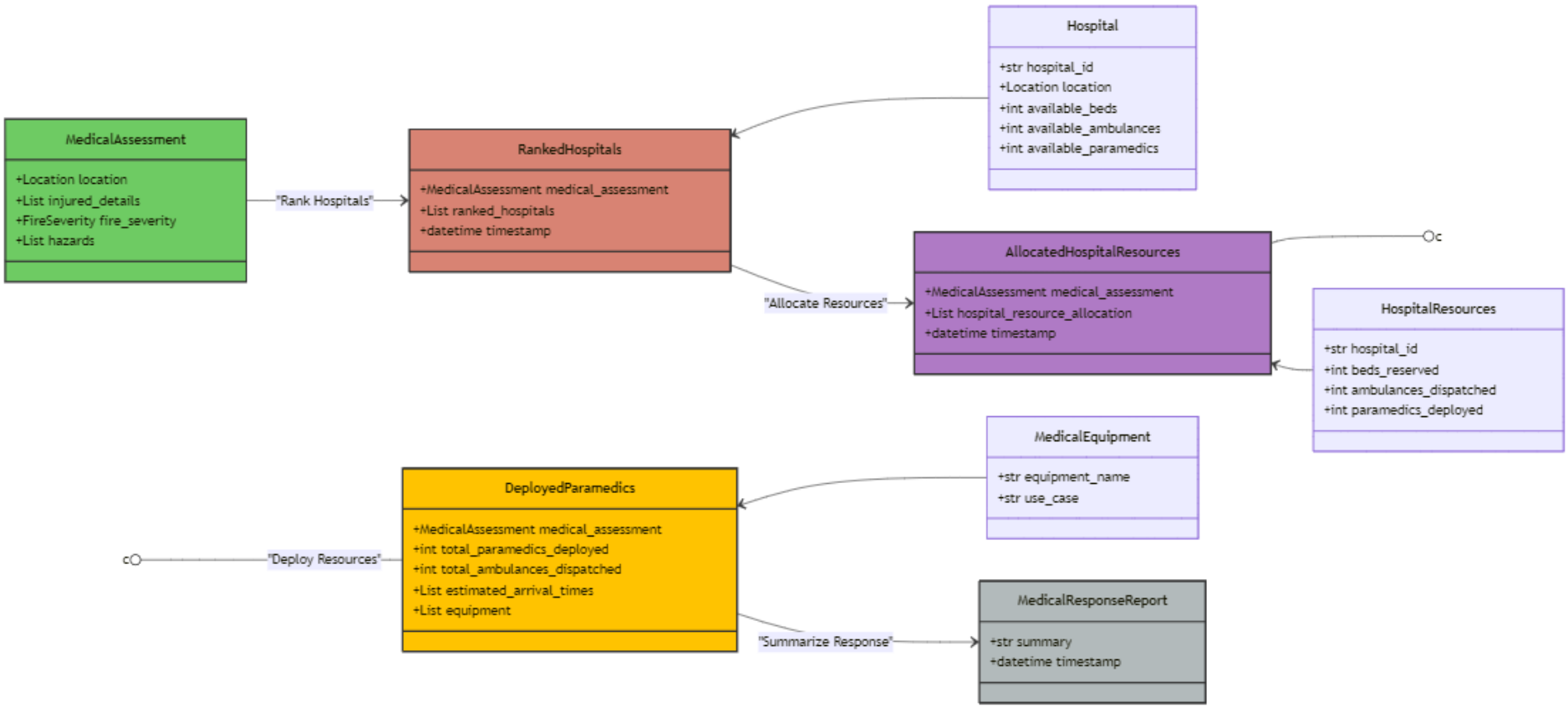
- What type of fire is it?
- Where is it?
- Is anyone injured? How badly?
- How severe is the fire?
- Are there hazards?
- Is it an indoor or outdoor fire?
- Is anyone inside or trapped?



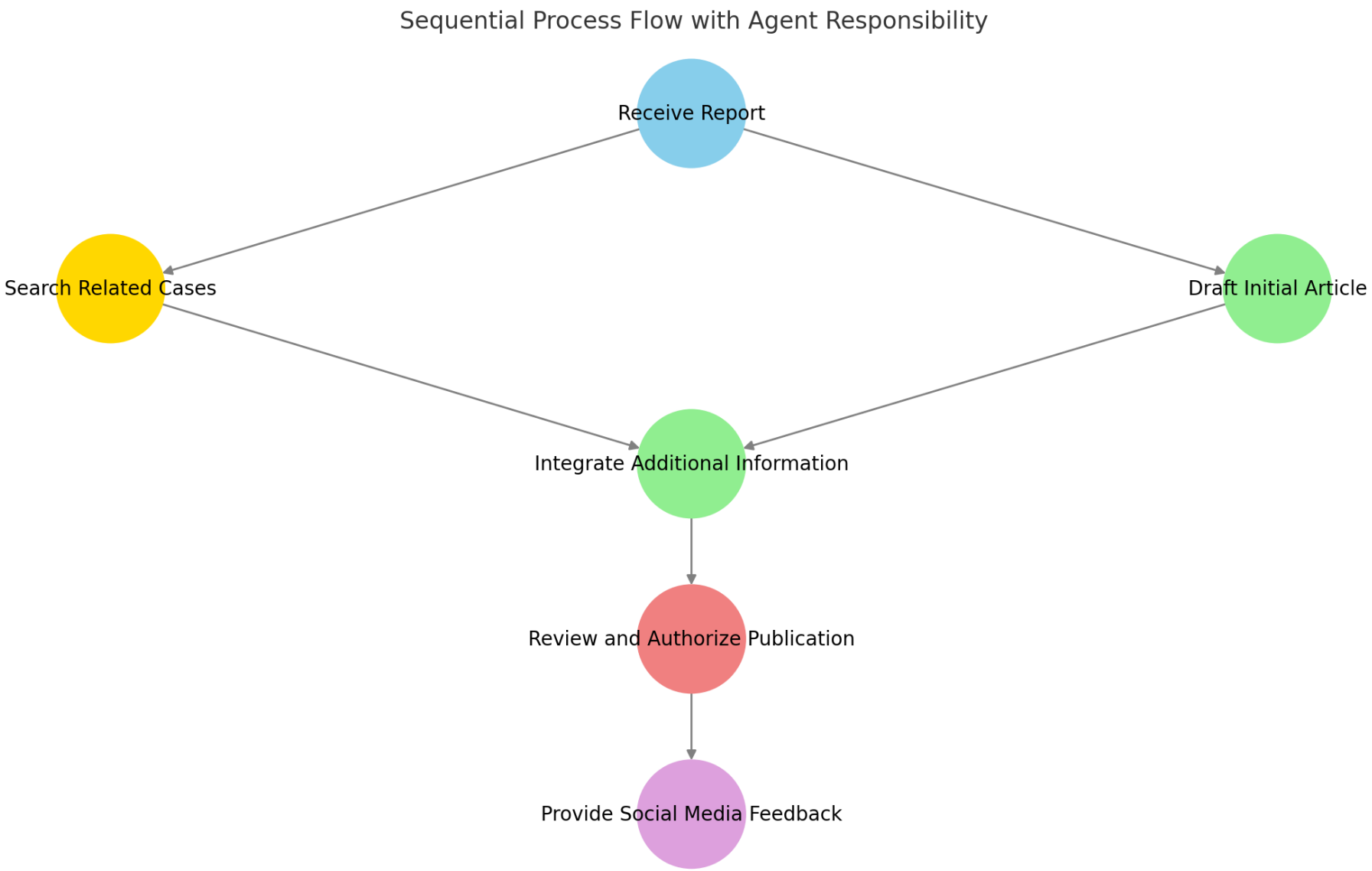
Medical Services Process



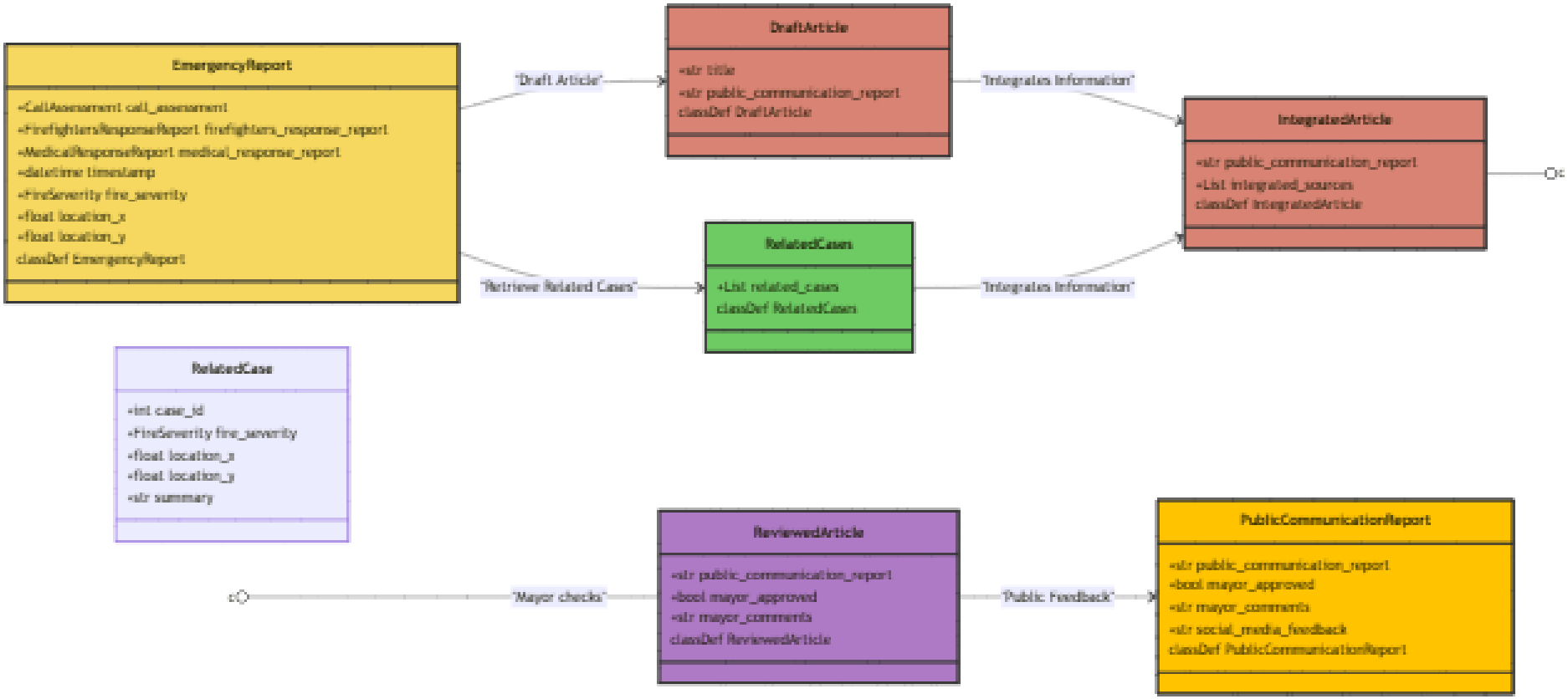
Medical Services Outputs



Public Communications Process

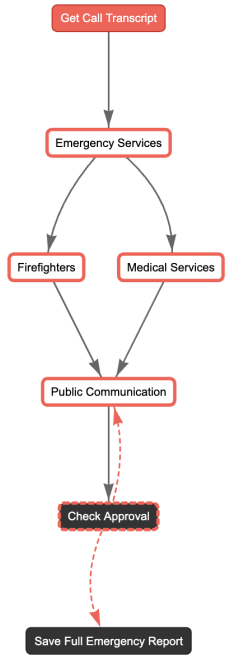


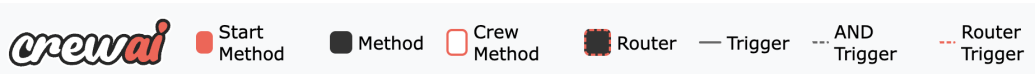
Public Communications Outputs



CrewAI Flow

- Crews coordinate through **centralized state**
- Flow manages **state** and **crew kickoffs**
- Use of `_and`, `_or` and `router` allow **complex ordering** and **parallelization**
- **Retry system** facilitates public communications





Flow State

```
class EmergencyPlannerState:
    call_transcript: str | None
    call_assessment: CallAssessment | None
    firefighters_report: FirefightersReport | None
    medical_report: MedicalReport | None
    public_report: PublicReport | None
    retry_count: int = 0
```

References

- Wooldridge, Michael. An Introduction to MultiAgent Systems. 2nd ed., John Wiley & Sons, 2009. ISBN 978-0-470-51946-2.
- Wooldridge, Michael. "Properties of Intelligent Autonomous Agents." YouTube, 26 Feb. 2010, `https://www.youtube.com/watch?v=vID-_uIfAvg`.