

Coordination of a Multi-Agent System for Emergency Response

Team 05

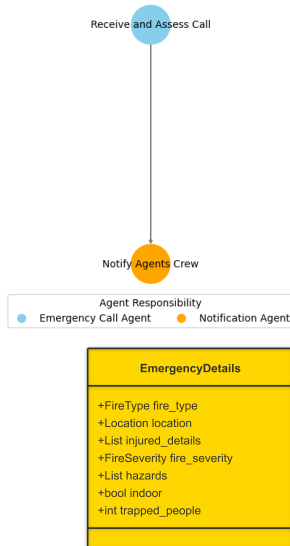
December 8, 2024

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

Sequential Process Flow with Agent Responsibility

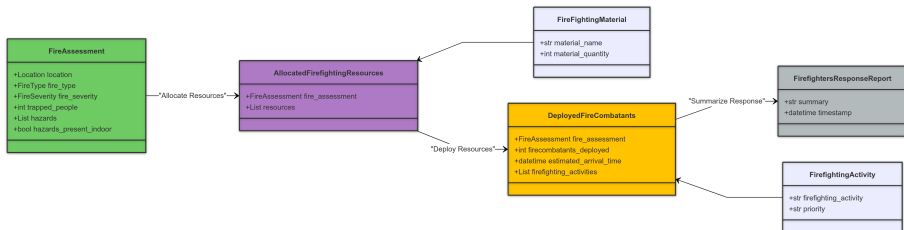


- What type of fire is it?
- Where is it?
- Is anyone injured? How badly?
- How severe is the fire?
- Are there hazards?
- Is it an indoor or outdoor fire?
- Is anyone inside or trapped?

Firefighters Process

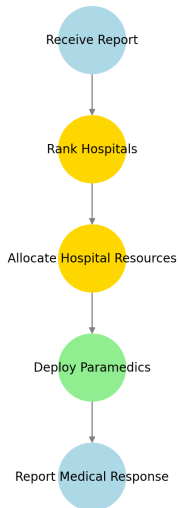


Firefighters Outputs

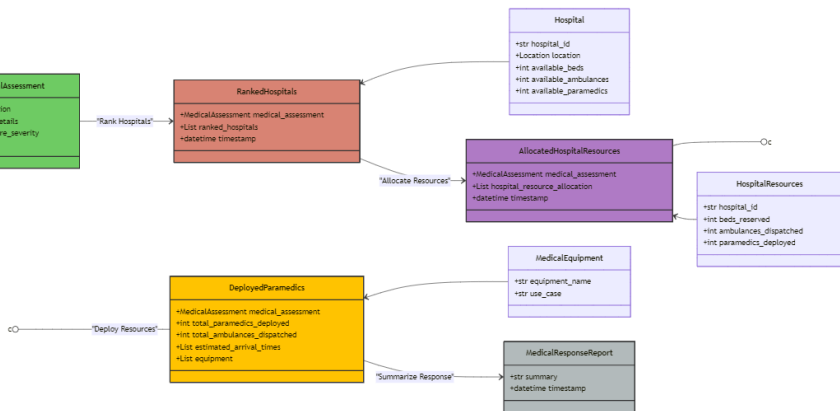


Medical Services Process

Medical Services Crew Task Flow

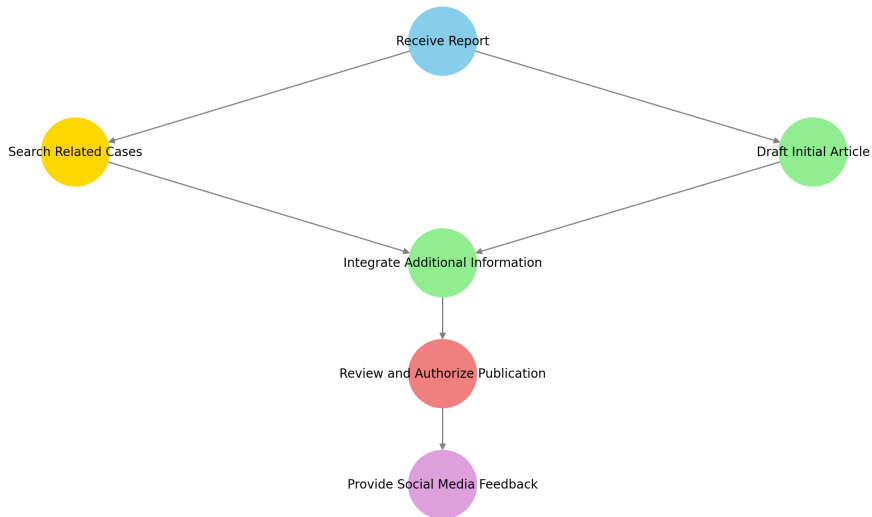


Medical Services Outputs

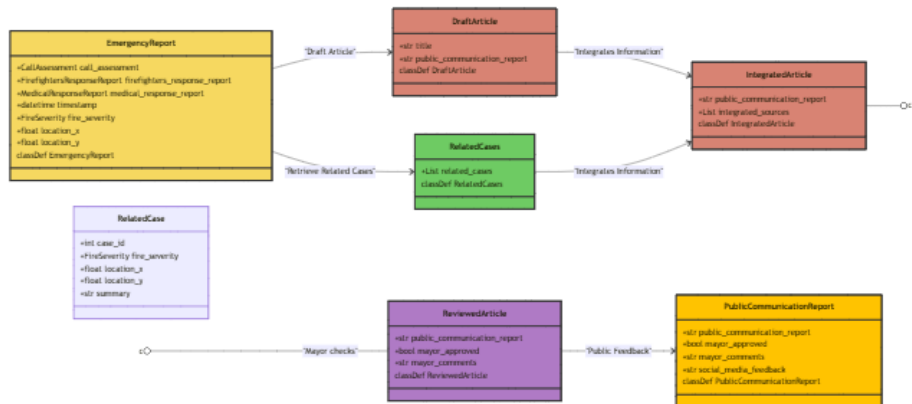


Public Communications Process

Sequential Process Flow with Agent Responsibility



Public Communications Outputs



Emergency Planner 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

*crewai*

Start Method

Method

Crew Method

Router

Trigger

AND Trigger

Router Trigger

Emergency Planner 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
```

- `call_transcript`: The transcript of the emergency call
- `call_assessment`: From EmergencyServices crew
- `firefighters_response_report`: From Firefighters crew
- `medical_response_report`: From MedicalServices crew
- `public_communication_report`: From PublicCommunication crew
- `mayor_approval_retry_count`: Number of mayor approval attempts

Conclusion

- **Emergency Services** establishes robust initial assessment and crew dispatching
- **Firefighters and Medical Services** demonstrates effective parallel operation and complex processes
- **Public Communications** generates useful summaries with mayor approval system and retry mechanisms
- We use a **centralized state management** with the CrewAI flow framework, enabling coordination between crews
- We use a **standardized reporting system** with structured outputs from each specialized crew, which will be compiled into a single report

Thank You!

Questions?

References



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