

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

Team 05

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# Outline

- 1 Introduction
- 2 City Selection
- 3 Environment
- 4 Tools
- 5 Agent Crews
  - Emergency Services
  - Firefighters
  - Medical Services
  - Forensics Team
  - Public Communications

# Introduction

- Multi-agent system for fire-related emergencies in Lloret de Mar
- Five specialized response teams using CrewAI:
  - Emergency services
  - Medical services
  - Firefighters
  - Public communications
  - Forensics team

# City Selection Process

- Selection criteria
- Candidate cities
- Evaluation metrics

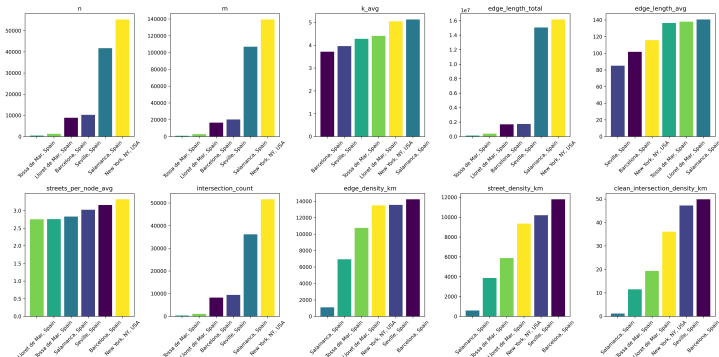


Figure: Statistics of map complexity of candidate cities

# City Selection

Final selection: **Lloret de Mar**



**Figure:** Relative map complexity

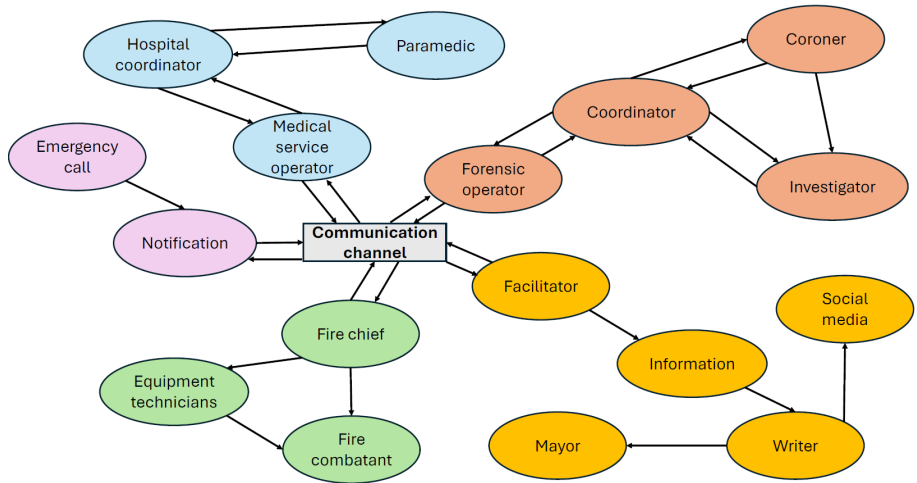
# Environment Properties

- 👁 Partially observable
- ❓ Non-deterministic
- 🔗 Non-episodic
- 🔄 Dynamic
- 📍 Continuous

# Agent Tools

- Communication Channel:
  - Enables **communication** between crews.
  - Each crew has a **facilitator** agent with access to it.
- Database Management:
  - Grants access to **persistent** data.
  - **Information** agents can read and update databases.
  - Other agents may query to **specialized knowledge** bases.
- GPS:
  - Provides use of the map for **routing** and **distance calculation**.

# Agent Crews Overview





# Emergency Services

- **Emergency Call Agent:**
  - **Interface** agent.
  - Receive and assess emergency calls.
- **Notification Agent:**
  - **Facilitator** agent.
  - Relay information to **other agent crews**.

# Firefighters

- **Fire Chief:**

- **Facilitator** agent.
- **Relays info** between the emergency operator and the crew at the scene.

- **Equipment Technician:**

- **Information** agent.
- Selects and **manages** necessary **equipment** to combat the fire.

- **Fire Combatant:**

- **Collaborative** agent.
- **Assess** the situation, and **coordinate** on the best strategy to extinguish the fire.

# Medical Services

- **Medical Services Operator:**

- **Facilitator** agent.
- Capable of **communicating** with other crews.

- **Hospital Coordinator:**

- **Information** agent.
- In charge of **managing** hospital **resources**.

- **Paramedic Teams:**

- **Collaborative** agent.
- Deployed in **teams** to aid at the emergency site.

# Forensics Team

- **Forensics Operator:**
  - **Facilitator** agent.
  - Capable of **communicating** with other crews.
- **Forensics Coordinator:**
  - **Information** agent with access to a **database**.
  - Manages resources and information for the forensics team.
- **Coroner:**
  - **Collaborative** agent.
  - Determines the cause of death.
- **Investigator:**
  - **Collaborative** agent.
  - Investigates the cause of the fire.

# Public Communications

- **Communications Operator:**
  - **Facilitator** agent.
  - Capable of **communicating** with other crews.
- **Archive Keeper:**
  - **Information** agent.
  - **Stores** and **retrieves** incidents.
- **Article Writer:** Drafts and refines public announcements.
- **Mayor:** Approves and aligns communications with city standards.
- **Social Media Commentator:** Engages the public with morale-boosting commentary of the articles.

# References

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[https://www.youtube.com/watch?v=vID-\\_uIfAvg](https://www.youtube.com/watch?v=vID-_uIfAvg).