

# Simultaneous Search and Rescue

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## Agile Collaboration

Create agile collaboration between autonomous agents during a search and rescue scenario.

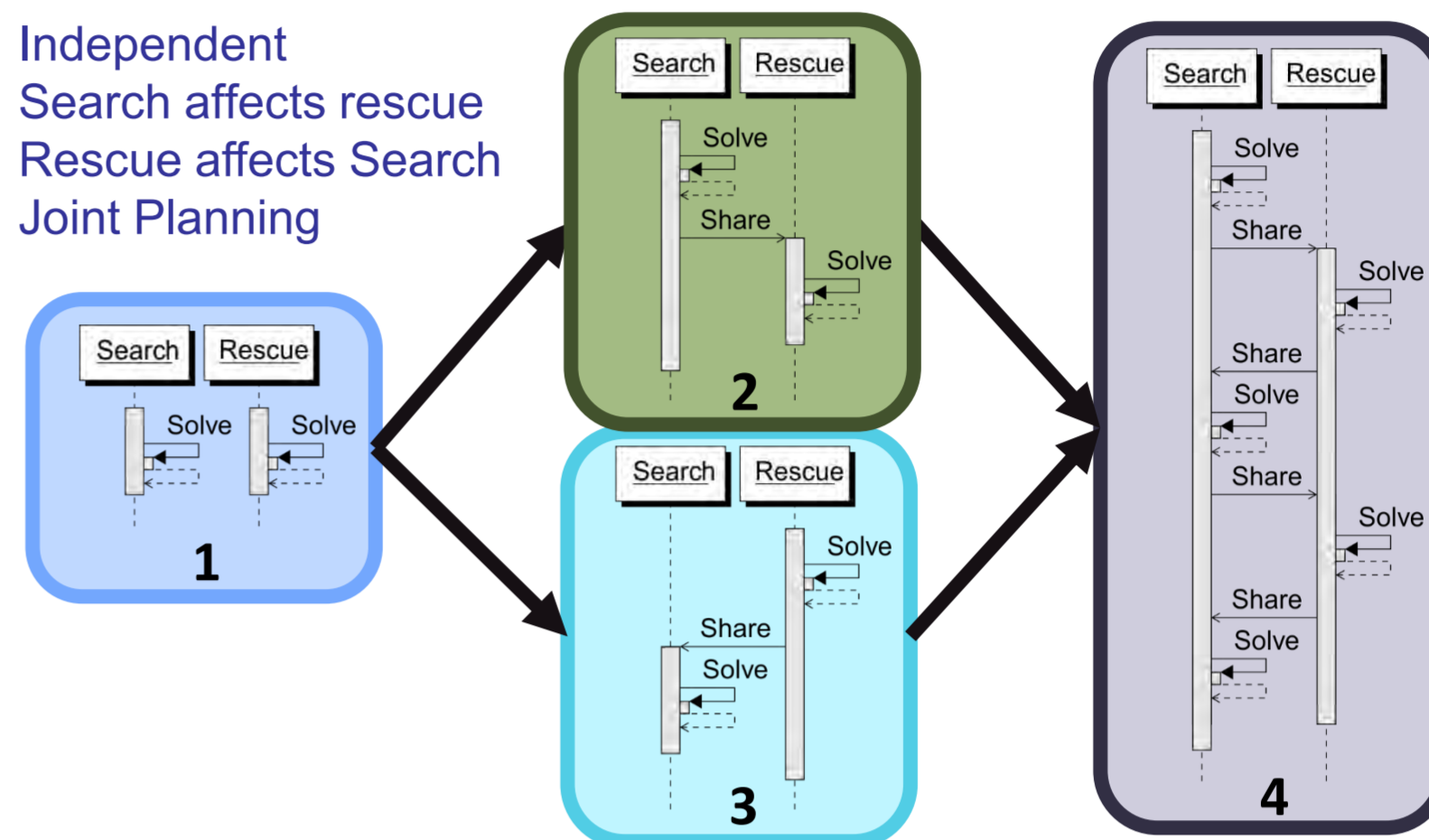
As **autonomous vehicles** are present at disaster sites, how can we achieve an **efficient collaboration** between **different vehicles** with different capabilities during a **complex task** as **search and rescue**?



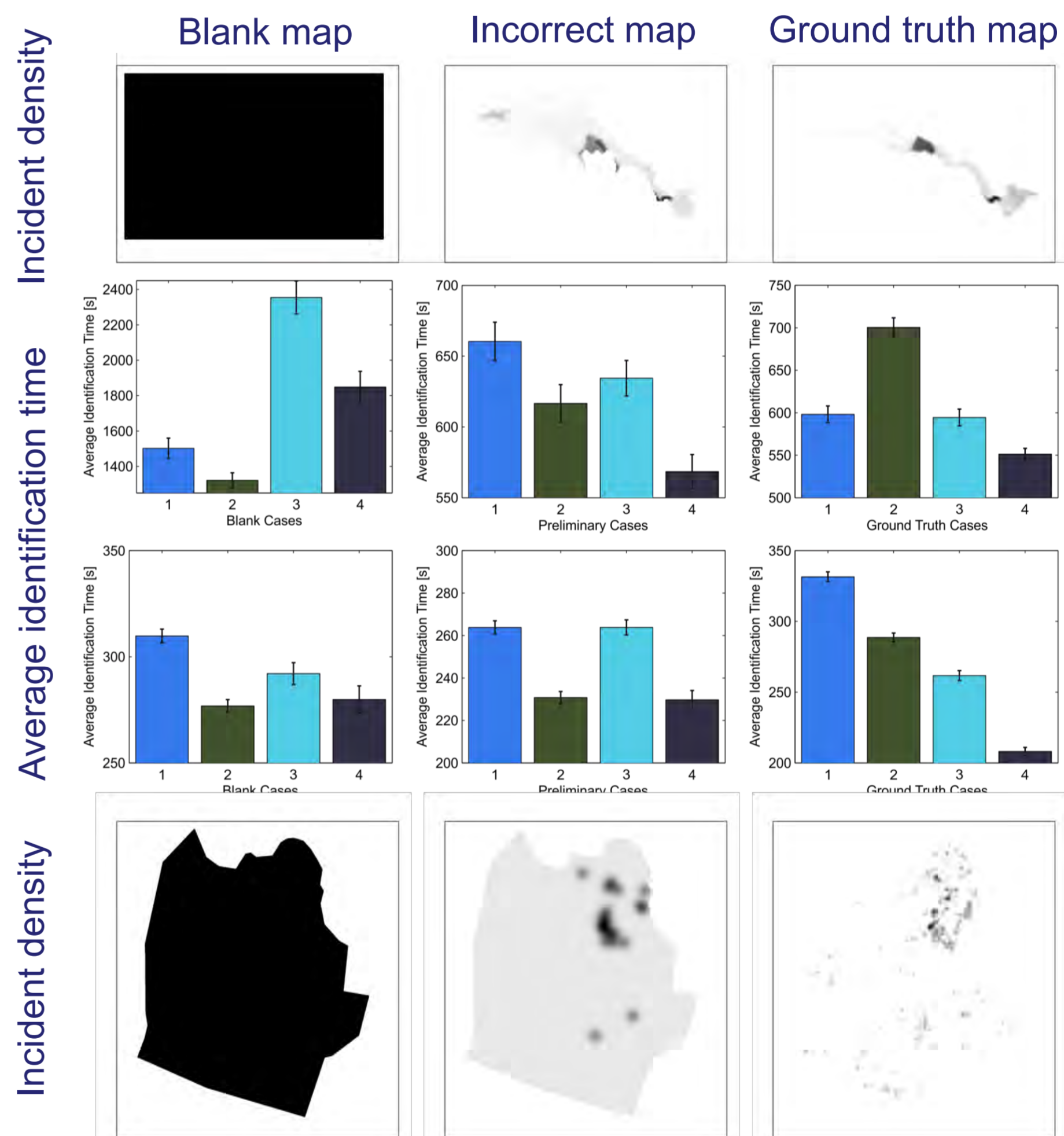
## Levels of Collaboration

For performance comparison, we have defined four levels of collaboration based on the planning of the two agent groups:

1. Independent
2. Search affects rescue
3. Rescue affects Search
4. Joint Planning



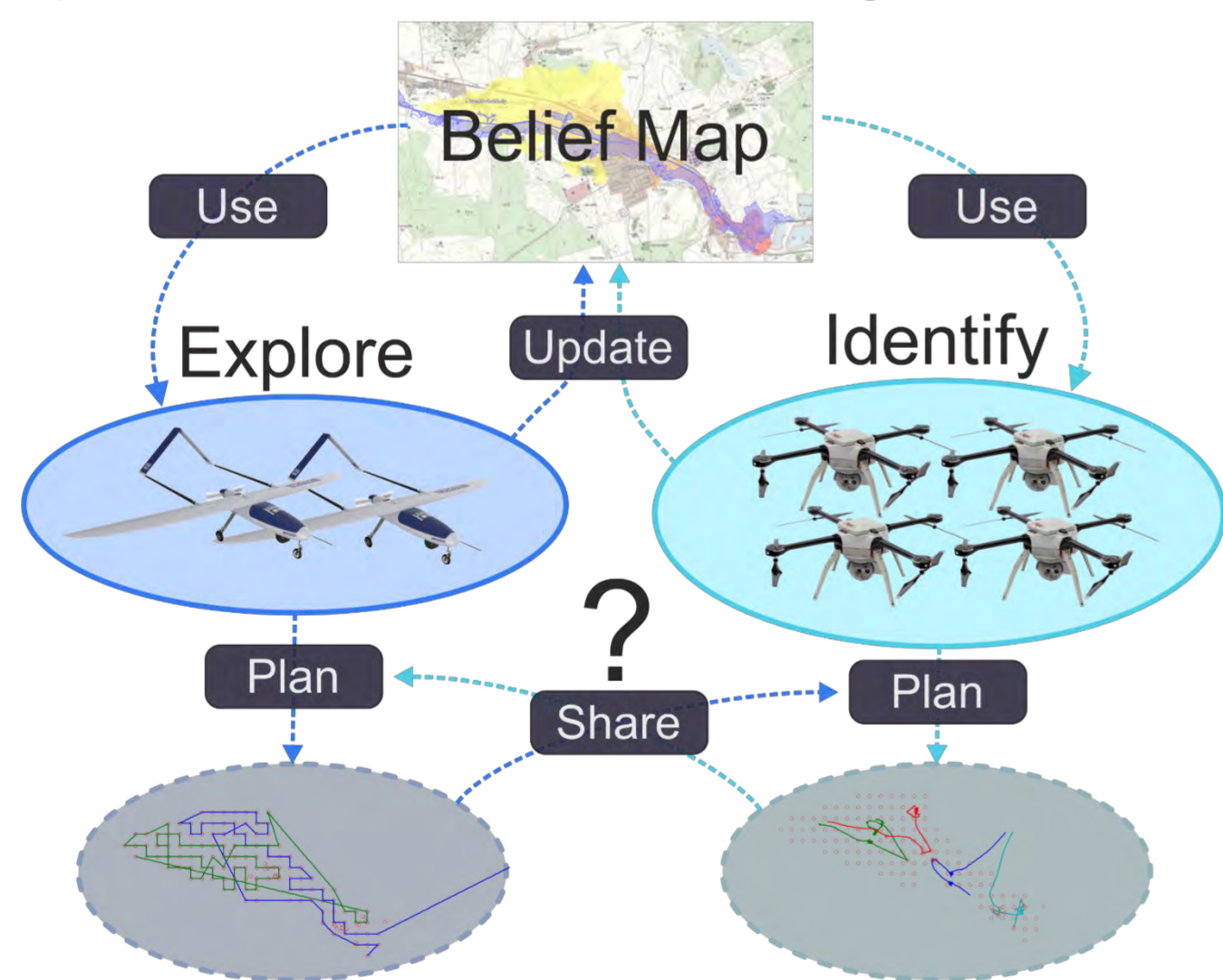
## Simulation Results



## Collaboration Model

The agents perform search and rescue:

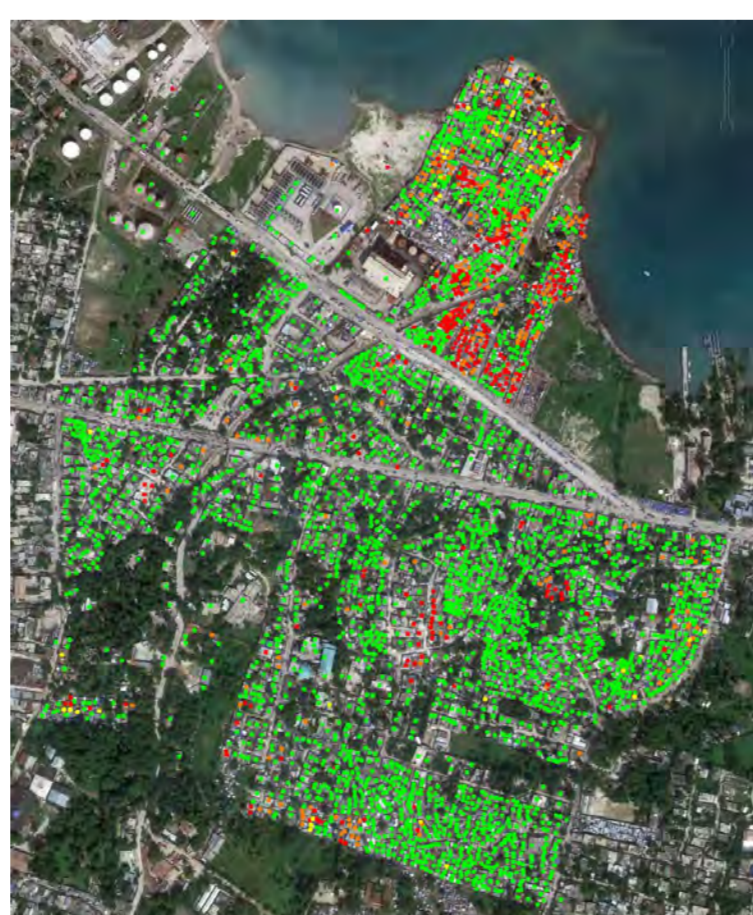
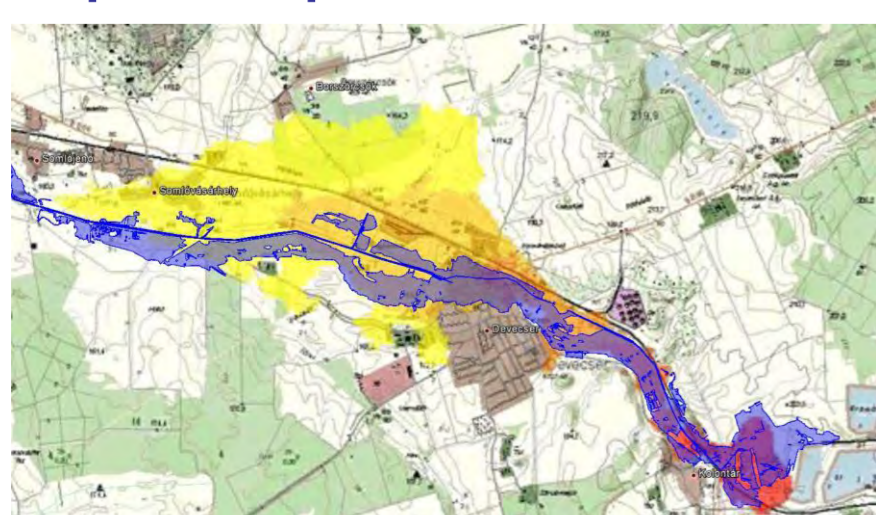
- **Search** agents **explore areas** by taking **aerial images**
- **Rescue** agents **identify incidents** at locations of interest
- Agents **share** their knowledge of the area as a **map of incident density**
- This map is **updated** by the actions of the agents
- The **agent groups** use the map to **create plans**
- The key of the collaboration is **creating these plans together**



## Real Incident Data

Disaster assessment data from real disasters:

- **Haiti earthquake, 2010**
  - **small area** (1.1 km) of one sector
  - **large incident density**
- **Ajka Alumina Plant industrial spill, 2010**
  - **large area** (11 km)
  - **sparse impact**



## Future Work

Intelligent method for joint planning  
Monte Carlo Tree Search

Deployment on real platforms

