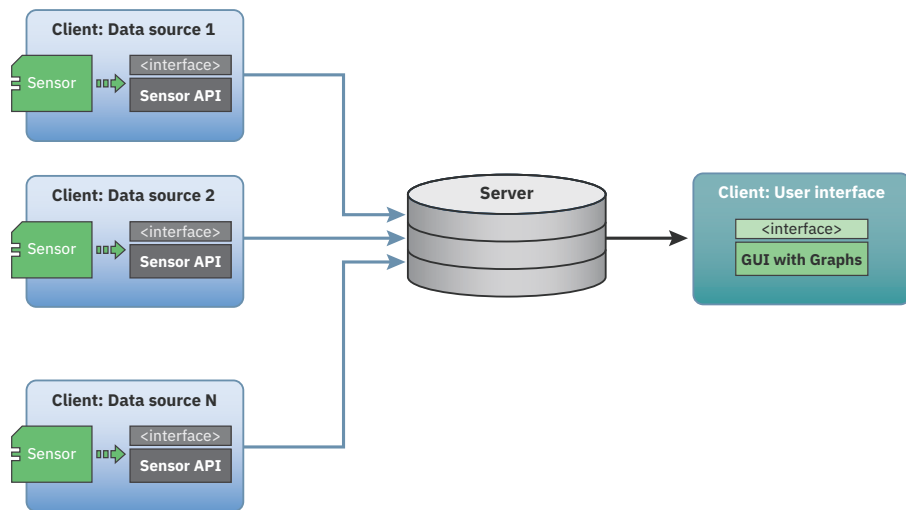# Intelligent Field Operations & Surveillance (IFOS)

First real-time, context-aware decision support system for smart team coordination

We are pioneering the first system to provide real-time, context-aware decision support for smart team coordination by integrating physiological, behavioral, and communication data—something no existing solution achieves at this level.

- **Threat:** Teams often suffer from misaligned situational understanding, especially under stress or limited communication—leading to delays, errors, or mission failure.
- **Gap:** Existing tools lack real-time integration of team context and adaptive decision support.
- **Response:** IFOS detects divergent mental models and coordination breakdowns, flags misunderstandings, and recommends actions to restore team alignment.

Key Features

- Multimodal state monitoring
- Context-aware task modeling
- Situation understanding
- Decision support and recommendation engine

Procedure

- Customized a multimodal bio-signal sensor suite for field-compatible team monitoring
- Implemented real-time state estimation algorithms to track individual and team-level status
- Developed a demonstration user interface for displaying team state and task progress
- Built a conversation analysis pipeline to extract coordination cues and detect misunderstandings
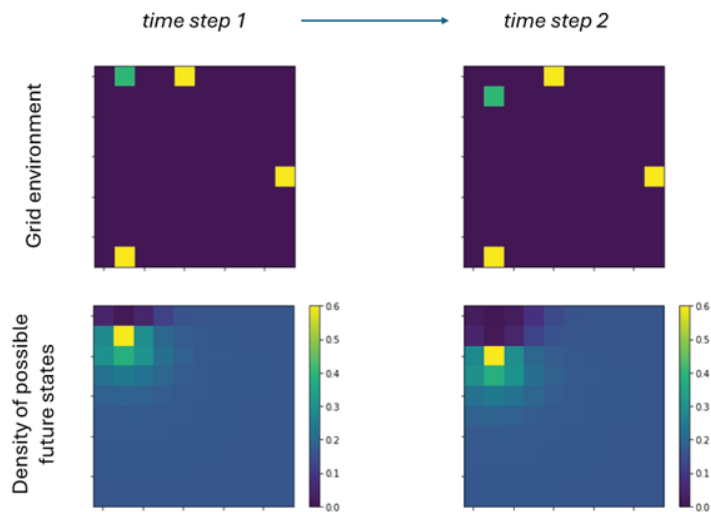
Intelligent Field Operations & Surveillance (IFOS)

RIVERSIDE RESEARCH

Observations

time step 1 → time step 2

Grid environment

Density of possible future states

Predicting an agent's actions within an environment: User interface architecture is configurable and flexible to receive sensor or other data feeds needed to achieve effective team coordination.

Top panels: An agent (turquoise square) navigates a grid environment. Yellow squares are potential targets with varying reward values.

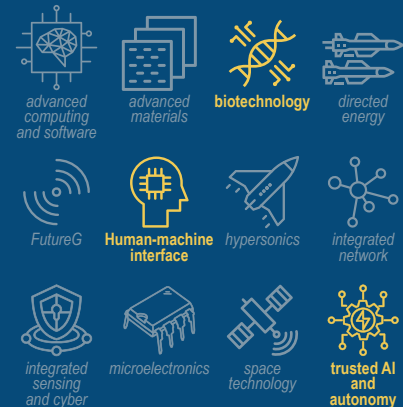**Bottom panels:** The distribution of possible future agent states derived from model outputs.

The IFOS system is a smart team coordination platform that integrates physiological, behavioral, and communication data to track team members' status, task progress, and situational context in real time. By identifying divergent understandings, degraded coordination, or emergent risks, IFOS provides tailored recommendations to restore alignment and enhance mission success. Unlike existing tools, it synthesizes multimodal inputs into actionable guidance, even in disconnected or high-stress environments. This technology is designed to improve performance in military, medical, and other high-stakes team operations.

Next Steps

- Integrate the coordination agent with the current sensing and task-tracking framework
- Conduct user testing with representative teams to evaluate usability and operational impact
- Refine and customize physiological state estimation algorithms to assess individual and team readiness in real time
- Expand scenario coverage to include diverse mission profiles and stress conditions

Critical Tech Areas

advanced computing and software | advanced materials | **biotechnology** | directed energy

FutureG | **Human-machine interface** | hypersonics | integrated network

integrated sensing and cyber | microelectronics | space technology | **trusted AI and autonomy**

DoD Priorities

1 2 3 4 5 6
7 8 **9** 10 11 12
13 14 15 **16** 17

1. Southwest Border Activities
2. Combating Transnational Criminal Organizations in the Western Hemisphere
3. Audit
4. Nuclear Modernization (including NC3)
5. Collaborative Combat Aircraft (CCAs)
6. Virginia-class Submarines
7. Executable Surface Ships
8. Homeland Missile Defense
9. One-Way Attack/Autonomous Systems
10. Counter-small UAS Initiatives
11. Priority Critical Cybersecurity
12. Munitions
13. Core Readiness, including full DRT funding
14. Munitions and Energetics Organic Industrial Bases
15. Executable INDOPACOM MILCON
16. Combatant Command support agency funding for INDOPACOM, NORTHCOM, SPACECOM, STRATCOM, CYBERCOM, and TRANSCOM
17. Medical Private-Sector Care