

## INNOVATING CROSS-DOMAIN SOLUTIONS TO DETECT EMERGING BIOLOGICAL THREATS

### Biotechnology-enabled Standoff Detection and Mapping of CB Agents

**Brandon Fields** Fieldstone Bio, Inc.    **Patrick Stone** Fieldstone Bio, Inc.    **Adam Wahab** MITRE Corporation    **John Grossmann** MITRE Corporation  
**Alex Tobias** MITRE Corporation    **Steven Fairchild** MITRE Corporation    **John John Dileo** MITRE Corporation

The natural ability of microorganisms to detect and respond to chemicals in their environment can be leveraged for novel chemical-biological detection concepts and applications. Decades of research have demonstrated that microbes can be engineered to sense operationally relevant agents such as nutrients in soil, heavy metals, organic pollutants, explosives, and pathogens. As sensing hardware, microbes are cheap to produce, require no electricity to operate, are capable of self-renewal, and can sense at scales <1 mm. However, fielding of microbial sensors has been held back by available detection methods. Fieldstone Bio has licensed and is further developing a novel bio-reporter technology from MIT that enables the remote detection of microbial sensors across multi-acre territories, within buildings, or through air filtration. By virtue of the methods used to create the microbes' sensory functionality, the resulting strains may be considered non-GMO by US regulatory authorities.

Fieldstone Bio is collaborating with MITRE to develop a complete, cross-domain standoff detection system that integrates drone-mounted hyperspectral cameras and advanced mapping and interpretation algorithms with the dispersed microbial sensors. For certain CONOPS, the bio-reporter signal can also be read by satellite.

Laboratory and initial field tests demonstrate the feasibility and promise of this unique technology. Larger scale field tests at the MITRE Drone Range are scheduled for Fall, 2024, and are expected to generate extensive performance envelope data and substantially advance the technical readiness level of the system.

Fieldstone Bio and MITRE are seeking additional partners in the CBD space to tailor and evaluate the technology for their unique challenges and mission spaces under realistic conditions.