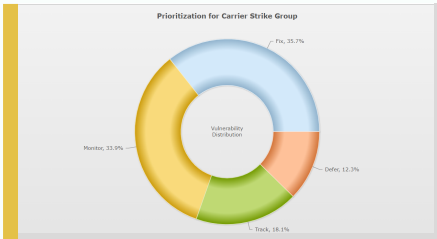
SUCCESS STORY

TOPIC NUMBER: N181-051

SBIR INVESTMENT: $1,624,837

PHASE III FUNDING: $5,971,454



UNIFIED CYBERSECURITY SYSTEM MODELING OF NAVAL CONTROL SYSTEMS

The Strategic Optics for Intelligent Analytics (SOFIA) software tool gives Navy system owners a single integrated platform for Cyber Ready operations, providing unified models for actionable cybersecurity insights to enhance operational readiness.

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THE CHALLENGE

The Navy required a scalable, integrated tool to perform comprehensive cybersecurity analysis of Naval Control Systems (NCS). Existing tools focused on compliance rather than assessing mission risk, leaving critical gaps in understanding how cyber threats could impact operational effectiveness. To address these challenges, the Navy required a unified enterprise solution—one capable of near real-time scenario modeling, empowering engineers to analyze the impacts of emerging cyber vulnerabilities and their potential effects on operational missions.

THE TECHNOLOGY

G2 Ops developed the Strategic Optics for Intelligent Analytics (SOFIA) software tool. SOFIA leverages model-based systems engineering (MBSE) to provide a mission-based risk assessment framework, integrating data from diverse Navy and open-source intelligence (OSINT) databases for precise vulnerability tracking and continuous monitoring. SOFIA enhances cybersecurity risk analysis through data fusion, integrating OSINT with mission-based threat assessment. Through MBSE, artificial intelligence/machine learning (AI/ML), and natural language processing (NLP), SOFIA automates the measurement of attack surface exposure, enabling prioritized protections based on actual risk. SOFIA enhances traditional vulnerability scoring by integrating system context—asset criticality, exposure, and mitigation—ensuring severity reflects mission reality. Visualizations, dashboards, and on-demand reports support rapid decision-making.

THE TRANSITION

G2 Ops was awarded a Phase I SBIR contract in 2018, proposing a transformative cybersecurity tool for the Navy. With a Phase II award in 2019, the company developed a working prototype. While still performing under Phase II, G2 Ops secured Phase III funding from NAVSEA PEO IWS 1.0 through a five-year basic ordering agreement (BOA), which was renewed for a second five-year period in 2024.

Throughout this period, SOFIA evolved from concept to a mission-ready operational tool, delivering real-time cybersecurity risk management during the Western Pacific deployment of a carrier strike group. By providing daily executive dashboards and automated triage and prioritization of cyber risks within 24 hours of detection, SOFIA proved effective in maintaining operational readiness.

THE NAVAL BENEFIT

SOFIA delivers near real-time cybersecurity risk analysis and modeling, significantly enhancing the Navy's ability to assess and manage vulnerabilities across complex system of system architectures. By providing comprehensive insights into a system’s current cyber posture and predicting how vulnerabilities could affect missions, SOFIA empowers decision-makers to rapidly prioritize remediation efforts. Additionally, SOFIA’s ability to integrate with existing system architectures promotes smarter design and maintenance strategies, ultimately reducing cybersecurity-related acquisition and sustainment costs. As a versatile and scalable tool, SOFIA is adaptable to a wide range of NCS applications, reinforcing the Navy’s Cyber Ready initiatives led by DoN chief information officer.

THE FUTURE

Under the current five-year BOA, G2 Ops will continue to expand SOFIA’s core capabilities to enhance integration with authoritative data sources, support high-risk cybersecurity reviews, and deliver quantifiable, automated, and repeatable analysis. Future efforts include enabling Red/Blue team exercises, mission kill chain analysis, supporting additional NAVSEA use cases, and broader deployment across Naval SYSCOMS. G2 Ops is also collaborating with the Navy to leverage SOFIA and other MBSE tools to capture, model, and analyze tactical system designs, strengthening cyber readiness across AEGIS baselines and beyond.

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