

# Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2016-914

Topic # N121-008

High-Power Microwave (HPM) Weapons Effects and Failure Analysis Tool

TechFlow, Inc.

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:**

NAVAIRSYSCOM (China Lake)

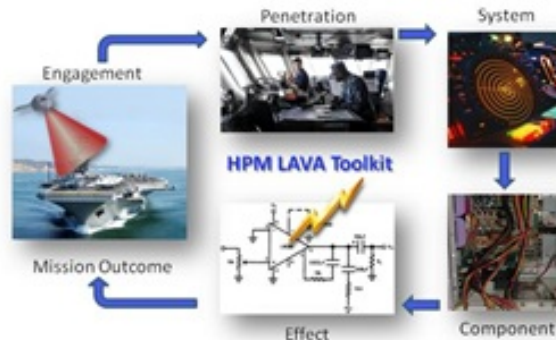
**Transition Target:** This software tool addresses requirements for modeling vulnerability and susceptibility of electronic systems, subsystems, and components radiated by

**TPOC:**

(760)939-3055

**Other transition opportunities:**

TechFlow's processes can be applied to kinetic and non-kinetic weapons in any of the 5 warfare domains. Data or intelligence is needed to use weapons to prevent asset identity and location detection, or offensively to successfully identify and locate the enemy. Since electronics pervade every aspect of warrior behavior in an "Internet of Things" and "Totally Connected" world, there are unlimited opportunities to find vulnerabilities in friendly and enemy weapon systems. LAVA can be employed in Department of Defense (DoD) environments across the three dimensions of electronic warfare (EW), high-power electromagnetic pulse (HEP) and EW. EW is conducted using electromagnetism.



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## WHAT

**Operational Need and Improvement:** The C5ISR mission requires control of the electromagnetic spectrum, operational network system components, and elimination of vulnerabilities at all levels of operation. LAVA can be used to enable lethality and vulnerability assessment of electronic systems which have been radiated by high-power electromagnetic energy (HEP).

**Specifications Required:** - Intermittent Operation of Targeted Platforms

- Destruction of Components within Targeted Platforms

- Level of Malware Penetration for Seizing Operational Control

**Technology Developed:** A knowledge base for understanding effects of HPRF radiation via inductive coupling, electric transmission, and other HPM-induced upset, front-door/back-door phenomenology in complicated electronic targets. TechFlow's HPM LAVA services directed energy (DE) and EW domain test and research personnel, and mission level engagement analysts requirements. TechFlow intends to expand LAVA to the HEP, EW and Jamming, and cyber attack domains, and develop agency-specific target class libraries derived from perceived HPM engagement mission objectives.

**Warfighter Value:** An enhanced capability to effectively defend against and offensively target enemy weapon platforms using HPRF DE. Naval operators are able to disable, deny service, or take control of incoming missiles, UAVs, small boats, and other weapons. LAVA provides the information needed to set DE variables for maximum effect in complex, dynamic battle environments. HEP is of great concern to warriors seeking to complete C5ISR missions enabled by the use of the Electromagnetic Spectrum. Electromagnetic pulse (EMP) and solar flares can seriously deny service or even eliminate warrior access or use. LAVA can be used to categorize experimental results about the impact of HEP to better understand defensive behaviors that may mitigate HEP effects. Front-door coupling and back-door coupling of HPEM to electronic structures also provides information about vulnerabilities in systems and networks and how to penetrate enemy systems and networks. This information could enable the insertion of software to manipulate or control enemy weapon platforms.

## WHEN

**Contract Number:** N68936-14-C-0026 **Ending on:** December 29, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
New Model Implementation	Low	Customer Satisfaction	5	April 2016
GUI Implementation	Low	Customer Satisfaction	5	May 2016
Complete 2nd Algorithm	Med	Customer Satisfaction	5	December 2016
Prototype Demo	High	Customer Satisfaction	5	December 2016

## HOW

**Projected Business Model:** This technology and the various products derived from it has immediate clients from all levels of the DoD research & development, test and evaluation, end-user operational decision making, and training communities. Each of these DE weapons market segments are significant in size. Extending the LAVA model to include non-kinetic and kinetic weapons increases the toolkit's market potential exponentially. TechFlow's Phase III commercialization business model focuses on direct government sponsorship from DoD, Department of Homeland Security (DHS), US Coast Guard (USCG), and other agencies, and license agreement and direct prime engineering support contract opportunities. The LAVA Toolkit provides a relevant framework to assess defensive and offensive radiation and evaluate the effects of radiated samples across all three electromagnetic warfare domains.

**Company Objectives:** LAVA is selected initially for military employment, battle damage assessment and the capability to find a means for denial of service, control of foreign platforms, or destruction of platform components and/or systems. LAVA provides capability to land, air, sea, space, and cyber operational assets to defend against HEP, EW and Jamming, and cyber attack, and supports offensive mission planning. There is a need for this product in both the government and non-government markets. To date most of the technology has been driven by government requirements. However, today's power grids, data warehouses, nuclear plants, etc. are vulnerable to attacks across the three dimensions of EW.

**Potential Commercial Applications:** The role of the LAVA Toolkit can be applied commercially and has significant market potential in industrial control system supervisory control and data acquisition (ICS – SCADA) power utility application and processing facility markets.

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