

Topic: A03-070

Monterey Technologies, Inc.

Merging Sensor and Stored Terrain Database Data for Rotorcraft Poor Visibility Weather Operations

VIPER CVW is a multi-aircraft planning application which allows users to rapidly sketch a mission-specific course of action, resulting in a rich visualization of the plan flow within a geographic context. Plan elements are in digital form to enable sharing with stakeholders and transfer to aircraft mission load and portable media. VIPER is nearly complete with test and certification activities for deployment as a federated application on the Navy Joint Mission Planning System (JMPS-M). Monterey Technologies, Inc. (MTI) specializes in Human Factors Engineering and Human-Systems Integration. Our approach to mission planning uses a minimum necessary toolset to sketch complex plans, with room for toolset expansion over time. MTI is looking to expand VIPER CVW to support dynamic multi-vehicle planning across a range of warfighting domains.

Technology Category Alignment:

Satellite Communications (SATCOM)

Robotics/Automated Material Handling Equipment

Shipyards/Shipbuilding

Supply; Storage

Satellite Communications (SATCOM)

Satellite Communications (SATCOM)

Supply; Storage

Supply; Storage

Satellite Communications (SATCOM)

Shipyards/Shipbuilding

Robotics/Automated Material Handling Equipment

Robotics/Automated Material Handling Equipment

Robotics/Automated Material Handling Equipment

Robotics/Automated Material Handling Equipment

Protection, Sustainment, and Warfighter Performance

Medical Chem-Bio Defense

Military Infectious Diseases

Propulsion and Extreme Environments

Fixed Wing Vehicles (includes UAS)

Survivability

Maintainability/Sustainability

Unmanned Ground and Sea Vehicles

Corrosion

Advanced Computing/Software Development

Networks and Communications

Modular/Open/Reconfigurable Architectures

RF Components for sensing, transmission and communication

Electronics Integration

Broadband/Multispectral Components and Systems

Sensors, Electronics and Photonics

Radio Frequency (RF) (non-EW)

Survivability

Broadband/Multispectral Components and Systems

RF Components for sensing, transmission and communication

Radio Frequency (RF) (non-EW)

Networks and Communications

Guidance, Navigation & Control (GN&C) and Data Links

RF Components for sensing, transmission and communication
Networks and Communications
Cognitive/Adaptive Capabilities
Preemptive/Proactive Effects
Broadband/Multispectral Components and Systems
Advanced Computing/Software Development
Networks and Communications
Personalized Assessment, Education, and Training
System Interfaces & Cognitive Processes
Aircraft Propulsion, Power and Thermal
Modeling, Simulation & Test Infrastructure
Rotary Wing Vehicles
Fixed Wing Vehicles (includes UAS)
Fixed Wing Vehicles (includes UAS)
Acoustic, Seismic and Magnetic
Rotary Wing Vehicles
Structures and Protection
Energy storage
Unmanned Ground and Sea Vehicles
Mobility
Power and Energy
Synthesis/Analytics/Decision Tools
Information Collection/Management
Advanced Computing/Software Development
Survivability
Unmanned Ground and Sea Vehicles
Radio Frequency (RF) (non-EW)
Power Generation/Energy Conversion
Energy storage
Power and Energy
Sensors, Electronics and Photonics
Maintainability/Sustainability
Advanced Computing/Software Development
EO/IR Components for sensing, transmission and communication
Microelectronics and Nanoelectronics
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Human/Autonomous System Interaction and Collaboration
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Aircraft Propulsion, Power and Thermal
Power Generation/Energy Conversion
High Energy Lasers (HEL)

Propulsion
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Protection, Sustainment, and Warfighter Performance
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Acoustic, Seismic and Magnetic
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Electronic Materials
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RF Components for sensing, transmission and communication
Electromechanical conversion
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Power Control and Distribution
Power Generation/Energy Conversion
Thermal Transport and Control
EO/IR Components for sensing, transmission and communication
RF Components for sensing, transmission and communication
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Fixed Wing Vehicles (includes UAS)
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Energy storage
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Rotary Wing Vehicles
Protection, Sustainment, and Warfighter Performance

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Assuring Effective Missions
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Biomedical Informatics / Health Information Systems & Technology
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High Energy Lasers (HEL)
EO/IR Components for sensing, transmission and communication

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Thermal Transport and Control
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Power Control and Distribution
Acoustic, Seismic and Magnetic
Fixed Wing Vehicles (includes UAS)
Aircraft Propulsion, Power and Thermal
Rotary Wing Vehicles
EO/IR Components for sensing, transmission and communication
Satellite Communications (SATCOM)
Networks and Communications
Trust Foundations
Electro-Optical/Infrared (EO/IR)
Unmanned Ground and Sea Vehicles
Maintainability/Sustainability
Modularity
Survivability
Electro-Optical/Infrared (EO/IR)
Sensors, Electronics and Photonics
EO/IR Components for sensing, transmission and communication
RF Components for sensing, transmission and communication
Networks and Communications
Broadband/Multispectral Components and Systems
Electronics Integration
Protection, Sustainment, and Warfighter Performance
Clinical & Rehabilitative Medicine
Combat Casualty Care
Medical Chem-Bio Defense
Energy storage
Protection, Sustainment, and Warfighter Performance
Human Computer Interfaces (HCI) for Decision Making
Synthesis/Analytics/Decision Tools
Undersea Weapons
Human Computer Interfaces (HCI) for Decision Making
Information Collection/Management

Synthesis/Analytics/Decision Tools
Power and Energy
Propulsion and Extreme Environments
RF Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
Broadband/Multispectral Components and Systems
Preemptive/Proactive Effects
Radio Frequency (RF) (non-EW)
Energy storage
Manufacturing Technology for Affordability
Power and Energy
Structures and Protection
Synthesis/Analytics/Decision Tools
Fixed Wing Vehicles (includes UAS)
Advanced Computing/Software Development
Trust Foundations
Integrating Architecture and Capability Demonstrations
Unmanned Ground and Sea Vehicles
Aircraft Propulsion, Power and Thermal
Synthesis/Analytics/Decision Tools
EO/IR Components for sensing, transmission and communication
Networks and Communications
Preemptive/Proactive Effects
Electro-Optical/Infrared (EO/IR)
Sensors, Electronics and Photonics
Scalable Teaming of Autonomous Systems
Networks and Communications
Unmanned Ground and Sea Vehicles
Acoustic, Seismic and Magnetic
Test, Evaluation, Validation, and Verification
Propulsion and Extreme Environments
Fixed Wing Vehicles (includes UAS)
Networks and Communications
Mobility
Unmanned Ground and Sea Vehicles
Fixed Wing Vehicles (includes UAS)
Rotary Wing Vehicles
Manufacturing Technology for Affordability
Readiness
Aircraft Propulsion, Power and Thermal
Propulsion
Protection, Sustainment, and Warfighter Performance
Individual Warfighter
Synthesis/Analytics/Decision Tools
Collaborative Analysis and Decision-making
Survivability
Modeling, Simulation & Test Infrastructure

Fixed Wing Vehicles (includes UAS)
Human/Autonomous System Interaction and Collaboration
Scalable Teaming of Autonomous Systems
Synthesis/Analytics/Decision Tools
Acoustic, Seismic and Magnetic
Undersea Weapons
Frameworks for Interoperability
Information Collection/Management
Synthesis/Analytics/Decision Tools
Maintainability/Sustainability
Human/Autonomous System Interaction and Collaboration
Machine Perception, Reasoning and Intelligence
Protection, Sustainment, and Warfighter Performance
RF Components for sensing, transmission and communication
Networks and Communications
Advanced Electronic Protection Techniques and Technology
Survivability
Sensors, Electronics and Photonics
Information Collection/Management
Synthesis/Analytics/Decision Tools
EO/IR Components for sensing, transmission and communication
RF Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
High-Speed/Hypersonics
Synthesis/Analytics/Decision Tools
Electromechanical conversion
Energy storage
Power Control and Distribution
Power Generation/Energy Conversion
Electronics Integration
Energy storage
Power Control and Distribution
Power Generation/Energy Conversion
Survivability
Fixed Wing Vehicles (includes UAS)
Networks and Communications
Energy storage
Power Generation/Energy Conversion
Unmanned Ground and Sea Vehicles
Electromechanical conversion
Energy storage
Power Control and Distribution
Power Generation/Energy Conversion
Thermal Transport and Control
Thermal Transport and Control
Protection, Sustainment, and Warfighter Performance
Modeling, Simulation & Test Infrastructure

Microelectronics and Nanoelectronics
RF Components for sensing, transmission and communication
Modularity
Acoustic, Seismic and Magnetic
EO/IR Components for sensing, transmission and communication
Broadband/Multispectral Components and Systems
Guidance, Navigation & Control (GN&C) and Data Links
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Manufacturing Technology for Affordability
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Synthesis/Analytics/Decision Tools
Distributed/Coordinated/Net-Enabled Systems
Aircraft Propulsion, Power and Thermal
Energy storage
Thermal Transport and Control
High Energy Lasers (HEL)
Power and Energy
Mobility
Modularity
Electronic Materials
RF Components for sensing, transmission and communication
Manufacturing Technology for Affordability
Personalized Assessment, Education, and Training
Protection, Sustainment, and Warfighter Performance
System Interfaces & Cognitive Processes
Propulsion and Extreme Environments
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Test, Evaluation, Validation, and Verification
Electronics Integration
RF Components for sensing, transmission and communication
Acoustic, Seismic and Magnetic
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Electronics Integration
Information Collection/Management
Maintainability/Sustainability
Acoustic, Seismic and Magnetic
Structures and Protection
Protection, Sustainment, and Warfighter Performance
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Electronics Integration
Rotary Wing Vehicles
Test, Evaluation, Validation, and Verification

Maintainability/Sustainability
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Fixed Wing Vehicles (includes UAS)
Human/Autonomous System Interaction and Collaboration
Personalized Assessment, Education, and Training
EO/IR Components for sensing, transmission and communication
Electro-Optical/Infrared (EO/IR)
Radio Frequency Weapons (RFW)
Sensors, Electronics and Photonics
RF Components for sensing, transmission and communication
EO/IR Components for sensing, transmission and communication
Scalable Teaming of Autonomous Systems
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RF Components for sensing, transmission and communication
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Fixed Wing Vehicles (includes UAS)
Rotary Wing Vehicles
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Fixed Wing Vehicles (includes UAS)
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Survivability
High Energy Lasers (HEL)
EO/IR Components for sensing, transmission and communication
Broadband/Multispectral Components and Systems
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Manufacturing Technology for Affordability

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Assuring Effective Missions
Resilient Infrastructure
Trust Foundations
Advanced Computing/Software Development
Trust Foundations
Advanced Electronic Protection Techniques and Technology
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RF Components for sensing, transmission and communication
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Sensors, Electronics and Photonics
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Advanced Computing/Software Development
Conceptual, Computational, and World-Wide Environmental Representation
Simulation Information Technology
Aircraft Propulsion, Power and Thermal
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Readiness
Maintainability/Sustainability
Structures and Protection
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EO/IR Components for sensing, transmission and communication
Microelectronics and Nanoelectronics
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Sensors, Electronics and Photonics

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Synthesis/Analytics/Decision Tools
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Personalized Assessment, Education, and Training
System Interfaces & Cognitive Processes
Acoustic, Seismic and Magnetic
Undersea Weapons
Human/Autonomous System Interaction and Collaboration
Machine Perception, Reasoning and Intelligence
Synthesis/Analytics/Decision Tools
Acoustic, Seismic and Magnetic
Synthesis/Analytics/Decision Tools
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Propulsion and Extreme Environments
Survivability
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Power Generation/Energy Conversion

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Synthesis/Analytics/Decision Tools
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Advanced Electronic Protection Techniques and Technology
Electro-Optical/Infrared (EO/IR)
Human Computer Interfaces (HCI) for Decision Making
Synthesis/Analytics/Decision Tools
Synthesis/Analytics/Decision Tools
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Biomedical Informatics / Health Information Systems & Technology
Combat Casualty Care
Military Operational Medicine
Personalized Assessment, Education, and Training
System Interfaces & Cognitive Processes
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Propulsion
Propulsion and Extreme Environments
Electronic Materials
EO/IR Components for sensing, transmission and communication
Microelectronics and Nanoelectronics
Electro-Optical/Infrared (EO/IR)
Test, Evaluation, Validation, and Verification
EO/IR Components for sensing, transmission and communication
Microelectronics and Nanoelectronics
Networks and Communications
Networks and Communications
Aircraft Propulsion, Power and Thermal
Electro-Optical/Infrared (EO/IR)
EO/IR Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
Unmanned Ground and Sea Vehicles
Electro-Optical/Infrared (EO/IR)
Sensors, Electronics and Photonics
Broadband/Multispectral Components and Systems
Cognitive/Adaptive Capabilities

Electro-Optical/Infrared (EO/IR)
Biomedical Informatics / Health Information Systems & Technology
Advanced Computing/Software Development
Synthesis/Analytics/Decision Tools
Biomedical Informatics / Health Information Systems & Technology
Personalized Assessment, Education, and Training
Protection, Sustainment, and Warfighter Performance
Modeling, Simulation & Test Infrastructure
Fixed Wing Vehicles (includes UAS)
Rotary Wing Vehicles
Human Computer Interfaces (HCI) for Decision Making
System Interfaces & Cognitive Processes
Human Computer Interfaces (HCI) for Decision Making
Information Collection/Management
Synthesis/Analytics/Decision Tools
Human Aspects of Operations in Military Environments
System Interfaces & Cognitive Processes
Rotary Wing Vehicles
Machine Perception, Reasoning and Intelligence
Synthesis/Analytics/Decision Tools
Unmanned Ground and Sea Vehicles
Fixed Wing Vehicles (includes UAS)
Machine Perception, Reasoning and Intelligence
Scalable Teaming of Autonomous Systems
Unmanned Ground and Sea Vehicles
Personalized Assessment, Education, and Training
Electronics Integration
Power Control and Distribution
Design and Integration
Maintainability/Sustainability
Modularity
Biomedical Informatics / Health Information Systems & Technology
Survivability
Protection, Sustainment, and Warfighter Performance
EO/IR Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
Networks and Communications
Design and Integration
Mobility
Human Computer Interfaces (HCI) for Decision Making
Design and Integration
Modularity
Unmanned Ground and Sea Vehicles
System Interfaces & Cognitive Processes
Fixed Wing Vehicles (includes UAS)
Information Collection/Management
Electro-Optical/Infrared (EO/IR)

Broadband/Multispectral Components and Systems
Power Control and Distribution
Power Generation/Energy Conversion
Modeling, Simulation & Test Infrastructure
Radio Frequency Weapons (RFW)
EO/IR Components for sensing, transmission and communication
Networks and Communications
Electro-Optical/Infrared (EO/IR)
Sensors, Electronics and Photonics
EO/IR Components for sensing, transmission and communication
Survivability
Unmanned Ground and Sea Vehicles
Electro-Optical/Infrared (EO/IR)
Undersea Weapons
Personalized Assessment, Education, and Training
System Interfaces & Cognitive Processes
Acoustic, Seismic and Magnetic
Undersea Weapons
RF Components for sensing, transmission and communication
Networks and Communications
Networks and Communications
Electronic Materials
RF Components for sensing, transmission and communication
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Energy storage
RF Components for sensing, transmission and communication
Power Control and Distribution
Assuring Effective Missions
Resilient Infrastructure
EO/IR Components for sensing, transmission and communication
Preemptive/Proactive Effects
Electro-Optical/Infrared (EO/IR)
Guidance, Navigation & Control (GN&C) and Data Links
Scalable Teaming of Autonomous Systems
Networks and Communications
Trust Foundations
Guidance, Navigation & Control (GN&C) and Data Links
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EO/IR Components for sensing, transmission and communication
Design and Integration
Mobility
Sensors, Electronics and Photonics
Machine Perception, Reasoning and Intelligence
Information Collection/Management
Synthesis/Analytics/Decision Tools
Collaborative Analysis and Decision-making
RF Components for sensing, transmission and communication

Information Collection/Management
Networks and Communications
Broadband/Multispectral Components and Systems
Radio Frequency (RF) (non-EW)
Microelectronics and Nanoelectronics
Broadband/Multispectral Components and Systems
Electro-Optical/Infrared (EO/IR)
Sensors, Electronics and Photonics
Fixed Wing Vehicles (includes UAS)
Rotary Wing Vehicles
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Collaborative Analysis and Decision-making
Human/Autonomous System Interaction and Collaboration
Machine Perception, Reasoning and Intelligence
Advanced Computing/Software Development
Information Collection/Management
Maintainability/Sustainability
Aircraft Propulsion, Power and Thermal
Combat Casualty Care
Military Infectious Diseases
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Acoustic, Seismic and Magnetic
Fixed Wing Vehicles (includes UAS)
Networks and Communications
Machine Perception, Reasoning and Intelligence
Synthesis/Analytics/Decision Tools
Assuring Effective Missions
Survivability
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EO/IR Components for sensing, transmission and communication
Machine Perception, Reasoning and Intelligence
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Propulsion and Extreme Environments
Machine Perception, Reasoning and Intelligence
Networks and Communications
Unmanned Ground and Sea Vehicles
Acoustic, Seismic and Magnetic
Protection, Sustainment, and Warfighter Performance
Machine Perception, Reasoning and Intelligence
Information Collection/Management
Maintainability/Sustainability
Electro-Optical/Infrared (EO/IR)
Integrated Weapon Demonstrators (IWD)
Fixed Wing Vehicles (includes UAS)

Networks and Communications
Cognitive/Adaptive Capabilities
Distributed/Coordinated/Net-Enabled Systems
Radio Frequency (RF) (non-EW)
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Scalable Teaming of Autonomous Systems
Test, Evaluation, Validation, and Verification
Information Collection/Management
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Information Collection/Management
Biomedical Informatics / Health Information Systems & Technology
Human Computer Interfaces (HCI) for Decision Making
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Personalized Assessment, Education, and Training
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Networks and Communications
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Design and Integration
Modeling, Simulation & Test Infrastructure
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Protection, Sustainment, and Warfighter Performance
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Fixed Wing Vehicles (includes UAS)
Rotary Wing Vehicles
Acoustic, Seismic and Magnetic
RF Components for sensing, transmission and communication
Fixed Wing Vehicles (includes UAS)
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Structures and Protection
Aircraft Propulsion, Power and Thermal
Corrosion
Propulsion and Extreme Environments

Department of the Navy SBIR/STTR Transition Program

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Topic # A03-070

Merging Sensor and Stored Terrain Database Data for Rotorcraft Poor Visibility Weather Operations
Monterey Technologies, Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: Strike Planning and Execution Systems Program Office (PMA-281)

Transition Target: Visual Planning, Execution and Review-Carrier Air Wing (ViPER-CVW) System

TPOC:

(301)757-6179

Other transition opportunities:

Navy Strike Group Multi-Ship/Aircraft Planning
Joint Mission Planning System (JMPS-AF) Program Office
- Multi-vehicle ISR Planning
NSMWDC; Aegis Program Office
- Integrated Air and Missile Defense Planning



ViPER-CVW, Copyright, 2015, Monterey Technologies, Inc.

Notes: Screenshot showing strike routing, aircraft sensor coverage, and tactical planning picture.

WHAT

Operational Need and Improvement: Current mission planning processes are labor and time intensive, complicated, and require considerable training/proficiency. Nearly every aircraft requires a validated, digital mission plan prior to execution of an airborne mission. However, much of the planning data still must be manually entered by the aircrew in multiple applications. New innovative human factors workflows, visualizations, and improved data handling algorithms are needed to establish expedited mission planning processes, without redundant manual data entry and other unnecessary interactions. Joint Task Force integration of naval assets require an integrated planning environment that facilitates rapid assimilation of task constraints to produce comprehensive, well-reviewed tactical plans.

Specifications Required: Requisite human factor engineering are employed to: evaluate intuitive human-computer interactions and visualization techniques; create optimal mission planning data entry and upload processes; and establish a highly adaptive planning framework.

Technology Developed: ViPER-CVW aids Carrier Air Wing personnel in the creation and coordination of integrated multi-element strike plans. ViPER-CVW allows planning data, such as target coordinates, to traverse the "Sensor-to-Shooter" pathway in digital format. ViPER-CVW provides tools to rapidly visualize actions of large multi-aircraft packages in space, time, and relation with planning constraints. ViPER's stand-alone java-based application can be deployed in a variety of operating environments. The ViPER-CVW variant is integrated as a JMPS federated application facilitating the exchange of planning data, charts, threats, airspaces, and flight routes.

Warfighter Value: ViPER, designed from a perspective which looks at planning components that underlie all naval planning echelons, employs the simplest available method for sketching and visualizing planning components in a common temporal and spatial context. Since, planning data is captured in a digital format, the development of physical planning products is automated, providing time and tools for mission rehearsal, analysis, re-planning, and optimization. ViPER transitions JMPS from an aircraft data loading to a tactical planning capability.

WHEN

Contract Number: N68335-14-C-0385 **Ending on:** September 10, 2016

| Milestone | Risk Level | Measure of Success | Ending TRL | Date |
|---|------------|--|------------|----------------|
| Integration with JMPS build | Low | ViPER CVW Certified for inclusion in JMPS MPE | 8 | June 2015 |
| ViPER-CVW Authority to Operate | Low | ATO certification letter received | 8 | December 2015 |
| Operational Assessment and Release of ViPER CVW | Low | ViPER-CVW effectively used in fleet operations | 9 | March 2016 |
| Software update with upgraded UI and additional mission tools | Med | Software update passes engineering and operational testing | 9 | September 2016 |

HOW

Projected Business Model: Monterey Technologies, Inc. (MTI) will continue to act as the prime contractor for development and integration of ViPER-CVW software. Additional task analysis, requirements derivation, and feature design is required to fully exploit the benefits of ViPER in addition to software code maintenance and production. MTI will continue to work closely with JMPS component developers, subcontractors, and prime contractors to develop new capabilities and integrate Viper-CVW functionality into additional JMPS MPE tools.

Company Objectives: Although, ViPER-CVW is well-known in the naval carrier aviation community, its capabilities are easily tailored to support the broader aviation community, Carrier Strike Group, Joint Task Force, and tactical multi-asset planning mission planning activities. MTI is interested in transitioning ViPER-based mission planning technology to additional Navy, Air Force, and MDA mission planning activities. A version of ViPER, the submarine Mission Planning Application (MPA) is currently targeted for integration into the submarine combat system.

Potential Commercial Applications: Potential target markets for ViPER's multi-vehicle planning environment include many commercial planning activities, such as "delivery drone route planning", currently being explored by Amazon. Logistics and shipping companies can leverage MTI's ViPER-like mission planning functionality to support planning, re-planning and the synchronization of enroute and scheduled delivery planning requirements.

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