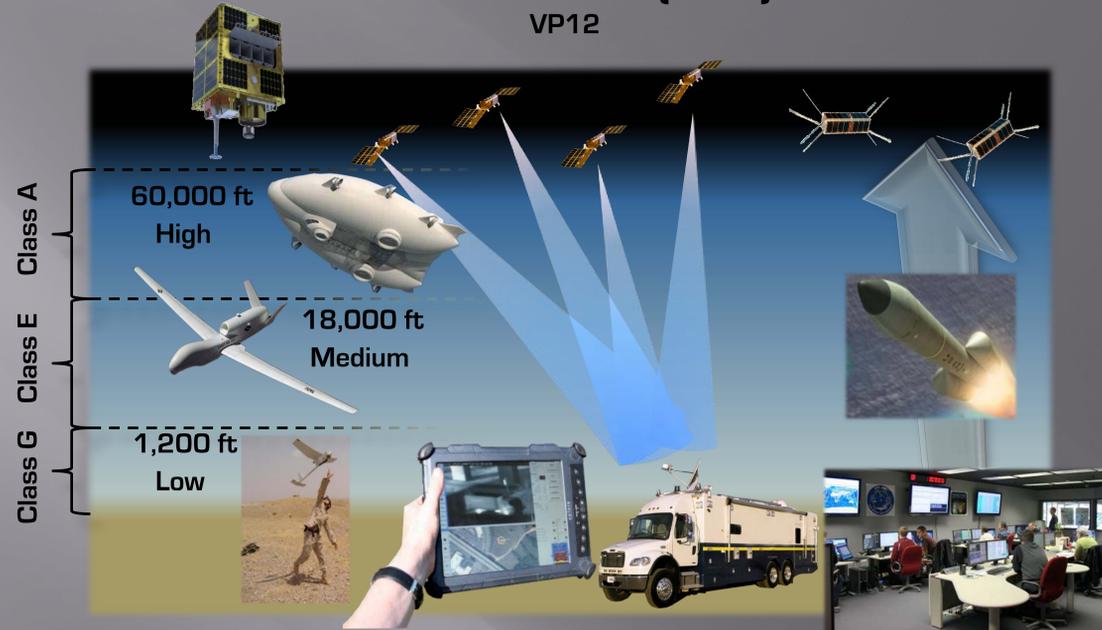


# Huntsville Responsive Systems Initiative (HRSI)

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## Goals

- Map and document key capabilities, programs, and projects under development at Redstone and NASA MSFC
- Identify and leverage mechanisms already in place that would enable greater collaboration between organizations at Redstone
- Frame an execution plan including sustained support to Team Redstone to convert concepts and recommendations into programs, projects, and activities

Integrate a student or university project or experiment into a draft of at least one integrated systems solution

## Outcomes

- New lower-cost, rapidly deployed, innovative solutions concepts sensitive to budget constraints and customer needs
- Recognition of HSV as a key systems solutions provider for small spacecraft, UAS, and high altitude platforms to a broad range of users
- Identification of DOD, NASA, NOAA, DHS organizations for innovative, collaborative projects exploit regional assets

Increase in universities capability to perform large-scale research, experiments, and tests with a limited budget

## Future Work

- Create a new decision support tool that matches the optimal platform and underlying capabilities with the customer's mission requirements
- Complete Technology Review, Facilities/Key Assets Review, and Facilities Utilization/Pricing Police Review
- Formulate regional strategic plan and marketing documentation that can be used to better position/brand Huntsville as the systems solutions capital for small spacecraft, UASs, and high altitude platforms

Provide cost effective opportunities for small satellite, UAS, and high altitude platform-based academic research nationwide

## Abstract

Redstone Arsenal possesses a diverse set of low cost, high altitude platforms that represent future innovative systems solutions for operational, research, and science missions. However, this portfolio of small spacecraft, unmanned aerial systems (UAS), and high altitude platforms and the associated sensors, instruments, operations centers, test facilities, and ongoing projects are not well known outside of their home organizations, or the Huntsville region. The Small Spacecraft, UAS, and High Altitude Platforms Initiative (HAPI) seeks to inform regional and national leaders about the wealth of assets within the Huntsville Region and their potential to provide low cost tactical and theater system solutions to key customer requirements in the DOD, NASA, NOAA, USDA, and DOE. As part of the Review/Planning Team, I will assess regional capabilities and market/procurement opportunities, as well as make initial recommendations regarding potential system of systems projects and initiatives. A system of systems solution integrates several technological systems to tackle a more complex problem. Such a system of systems could be a cubesat launch-on-demand platform capable of deploying 25 kilograms of payload to low earth orbit for persistent communications or surveillance coupled with a UAS deployed to the same region to provide targeted mapping, insights, or short-term, rapid turnaround capabilities. Future work by the Team includes creating a new decision support tool that matches the optimal platform and underlying capabilities with the customer's mission requirements.

## Systems Solutions

A system of systems builds a larger system capable of undertaking more complex problems and tasks by networking smaller, simpler systems. Smaller systems, such as nanosats, UASs, and even autonomous underwater vehicles (AUVs), can gather limited data over a limited area; however, a collaborative network can provide a complete picture of the theater or area of interest. For example, a system of small satellites and AUVs can provide continuous monitoring for transient environmental phenomena like harmful algal blooms (HAB); HABs, over a short period of time, incur considerable environmental damage, in addition to economic damage to fishing industries. The low cost and quick deployability make systems like ARC-sat ideal for customers requiring rapid response, like the military, or minimal expenditure, like universities.

This initiative endeavors to facilitate the development of inter-agency system of systems solutions and the exploration/validation of system interoperability. By raising awareness of each program's assets and capabilities, the initiative will provide innovative solutions by connecting the puzzle pieces to create cost effective system of systems solutions



## At a Glance: Regional Capabilities

### Arctic Region Communications Small Satellites (ARC-Sat) JCTD

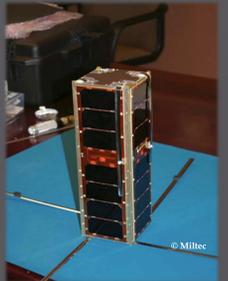
The ARC-Sat Joint Capabilities Technology Demonstration (JCTD) is part of a collaborative project among DOD, EUCOM, NORTHCOM, MSFC, and STP proposed for flight in 2013. Once on orbit, the Mothership will launch four independently maneuverable CubeSats to provide voice and data



communications relay, Maritime Domain Awareness (MDA), data-extraction from unattended sensors, photomosaic imaging, and Search & Rescue (SAR) beacon detection throughout the Arctic Region.

### SMDC-ONE

Launched in December 2010, the first SMDC-Orbiting Nano Experiment (ONE) uploaded the data recorded by an untended ground-based network of sensors. The success of the first has paved the way for the deployment of four nanosats in 2012. The goal is to demonstrated the ability to rapidly design and develop a militarily spacecraft with an operational life of 12 months or longer.



### Long Endurance Multi-Intelligence Vehicle (LEMV)

The Long Endurance Multi-Intelligence Vehicle, managed by SMDC and initiated by EUCOM, is a state-of-the-art aircraft that will provide persistent time-on station for additional intelligence, surveillance and reconnaissance to the theater commander. With a 21-day endurance, its multi-intelligence capability makes the LEMV a perfect platform for a system of systems solution including a cluster of either cube-sats or UASs.



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### RQ-7 Shadow

The RQ-7 Shadow is a UAS workhorse of the U.S. Army and Marines. As a reconnaissance aircraft, the RQ-7 carries a forward-looking Infrared which currently uses the camera and daytime camera. The aircraft is part of a larger system M1152-series of Humvees for ground transport of all ground and air equipment. The Redstone Arsenal manages the U.S. Army's fleet.



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