

ENGINEERED INTELLIGENCE

F O R

SPACE



ENHANCING SPACE DOMAIN AWARENESS

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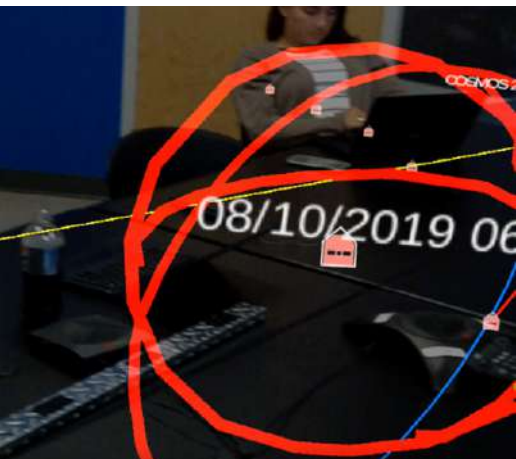
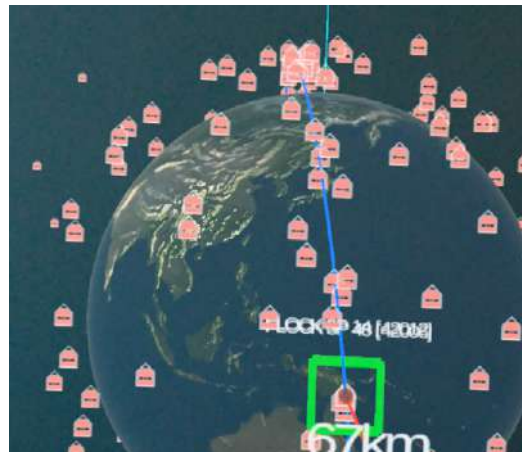
IS YOUR SPACE-BASED INFORMATION ACCURATE AND PROTECTED?

The growing number of satellites and debris in orbit makes tracking assets, identifying threats, and preventing collisions a daunting task—incomplete or inaccurate information will compromise decision making and result in costly missteps.

Charles River Analytics' 3D SSA visualization and course-of-action (COA) analysis optimization tools offer a seamless path to modernization of today's Space Operations Centers.

With these tools, customers can monitor, assess, and act with confidence to maintain critical space assets and ensure multi-domain success.

Our pioneering research in probabilistic programming, machine learning, data mining, and natural language processing has led us to create hybrid, novel AI-powered tools and innovative architectures that provide cost-effective and tailored solutions to the complex problems facing the space community today.



CORE TECHNOLOGIES

As threats to US space assets grow, space situational awareness (SSA) is needed for more than just daily operations and maintenance—it directly affects our ability to resolve conflicts. No one understands this better than SSA space operators, who need access to intelligence, support for flexible tasking and rapid decision making, and tools that integrate data from multiple sensors to maintain the upper hand in space.



Images from DARPA tv, Hallmark Transitions Key Strategies for Space Situational Awareness, Management: <https://www.youtube.com/watch?v=W0NZISH-ibQ>

Charles River Analytics adapts and integrates multiple AI technologies to leverage each tool's functional strengths, avoid bias, and maintain the transparency necessary to keep humans "on-the-loop" and informed about the dimensions of the space enterprise that are relevant to their mission.

We help operators reason about uncertainty when time is of the essence, trust the decisions they are making, and conquer complexity through the use of intuitive, multi-modal interfaces.

CASE STUDY:

Fusing AI to Create Actionable SSA Visualizations

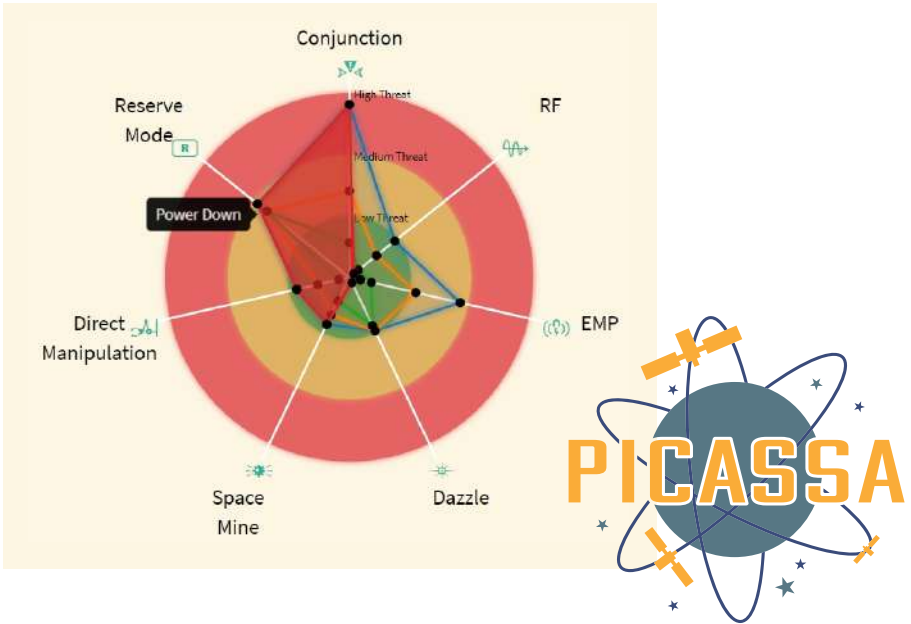


The US military, under efforts such as DARPA’s Hallmark program, seeks to help operators quickly develop SSA in the complex space domain. During military operations, operators must quickly combine information from disparate data sources to accurately track assets in space, understand events, and develop COAs to mitigate threats.

As part of the Hallmark program, we developed Space Operation Visualizations Leveraging Augmented Reality (SOLAR). With SOLAR’s intuitive visualizations, operators quickly make sense of outputs from novel AI, machine learning, and other advanced analytic tools developed by Charles River Analytics and third-party organizations.

Operators interact with SOLAR’s visualizations within next-gen augmented reality displays using a workflow-centric graphical user interface to make faster decisions with greater confidence.





Our Probabilistic Inference for COA Analysis in Space Situational Awareness (PICASSA) tool, which improves

threat detection in space using advanced probabilistic reasoning, was also developed under the Hallmark program. When viewed within SOLAR’s interactive visualizations, space operators can easily understand and incorporate outputs from PICASSA’s reference models and decision algorithms into their SSA and course-of-action workflow.

PICASSA builds probabilistic models with Figaro™, our free, open-source probabilistic programming language. Figaro makes it possible to express probabilistic models using the power of programming languages and includes built-in reasoning algorithms for application to new models.

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Charles River Analytics conducts cutting-edge AI, robotics, and human-machine interface R&D to create custom solutions for your organization. Our customer-centric focus directs us towards problems that matter, and our passion for science and engineering drives us to create actionable, impactful solutions.

We were founded in 1983 to perform results-focused research for the US government. We became an employee-owned company in 2012, setting the stage for the next generation of innovation, service, and growth. Today, our nearly 200 employees make a difference for a “who’s who” in government and industry by delivering results on government programs and working with commercial partners.

We come to work every day because we want to advance technology to solve today’s hardest problems. We have a stellar track record implementing successful solutions that enrich diverse markets—defense, intelligence, medical technology, training, transportation, space, and cyber security. We owe our success to our expertise in advanced algorithms, machine learning, autonomous systems, advanced human-system interfaces, agile software and hardware engineering, and to our enduring base of knowledgeable customers.

**At Charles River Analytics,
we turn research into results.**

Charles River Analytics
625 Mount Auburn St.
Cambridge, MA 02138

617.491.3474
contactus@cra.com
www.cra.com



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Employee-Owned Small Business

A full-page background image showing an astronaut in a space suit floating in the void of space. The Earth's horizon is visible as a bright, glowing line, with the dark, star-filled expanse of space above and the dark, textured surface of the planet below. A satellite or space station component is visible in the distance.

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