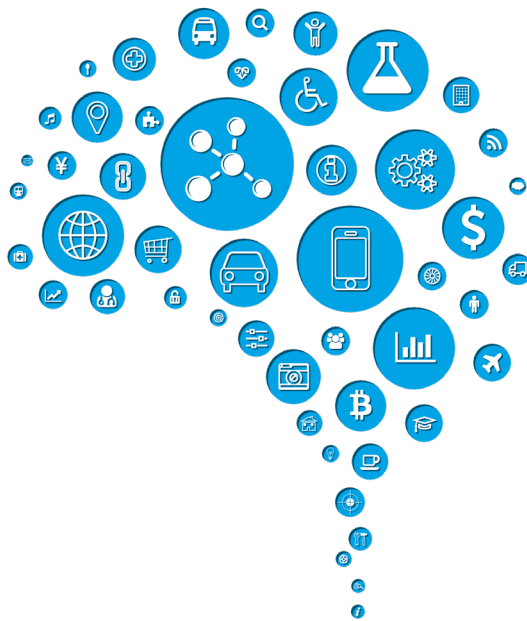


Smart

on the fly



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THE CORE TOOLSET ALLOWS EXISTING SYSTEMS
TO ADD ARTIFICIAL INTELLIGENCE CAPABILITIES

Imagine what you could do with technology that utilized artificial intelligence to make smart decisions. Now imagine that you could take systems you already have and easily make them that smart. With the help of the Army Small Business Innovation Research (SBIR) program, Andy Bevilacqua has been working on creating that future, and has found unexpected bonuses for DoD along the way.

Say your unmanned aerial vehicle (UAV) is on a mission and its communication system jams—what does the UAV do? Choose among its available options or turn around and go home? With artificial intelligence (AI), the UAV can make instantaneous decisions based on surveillance, firing, or combat scenarios. The mission can be saved without a human present. Or let's say your space vehicle is on Mars and about to wreck

itself on an obstacle. Would you rather have it phone home and ask what to do or have it make the best choice available to save itself? That said, you still want boundaries. You want a system that can make decisions that will preserve the mission (semi-autonomy), but you don't want it making decisions on its own (emergent behavior) which can lead to unintended consequences.

Smart is hard. Responsiveness to quickly changing situations or needs is one of the major challenges facing anyone creating an AI system. You have to be able to adapt your smart system on the fly, which means your system has to be easy to change, all without an army of AI experts or months of testing time. For example, if you're simulating a battle scenario, you might need to change the strengths or weaknesses of your simulated opponent to match those of a real potential opponent.

The CORE (Cognitive Object Reasoning Engine) toolset now offers an elegant solution. CORE was born when the Army awarded Alabama-based Bevilacqua Research Corporation (BRC) a Small Business Innovation Research (SBIR) contract to add AI to a threat system being used in distributed simulation environments. While the purpose of the initial SBIR work was to add AI to an existing system, a subsequent Army SBIR award enabled BRC to create the CORE toolset that allows AI to be quickly added to any system, in a format that can be validated.

Using the toolset does not require knowing AI or even computer programming—you just create a graphic representation of what you want to do. The toolset then translates that into code, which your existing system can use when it needs to make a decision.

Andy Bevilacqua, CEO of BRC and a cogni-




tive psychophysicist, used his knowledge of how humans think to create a system that makes decisions similar to the way people do. "It can't be any better than the best experts," he said, "but it can be millions of times faster." Like humans, the software can even learn from its own mistakes.

In developing the system, BRC made another crucial discovery. The technology used by the toolset to create AI can also be used to store information—which in turn led to a better way to send information. It's an entirely new communications paradigm that provides

secure, lossless compression far better than anything currently available on the market.

Besides potentially saving DoD millions of dollars in development costs for its new intelligent systems, BRC's CORE toolset is at the center of an emerging market that could be worth millions of

dollars to the small company. As Bevilacqua said, "The SBIR program gave us the seed funding necessary to establish ourselves as the leader in AI/machine learning technology in the United States."

BRC has established a new human and machine learning laboratory at their headquarters in Huntsville, Alabama, to be ready for the growth expected from demand for the CORE tools that grew out of the SBIR program. Nearly half of the work BRC does is directly associated with using the CORE toolset to create AI-based products for DoD, including organizations within the Army, Navy, Air Force, and Space and Missile Defense Command. These include human behavioral models, automatic target recognizers, and decision aids, to name a few. The future of DoD is bright—and smart—thanks in no small part to the Army's SBIR program. 

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Bevilacqua Research Corp.

Modernization Priority: Artificial Intelligence / Machine Learning
Huntsville, AL • SBIR contract: M67004-97-C-0027 • Agency: Army • Topic: A96-177, A Dialectic Approach to Intelligence Data Fusion For Threat Identification