



U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND CHEMICAL BIOLOGICAL CENTER

AUSA Aberdeen Chapter November Luncheon

Eric L. Moore, PhD.

Director

DEVCOM Chemical Biological Center





AGENDA



- **DEVCOM Chemical Biological Center (CBC) Overview**
- **Emerging Global Threats**
- **Emerging Technology**
- **Strategic Partnerships**
- **Future Outlook**
- **Questions**



DEVCOM CHEMICAL BIOLOGICAL CENTER



Cum Scientia Defendimus (With Science We Defend)

MISSION

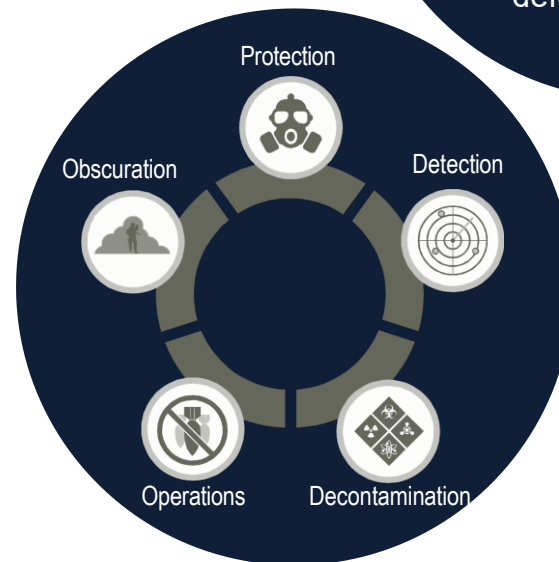
Provide innovative chemical, biological, radiological, nuclear and explosive (CBRNE) defense capabilities to enable the Joint Warfighters' dominance on the battlefield and interagency defense of the homeland

VISION

Be the premier provider of innovative CBRNE solutions for the Army, DOD, the Nation and our allies

WHAT WE DO

Research, development and engineering combined with testing, training and field operations to create new, effective chemical biological defense solutions





AFC/DEVCOM ORGANIZATION



GEN John M. Murray
CG AFC



MG Edmond 'Miles'
Brown
CG DEVCOM



Mr. John S. Willison
Deputy to the CG DEVCOM



CSM Bryan Barker
CSM DEVCOM

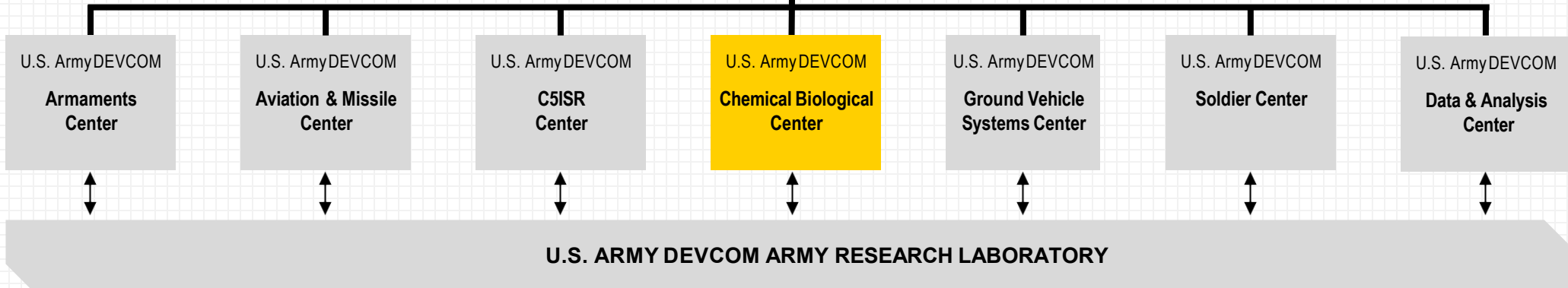


Mr. Chris P. Manning
Director, DEVCOM S&TI



BG David C. Trybula
DCG DEVCOM

- DEVCOM Atlantic
- DEVCOM Pacific
- DEVCOM Americas





DEVCOM CHEMICAL BIOLOGICAL CENTER LEADERSHIP





DEVCOM CHEMICAL BIOLOGICAL CENTER INTRODUCTION





DEVCOM CHEMICAL BIOLOGICAL CENTER PRIORITIES



Advance S&T efforts to protect against emerging CB threats

Modernize biomanufacturing and synthetic biology processes to scale up materials

Support S&T for All Domain Protection/AFC Concept for Protection

Increase the use of robotics and autonomous systems to improve accuracy and safety

Expand key partnerships to accelerate technology advancements



COMPLEXITY OF EMERGING THREATS



OCTOBER 2020: ALEXEY NAVALNY ON THE POISONING ATTACK HE SURVIVED AND WHY HE THINKS PUTIN WAS BEHIND IT

In a report that originally aired last October, the Russian opposition leader tells Lesley Stahl about what he went through after falling ill on an airplane in August 2020 and why he won't let it stop him from the work he's doing against Russian President Vladimir Putin.



Lab Shifts Gears to Fight COVID-19



Trade Deal Or Not, China Is Investing Big In Synthetic Biology



China jails 'gene-edited babies' scientist for three years

© 30 December 2019

U.K. Charges 2 Men in Novichok Poisoning, Saying They're Russian Agents

Asia & Pacific
Kim Jong Un's half brother was killed by VX nerve agent, Malaysian police say

FEATURE / SYRIA'S CIVIL WAR
How chlorine gas became a weapon in Syria's civil war

Syria's chlorine problem: the human toll of chlorine attacks in six years of civil war.



WORLD WAR AND PEACE BIOETHICS
The Fight to Ban Chemical Warfare Helped Us Battle Covid-19

The research of chemist Julian Perry Robinson and biologist Matthew Meselson on arms control set public health standards for understanding the spread of contagion.

By Peter Pringle

APRIL 23, 2020



Pentagon, DHS considering designating fentanyl a WMD, memo says



May 21, 2021, 01:20am EDT | 2,086 views

Gene Editing Seeds With CRISPR Is Transforming Agricultural Biotechnology



Scientists Hack a Computer Using DNA

Malware can be encoded into a gene and used to take over a computer program.

Innovating in an expanding threat landscape



EMERGING TECHNOLOGY EXPANDS THE ART OF THE POSSIBLE



DEVCOM CBC harnesses emerging technology to enhance CB defense operations

Synthetic biology • Biomanufacturing • Artificial Intelligence/Machine Learning • Next Generation Sensors • Genome Sequencing



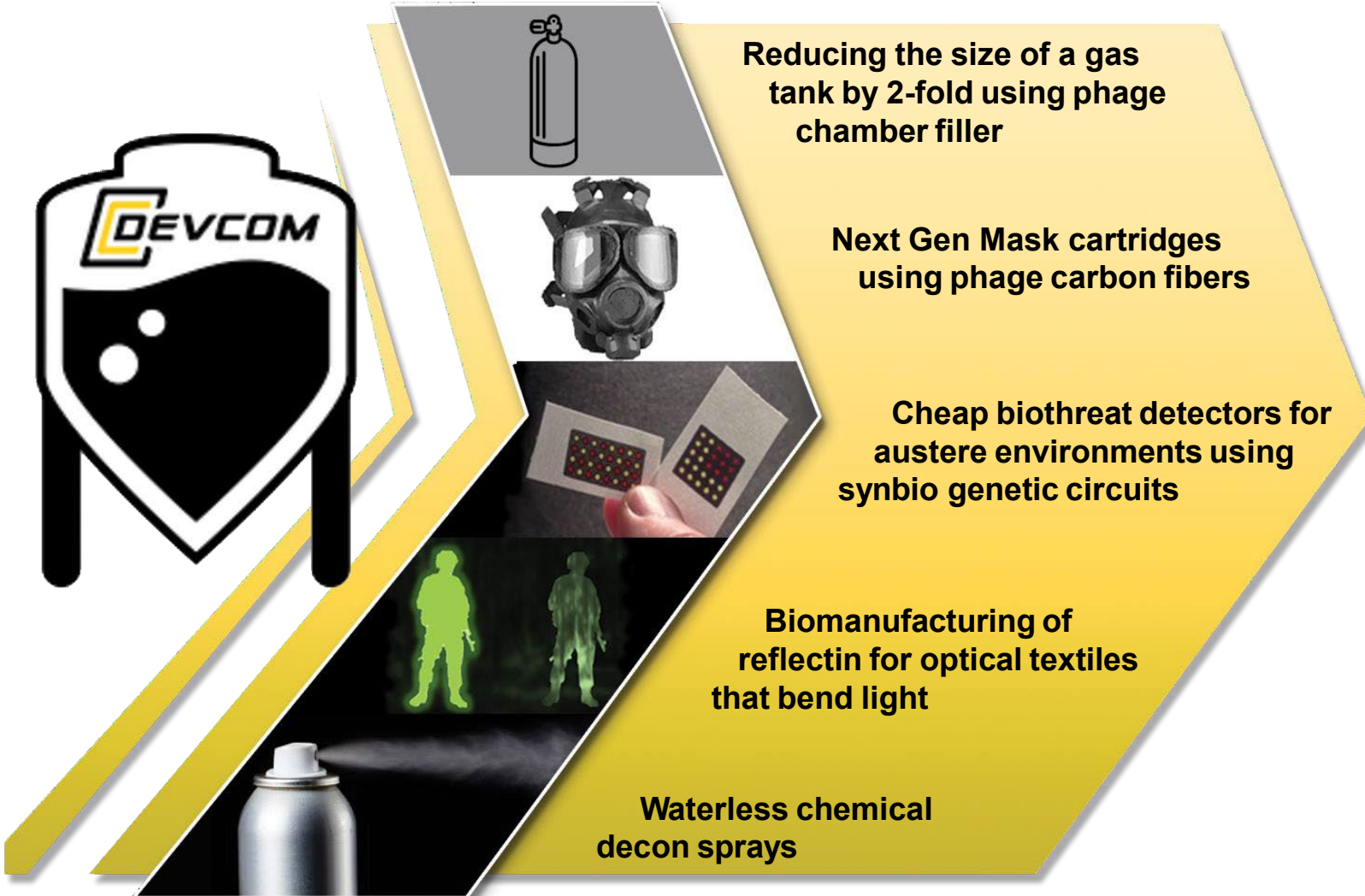
EMERGING TECHNOLOGIES



SYNTHETIC BIOLOGY



CURRENT CBC EFFORTS



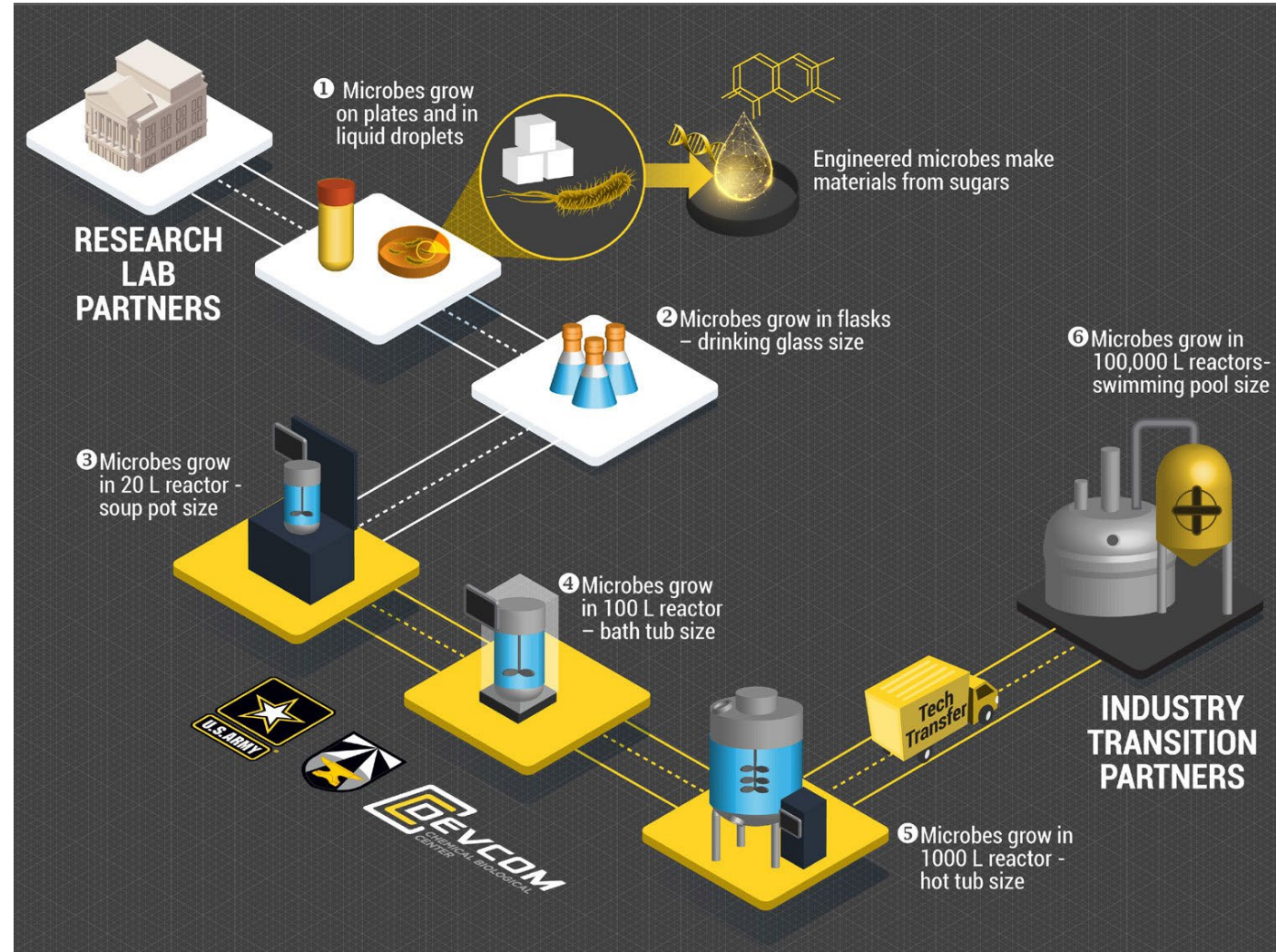
DEVCOM CBC collaborates with various DoD laboratories & industrial partners to develop materials & chemicals from biotechnology, ultimately leading to improved technologies for the warfighter



BIOMANUFACTURING



Biomanufacturing enables the creation of **high-performance, high value materials** by controlling the genetic makeup of the organisms that make them



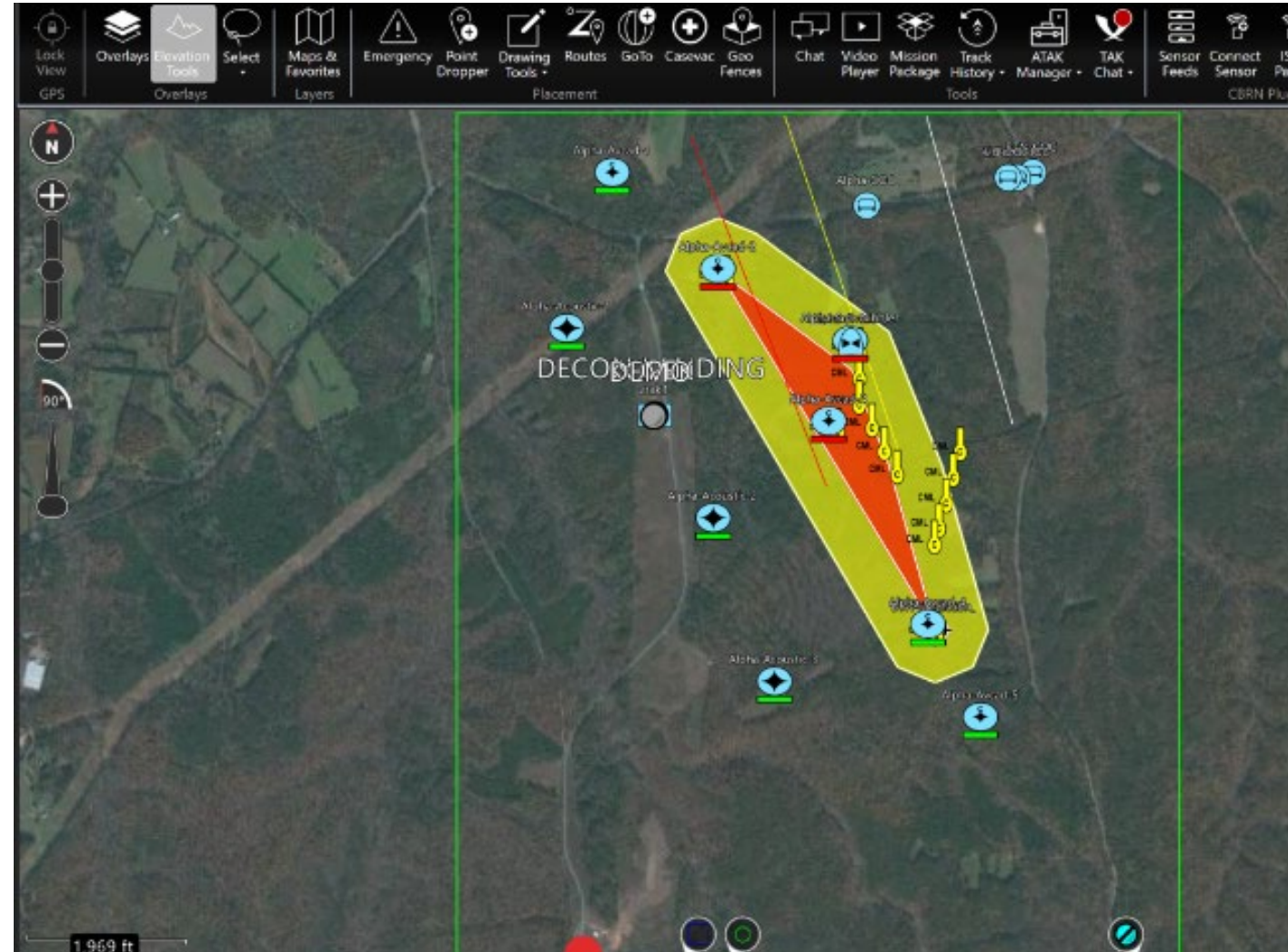
DEVCOM CBC has a pilot Biomanufacturing large scale facility powered by chemical engineering and molecular biology experts



INTEGRATED EARLY WARNING



- Army Persistent Experimentation eNvironment (APEN)
- Integrated Threat Response – ATD (Integrated Early Warning + Integrated Layered Defense)
- Digital Battlespace Management Science, Technology & Integration



DEVCOM CBC is working to integrate and populate CBRN sensor information on a Common Operating Picture and disseminate it across the digital battlefield



ARTIFICIAL INTELLIGENCE/MACHINE LEARNING



- **Classification** of Chemical Sensor Data
- **Data extraction** from various, disparate sources (i.e., articles, Technical Reports)
- Improve **object recognition** during augmented reality chemical biological detection equipment training



DEVCOM CBC is using artificial intelligence and machine learning to improve battlefield decision making and help scientists quickly ascertain vital information



NEXT GENERATION SENSORS



- CBC and the Republic of Korea will research, develop, manufacture and test a **low cost, low weight chemical detection** payload for micro Unmanned Aerial Systems, Black Hornet 3 UAS
- The Array Configured of Remote Networked Sensors (ACoRNS) updated interface will be **integrated in both air and ground** platforms



Black Hornet 3 UAS
courtesy of FLIR Systems

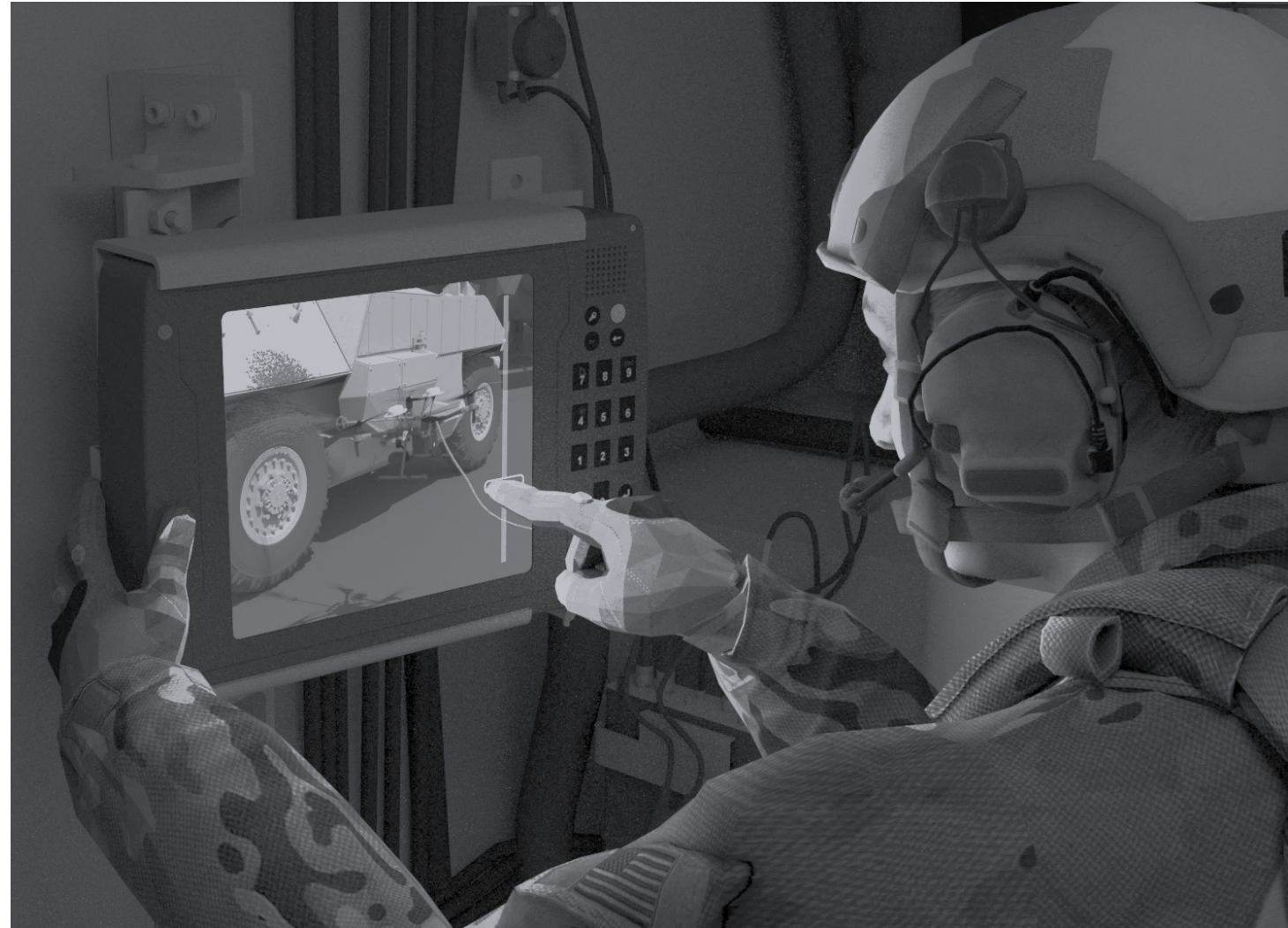
DEVCOM CBC is supporting the integration of chemical and biological sensors across numerous autonomous and semi-autonomous platforms



ROBOTIC DECONTAMINATION SYSTEM



- Demonstrates an **interdependent system-of-systems**
- Integrates information enabled **precision application, autonomy** and other advanced/emerging technologies



DEVCOM CBC is part of a collaborative effort to reduce the time, resources and risk required to conduct contamination mitigation of CBRN hazards across the multi-domain battlefield



STRATEGIC PARTNERSHIPS ENABLE PERPETUAL MODERNIZATION



Technology Transfer Mechanisms for Partnership

Technology Support Agreement (TSA)	Technical Arrangement (TA)
Cooperative Research Development Agreement (CRADA)	User Agreement
Memorandum of Agreement (MOA)	Support Agreement
Memorandum of Understanding (MOU)	Joint Ownership Agreement (JOA)
Interagency Agreement (IAA)	Patent License Agreement (PLA)
Material Transfer Agreement (MTA)	Letter of Intent (LOI)
Educational Partnership Agreement (EPA)	Service Level Agreements (SLA)



DEVCOM CBC engages with diverse minds (industry, academia, OGAs and international partners) to discover untapped innovation to support priorities



FUTURE OUTLOOK



Common Goal:

Prepare and Protect the Warfighter, Homeland and Allies

Challenges:

- People
- Infrastructure
- Funding/priorities

DEVCOM CBC wants to:

- Collaborate
- Integrate
- Innovate

Benefits of collaborating with us:

- Experts in CB defense
- Institutional knowledge
- Unique facilities
- Steadfast partner

For more information, please contact

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DEVCOM CBC Technology Transfer Office
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QUESTIONS



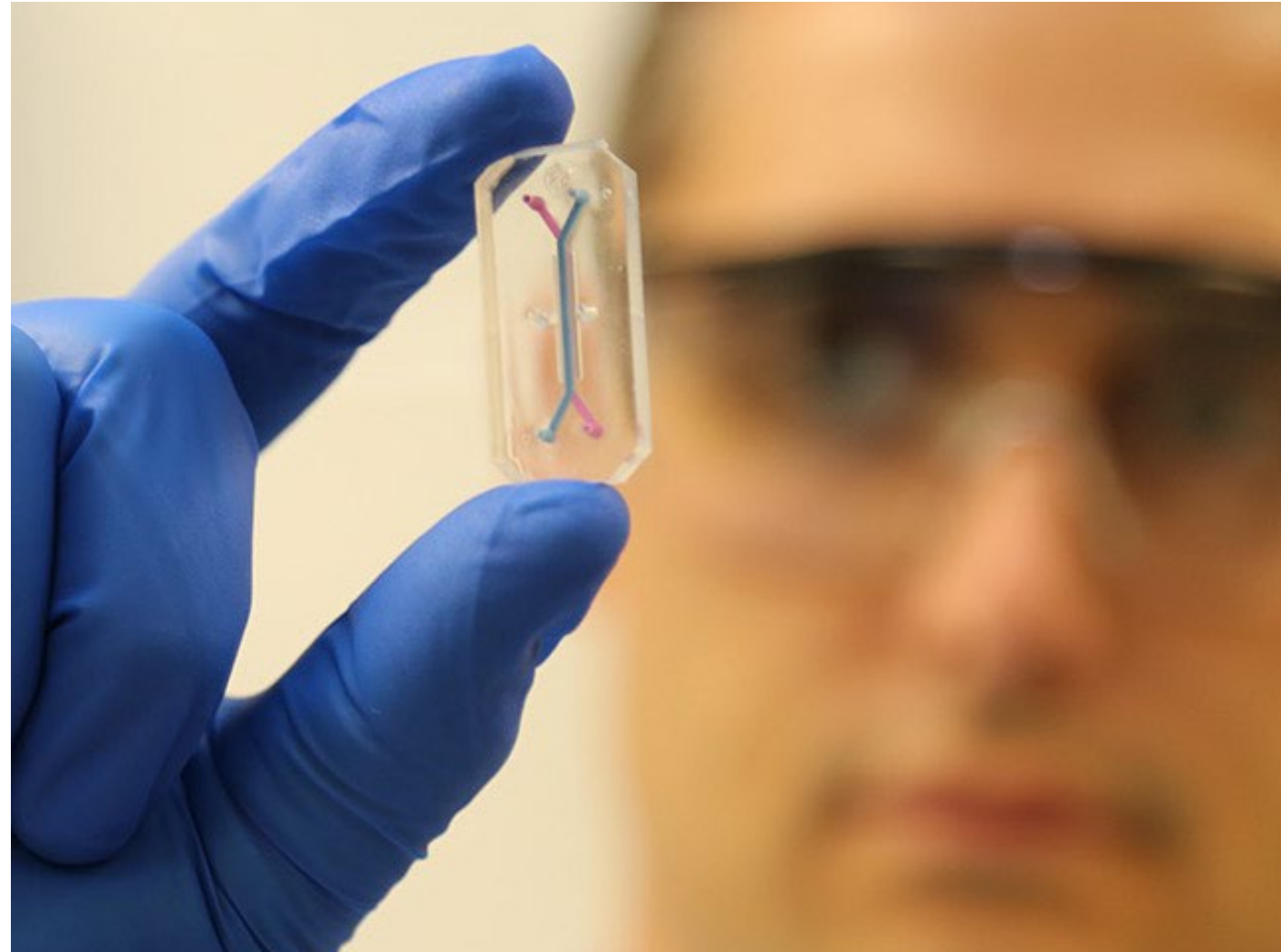
BACK UP



ORGAN-ON-A-CHIP



- **Replication of human organ functions** as test systems for chemical and biological threats
- COVID-19 application:
 - Creates a microenvironment in which to watch, record and analyze **how SARS-CoV-2 virus affects lung tissues** at different doses in real time



DEVCOM CBC has established an organ-on-a-chip research program to assess the effects of chemical biological threats on human physiology