Binational Cooperative Pilot/Israel-U.S. Binational Industrial Research and Development (BIRD) Foundation

September 18, 2020

Fiscal Year 2020 Report to Congress

Science and Technology Directorate

Foreword from the Senior Official Performing the Duties of the Under Secretary for Science and Technology

September 18, 2020

I am pleased to present the following report, "Binational Cooperative Pilot/Israel – U.S. Binational Industrial Research and Development (BIRD) Foundation," which has been prepared by the Department of Homeland Security (DHS) Science and Technology Directorate.

This document has been compiled pursuant to direction in Senate Report 116-125 accompanying the Fiscal Year 2020 DHS Appropriations Act (P.L. 116-93).

Pursuant to congressional requirements, this report is being provided to the following Members of Congress:

> The Honorable Lucille Roybal-Allard
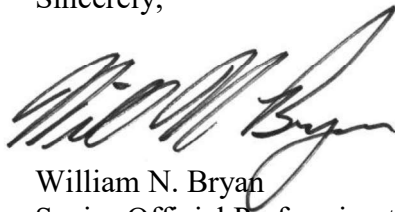> Chairwoman, House Appropriations Subcommittee on Homeland Security
>
> The Honorable Chuck Fleischmann
> Ranking Member, House Appropriations Subcommittee on Homeland Security
>
> The Honorable Shelley Moore Capito
> Chairman, Senate Appropriations Subcommittee on Homeland Security
>
> The Honorable Jon Tester
> Ranking Member, Senate Appropriations Subcommittee on Homeland Security

Inquiries relating to this report may be directed to me at (202) 254-8392.

Sincerely,

William N. Bryan
Senior Official Performing the Duties of the
Under Secretary for Science and Technology

Binational Cooperative Pilot/Israel-U.S. Binational Industrial Research and Development (BIRD) Foundation Fiscal Year 2020 Report

Table of Contents

I.   Legislative Language

This document has been compiled pursuant to direction in Senate Report 116-125 accompanying the Fiscal Year (FY) 2020 Department of Homeland Security (DHS) Appropriations Act (P.L. 116-93).

Senate Report 116-125 states:

> [The Committee] is pleased that S&T has been engaged in a three-year binational research and development pilot. The recommendation includes $2 million for continuation of this pilot. The pilot should continue its focus on border security, maritime security, biometrics, cybersecurity, and video analytics among other topics. Within 180 days of the enactment of this act, S&T shall provide a report to the Committee on the results of each grant awarded through the pilot and on any commercialization or transition to practice that has resulted from the pilot's projects.

II. Background

The Binational Industrial Research and Development (BIRD) Foundation was established in 1977 as a joint initiative between the U.S. and Israeli governments to stimulate, promote, and support joint (nondefense) industrial research and development (R&D) of mutual benefit to Israel and the United States. In 2016, the DHS Science and Technology Directorate (S&T) established a contractual mechanism with the Israel Ministry of Public Security (MOPS) under the 2009 *Agreement between the U.S. and Israel on Cooperation in Science and Technology for Homeland Security Matters* to fund the binational R&D pilot. A dedicated technical annex titled "NextGen First Responder Technologies" between DHS and MOPS established a path forward. In 2019, the BIRD process and model expanded to BIRD Homeland Security (BIRD HLS) to take a more comprehensive approach to the DHS mission and to follow P.L. 116-93 guidance, which states that the pilot "… should continue its focus on border security, maritime security, biometrics, cybersecurity, and video analytics among other topics."

The objective of the BIRD HLS program is to stimulate, promote, and support joint, nondefense, industrial R&D of mutual benefit to the United States and Israel. Using a comprehensive two-step solicitation process, S&T seeks to develop technologies with significant commercial potential in the field of homeland security in order to improve the capabilities of the parties in relation to the homeland security enterprise. The BIRD HLS program raises awareness of capability gaps within the global innovation ecosystem and helps to build relationships between industry and first responder organizations, both in Israel and the United States. This continued partnership allows us to work with international partners to find innovative technology solutions for homeland security needs.

The BIRD HLS program uses an annual solicitation to identify and develop advanced technologies for the homeland security mission. BIRD HLS supports qualified projects that meet the following basic criteria:

- The two partners are an American company and an unrelated Israeli company;
- The companies agree to share risk, involvement in the project, and rewards;
- The proposed project offers significant innovation, with a high commercial potential;
- The companies' joint project proposal is reviewed by a group of experts and approved by S&T, MOPS, and BIRD's Board of Governors;
- The maximum conditional grant is $1 million per project, and no more than 50 percent of the joint R&D budget; and
- Project duration is typically 1-2 years but may be as long as 3-4 years, if deemed necessary for reaching commercial readiness.

The program is funded equally by the United States (S&T) and Israel (MOPS) and is managed by the BIRD Foundation.

III. Binational Cooperative Pilot Overview

Under the BIRD Framework, three "BIRD First Responders" Calls for Proposals were issued from FY 2016 to FY 2018 in alignment with DHS First Responder Capability Gaps, and one "BIRD HLS" Call for Proposals was issued in FY 2019 in alignment with the DHS Homeland Security Capability Gaps. DHS and Israel have contributed $4 million each for a combined total of $8 million over the four solicitation cycles. The nine projects funded to date via the program total $7.87 million, with the remaining funds associated with annual exchange rate differences and project administration. Government funding is leveraged by a 50-percent matching from private-sector funding totaling at least $16 million. A listing of funding for projects is listed in Section V of this report.

The BIRD HLS program has been successful in raising awareness of homeland security capability gaps within the global innovation ecosystem and in building relationships between industry and first responder organizations, both in Israel and in the United States.

IV. Explanation of Current Activity

Building upon the foundation established by the BIRD pilot, S&T and MOPS began working to establish an updated 2020 project agreement that focuses more broadly on the homeland security enterprise. The enhancement of the BIRD HLS program through this project agreement improves the parties' capabilities—through joint or coordinated funding, cooperative review, and management of innovative research, development, and test and evaluation projects—to share information and to conduct other activities that may be set out in technical agreements pursuant to the project agreement.

The BIRD Foundation, S&T, and MOPS worked closely together to plan for the 2020 cycle. The list of homeland security-based problem sets and capability gaps, jointly agreed upon between S&T and MOPS, includes:

- Law enforcement supporting technologies to combat cybercrime;
- Technologies and methods to secure critical infrastructure and public facilities ("soft targets");
- Technologies focused on safe and secure cities;
- Border protection, including maritime security (e.g., biometrics, screening systems, robotics, etc.);
- Unmanned aerial systems (UAS); and
- Advanced first responder technologies (such as command and control (C2), video analytics, communications, personal protective equipment, etc.).

2020 BIRD HLS Action Timeline

June 5, 2020	BIRD HLS Call for Proposals released
August 13, 2020	First deadline for executive summaries
September 23, 2020	Deadline for full proposals
December 2020	Final awardee decisions

The 2020 timeline has been affected by a variety of factors including Israeli Government changes and the Coronavirus Disease 2019 pandemic. S&T and MOPS currently are updating the project agreement and the technical annex for the 2020 cycle. Final award decisions will be made at the annual Board of Governor's meeting in December 2020.

V. FY 2020 Next Steps

Following the receipt of proposals associated with the 2020 BIRD HLS Call for Proposals, S&T will work diligently to evaluate the proposals. At the annual Board of Governor's meeting, to be held in December, DHS and MOPS leadership will finalize selections of an anticipated one to three projects to complete the BIRD HLS 2020 cycle.

To improve visibility into the awarded projects further, S&T will maintain communications with, and conduct site visits to, the U.S.-based companies in addition to BIRD's comprehensive reviews. DHS will receive status reports to include research progress and financial expenditures. Twice per year, the BIRD Foundation will submit technical, financial, and commercialization/ utilization reports to S&T and MOPS on the activities funded by BIRD HLS.

VI. BIRD First Responder Pilot Funding 2016-2019

Technical Topic	Locating and Monitoring
Project Title	Indoor Positioning, Locating, and Reporting System
Project Description	In emergency response situations, first responders need positioning and communication solutions to assist evacuation and rescue operations. Successful emergency response to those in need is dependent upon a responder's ability to receive accurate location information to effect timely action and to communicate with the response team. This project sought to develop a smartphone platform that can provide three-dimensional (3D) location services, physiological status, and local hazard indicators, and that can allow for emergency response personnel to communicate with one another.
Project Specifics	The outcome of this joint project is a smartphone platform technology, providing indoor 3D location, physiological status, voice, local hazard indicators, and interresponder communications. The U.S. company provides the indoor navigation; the Israeli company provides the other elements.
U.S. Company	**OptoKnowledge, (Torrance, California):** Developed vision-based navigation and mapping technologies for global positioning system-denied environments, applying these to indoor navigation and mapping for first responder situational awareness.
Israeli Company	**SayVU:** Provides real-time reporting and event management systems by accessible life-saving technologies.
Commercialization Potential	Contender at Urban Navigation Technologies contest, http://cttsc-x.com/the-contest; discussions with Motorola Innovation; and demonstration to corporate chief technology officers.
Award Amount	$950,000
Project Start Date	December 1, 2016
Project Duration	30 months
Project Status	Project completed; however, the joint capability requires further development to reach full maturity.
Commercialization/ Transition Progress	The Israeli company is working with Israeli integrators to market and deploy its technology, including elements developed and/or improved in the project.

Technical Topic	Communications/Search and Rescue
Project Title	Unmanned Search and Rescue Systems
Project Description	In the event of an emergency or disaster where first responders are called to assist in rescue efforts, unmanned vehicles can play an important part in assessing the disaster impact and threat

	landscape of an incident. Unmanned ground vehicles (UGV) enable remote teams to monitor hazardous environments and active threats in real time and empower first responders to assess and prepare for recovery and threat mitigation efforts appropriately. This project sought to develop a UGV that allows emergency response teams to identify hazards and to monitor active threats via remote video and audio streaming.
Project Specifics	The outcome of the joint project was the development of a UGV equipped with a variety of sensors integrated with communication systems that create generic, frequent-agnostic ad hoc network streaming of video and audio. More specifically, the project developed a handheld controller with a video screen to enhance control capabilities of the UGVs. This resulted in the ability to enable fully integrated operation of UGV with C2 and first responder teams and in the ability to enable connection of the local area network via long-distance broadband wireless links to an emergency operations center to enable UGV real-time video streaming.
U.S. Company	**Mantaro Networks, (Germantown, Maryland):** Develops and provides telepresence robotic systems for commercial businesses, healthcare, construction, and law enforcement. In addition, provides custom engineering and design services for Internet of Things and custom robotic products, applying its expertise in communications and radiofrequency engineering.
Israeli Company	**Beeper Communication:** Provider of emergency communication and critical messaging services for military and homeland security organizations, combining satellite and ground radiofrequency transmission to provide comprehensive and reliable coverage.
Commercialization Potential	Companies attended the Association of the United States Army tradeshow in Washington, D.C. (military applications); companies overall reported that they found much interest among potential users for demonstrations and provided input to define system requirements.
Award Amount	$950,000
Project Start Date	July 1, 2017
Project Duration	18 months + 3-month extension
Project Status	Project completed; however, work to complete a full prototype continues.
Commercialization/ Transition Progress	Mantaro Networks now is able to provide an improved communication capability to other applications, using Beeper's technology. The technology developed by Beeper is being marketed under the brand BBT.live for seamless network connectivity. A new company, Beeper Broadband Technology, Ltd., also has been established.

Technical Topic	Public Safety Off-Network Broadband Communication
Project Title	**Public Safety Off-Network Broadband Communications using Multi-Hop Long-Term Evolution (LTE) Direct Proximity Services (ProSE) Technology**
Project Description	It is imperative that first responders are able to communicate with one another quickly and effectively in the event of an emergency. With the tremendous changes in emergency communications using smartphones and similar devices, public safety organizations are also responsible for addressing the network service challenges to communicate through voice, video, and data over extended ranges. This project sought to enhance smartphone communication capabilities for public safety officials through the development of an extended-range, off-network broadband communication solution.
Project Specifics	The purpose of this joint project was to develop a public safety off-network broadband communication solution, based upon the LTE ProSe standard for device-to-device connectivity, with a unique multihop technology for extended-range connectivity. This technology will enable first responders to continue getting broadband services (voice, video, and data) from their colleagues, within a 1-kilometer radius, by using their existing smartphones.
U.S. Company	**M87, (Bellevue, Washington):** Commercializing a groundbreaking, patent-pending software technology that makes wireless networks higher performing, more efficient, and easier to use.
Israeli Company	**Elbit Systems Land and Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR), Elbit Systems Ltd:** Develops and implements advanced C4ISR systems and integrated intelligence and communication systems.
Commercialization Potential	The companies focused on the first responders' market and offered new tools and capabilities available nationwide, anytime, even without cellular LTE coverage (off-network).
Award Amount	$900,000
Project Start Date	November 1, 2017
Duration	18 months (Terminated at 12 months)
Project Status	Project was terminated early.
Commercialization/ Transition Progress	The project was terminated early because M87 was acquired by another company and the priorities of the company changed. The companies were able to demonstrate message transfer in two hops (using three devices) at a distance of 330 meters in multiple floors in a fully offline setting.

Technical Topic	**Autonomous Drone-Based Search and Rescue (SAR)**

Project Title	Autonomous Drone-Based Search and Rescue
Project Description	After a disaster or incident, time is a precious commodity in rescue and recovery efforts. UAS can be an effective life-saving tool with the ability to scan a scene remotely for signs of life to identify and locate casualties and fatalities. This project seeks to develop UAS software and hardware that will enhance the detection and evaluation of human lives in an SAR scenario.
Project Specifics	The outcome of this joint project is a system to assist and enhance the use of UAS and autonomy in SAR missions. The product is an onboard software and hardware kit to enhance the capabilities of a multirotor UAS for victim detection, health evaluation, and communication.
U.S. Company	**Sinclair College, (Dayton, Ohio):** Sinclair's National UAS Training and Certification Center represents one of the most comprehensive and pioneering facilities for the advancement of UAS training and applied research support.
Israeli Company	**Simlat:** A leading provider of innovative, next-generation training solutions for UAS. These training solution systems enable training for any platform, payload, and mission.
Commercialization Potential	Starting marketing-related activities ahead of planned schedule. The companies have been demonstrating the technology at a number of trade shows.
Award Amount	$950,000
Project Start Date	May 1, 2017
Project Duration	33 months + 12-month extension
Project Status	Project is ongoing. New capabilities have been developed and demonstrated in flight tests, and companies are planning for a demonstration to the Israeli police; however, delays related to the Coronavirus Disease 2019 pandemic are affecting some activities.

Technical Topic	Drone-based/Cellular Search and Rescue
Project Title	Autonomous Drone-Based Search and Rescue
Project Description	After a disaster or incident occurs, the ability to locate persons trapped beneath rubble or other structures can be both arduous and inefficient if emergency responders don't know for whom to look or where they are located. However, with the prevalence of smartphones in everyday life, emergency responders can utilize aerial technology to survey a disaster area and to detect cellular signals to locate trapped victims. This project seeks to develop an advanced drone technology that can locate victims accurately using signals from cellular phones.
Project Specifics	The outcome of this joint project is the "Advanced Res-Q-Cell," an advanced drone-mounted SAR system for locating victims under ruins and in disaster areas by the accurate location of their cellular phones.

U.S. Company	**TLC Solutions, (St. Augustine, Florida):** Provides secure wireless network solutions designed specifically for portability, ease-of-use, and tactical communications applications across a variety of standards.
Israeli Company	**Elta Systems:** A group and subsidiary of Israel Aerospace Industries, Elta Systems is an Israeli defense electronics company and is in the field of intelligence, surveillance, early warning and control, homeland security, self-protection and self-defense, and fire control applications.
Commercialization Potential	The SAR equipment market is projected to grow from an estimated $113.62 billion in 2017 to $125.6 billion by 2022, at a compound annual growth rate of 2.03 billion. The factors expected to drive the market in the coming years are increased focus of countries on the safety of their citizens and rising terrorism and insurgency. The companies view the market for the Res-Q-Cell System as worldwide and including all the national and international agencies. A list of agencies may be found in the "Search and Rescue Contacts" website https://sarcontacts.info/. The target price for an integrated product (after full commercialization and excluding the installation platform) is estimated to be about $400,000.
Award Amount	$950,000
Project Start Date	October 1, 2018
Project Duration	24 months + 6-month extension
Project Status	Project is ongoing. Multiple flight tests were conducted using two drones over a training area that contains "human-made" wreckages and concrete building ruins. The companies also plan to start advertising and meetings with relevant agencies and users in the coming months following delays related to the Coronavirus Disease 2019 pandemic.

Technical Topic	First Responders Communications
Project Title	**First Responders Emergency Radio Repeater System (FRRS) for Existing High-Rise Buildings**
Project Description	Geographical and structural obstacles can obstruct the communication device signals of emergency response teams when conducting rescue efforts in high-rise buildings, especially those in dense urban areas. Infrastructure obstacles, including reinforced concrete and structural steel, hinder radio signal strength and communication. First responders rely on portable radios to communicate with C2 centers, to account for personnel, and to communicate risks to other first responders while performing crucial rescue operations. This project seeks to enhance radio communication for first responders by developing a radio repeater that can receive and retransmit radio signals at a higher power, so that it can cover a greater distance.
Project Specifics	The outcome of this joint project is the development of a first responders' emergency radio repeater system, which is a combination of a radio receiver and a radio transmitter that enables signals to cover longer distances for high-rise buildings.
U.S. Company	**Allstate Sprinkler Corp. (Bronx, New York):** A fire protection contractor servicing the New York City Metropolitan area.
Israeli Company	**HiRiseTech:** Provides developers, building owners, general contractors, construction managers, and low voltage contractors with turnkey Emergency Responder Radio Coverage System solutions, specifically configured for each structure. Designs, installs, and maintains each system while meeting the most stringent building code requirements regarding public safety radio communications.
Commercialization Potential	The commercial prospect for the FRRS project is significant. Tens of thousands of high-rise buildings lack an effective radio coverage system for first responders. An independent survey estimates the New York market at $1 billion and an additional $3 billion to $5 billion in other U.S. metropolitan centers. The global market is estimated to be in excess of $10 billion.
Award Amount	$950,000
Project Start Date	September 1, 2018
Project Duration	24 months + 6-month extension
Project Status	Project is ongoing. The companies are in the final process of selecting the high-rise building in New York City, where the pilot will be done.

Technical Topic	Unmanned Aerial Systems
Project Title	**Multimission, Multitype HLS Drone Command and Control Capability**

Project Description	The main goal of this project is to develop a C2 center for multimission, multitype drones designated for HLS complex operations. The solution is based on an open-architecture system with a vehicle-agnostic approach enabling the simultaneous operation of several drones designated for several missions (in a specific location) and the ability to perform different types missions by controlling an overall aerial view (similar to aerial control agencies) allowing observance and control of several drones and allocation of a relevant mission to each one.
Project Specifics	The focus of this project is to allow first responders and other security agencies faster and more effective emergency management. Using drones in complex operations will reduce on-the-job risks by allowing a safer and much faster execution of multimissions than with traditional methods, and a C2 capability will help in saving lives.
U.S. Company	**Easy Aerial (Brooklyn, New York):** Focused on developing, producing, and deploying fully autonomous drone-based solutions for perimeter security and incident management.
Israeli Company	**Blue White Robotics:** Specializes in autonomous and unmanned technologies, from research and testing to full operational capabilities in the air, land, and sea.
Commercialization Potential	The commercial prospect for this project is significant, because the companies plan to develop a complementary system to their current solution. They identified the need for a multimission, multitype drone C2 capability among their current clients, mainly the U.S. Air Force and DHS. The UAS drones' C2 platform will increase their portfolio and competitiveness, will enable use of the drones in complex scenarios, and will provide more benefit from their existing and additional drones.
Award Amount	$900,000
Project Start Date	February 1, 2020
Project Duration	18 months
Project Status	Project initiated and ongoing as planned.

Technical Topic	**Advanced First Responder Technologies**
Project Title	**A Fully Turnkey Artificial Intelligence (AI)-Based Analytics Video Security Solution for Remote Sites**
Project Description	Video camera security has progressed over the last few decades from analog systems to Internet Protocol-based systems, which has enabled more sophisticated digital video analytic capabilities. This project is targeting the development of an AI solution for remote sites, providing cost-effective, high reliability, high accuracy, and highly scalable True Cloud full video detection, deterrence, and alerting solution-as-a-service (SaaS) security.

Project Specifics	The expected outcome is a system that can provide central command video monitoring stations (policing forces, security services, etc.) with a highly reliable, centrally managed, bandwidth-conserving, low information technology overhead, military-grade cybersecure cloud SaaS with AI-based video analytics running at remote sites with minimum electrical, computing, and connectivity resources.
U.S. Company	**LiveView Technologies (Orem, Utah):** An enterprise cloud software vendor providing a platform-as-a-service cloud solution for remote video and analytic data gathering, processing, and delivery
Israeli Company	**Cawamo:** Developed an innovative AI-based, easy to use, and cost-effective video analytic solution that turns any security camera into a smart, accurate, automated alert system.
Commercialization Potential	Providing video security at remote sites is very difficult because of a lack of telecommunications and electricity utility infrastructure and the rugged nature of the environment. The combined focus of these companies on technology development and market know-how not only will result in a solution that cost effectively provides high reliability and accuracy in video monitoring, but also can commercialize to remote site surveillance.
Award Amount	$900,000
Project Start Date	February 1, 2020
Project Duration	18 months
Project Status	Project initiated and ongoing as planned.

Technical Topic	**Advanced First Responder Technologies**
Project Title	**FLARE (Firefighter Location and Rescue Equipment) – IL-US Enclosure Ruggedization and Beta Test with Israel Fire and Rescue Authority (IFRA)**
Project Description	FLARE serves as a firefighter's "black box," the electronics providing the real-time indoor location tracking. This solution utilizes state-of-the-art sensors, communication technologies, and software called FLARE. FLARE creates a self-contained mesh network that monitors, records, and reports a firefighter's movements, location, and surrounding temperature in real time.

Project Specifics	The FLARE device is unique in that the enclosure needs to withstand high temperatures and the device seals need to be just as temperature-inert as the outer shell polymer. To provide the best protection, the device will be a fully sealed unit that charges wirelessly and is rated at a minimum of Ingress Protection Code 68. Currently, nothing is available on the market that provides first responders with the level of accuracy that FLARE can provide. Innovating the enclosure to resist as much thermal penetration as possible will ensure that no first responders are lost.
U.S. Company	**3AM Innovations, (New York):** Specializes in software design, hardware design, product delivery, and product maintenance. Developed a patented system that monitors and alerts key personnel to potential and immediate firefighter safety problems.
Israeli Company	**S.H. Goren Management and Innovation Ltd.:** Specializing in providing full solutions using advanced technologies in the fields of safety and firefighting.
Commercialization Potential	The U.S. company is developing a much-needed solution for firefighters, which can provide location information, surviving high-temperature environments. The contribution of the Israeli company in the R&D phase is relatively modest, but there is a great fit for the planned pilot phase and possible implementation in Israel. The companies also have a letter of interest with IFRA to perform a beta test of the system and. upon a successful test, will look to purchase 2,000 units.
Award Amount	$470,000
Project Start Date	August 1, 2020
Project Duration	12 months
Project Status	Project initiated and ongoing as planned.

Appendix: Abbreviations

Abbreviation	Definition
3D	Three-Dimensional
AI	Artificial Intelligence
BIRD	Binational Industrial Research and Development
BIRD HLS	BIRD Homeland Security
C2	Command and Control
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
DHS	Department of Homeland Security
FLARE	Firefighter Location and Rescue Equipment
FRRS	First Responders Emergency Radio Repeater System
FY	Fiscal Year
IFRA	Israel Fire and Rescue Authority
LTE	Long-Term Evolution
MOPS	Ministry of Public Security
ProSe	Proximity Services
R&D	Research and Development
S&T	Science and Technology Directorate
SAR	Search and Rescue
SaaS	Solution-as-a-Service
UAS	Unmanned Aerial System
UGV	Unmanned Ground Vehicle