Defense Biometric and Forensic Office Research, Development, Test and Evaluation Strategy

6 January 2015

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RESEARCH
AND ENGINEERING

6 January 2015

I am pleased to present the Defense Biometric and Forensic Office's (DBFO) Research, Development, Test and Evaluation (RDT&E) Strategy. This strategy aligns with DoD's overarching RDT&E strategies including *Better Buying Power 3.0,* the *DoD Research and Engineering Enterprise* and the *Reliance* 21 operating principles. It also ensures that the DBFO's approach links directly to Deputy Secretary of Defense for Emerging Capability and Prototyping's evolving mission and RDT&E paradigm.

Over the past decade of war, the DBFO, through the Rapid Fielding Directorate, worked to deliver near-term, time-sensitive and/or responsive technology solutions to current requirements. Going forward, this office will adjust its focus toward emerging threats and addressing those threats with RDT&E efforts focused on prototype development. While this office will not exclude RDT&E efforts that address current problems from its consideration, over the next 12-24 months the DBFO RDT&E portfolio will reflect a shift toward technologies that address emerging threats.

This strategy explains the DBFO's approach to biometric and forensic RDT&E. It anticipates that other organizations that fund projects across these enterprises will develop their own priorities and strategies to address their specific requirements. These individual strategies, when combined into an overarching portfolio, will provide a holistic view of biometric and forensic RDT&E investments across the Department of Defense.

I look forward to advancing our common efforts to achieve the Department's biometric and forensic RDT&E goals and objectives. My office remains committed and positioned to support the collaboration required to ensure that the Department possesses the required biometric and forensic-enabled capabilities into the future.

John Boyd
Director, Defense Biometrics and Forensics

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DEFENSE BIOMETRIC AND FORENSIC OFFICE RESEARCH, DEVELOPMENT, TEST AND EVALUATION STRATEGY

INTRODUCTION

> *In order to continue to maintain our technological advantage and stay on the cutting edge of technology, we must be willing to take risks in our innovation and creative thinking.*[1]
>
> --Secretary of Defense Chuck Hagel

This document describes the strategy the Defense Biometric and Forensic Office (DBFO) will pursue to identify and assess research, development, test and evaluation (RDT&E) projects. The DBFO created this strategy from guidance published in the Department of Defense (DoD) Research and Engineering Strategy[2] and the realignment of its higher headquarters from Rapid Fielding to Emerging Capability & Prototyping (EC&P). The goal of this strategy is to guide the development and promulgation of a forthcoming biometric and forensic RDT&E project plan and investment strategy that this office will use to inform its investment decisions in the future. This strategy will also serve as one of the DBFO's mechanisms to inform the DoD biometric and forensic communities on this office's shift from addressing current threats to responding to emerging threats.

Over the past decade, one marked by conflicts similar to, but distinctly unique from, prior military engagements, the DoD made unprecedented investments in biometric and forensic RDT&E. From refining biometric modalities to exploring 'game changing' forensic technologies such as rapid DNA to the near real-time updating of technologies to maintain a competitive advantage such as those supporting digital and multimedia exploitation, the DoD grew to be a leader in biometric and forensic research across the federal government. Constricting defense budgets place future investments in these areas at risk, mandating the need for a clear plan that identifies RDT&E projects that meet overarching guidance, while addressing both the near- and longer-term needs of users.

Better Buying Power 3.0 provides additional evidence that the DoD needs a clear plan. It emphasizes that the technology advantage enjoyed by the United States in the past is not assured for the future.[3] As a result, the Department must leverage innovation by increasing its use of

[1] Secretary of Defense. "Opening Keynote for Defense Innovation Days" (speech, Newport, RI, September 3, 2014), DoD, http://www.defense.gov/Speeches/Speech.aspx?SpeechID=1877
[2] Assistant Secretary of Defense for Research and Engineering. *DoD Research and Engineering Enterprise.* April 2014.
[3] Under Secretary of Defense for Acquisition, Technology and Logistics. *Better Buying Power 3.0* (Interim Release). September 19, 2014. p. 2.

prototyping and experimentation; emphasizing technology insertion and refresh in program planning; using modular open systems architecture; and providing draft technical requirements to industry to involve them in requirements definition.[1] Innovation also includes looking at RDT&E from both the product (developing new devices and tools) and process (developing new solutions to meet requirements) perspectives.[2]

The DBFO has two distinct but linked roles in supporting biometric and forensic RDT&E. Its first role, by virtue of its location within the Office of the Assistant Secretary of Defense for Research and Engineering (ASD (R&E)), is to identify, fund, manage and transition projects that support biometric and/or forensic requirements. In the second role, the DBFO performs day-to-day execution of Principal Staff Assistant responsibilities to coordinate and synchronize biometric and forensic RDT&E efforts among DoD Components and USG agencies.[3]

This strategy:

- Identifies DBFO's broad desired outcomes of biometric and forensic RDT&E;
- Outlines the DBFO's RDT&E plan and links it to higher headquarters' strategies;
- Identifies DBFO RDT&E priorities;
- Identifies an initial list of research lines of effort (LOE)
- Describes DBFO's internal and external coordination efforts; and
- Identifies the next steps to implement this strategy.

Using its current staff resources, as well as leveraging the capabilities resident within EC&P and the Rapid Reaction Technologies Office (RRTO), the DBFO will coordinate with the appropriate organizations (e.g., Intelligence, Combatant Commands (CCMDs)) to identify and assess emerging threats required to accomplish this strategy. The DBFO's pivot to addressing emerging threats will dovetail with the current efforts within EC&P and RRTO to establish the processes and systems to identify and analyze these threats. Finally, the DBFO will maintain its current collaboration relationships with the biometric and forensic RDT&E stakeholders and end users while improving its coordination with the DoD's Science and Technology Communities of Interest (COIs)[4]. These relationships will serve as the office's foundation to define requirements against potential solutions.

This strategy is not intended to lay out an overarching DoD-wide biometrics and forensics investment priority framework. Instead, this document will serve as the DBFO's portion of a compilation of individual stakeholder strategies as outlined in the Reliance 21 model.[5] This model serves as a framework that allows various stakeholders in an RDT&E community to jointly share information, align efforts, coordinate priorities and support research efforts. Reliance 21 provides a framework to ensure a collective understanding of the priorities, requirements, and opportunities of the various organizations that manage biometric and forensic RDT&E resources. Based on this model, the DBFO encourages those stakeholders who invest in

[1] Ibid. pp. 6-7
[2] Comments by DASD (EC&P) from: Amanda Wyle. "Official Describes Emerging Capability, Products, Processes." September 4, 2014. Retrieved from: http://www.defense.gov/news/newsarticle.aspx?id=123077&source=GovDelivery
[3] As outlined in DoD Directive (DODD) 5205.15E, "DoD Forensic Enterprise (DFE)." April 26, 2011 p. 7. and DODD 8521.01E, "Department of Defense Biometrics." February 21, 2008. p. 4.
[4] *DoD Research and Engineering Enterprise.* pp. 8-11.
[5] DoD. *Reliance 21 Operating Principles.* January 2014.

biometric and forensic RDT&E to develop similar documents to inform one another and research end users of their organization's investment priorities and processes. These documents, taken together, will represent the DoD-wide approach to biometric and forensic RDT&E activities in order to reduce cost, prevent unnecessary duplication of effort and enhance the use of current resources that maximize value while managing risk.

BROAD DESIRED OUTCOMES OF BIOMETRIC AND FORENSIC RDT&E

Biometrics are measurable physical characteristics or personal behavior traits used to recognize the identity or verify the claimed identity of an individual.[1] Forensics is the application of multi-disciplinary scientific processes to establish facts by linking personnel, equipment, locations and events.[2] Biometrics and forensics do not comprise DoD missions, but they do enable capabilities that directly impact mission accomplishment. Both biometrics and forensics support DoD efforts to remove the anonymity of adversaries and/or link them to each other or items or incidents of interest. Biometrics and forensics support a myriad of missions and tasks across the DoD both on the battlefield and at home stations. Battlefield support includes counter-improvised explosive device (IED) attack the network efforts, targeting and force protection. Home station applications include access control, force protection, law enforcement, medical applications, computer network defense and many others. The wide-ranging scope in their application makes research investment in these areas high-impact, as technology development to support one mission set may support other mission sets through dual- or triple-use technologies.

In general, biometric and forensic RDT&E efforts will address capability gaps[3] in warfighters' ability to solve problems. Biometric and forensic RDT&E goals include, but are not limited to, the reduction of operational risk and costs. The scope of biometric and forensic applications and end users, however, requires establishing overarching operational risk reduction outcomes:

- Counter emerging threats—Mitigate adversaries' emerging capabilities that present a new or innovative risk to warfighters or degrade DoD biometric and/or forensic-enabled capabilities;
- Provide improvements to:
  - Completeness—Increase the quantity or value of the information that allows for more informed decision making;
  - Accuracy—Increase the likelihood of delivering the correct answer or deliver a more correct answer than previous technologies that allow for more informed decision making;
  - Timeliness—Deliver an answer in a shorter period of time allowing for faster decision making, particularly within our adversaries' decision cycle;
- Deliver reductions in:
  - Cost—Provides cost savings by reducing the price of manpower, technologies, processes, maintenance/upkeep or supporting capabilities;

[1] Department of the Army. *DoD Capstone Concept of Operations for Employing Biometrics in Military Operations.* June 10, 2012. p. iii.
[2] Director of Defense Research and Engineering. *Capstone Concept of Operations for DoD Forensics.* August 5, 2008. pp. 1, 3.
[3] Capability Gap: The inability to execute a specified course of action. The gap may be the result of no existing capability, lack of proficiency or sufficiency in an existing capability solution, or the need to replace an existing capability solution to prevent a future gap. (JCIDS Manual, 19 Jan 2012, p. GL-7)

- Footprint—Delivers 'smaller, faster, lighter' technologies that produce reliable analysis closer to the point of collection as well as increasing automated analysis that reduces manual processes and human intervention.

In some cases, new technologies will require tradeoffs between the above operational risk mitigations. For instance, one end user may need increased accuracy but is willing to sacrifice timeliness to achieve it while another may need a more timely answer but does not require as complete of one.

DBFO RDT&E PLAN

Three principles inform the DoD's performance of research and engineering. The DoD undertakes these activities to:

- Mitigate or eliminate new and emerging threats to National Security;
- Affordably enable new or extended military capabilities; and
- Create technology surprise through science and engineering.[1]

The Deputy Secretary of Defense recently established a fourth principle: to use technology to offset manpower.[2]

In addition, the Deputy Assistant Secretary of Defense (DASD) EC&P—under whom the DBFO falls—announced his intention to pursue research that leads to prototypes that counter emerging technology threats. DASD (EC&P) established the following strategic priorities for EC&P funded projects:

- Explore the art of the possible;
- Hedge against technology uncertainty; and
- Develop an affordable capability option.[3]

In the past, DBFO pursued RDT&E investments that addressed near-term and/or time-sensitive requirements for which a solution could be delivered in no more than 24-30 months. Under this paradigm, customers identified their technological gaps to meet current requirements and the DBFO funded promising projects. In many cases, the customer identified both the gap and the proposed technological solution that they had determined, based on their internal market research, would best meet their needs.

Going forward, the DBFO will transition from its prior RDT&E investment strategy of addressing end users' immediate needs into one that is more forward-looking and which examines emerging technology threats from adversaries and their impact on DoD's biometric and forensic capabilities. The DBFO will continue to consider projects for funding that meet an immediate user need, but will focus its investments on projects that intend to address emerging threats. The DBFO anticipates that other RDT&E funding sponsors within the biometric and forensic communities will continue to address end users' current requirements.

Second, the DBFO intends to focus on funding projects that will lead to the delivery of proof of principle, pre-engineering and manufacturing development (pre-EMD), and post EMD (EMD+)

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[1] *DoD Research and Engineering Enterprise.* pp. 3-7.
[2] Deputy Secretary of Defense. "National Defense University Convocation." (speech, Washington, DC, August 5, 2014), DoD, http://www.defense.gov/Speeches/Speech.aspx?SpeechID=1873
[3] DASD (EC&P). "Emerging Capability & Prototyping All-Hands." August 15, 2014. slide 4.

prototypes (See Annex A). The DBFO will focus on projects that deliver a prototype in less than 36 months, with a 12-24 month delivery window ideal.

It is important to note that prototype means more than just a device. Projects that deliver algorithms, software code, database management processes and other data analytics tools and analysis solutions can all meet the definition of prototypes eligible for DBFO funding. In addition, projects that conduct evaluations of emerging technologies for their suitability to meet DoD requirements will also fall under this rubric. Projects less likely to receive DBFO funding include validation studies of biometric and/or forensic processes or methods, since they lack a prototype component. Typically, other agencies across the U.S. Government (e.g., National Institute of Justice, National Institute of Standards and Technology (NIST)) fund these types of projects and the DBFO intends to rely on their findings to inform DoD processes.

Third, accepted projects must have a transition partner for sustainment. Sustainment includes continued funding for the capabilities, training, spare parts, maintenance, etc.

Finally, the DBFO plans to take calculated risks in investment decisions, sometimes eschewing projects that need a 'slight push' to achieve what is clearly possible in favor of those that will expand understanding of 'what is within the realm of the possible.' The DBFO and its leadership recognize that this strategy may result in projects that ultimately do not meet expectations, but believe that adopting DASD (EC&P)'s forward looking paradigm will better allow the office to create technology surprise.

This transition will take time to execute and the office will implement it in close coordination with the DoD's RDT&E Enterprise and the biometric and forensic EAs, RDT&E funding stakeholders and end user communities.

DBFO RDT&E PRIORITIES

In addition to linking DBFO's RDT&E investment strategy to DoD's RDT&E principles[1] and DASD (EC&P)'s strategic priorities,[2] the DBFO must also ensure any projects funded fall within one of the DoD's 17 RDT&E priority areas and their associated COIs.[3] In general, biometric and forensic research crosses multiple priorities depending on the specific application. This cross-cutting nature of different projects presents a challenge and an opportunity when advocating for biometric and forensic RDT&E funding: a challenge because without a sponsoring COI, obtaining funding advocacy becomes more difficult, and an opportunity because operating outside a specific COI will not force biometric and forensic projects to compete with the larger projects—as multiple COIs can leverage biometrics and forensics to meet their respective priorities.

The DBFO conducted an initial analysis of the seven DoD S&T investment priority areas and identified three to serve as the office's initial focus areas for project evaluation. The DBFO selected these priorities because their outcomes have great relevance to biometrics and forensics.

[1] *DoD Research and Engineering Enterprise.* pp. 3-7.
[2] "Emerging Capability & Prototyping All-Hands." August 15, 2014. slide 4.
[3] *DoD Research and Engineering Enterprise.* pp. 8-11.

- Data to decisions:[1] RDT&E that includes data to decisions tools, information management, advanced computing and software development, and networks and communications that collate, analyze and/or interpret biometrics or forensic data sets—especially large data sets.
- Autonomy: RDT&E that helps achieve autonomous systems that reliably and safely accomplish complex tasks in all environments—autonomous biometric and forensic processes include those that automate one or more of the biometric or forensic processes or provide users cues when human intervention becomes necessary.
- Human systems: RDT&E that enhances human-machine interfaces to increase productivity and effectiveness—biometric and forensic systems include those that develop more intuitive biometric or forensic devices, present data in a more 'user friendly' manner or leverage systems to aid in biometric and/or forensic training or assessment.

Additionally, the office identified other priorities that should already consider RDT&E projects with biometric and/or forensic applications. To develop increased relevance for biometrics and forensics within their aligned COIs the DBFO will engage at the technical sub-group level to generate interest and advocacy in biometric and forensic research. These engagements may also lead to the COIs incorporating relevant projects into their plans when the project aligns with the COIs' larger strategic objectives. These other COIs include:

- Biomedical—e.g. bioinformatics supporting next generation DNA sequencing;
- Counter-IED—e.g. biometric and forensic technologies that aid in attacking the network or sourcing the device;
- Counter WMD—e.g. technologies that allow the collection of human forensic materials from contaminated items; and
- Cyber—e.g. cyber forensic technologies and techniques that aid in intrusion detection, tracking or network defense/hardening, law enforcement and intelligence functions.

DBFO Research Lines of Effort

The first step in the transition process is developing and refining a list of research LOE based on the current understanding of the threat. Concurrently, the DBFO will not lose sight of on-going or near-term research opportunities that must be continued or transferred to other areas of the Biometric or Forensic Enterprises.

Based on current work and preliminary assessment of biometric and forensic research, the DBFO identified the research LOE listed in Annex B to guide the transition to the new strategic paradigm. As outlined in the implementation section below, the next steps include surveying emerging threat literature and to fully elucidate problems. This will enable us to begin to identify and define solution options.

DBFO Coordination with Internal and External Stakeholders

To achieve success, the DBFO must link its requirement identification, validation and assessment processes to those established by the EAs and other RDT&E funding stakeholders to

[1] Data to Decisions now falls within the Command, Control, Communications, Computers, and Intelligence (C4I) COI

minimize gaps and ensure that, as an Enterprise, all priority needs are adequately addressed. Throughout this process, the DBFO will coordinate within the DoD's Biometric and Forensic Enterprises as well with interagency, international, multi-national, non-governmental, industry and academic partners to identify challenges and opportunities from both the emerging and current-threat perspectives.

Coordination with DoD Stakeholders

The DBFO will principally pursue a 'forward-looking' approach to requirements generation by examining emerging threats and capabilities; identifying those that pose a risk to the DoD's biometric and/or forensic capabilities or outcomes; developing technological solutions through problem definition and clarity; and defining solution options. The DBFO will collaborate closely with the DoD's RDT&E Enterprise and the biometric and forensic EAs to leverage the scientific and technical experts from relevant DoD Biometric and Forensic Centers of Excellence[1] (COE) and other stakeholders[2] to ensure the feasibility and scientific validity of those solutions.

This strategy anticipates the EAs will continue to principally engage in a 'current-fight' approach by identifying user (e.g., laboratories, forensic customers, CCMDs) requirements and evaluating them against potential technological solutions. The DBFO will support each EA's process by providing funding for projects they nominate that align with this strategy. The DBFO will also work closely with the EAs, other biometric and forensic funding stakeholders and the RDT&E COIs to seek funding from across the DoD science and technology enterprise when appropriate.

Finally, the DBFO encourages the EAs and other biometric and forensic RDT&E funding sponsors to develop and publish their own priority frameworks. When all organizations identify the types of projects they plan to fund, as well as any other requirements to secure funding, the DBFO and its leadership can better align the Biometric and Forensic RDT&E strategies across the Department; share new ideas, technical direction and technology opportunities; jointly plan programs; measure technical progress; and assess the general state of health for the biometric and forensic technology areas. A consolidation of these frameworks and plans would also help the Enterprises determine if any critical gaps and shortfalls exist in funding priorities and develop mitigation strategies to ensure end users' requirements are adequately met.

Coordination with External Organizations

The DBFO, in close coordination with the EAs, will continue to maintain situational awareness of biometric and forensic research across the interagency and with academic and industry partners. Outreach goals include minimizing DoD investment in areas other organizations currently fund and identifying potential partnering opportunities for high pay-off research efforts.

The principal means of outreach include attending RDT&E forums sponsored by interagency partners; individual meetings with the RDT&E offices across the interagency including the Departments of Homeland Security, Justice and NIST; attending symposia and conferences sponsored by biometric and forensic organizations (e.g., Global Identity Summit, American Academy of Forensic Sciences); and sponsoring industry days to identify emerging technologies.

[1] The DoD COEs include the Biometric Identity Management Activity, the Defense Computer Forensic Laboratory, and the Defense Forensic Science Center.
[2] Includes the Armed Forces Medical Examiner System and the Joint POW/MIA Accounting Command-Central Identification Laboratory.

The DBFO will continue to accept research and technology submissions directly from industry and academia. To ensure a full technical assessment of the proposal prior to deciding on funding, the DBFO will engage the DoD's RDT&E Enterprise and EAs and other stakeholders to provide the requisite scientific assessment.

IMPLEMENTATION

During the transition, the DBFO will continue to fund the projects to which it has already committed funding and to consider projects that address current requirements while it realigns the focus to emerging threats. Over the next six months, the DBFO will take the following steps to guide implementation of this strategy:

- **Collaboratively develop, formalize and communicate RDT&E project development process with biometric and forensic stakeholders.** The biometric and forensic end users need to understand the DBFO and EAs' timelines for assessing projects that aligns with the DoD's budgeting process. Not later than February 2015, the DBFO will publish an integrated annual timeline for requirements review and solutions development. In the interim, major milestones for FY 15 planning are:

Milestone	Complete By
Receive proposals from EAs	15 December 2014
Identify potential emerging threat projects	15 February 2015
Meet with EAs and other relevant stakeholders to prioritize projects	21 February 2015
Approve and commit funding	1 March 2015
Award projects	1 July 2015
Assess and monitor projects	**On-going**

Table 1—DBFO FY15 Project Assessment Timeline

- **Establish contacts within the intelligence community to gain access to emerging threat assessments.** The DBFO will work with appropriate DoD Components to increase awareness of emerging threats. DBFO will coordinate closely with EAs and biometric and forensic stakeholders and end users to gain information on the most pressing emerging threats and potential solutions.
- **Begin development of project lists and investment plans.** Working closely with the EAs, other stakeholders and the DoD RDT&E community, the office will identify specific project topics; prioritize them against user requirements and map out an investment strategy that ensures a logical and sequential funding strategy to address the most important needs.
- **Establish mechanism to identify, track and communicate RDT&E project status.** To increase transparency and information sharing, the DBFO will champion a web-portal listing of all planned, completed, on-going, considered but unfunded, as well as considered and rejected projects. The portal will also list the proposed and actual outcomes, programmatic and technical details, the sponsor organization with points of contact and the rationale in the case of rejected projects. This portal will interoperate with interagency project portals. The portal will employ appropriate business rules to control

access to information with respect to security classification, privacy, civil liberties, policies, regulations and other statutory requirements.

- **Integrate the DBFO within RDT&E COIs that have linkages to biometrics and forensics.** The DBFO needs to increase its awareness of on-going or future projects funded by the various COIs that may impact biometrics and forensics. These contacts will also serve as potential avenues to nominate projects, that the DBFO or other biometric/forensic stakeholders cannot fund, to the COIs for consideration.
- **Increase contacts with ASD (R&E) divisions/laboratories focused on basic research (TRL 1-3).** Addressing emerging threats may call for a solution in the earliest stages of development or will require basic research before the proof of principle prototyping stage can even begin. By establishing the appropriate contacts within the DoD's basic research communities, the DBFO can champion basic research projects with the intent of transitioning work to this office to fund further development.
- **Continue outreach to the interagency, academia and industry.** DBFO's research partners will benefit from a better understanding of DBFO's changing role in biometrics and forensic research as well as how other DoD stakeholders plan to focus their research efforts. Further, the DBFO must remain cognizant of research efforts by other organizations to minimize unneeded duplications and seek funding partnerships where appropriate.

ANNEX A—PROTOTYPING CATEGORIES

Prototyping is a set of design and development activities intended to reduce technological uncertainty and to generate information that will improve the quality of subsequent decision making. They enable the DoD to:

- Explore the realm of the possible without commitment to follow-on procurement;
- Cost-effectively enhance interoperability and reduce lifecycle costs;
- Devise/demonstrate a hedge against technical uncertainty or unanticipated threat;
- Advance technical skill sets; and
- Advance the state of practice in unique disciplines.[1]

As shown in figure A-1 below, the DoD employs different types of prototyping activities throughout the research and development process with each level of prototyping intended to provide decision makers the requisite information necessary to make the appropriate decisions at the various technical readiness levels (TRL) and milestone decision points.

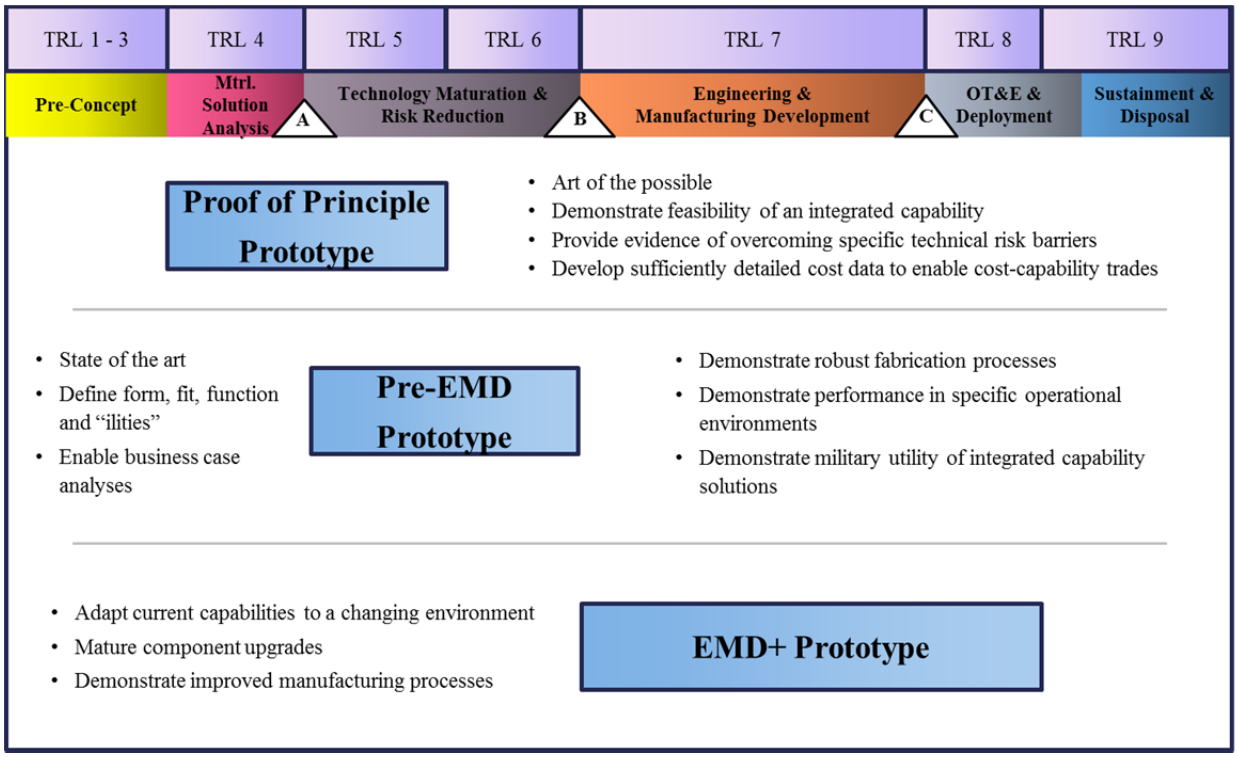

Figure A—Prototyping Categories and Associated TRL

[1] DASD (EC&P). "Agility Innovation & Affordability." Presentation delivered at Analytic Service, Inc. August 21, 2014. slide 3.

ANNEX B—DBFO RESEARCH LINES OF EFFORT

Research Line	DOD Supported Principles	DOD RDT&E Priority(ies)	Description	Project Examples
Data Analysis	Mitigate Threats Technology Surprise Offset Manpower	Data-to-Decisions Autonomy Human Systems	Managing, interpreting, fusing and/or synthesizing the data produced by biometric and/or forensic scientific analysis	• Bioinformatics analysis system to process raw sequence data to make DNA (STRs, SNPs, etc.) variant calls • Data analytic tools to extract, parse and catalog digital information • Biometrics collection and use for benefits to disaster victims
Automated, or Remote Systems	Mitigate Threats Technology Surprise Offset Manpower	Data-to-Decisions Autonomy Human Systems	Automating the collection and/or analysis of biometric and/or forensic materials, removing the need for human processing and/or data interpretation or projects that allow the analysis of biometric and/or forensic materials away from the actual location of the materials reducing the need for deployed examiners	• Automated processes to recognize, collect, preserve or analyze forensic materials • Virtual/remote sensing and analysis • Image/video analytics • Soft biometrics • Physical access controls incorporating biometrics

Research Line	DOD Supported Principles	DOD RDT&E Priority(ies)	Description	Project Examples
Standoff Collection	Technology Surprise Offset Manpower	Autonomy Human Systems	Collecting biometrics and/or forensic materials from a distance in an overt manner	• Non-cooperative collections • On-the move collections (e.g., iris, face) • Remote sensing, identification and examination • Collecting biometrics at a distance (e.g., iris, face)
Non-Compliant Collection	Mitigate Threats Technology Surprise	Autonomy Human Systems	Collecting biometrics and/or forensic materials from individuals who are actively attempting to hide their data or prevent its collection	• Un-cooperative collections • Surreptitious collections
Personnel Accounting	Secretary of Defense Priority	Various	Improving (as measured by time, accuracy or cost) the recognition, collection, preservation, scientific analysis and/or storage of forensic materials that support human remains identification	• Human remains locating • Extended kinship analysis • Remote Detection of Clandestine Graves, Burials and Crash Sites
Counter-Counter Biometric/ Forensic Technologies	Mitigate Threats Technology Surprise	C4I[1]	Thwarting threat efforts to mitigate or minimize the effectiveness of our biometric and/or forensic capabilities	• Detection of falsified/ spoofed forensic/ biometric materials

[1] This LOE has broader applications than just data-to-decisions and impacts the entire C4I COI

ANNEX C—DBFO PROJECT IDENTIFICATION AND FUNDING PROCESS

Overview

The DBFO anticipates that it will continue to obtain funding to support projects from other program lines within ASD (R&E) as reflected in the President's Budget submission. The office will employ a modified version of the EC&P methodology to identify its research LOE, define user problems and identify promising technological solutions to establish its funding priorities. Figure C-1 outlines the overall process.

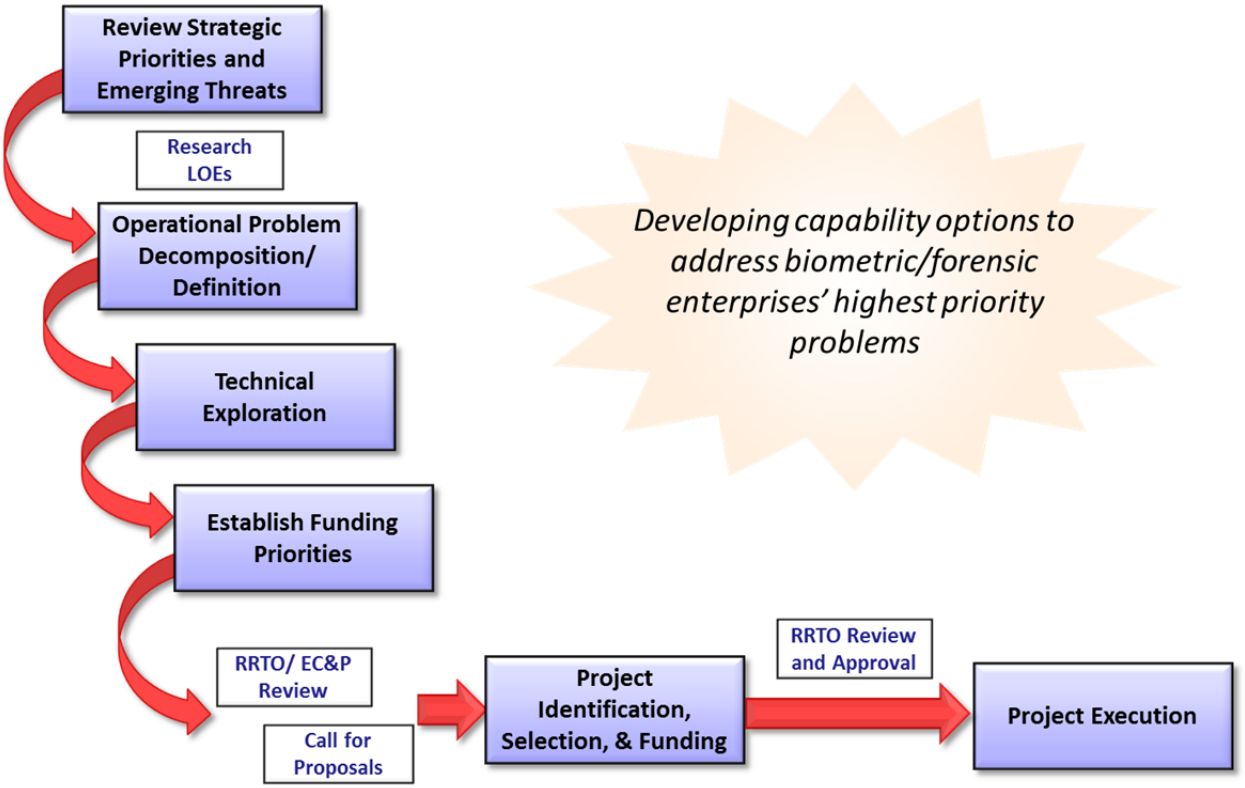

Figure C-1—DBFO Overarching RDT&E Process

The DBFO will not perform the above steps independently of stakeholders. Instead, the DBFO commits to working with DoD Components to conduct a rigorous problem analysis of strategic priorities to better identify research or technology solutions. At every step of the process, the DBFO will leverage the capabilities resident within the DoD's RDT&E Enterprise, EAs, other sponsors of biometric and forensic research (e.g., Joint IED Defeat Organization, Combating Terrorism Technical Support Office, Intelligence Systems Support Office, US Special Operations Command) and the end user communities (e.g., CCMDs, Military Criminal Investigative and Medical Organizations) to gain access to the relevant subject matter expertise.

In addition to prioritizing the projects developed through the examination of emerging threats, the DBFO also anticipates that the biometric and forensic EAs and end users will forward requirements and/or projects for DBFO to consider for funding. The DBFO will assess each project against the criteria listed in Annex D to assess how closely it aligns with this strategy to determine its priority for funding.

It is important to note that this prioritization schema applies only to how DBFO assesses projects; it does not apply to other stakeholders within the Biometric and Forensic Enterprises. The DBFO expects that, at times, it will assess a project as a lower priority while other organizations may see it as a higher priority based on their respective RDT&E funding strategy.

Timelines

The process outlined above and described in detail below operates on an annual basis tied to the national budget cycle. It strives for all projects approved for funding to be identified and ready for contract execution by September of each year to allow the funding agency to obligate funds during the first quarter of the fiscal year. Figure C-2 depicts this annual cycle.

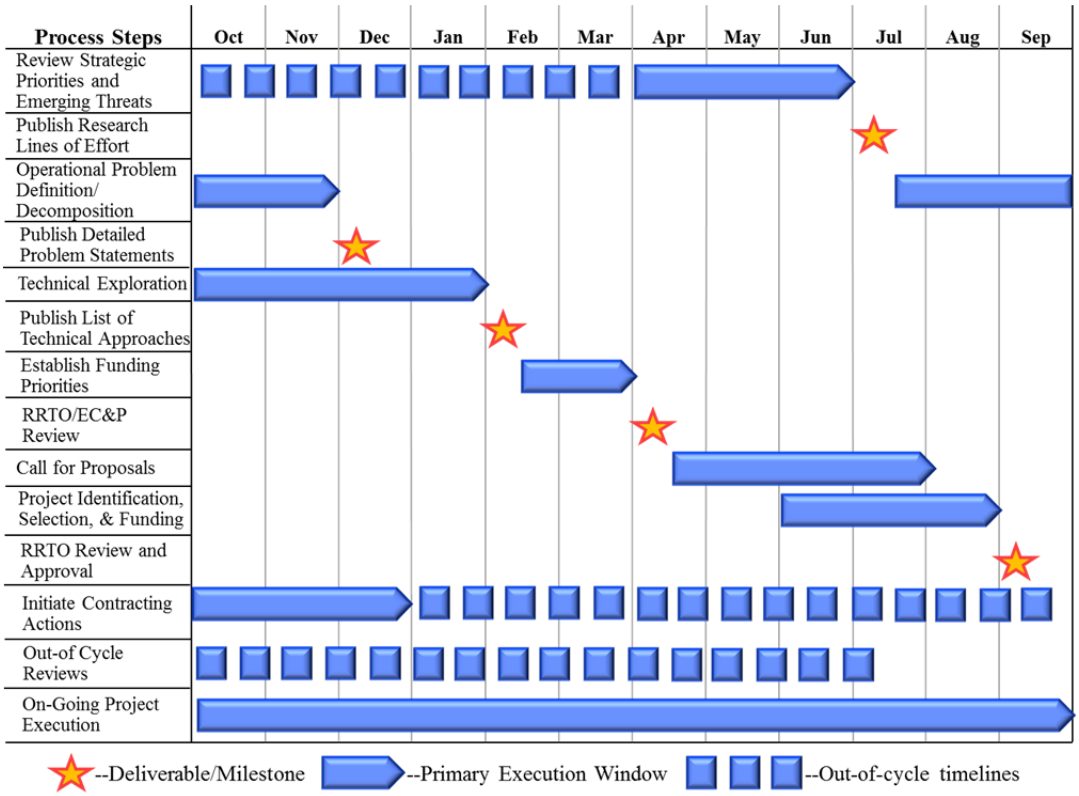

Figure C-2—DBFO Annual Process Timeline

The variability of the emergence of new threats or technology requirements within the DoD makes establishing and adhering to a strict timeline problematic at best. Continuing Resolutions and other delays in the federal budget process also result in delays or deferments of the above actions. In addition, the ASD (R&E) budget execution cycle often results in unforeseen funding coming available allowing the DBFO to fund projects outside the above planning windows. As a result, while the DBFO identified primary time periods throughout the year principle activities will occur, it recognizes that many of these steps will actually occur periodically throughout the year based on those factors.

Phase Descriptions

What follows is a description of the inputs, processes and outcomes of each phase depicted in figure C-1.

Review Strategic Priorities and Emerging Threats

This step serves as the foundation for the DBFO investment strategy and ensures that projects the office funds trace back to the DoD's science and technology (S&T) principles and priorities, EC&P/RRTO priorities and stakeholders' most pressing requirements. It will identify:

- Strategic objectives that biometrics and forensics can support; and
- Potential disruptive threat technologies that degrade or mitigate DoD's biometric and/or forensic capability.

The DBFO will execute this step by first reviewing the relevant official guidance including the Quadrennial Defense Review, national or DoD strategic guidance, intelligence assessments, requirements documents (e.g., joint capabilities documents, S&T integrated priority lists, etc.) EC&P and RRTO) focus area documents, any relevant scientific studies and other senior level guidance. This literature review will provide the DBFO a baseline understanding of potential requirements and capabilities to inform follow-on engagements with stakeholders. Then, in conjunction with the EAs, the DBFO will engage relevant stakeholders to identify and refine proposed research LOE likely to produce impactful solutions that support the Services, CCMDs and other end user communities. During this process, the EAs and other biometric/forensic RDT&E funding sponsors should identify their LOEs to produce a holistic framework to support the widest range of end user priorities.

At the completion of this step, the DBFO, EAs and other biometric/forensic funding sponsors will jointly publish their respective LOEs to the end user communities.

Operational Problem Definition and Decomposition

In conjunction with EC&P's strategic shift to performing more problem analysis, definition and decomposition, the DBFO plans to work toward gaining a greater understanding of the end users' problems before assessing technological solutions. Historically, end users or vendors brought their solution to this office for funding and the DBFO accepted that the proposed solution would best solve the problem. Going forward, and in coordination with the EAs, the DBFO will work to gain a fuller understanding of the underlying problem impacting a requirement or capability gap to better inform subsequent technology analysis.

The DBFO's goal is to help end users define their problems in terms of requirements and not pre-determined technology solutions. In other words, the DBFO aims to help the end users recognize that their problem is that they need a 'quarter-inch hole', not a 'quarter-inch drill bit'.

During this phase, in conjunction with the EAs and other RDT&E funding sponsors, the DBFO will conduct a series of engagements (group and individual) to leverage the expertise in the operational and intelligence communities[1] to expand operational context within the LOEs. This context includes identifying operational objectives and requirements and the key operational

[1] The operational communities that benefits from biometric and forensic RDT&E represent a diverse set of organizations with a wide-ranging set of problems. They include operational forces (general purpose and special operations), CCMDs, Services, intelligence analysts, military law enforcement, forensic laboratory technicians and others. In addition to the variability within the community, biometrics and forensics supports a wide variety of outcomes such as cyber, force protection, law enforcement, medical applications, personnel accounting and more. To manage expectations during this phase, the DBFO must ensure it links the operational problem discussions to the strategic priorities identified in phase one and ensure the problems are clearly defined and understood, in order to support the published research LOE.

gaps and problem areas that impact resolution. Some key questions this phase will seek to answer include:

- Is the problem clearly understood and defined properly? Is the problem a subset of a larger unstructured problem? How is the problem addressed today (if at all), and what are the limits of current practice? How important is solving this problem to the end user community?
- Which organization(s) is most affected by the problem? Who is responsible to correct the problem? Do all stakeholders agree on the problem's root cause? Do they agree that a biometric and/or forensic solution is best?
- To what extent does the problem exist in the "seams" between organizations? (An example would include the BEWL Dissemination Management Server (BDMS). BDMS provides capabilities in the "seam" between military operations and intelligence.)
- Is there a potential biometric and/or forensic solution to the problem? Are there better alternative solutions based on cost, timeliness or effectiveness?

This phase will result in the development of end user endorsed detailed problem statements that include the operational context of the problem (objectives and requirements) and the key gaps and problem areas.

Technical Exploration

During this phase, the DBFO will leverage the scientific and technical expertise of the RDT&E Enterprise and, through the EAs, the biometric and forensic scientific communities resident in the COEs, and other forensic laboratories to identify and assess potential technological solutions to the problems identified in the previous phase. While the DBFO will coordinate and synchronize this step, it will take a secondary role in its execution as the office lacks the requisite understanding of potential technological solutions to inform this process.

The DBFO will host engagements with relevant subject matter experts (SMEs) from within and outside the DoD to identify potential technical solutions to the problem statements and the key gaps identified by the end user community. The SMEs will then assess the feasibility of each approach through analysis, identifying a proven capability in a different capacity, looking at similar on-going research in industry or academia, or other methodologies they deem appropriate. Finally, the SMEs will prioritize the approaches based on the following criteria:

- Suitability at meeting the operational requirement;
- Likelihood of success;
- Affordability;
- Timeliness;
- Degree of execution risk; and
- Similarity to other on-going research.

This step will result in a list of prioritized technical approaches that RDT&E funding sponsors (to include the DBFO) can use to inform their investment decisions.

Establish DBFO Funding Priorities

In coordination with RRTO and EC&P, the DBFO will determine which technical approaches that it will fund (those that map to the LOEs) and which it will forward to other RDT&E funding sponsors for their consideration. The DBFO will use the prioritization framework in Annex D to

assess the technical solutions against this strategy's goals and objectives to select those in closest alignment.

The DBFO's decision not to fund a certain technical approach does not minimize its importance; it only reflects the reality of a fiscally constrained environment where this office's RDT&E investments must closely align with its overarching strategic guidance.

Once RRTO and EC&P approve the funding priorities, the DBFO will work with the EAs, other RDT&E funding sponsors and the end users to develop and publish a call for projects to performers. As part of this step, the DBFO will work with the EAs and other sponsors to identify the best vehicle to announce the requirement. Options include:

- Standalone competitive request for proposals;
- Placement on broad area announcements(BAA) such as the DFBA or CTTSO BAAs;
- Announcement during industry days, innovation forums or through small business innovation research/small business technology transfer outreach;
- Use of an existing contract vehicle—including leveraging existing Federally Funded Research and Development Center contracts; and
- Cooperative agreements with academia.

Project Identification, Selection and Funding

Once the call for proposals is released, the DBFO, EAs and other funding sponsors will establish an appropriate team of DBFO staff, scientific and technical experts, and impacted stakeholders and end users to review performer submissions. The team will:

- Assess the proposed solutions against the relevant problem statements and technical approaches;
- Develop business case and cost/trade-off analyses;
- Identify project dependencies; and
- Evaluate execution risk (feasibility and time) and cost reasonableness (neither too high nor too low).

Throughout this process, the DBFO will stress that not selecting any project is a choice open to the team. Choosing to invest in a different problem or technical approach will be preferable to investing in a marginal proposal that may not lead to a viable solution to the problem or represents excessive execution risk.

Once the selection team agrees to fund a project, the DBFO will work with funding sponsors to obtain commitment for partnership funding. It will also work with the relevant end users to develop an initial transition plan for the technology. Finally, DBFO will seek funding authorization through RRTO and EC&P.

In some cases, a project that received a recommendation for funding may be left unfunded when competing priorities have exhausted all available funds. In these instances, the DBFO will propose the project to other funding stakeholders for potential investment. When the DBFO cannot identify an alternate funding sponsor, it will keep the project on file for future funding throughout the year should money become available due to reprogramming across RRTO, EC&P or ASD (R&E)

Project Execution

Oversight of DBFO funded projects is a collaborative effort between this office, relevant SMEs from the EAs, transition partners (e.g., relevant program offices) and end users. Throughout the life of the project, this oversight team will assess the performer's project and ensure that development focuses on solving the problem initially identified. Engagement with the end user community is critical at this stage to ensure continued alignment of project outcomes with the operational problem. A failure to keep end users engaged throughout the life of the project increases the possibility that the solution will fail to meet user needs, thereby leading to an increased risk of an unsuccessful transition.

During this stage, the DBFO will also work closely with the EAs and DoD testing and evaluation (T&E) organizations to design appropriate T&E protocols to evaluate the technology based on the prototyping category delivered.

Out-of-Cycle Funding Requests

The process outlined above represents the DBFO's deliberate year-over-year process to develop technical approaches and then identify, prioritize, fund and execute projects to meet operational requirements and challenges. Requirements generation does not adhere to a planning calendar, however. To address immediate needs, the DBFO will execute a streamlined version of the above process when presented with an out-of-cycle operational requirement:

- In coordination with the end user, relevant SMEs from the EAs, and other funding stakeholders, the DBFO will analyze the underlying problem to ensure a common understanding and validation as well as assess the proposed technical approach for feasibility and applicability to the problem. In cases of an unsolicited vendor proposal, the DBFO will ensure that the problem the proposed solution purportedly addresses is validated by end users and that the benefits of implementation outweigh costs.
- If the assessment team agrees the project has merit, the DBFO will evaluate it against its priorities in Annex D. If the project does not meet DBFO strategic priorities, the office will recommend it to other funding stakeholders based on their priorities and LOEs.
- If the project meets DBFO priorities, it will work to find funding partners and identify a clear transition plan. Also, it will identify the funding required; the relevant contract vehicle; and project timelines, milestones, and deliverables.
- The DBFO will then seek funding approval from RRTO/EC&P.
- Upon receipt of funding, the DBFO will execute the project as outlined above.

As when executing the office's deliberative process, throughout the out-of-cycle process the DBFO will also coordinate extensively with the technical expertise within the RDT&E Enterprise, the EAs, potential funding and transition partners, and the project's sponsor and end users to help inform the decision making process.

ANNEX D—DBFO TECHNICAL APPROACH SELECTION FRAMEWORK

Increasing Priority Focus

Selection Criteria	Increased Favorability	Decreased Favorability
Reduces operational risk to users	Appreciably reduces operational risk	Does not appreciably reduce operational risk
Reduces current costs and/ or operational footprint	Reduces acquisition, operations or maintenance costs; reduces size/space requirements; delivers acceptable trade-off between cost and footprint	Replaces current technology with one of equivalent or increased cost and/or footprint; fails to deliver acceptable tradeoff between cost and footprint
Delivers a proof of principle, pre-EMD or EMD+ prototype	12-24 months optimal; 36 months maximum	Fails to deliver prototype or delivers in >36 months
Transition plan	Clearly defined end user(s) or transition to next phase of development	Unclear or none
Aligns with DBFO Research LOE	Yes	No
Supports data-to-decisions, autonomy and/or human systems priorities	Yes	No
Type of Threat	Emerging	Current
Funding Partners	Multiple partners or partners contributing >50% of funding	Negligible or none
Solution applies to broad range of end users	Yes	No
Likelihood of concurrent research in other agencies/ organizations	Represents a research area with little current investment; addresses an issue that falls within a 'responsibility gap'	Other agencies organizations currently funding research or responsible to do so
Technological maturity	TRL 4-8	Lower TRL


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