

FY2016-2020 IC S&T STRATEGIC PLAN

MANAGING RISK TO ENSURE
INTELLIGENCE ADVANTAGE



*Intelligence Reform And
Terrorism Prevention Act of 2004*



*Executive Order
12333 (1981)*

*Industrial R&D Funding Begins
Exceeding Government R&D
Funding in the US (Circa 1980)*



National Security Act of 1947

*Office of Strategic Services
Disbanded (1945)*



About the Cover:

The cover uses a red and blue double helix to represent multiple concepts relating to the Intelligence Community's (IC's) science and technology (S&T) efforts. For example, starting at the bottom and moving up the image on the cover one observes—in chronological order—a number of key “red” challenges and “blue” technological achievements in the history of the IC. The use of this construct was not chosen randomly, however. Akin to how the base pairs in strands of deoxyribonucleic acid (DNA) correspond to one another, researchers and technologists within the IC S&T enterprise aspire to create capabilities that link to the threat environment of today—and in the future. Lastly, and perhaps most importantly, the choice of a DNA strand is meant to convey the critical importance of basic research to the IC's mission.

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Foreword

FROM THE PRINCIPAL DEPUTY DIRECTOR OF NATIONAL INTELLIGENCE:

The *FY2016-2020 IC S&T Strategic Plan* advances the Office of the Director of National Intelligence's ability to manage risk across the National Intelligence Program, and is the charter document guiding the Intelligence Community's (IC's) science and technology (S&T) activities. The *Strategic Plan* is comprehensive in its approach, rational in its prescriptions, and defensible in its justification for action. In short, it is exactly what we need to ensure our nation's future intelligence advantage at a time when technological democratization, unauthorized disclosures, and fiscal constraints threaten to erode the IC's capabilities and advantages.

This plan is a new way of doing business for the IC S&T enterprise, and this presents its own unique risks. But the benefits of success far outweigh any perils, making now the time for the IC to implement this novel approach.

The Honorable Stephanie L. O'Sullivan

Principal Deputy Director of National Intelligence

Office of the Director of National Intelligence

FROM THE DEPUTY DIRECTOR OF NATIONAL INTELLIGENCE FOR INTELLIGENCE INTEGRATION:

Innovation—to include technological advancements as well as improved business practices—is critical to maintain the IC's role as the nation's first line of defense and to our ability to provide the strategic and tactical intelligence advantage required by policymakers and warfighters. As the principal means of envisioning the IC's "after next" mission challenges, I will continue to actively support this *Strategic Plan*, which will be critical to ensure the IC and our partners are able to meet future intelligence needs and better promote a mutual understanding of our requirements and capabilities.

Mr. Michael P. Dempsey

Deputy Director of National Intelligence for Intelligence Integration

Office of the Director of National Intelligence

FROM THE DIRECTOR OF SCIENCE AND TECHNOLOGY:

To meet its vision of ensuring intelligence advantage, the IC and its S&T enterprise must know where it is headed—and it will need its partners' help in charting the best course forward. 'Partnership' is not a buzzword in the *Strategic Plan*; rather, it is its defining principle. We designed the *Strategic Plan* to be useful, flexible, enduring, and inclusive. I am particularly excited about involving our partners in generating technical roadmaps to solve current and anticipated intelligence challenges—an ongoing effort to keep the IC pointed in the right direction regardless of the challenges it faces. Feedback on this document can be provided to S&TInvestment@dnits.ic.gov (JWICS) or S&TInvestment@dni.gov—my staff and I look forward to hearing from you.

Dr. David A. Honey

Director of Science and Technology

Office of the Director of National Intelligence

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ICS&T

INTELLIGENCE COMMUNITY
SCIENCE & TECHNOLOGY

Vision

Ensure intelligence advantage

Mission

Apply science and technology to solve intelligence problems

Guiding Principles for Intelligence Community Science and Technology Enterprise Investments

Protect innovation at the edge. Make S&T investment choices at the “bench” level, where technical expertise is deepest.

Develop R&D plans that are rational, traceable, and defensible. Fully address Heilmeier Questions with milestones and metrics.

Acquire and develop talented technical professionals and leaders. Staff the IC S&T enterprise with able researchers, managers, and leaders.

Ensure all work is subject to scrutiny. Require conflict of interest-free peer review for all programs, projects, and strategies.

Leverage collaboration and enable integration. Realize transparency through information sharing.

Challenge assumptions regarding the best performer or solution. Pursue open competition—avoid sole source awards of research grants and contracts.

Deny adversaries access to our hard-earned advantages. Build counterintelligence efforts and safeguards into every program.

Meet requirements efficiently. Influence “build or buy” (lead, influence, adapt, adopt) decisions that conserve funding and meet mission requirements.

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CHAPTER 1

Introduction

The Need for a Comprehensive, Rational, and Defensible IC-wide Science and Technology Strategic Plan

Faced with growing budgetary pressures at home while struggling to stay ahead of changes resulting from an increasingly open and fast-moving global environment, the US Intelligence Community (IC) must innovate in the way it surveys, develops, and accelerates the adoption of new technologies and methods to ensure continued US intelligence advantage. To do so, the IC needs an improved understanding of the threats that our nation and its allies are likely to face as well as an improved means of addressing them. As the primary means for developing the often unique tools required for meeting these threats, the IC science and technology (S&T) enterprise must address the IC's strategic priorities, support and leverage external partners' efforts, and ensure that prospective technical advances and newly-developed capabilities are shared with the appropriate stakeholders.

Each of the IC's technical challenges is likely to have within it a number of technologies that are required to deliver a system solution. Given the fiscal constraints that the IC faces it is neither possible nor desirable for the IC to be a world leader in all of those technologies all of the time. As technology matures the US Government's market share often decreases to the point where it becomes available as commercial-off-the-shelf (COTS), lowering acquisition cost while simultaneously increasing yield, uniformity, and reliability.

Choosing where to apply S&T investments so as to get the right technology at the right time at the right cost requires careful analysis and monitoring of the development of the technologies of interest. Although COTS items can be a great cost savings, changes in commercial markets can rapidly lead the development of items of interest into a new direction that does not meet IC needs, or in some cases lead to obsolescence and the need to identify and procure an alternative solution. Informing IC elements' acquisition strategies from any S&T strategic plan requires the planning and management of technologies in which the IC must choose whether to lead, influence, adapt, and adopt, taking interagency and industry progress and cooperation into account:

- **Lead.** Focused, sustained investment is required to advance these technology areas and realize benefits. The IC needs to define the performance goals, provide the vision, and specify the potential products or capabilities.
- **Influence.** Investments in these fields are required to understand and influence the fundamentals of new technologies. Industry will generally lead development but the IC needs to be closely involved to be assured that its needs are met.
- **Adapt.** Commercial industry is pushing technology forward with expertise and research funding levels with which the IC should not or cannot compete. In many of these fields, the IC needs to apply commercial advances to intelligence tools.
- **Adopt.** Commercial industry is driving intelligence-related technologies and the IC needs to simply follow the world leaders. Without making significant investments, the IC should maintain our understanding of what the leaders are doing in order to make knowledgeable decisions about procurements.

At the heart of the Community's acquisition decisions is the need for senior IC leaders to rationally and defensibly manage risk. This includes the risks in pursuing uncertain yet high payoff technologies and approaches as well as the risks in determining the optimal allocation of limited resources. The tools and methods required to comprehensively manage these risks across the IC S&T enterprise do not exist today.

To remedy this deficiency, the *FY2016-2020 IC S&T Strategic Plan* establishes an enduring mechanism to inform acquisition decisions and further integrate and align the IC S&T enterprise. It takes its direction from the White House's *National Security Strategy* and the Office of the Director of National Intelligence's (ODNI's) *2014 National Intelligence Strategy of the United States of America* (NIS). The *Strategic Plan* aligns with numerous NIS Enterprise Objectives—such as optimizing capabilities and activities across the IC to achieve unity of effort and effect; developing, implementing, and managing IC-oriented approaches to improve integration and interoperability of IC enabling capabilities; finding and deploying new scientific discoveries and technologies; and strengthening partnerships—to generate technical solutions to IC challenges.

The *Strategic Plan* lays the foundation for generating meaningful, clearly articulated thrusts in areas critical for aligning IC S&T enterprise and partners' pursuits with future intelligence and national security Needs. Following such a flexible yet enduring platform through 2020 positions the IC S&T enterprise to achieve its vision of ensuring intelligence advantage.

CHAPTER 2

The IC S&T Strategic Framework

The IC S&T enterprise will continue to be called upon to solve many of our nation’s most pressing challenges, often necessitating the development of novel technologies and approaches. Only by working closely with a number of key stakeholders and customers—such as those with wide-ranging mission needs like the National Intelligence Managers (NIMs)¹—can the IC S&T enterprise understand the full scope of intelligence challenges that our nation faces, thereby allowing senior IC leaders to effectively guide investment decisions and manage risk.

Given this new reality, the IC S&T Strategic Framework reflects an enduring method for capturing and solving IC mission needs by integrating the Community’s strengths and activities. When applied across the Community, such a process will further align R&D investments across the IC to avoid duplication and achieve synergies across the National Intelligence Program (NIP).

Although most of the resources to meet IC S&T needs come from within the NIP, additional resources exist within the US Government—such as the Military Intelligence Program (MIP), the Department of Energy (DOE) National Laboratories, the Department of Defense (DOD) Laboratories, and the Defense Advanced Research Projects Agency—that can provide research synergies. Additionally, improved cooperation in research with less traditional partners, such as the National Science Foundation, the National Aeronautics and Space Administration, and the Department of Health and Human Services—particularly the National Institutes of Health, the Biomedical Advanced Research and Development Authority, and the Centers for Disease Control and Prevention—can be mutually beneficial.

However, this expanded mission comes with additional obstacles—access to classified information can be a significant problem for many working within the basic research community. JWICS and even SIPRNET terminals are rare commodities even at DOD laboratories, and are not likely to become more accessible in the foreseeable future. Further complicating communication is the lack of cleared personnel. Finally, reporting requirements and travel restrictions imposed on individuals who hold high security clearances are viewed by most researchers and program managers as antithetical to the open, and often, international nature of the basic research they are engaged in; simply put, they do not want to be exposed to classified information. An important function, then, of the IC S&T enterprise is to be a selectively permeable information conduit between these two very dissimilar worlds while staying ahead of security challenges and foreign counterintelligence activities—no easy feat.

¹ Constituted under the auspices of the ODNI Office of the Deputy Director for Intelligence Integration (DDII), NIMs oversee and integrate all aspects of the IC’s collection and analytic efforts against a particular region or function. Each NIM serves as single focal point within the ODNI for the integration of all activities related to the particular region or function, as well as being the DNI’s personal representative on the issue. NIMs maintain senior-level contacts with the intelligence, policymaking and warfighting communities so that a full range of intelligence requirements for a particular function or region are met on a daily basis. Lastly, NIMs set strategic guidance to improve IC collection and analysis over the long term.

Going forward, empowering disparate stakeholders with their own voice in the direction of meeting Community challenges will be key to ensuring that senior IC leadership can make the informed resource decisions needed to **anticipate, inform, shape, strengthen, leverage, and develop as well as protect** disruptive S&T-related activities across the IC and beyond. As such, the IC will apply S&T to solve intelligence problems and effectively manage risk by

- Developing and protecting disruptive capabilities,
- Anticipating mission needs,
- Informing stakeholders of S&T-related developments,
- Shaping S&T investments and efforts,
- Strengthening integration, and
- Leveraging partners and resources outside of the NIP to solve problems of interest.

The *Strategic Plan* reflects enduring IC mission needs and integrates IC element strengths and activities. Because a strategic plan is only as real as the resources supporting it, the IC must integrate IC Program Managers' and Functional Managers' S&T investment plans. Only then can IC S&T leaders create a rigorous and comprehensive S&T strategy with set priorities and commit to an investment plan. This document represents that leadership commitment to enduring research critical to mission support.

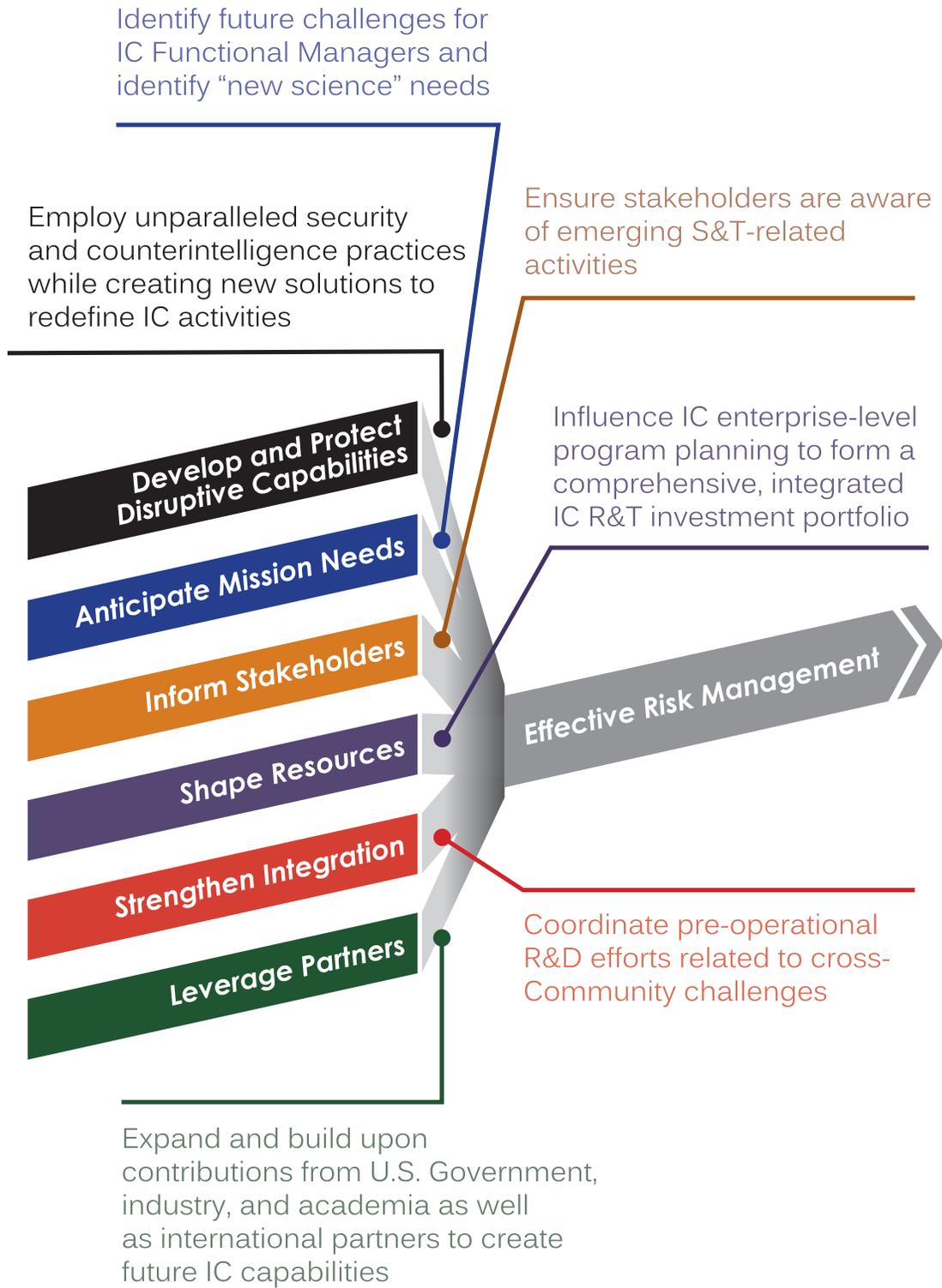


Figure 2.1 — The Intelligence Community Science and Technology Strategic Framework.

To accomplish these goals, the *Strategic Plan* articulates the Director of National Intelligence’s (DNI’s) vision for meeting IC-wide challenges—now and in the future—by expanding upon the process outlined in the *FY2015-2019 IC S&T Investment Landscape*.² Accordingly, the *Strategic Plan* will better align the IC S&T enterprise by:

- Providing the Community and its partners with insight into where S&T resources are being expended—*and not expended*—to better manage Community risk while ensuring the health and sufficiency of the national security research enterprise,
- In concert with the *Landscape*, completing the development of a comprehensive, defensible, transparent, and traceable process for aggregating and solving intelligence challenges,
- Institutionalizing new mechanisms to coordinate “pre-operational” R&D efforts related to cross-Community challenges, thereby freeing up Functional Managers’ (FM) resources to confront additional challenges within their functional areas, and
- Through ODNI’s Director of Science and Technology (DS&T), establishing initiatives to identify “new science” problems that engage both the IC S&T enterprise as well as partners elsewhere in the US Government, academia, and industry.

2 The first iteration of the *FY2015-2019 IC S&T Investment Landscape*, is located at: <https://ospace.dodiiis.ic.gov/ospace/docs/DOC-1162>

CHAPTER 3

ODNI Application of the IC S&T Strategic Framework

Fully engaging all of the IC's resources is critical to maintaining our mission success. The realities of the marketplace and the reduced share of the nation's R&D that originates in government laboratories requires the IC to closely examine the areas in which it must continue to lead, where it must influence partners' R&D investments, and where it must acquire new capabilities or procure commercially-available technology. As the principal means to structure and to stress the importance of these activities, the DS&T has developed the **Intelligence Science and Technology Partnership (In-SteP)**.

Anticipate IC-Wide Mission Needs

To help envision the future technical challenges the IC is likely to face, ODNI/DS&T is leading the IC S&T enterprise with the *Landscape* and In-SteP. In-SteP will influence IC S&T investments and inform industry's independent research and development (IRAD) and cooperative research and development agreement (CRADA) investments through FY2020 and beyond, and provides a set of precepts to guide decisions over subsequent program and budget cycles. The *Landscape*—which will be updated periodically at the direction of the DNI—serves as the principal mechanism to aggregate, relay, and champion across the Community and its partners those anticipated IC-wide Needs that do not map directly to individual IC elements' functional responsibilities. Although a variety of disparate sources are used to capture the breadth of future IC challenges, the *Landscape* draws heavily from Deputy Director of National Intelligence for Intelligence Integration (DDNI//II) products.

“The Landscape—which will be updated periodically at the direction of the DNI—serves as the principal mechanism to aggregate, relay, and champion across the Community and its partners those IC-wide Needs that do not map directly to individual IC elements' functional responsibilities.”

A critical part of crafting the *FY2015-2019 IC S&T Investment Landscape* was to identify and aggregate intelligence Needs from across the IC. To accomplish this objective in a manner calculated to reasonably catalogue most of the Community's Needs, DS&T staff used a variety of sources with differing perspectives: Subject Matter Expert, Program Management, Specialized Customers, and Field End-Users. Because of the pivotal role the DDNI//II NIMs³ play in driving ODNI integration policy, In-SteP is significantly influenced and driven by their representation and assessment of Needs.

3 A cornerstone of the DNI's National Intelligence Strategy to integrate the operations of the Community is the appointment, designation, and empowerment of ODNI National Intelligence Managers (NIMs) from amongst IC agencies' subject matter experts. NIMs oversee and integrate all aspects of the IC's collection and analytic efforts against a particular region or function and serve as the single focal point within the ODNI for the integration of all activities related to the particular region or function. Lastly, NIMs set strategic guidance to improve IC collection and analysis over the long term, and are responsible for the development, planning, execution and success of the Unifying Intelligence Strategies (UIS) and generally the orchestration of UIS activities by managing the policies and relationships among Community agencies.

Once IC-wide Needs were aggregated, they were filtered into various categories based largely on which IC Functional Manager(s) or other entities would be best positioned to solve the IC Need. This method of basing decisions on performers was selected to avoid the “binning” that often occurs when Needs are subdivided into various topical areas. The process of collecting and filtering these Needs is shown schematically in Figure 3.1.



Figure 3.1 — *Landscape* selection process for assigning Needs to various Performers. Note that from Category Zero to Category Three Needs, the role of the DS&T increases commensurately, moving from advising to ultimately championing S&T-related activities within the IC.

To aid in future revisions of the *Landscape*, IC-wide products—such as DDNI/II’s Unifying Intelligence Strategies (UISs)—should be prepared with the intent of encouraging interaction between the originators of these products and the IC S&T enterprise. By fostering these connections, FMs’ S&T endeavors will be focused on pursuing IC-wide Needs, in addition to those of the elements. Such contact will have the added benefit of providing a mechanism for the IC S&T enterprise to keep disparate IC officials—such as the NIMs as well as the acquisition and procurement communities—apprised of S&T-related developments that may directly impact their missions.

Leverage the Strengths and Resources of Partners

Individual IC elements and their contractors are well-positioned to solve many needs in the *Landscape*, but for a significant number of others it will be insufficient to rely exclusively on established R&D capabilities and will require the expanded community of DOD, DOE, US industry, industry associations, foreign partners, and academia. In addition to these resources, an active global campaign of investigation, collection, and outreach is required. To address a number of needs it is essential that the IC leverage outside and non-traditional resources to achieve new levels of scientific understanding.

To access and leverage these opportunities, DS&T-led IC initiatives will be developed with the ODNI’s Office of Partner Engagement (PE) to build on overtures to S&T leaders across the Government to organize, plan, and execute coordinated efforts. Moreover, the DNI has personally reached out to the Director of the Office of Science and Technology Policy (OSTP) to request help in bridging efforts across the nation’s S&T enterprise in areas of mutual benefit and to create an online research library for accessing interim and final reports of US Government-funded research. DS&T will actively participate in the DOD’s *Reliance 21* effort, and at the DNI’s direction has invited the Under Secretary of Defense for Intelligence to participate in Director of National Intelligence Science and Technology Committee (NISTC) activities. Lastly, to better leverage the considerable S&T resources of DOE’s National Laboratories, DS&T is working to align its efforts with innovative programs throughout DOE’s Field Intelligence Enterprise.

“Understanding the technical solutions that industry is pursuing, combined with insight into current programs gleaned from the portfolio review and summary processes, will empower IC leadership to align R&D resources to better manage cross-Community risk.”

Making the *Landscape* available to cleared industrial partners and requesting continuous feedback, such as through ODNI-RFI-14-02, will drive an increasingly open dialogue with our partners to inform and learn from their efforts. These proprietary partner responses are provided to the NISTC membership for discussion, evaluation, and distribution within the elements, and form the basis of the *Partner Response to the FY2015-2019 IC S&T Investment Landscape*. As such, the *Partner Response* provides a high-level matching of public- and private-sector partners’ existing, funded programs to the Needs captured in the *Landscape*. Understanding the technical solutions that industry is pursuing, combined with insight into current programs gleaned from the portfolio review and summary processes, will empower IC leadership to align R&D resources to better manage cross-Community risk.

Inform Stakeholders of New Technology Opportunities

Ensuring that current anticipated IC needs align with promising technology development activities is an important consideration in prioritizing S&T investments, but it is not the only one. Investment decisions on new technological capabilities should not be driven solely by user requirements, but should also be informed by new technical developments—regardless of where they originate. In particular, decision-makers require knowledge of, and exposure to, global R&D trends that could affect US national security or undermine the US Government’s R&D efforts.

S&T forecasting processes led by DS&T feed the ongoing development of an enterprise *S&T Strategic Plan*. Forecasts and products such as the *S&T Estimate*⁴ are used to inform IC customers and the NISTC⁵ of novel and prospective developments that could ultimately impact IC operations.

The *Estimate* highlights technology sectors with the potential to impact the IC enterprise during the next ten years or which are expected to show rapid evolution. By identifying these key sectors, the *Estimate* provides a starting point for enterprise-level strategic planning, informs inquiry to subject matter experts within and outside of the IC S&T community, and establishes context to explore potential threats to current and projected capabilities. It is available to all executive branch agencies as well as any cleared contractor, federally funded research and development center (FFRDC) or university-associated research center (UARC) via the R-Space website. This broad availability will allow synergies and integration among government agencies and informs industry investment planning.

Combined with inputs from the elements, the S&T forecasting process will influence the Intelligence Planning, Programming, Budgeting and Evaluation (IPPBE) process and IC element R&T investment activities through integrating forecast projections and findings into the DNI’s Consolidated Intelligence Guidance (CIG).

To further inform industry partners’ investment decisions, DS&T uses non-proprietary summary data from the *Partner Response* and its associated RFI to provide feedback to the respondents as well as R-Space participants. This information includes a preliminary market analysis of current and future opportunities based on the *Landscape Needs*. In addition to affirming the DS&T commitment to building partnerships across the public- and private-sectors, this outreach to industry is critical to the development of In-SteP (See Figure 3.2).

4 The most recent iteration of the *Estimate*, the *Science and Technology Estimate: 2012-2022*, is located at: http://intelshare.intelink.ic.gov/sites/acquisitiontechnology/sciTech/Products%20Repository/SandT%20Estimate_FINAL-PRINT.pdf (JWICS)

5 By statute, the NISTC is designated to be the standing body for the coordination and communication of S&T priorities and R&D investments across the IC. The NISTC is chaired by the DS&T, and its members include the principal science advisors of the elements of the National Intelligence Program. The Intelligence Reform and Terrorism Prevention Act of 2004 establishes and broadly describes the duties and functions of the DS&T and the NISTC.



Figure 3.2 — The Intelligence Science and Technology Partnership (In-STeP)

As shown in Figure 3.1, In-STeP uses these documents—the *Landscape* and the *Partner Response*—and the associated RFI, culminating in In-STeP outreach activities with IC partners and IC colleagues from the S&T, acquisition, and partner engagement communities. In-STeP outreach includes regular meetings between IC partners, DS&T staff, members of the NISTC, and representatives from the IC’s acquisition and procurement communities.

Strengthen Integration across the IC S&T Enterprise

While the IC elements each contribute to the collective S&T resources of the enterprise, they also serve

“Accordingly, DS&T and the NISTC will move in FY2016 to institutionalize new mechanisms to coordinate pre-operational R&D efforts related to cross-Community challenges, thereby freeing up FMs’ resources to accelerate current programs or confront additional challenges within their functional areas.”

unique functions within their own customer communities. Having evolved to serve unique purposes, the IC gains strength from the integration of their S&T efforts, while recognizing that they also retain unique specialization developed over time to serve the needs of their primary customers.

As noted in the *Landscape*, the DS&T’s breakdown of IC-wide S&T needs shows that it is essential for FMs to coordinate their R&D activities based on their competencies. As many needs are cross-disciplinary—touching at least several elements and/or FMs—DS&T will play a stronger role to ensure that they are adequately resourced and addressed, including coordination of related R&D

activities across participating IC elements. Accordingly, DS&T and the NISTC will move in FY2016 to institutionalize new mechanisms to coordinate pre-operational R&D efforts related to cross-Community challenges, thereby freeing up FMs' resources to accelerate current programs or confront additional challenges within their functional areas.

The *Landscape* and the *Partner Response* provide unprecedented insight into both IC-wide challenges and potential technical solutions, and will inform IC S&T strategic planning and the discussions during the annual element portfolio reviews. A primary goal of future portfolio reviews will be to inform IC enterprise-level program planning in support of the Needs listed in the *Landscape*. This may include informing the IPPBE process, identifying and resolving cross-program dependencies, recommending budget changes, and evaluating execution ability and performance. Ultimately, basing the annual portfolio reviews on the *Landscape* Needs will help ensure that IC element S&T investment portfolios combine to form a more comprehensive, integrated IC investment portfolio.

Develop and Protect Disruptive Capabilities To Meet IC Needs

In-STeP is designed to capture Community-wide Needs and assign responsibility to the relevant FMs to provide a solution, as aided by partners. However, additional organizations and non-requirements driven entities are also needed to provide the flexibility to operate outside of this mainstream process. This measure of flexibility enables these entities to develop truly disruptive solutions that may not be possible within a larger organization with traditional business models.

ODNI's Intelligence Advanced Research Projects Activity (IARPA) is one way to collaborate across the IC to develop novel methods and technologies to ensure its research addresses relevant future needs. This Community-wide focus ensures IARPA's ability to address cross-agency challenges, leverage cross-IC operational and R&D expertise, and coordinate transition strategies with our agency partners.

DS&T Strategic Studies

In addition to identifying technical challenges for individual IC FMs—as well as those challenges on which they need to collaborate—the first iteration of the *Landscape* identified a number of “new science” Needs that will be the focus of future DS&T-led initiatives to organize, plan, and execute coordinated efforts. The majority of these new areas of understanding will require leveraging partners outside of the NIP, such as the National Science Foundation and the National Academies of Science. These efforts will build on current or previous DS&T efforts to “change the business model” in a variety of areas, such as video analytics and identity intelligence.

A key challenge for the IC S&T enterprise when developing disruptive technologies is balancing the often necessary need for open, unrestricted scientific collaboration with the global research community and the needs of national security. Security and counterintelligence must play a significant role in all aspects of the IC S&T research enterprise if the US is to exploit its hard-earned technical advantages. The Research and Technology Protection (RTP) process, developed and implemented at IARPA, represents a best practice for achieving this balance. The RTP process provides a systematic and reproducible comprehensive security and technology protection framework for all funded research activities. It identifies threats to S&T initiatives which could compromise research, place the US at a technological disadvantage, or compromise our national security. Moreover, determining the protection framework at the very onset of a research activity ensures appropriate, consistent, classification decisions and defines the extent to which participation from non-traditional sources such as academia, small businesses, and international organizations can be allowed.

Shape Resources

Insights gleaned from future S&T portfolio reviews will directly influence S&T IPPBE engagement, resulting in S&T investment portfolios with meaningful, higher-priority technical investments. This engagement process leverages the interaction of the NISTC with the DS&T to dramatically increase the application of advanced technical capabilities to the challenging problems of the future.

Additionally, DS&T analysis of the *Landscape* Needs and partners' associated RFI responses are driving the identification of specific mission goals and technical objectives that will be critical for ensuring intelligence advantage, particularly as they relate to the IC's "new science" Needs. Partner-reported data from ODNI RFI 14-02 were used to explore linkages between the *Landscape* needs and the results suggest that its challenges are strongly connected. In fact, of the 302 S&T Needs in the *Landscape*, only 35 were not connected in any way.

As shown in Figure 3.3, analysis of partner responses against the S&T Needs enabled the identification of six initial "new science" challenge areas, which acted as the basis for creating preliminary technology roadmaps. These roadmaps were intended to discern and denote the key capabilities, technologies, and basic research challenges for the IC and the broader US Government. Ultimately, such roadmaps allow for engagement on a rational, defensible basis with external partners in the US Government's basic research funding agencies.

These roadmaps were further developed—up to the limits of proprietary information—with the help of industrial partners whose base of expertise complemented the IC's in key emerging technical areas. These roadmaps also form the basis of proprietary one-on-one discussions with partners working in these technical areas. Going forward, DS&T staff analysis of the *Landscape* Needs and RFI responses will afford the IC an enduring mechanism for engaging with industry partners to identify additional specific capabilities and technologies, as will IC partners' own efforts.

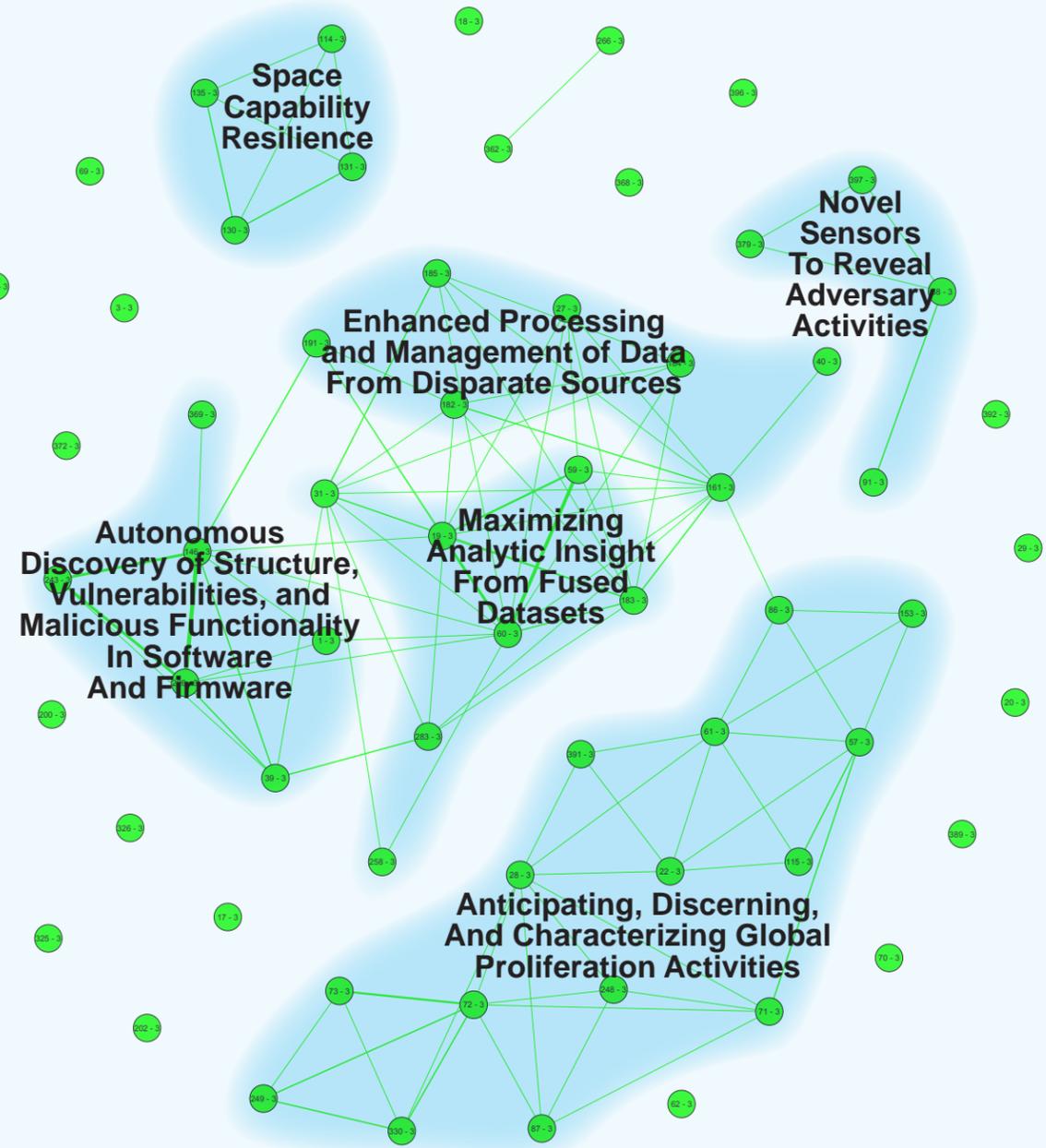
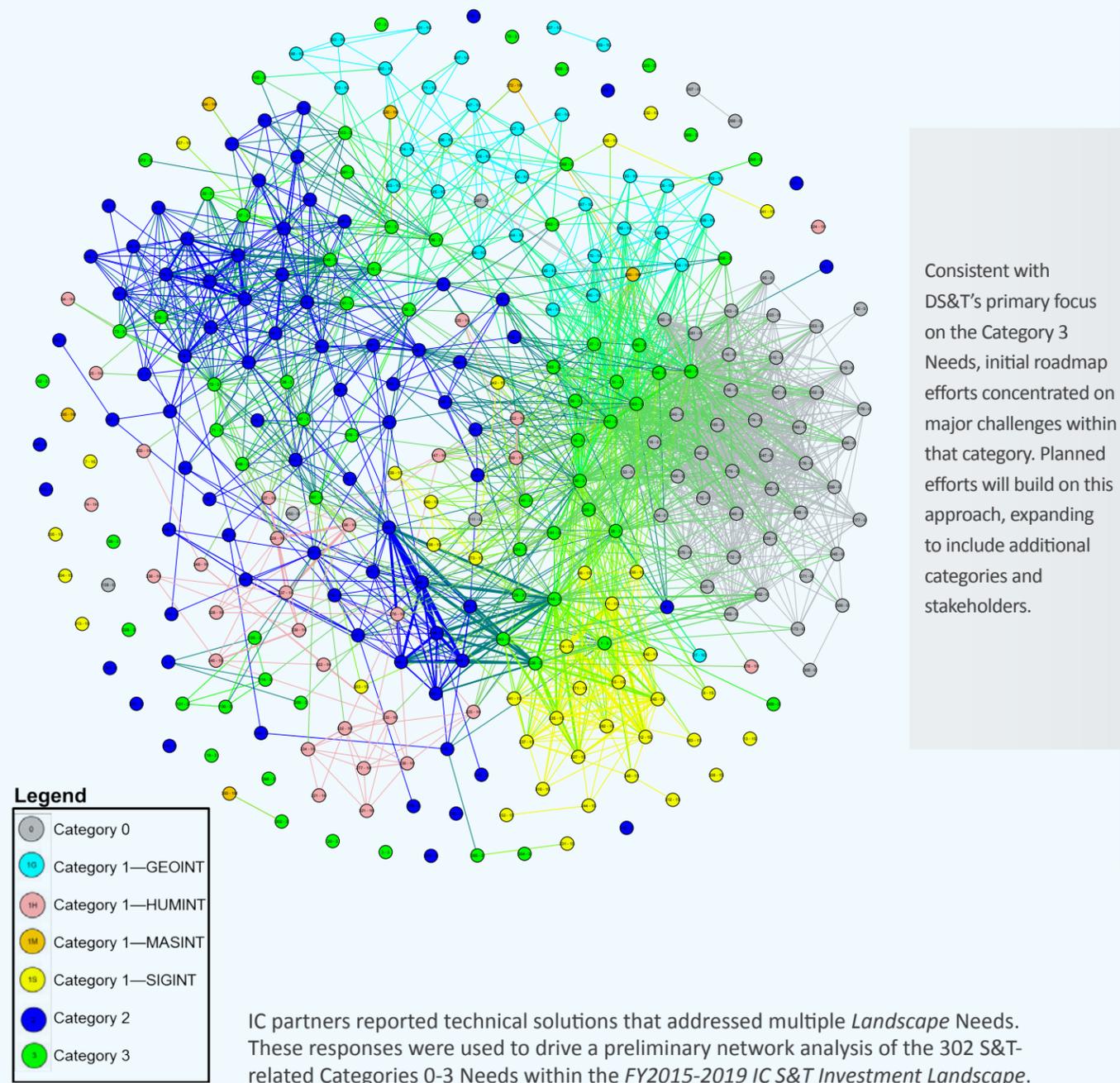
Moreover, the roadmaps will be used by the IC's acquisition community as the basis for developing actionable plans for developing the technologies essential to IC's future missions. With buy-in from both the IC and its partners, these plans will provide the prioritization and guiding principles of investment for the technologies identified in the roadmaps. An example of one of these roadmaps is presented in Figure 3.4.

Using specific research insights identified through the initial six In-STeP-derived roadmaps, the IC S&T enterprise will work internally and with the US Government's basic research community—in close collaboration with the private sector—to ensure that the capabilities and technologies required to solve future IC Needs are ultimately put into users' hands. Going forward, this method will continue to provide IC leaders with a better understanding of where the IC should bolster, leverage, or reallocate S&T resources as investment decisions related to the Lead-Influence-Adapt-Adopt construct are made.

Lastly, as a complement to In-STeP and other US Government basic research funding efforts, DS&T in FY2016 will pursue initiating a new effort—**Intelligence Ventures in Exploratory Science and Technology (In-VEST)**—to champion "new science" opportunities identified through industry-led roadmap activities. In-VEST will utilize DS&T and element expert identification of projects and leverage the elements' or service labs' contracting offices and program managers to manage identified projects for ensuring continued intelligence advantage.

Figure 3.3 — DS&T Down-Select Process for Identifying Initial In-STeP-derived Challenge Areas

Linkages between the *Landscape* S&T-related needs, as derived from data provided by IC partners through the RFI responses, were used to identify the initial six clusters for industry-led roadmap activities. Future activities using this process will develop roadmaps in additional areas of interest to the IC, the broader US Government, and the private sector. For example, as the *Landscape* Category Two Needs are cross-disciplinary in nature—by definition impacting several IC elements and FMs—a coordination of activities across participating IC elements would be beneficial.



DS&T analysis of the partner-reported linkages between the 67 Category 3 “new science” Needs allowed for the identification of six initial clustered challenge areas. Industry partners used these challenge areas as a basis for creating detailed technical roadmaps for meeting key aspects of these challenge areas through 2030.

Figure 3.4 — Roadmap: Enhanced Processing and Management of Data from Disparate Sources



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CHAPTER 4

Application of the IC S&T Strategic Framework to the IC Elements and Partners

The IC elements' contributions are critical to the collective S&T resources of the enterprise.⁶ They serve unique functions and retain specialization in key areas that have developed over time to serve the needs of policymakers and warfighters. Accordingly, the goal of this *Strategic Plan* is neither to radically refocus the direction of the elements nor to dilute their core competencies, but rather to provide a basis for ensuring that IC-wide Needs are efficiently met. Such an approach also allows the elements to better utilize their resources against FM-specific challenges.

To meet these goals, beginning in FY2016 ODNI/DS&T will ensure that IC element S&T investments combine to form a more comprehensive, integrated IC R&T investment portfolio. Accordingly, a primary goal of the National Intelligence R&T program review⁷ will be to inform and influence IC enterprise-level program planning—to include CIG alignment, cross-program dependencies, budget changes, execution ability and performance—in accordance with the Needs listed in the *Landscape*. This review process will identify gaps for the following year's cycle of the IPPBE process.

The IC S&T portfolio review⁸ will complement and supplement the subsequent fiscal year's R&T program review with program details and interactive NISTC member discussion, enabling a fuller picture of Community-wide R&T efforts. Additionally, working with ODNI's Chief Financial Officer (CFO) and the Office of Systems & Resource Analyses (SRA), the review will assess success and identify gaps, overlaps, and other areas for improvement in the next IPPBE cycle. The results of the two reviews will be combined into a portfolio summary provided to the DNI and the Principal Deputy Director of National Intelligence (PDDNI), and made available to the NISTC for further dissemination within the elements' S&T enterprises.

Only through a rigorous portfolio review process can senior leadership gain the insights needed to ensure that the IC's S&T investment portfolio contains meaningful, high-priority technical investments that are suitably funded—or to rationally and defensibly request additional top-line funding from the Office of Management and Budget (OMB). This engagement process will leverage interactions of the NISTC with the DS&T to dramatically increase the extent of collaboration and accelerate the application of advanced technical capabilities to meet future challenges.

6 See Appendix B for a review of IC efforts to ensure the health and sufficiency of the IC S&T enterprise.

7 The DS&T conducts an annual program review of NIP R&T activities to assess progress against IC S&T planning objectives and critical intelligence problems as part of his role in assisting the DNI in formulating a long-term strategy for scientific advances in the field of intelligence and on the science and technology elements of the budget.

8 The IC S&T portfolio review will be a comprehensive, cross-agency review of the currently executing S&T programs funded by the NIP, enabling de-confliction and collaboration between programs and agencies as well as overall coordination of programs and projects. The focus will be to review current research activities and assess the IC S&T portfolio for effectiveness and progress in addressing mission requirements and challenge problems.

These efforts will ensure that the IC S&T enterprise is able to expand and build upon the contributions from non-traditional partners such as small firms and academia—including through the IC Postdoctoral Research Fellowship Program—that can play a role in creating future IC capabilities and developing human capital. Smaller firms and universities that do not traditionally collaborate with or contract with the US Government present their own unique challenges, but they provide unique capabilities and skills for the IC. The IC S&T enterprise will therefore move to incorporate, to the extent practicable, the methods employed by In-Q-Tel, IARPA and others to engage small businesses and academic partners.

Accordingly, it is essential for FMs to work together to exploit IC competencies in key areas *exclusively within the realm of the NIP*. Similar to DS&T analysis of the “new science” Needs, NISTC analysis of the RFI responses will allow for the identification of specific mission goals and technical objectives that will be critical going forward for ensuring intelligence advantage, particularly as they relate to cross-Community Needs. Recognizing that IC working groups already exist and cover many of these challenges, DS&T will lend its processes and industry association connections to these bodies for creating and acting on roadmaps under the auspices of the NISTC.

CHAPTER 5

Conclusions and Next Steps

Responsibly Managing Risk across the IC S&T Enterprise

Given the budgetary and operational challenges the IC is likely to continue facing in the coming years, the conditions are now right for the IC to focus on enhancing its utility with policymakers, warfighters, and other IC stakeholders using the same or fewer resources. Using the comprehensive process outlined in this *Strategic Plan*, the DS&T and the NISTC will provide IC stakeholders with sufficient insight and transparency to ensure that the most promising means of generating intelligence advantage are pursued. By implementing this *Strategic Plan*, the DS&T and the NISTC will make informed investment recommendations to the DNI and the PDDNI, as well as to the White House regarding the allocation of resources to manage risk more effectively across the IC: a task that the Community is challenged to accomplish in a rational and defensible way with the tools and practices currently available.

“By implementing this Strategic Plan, the DS&T and the NISTC will make informed investment recommendations to the DNI and the PDDNI, as well as to the White House regarding the allocation of resources to manage risk more effectively across the IC: a task that the Community is challenged to accomplish in a rational and defensible way with the tools and practices currently available.”

The challenges facing the IC S&T enterprise are daunting, but not insurmountable. In-STeP enables DS&T to champion creative, collaborative, IC-wide R&D efforts and investments, recognizing the value of bottoms-up, grassroots innovation across the Community and beyond. DS&T will use In-STeP as a means for interacting with and expanding partnerships across the US Government, industry, and academia.

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APPENDIX A

Acronyms

CFO	Chief Financial Officer	NIM	National Intelligence Manager
CIA	Central Intelligence Agency	NIP	National Intelligence Program
CIG	Consolidated Intelligence Guidance	NIS	2014 National Intelligence Strategy of the United States of America
COTS	Commercial-off-the-shelf	NISTC	Director of National Intelligence Science and Technology Committee
DDNI/II	ODNI Deputy Director of National Intelligence for Intelligence Integration	NRO	National Reconnaissance Office
DIA	Defense Intelligence Agency	NSA	National Security Agency
DOD	Department of Defense	ODNI	Office of the Director of National Intelligence
DOE	Department of Energy	OMB	White House Office of Management and Budget
DNI	Director of National Intelligence	OSTP	White House Office of Science and Technology Policy
DS&T	ODNI Director of Science and Technology	PDDNI	Principal Deputy Director of National Intelligence
FFRDC	Federally Funded Research and Development Center	PECASE	Presidential Early Career Award for Science and Engineering
FM	Functional Manager	R&D	Research and Development
IARPA	Intelligence Advanced Research Projects Activity	RTP	Research and Technology Protection
IC	Intelligence Community	RFI	Request for information
IC CAE	IC Centers of Academic Excellence in National Security Studies	S&T	Science and Technology; Scientific and Technological
In-STeP	Intelligence Science and Technology Partnership	SRA	ODNI Systems and Resources Analyses
In-VEST	Intelligence Ventures in Exploratory Science and Technology	STEM	Science, Technology, Engineering, and Mathematics
IPL	Integrated Priority List	UARC	University-affiliated Research Center
IPPBE	Intelligence Planning, Programming, Budgeting, and Evaluation	UIS(s)	Unifying Intelligence Strategy(ies)
IRAD	Independent Research & Development	UTAP	Undergraduate Training and Assistance Program
MIP	Military Intelligence Program		
NGA	National Geospatial-Intelligence Agency		

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APPENDIX B

Efforts For Ensuring the Health and Sufficiency of the IC S&T Enterprise Workforce

The Intelligence Community (IC) requires a highly-skilled talent pool to perform its myriad technical missions. Although it is understood that each IC element recruits and draws its science and technology (S&T) talent from identified and vetted pipeline sources in alignment with its established requirements, the below initiatives illustrate how organizational practices and community programs can strengthen and broaden an S&T employee's career development, provide an IC showcase for demonstrating the value and recognition of S&T talent; and augment and expand the IC's S&T workforce as necessary to meet critical mission needs through collaborative academic and industry partnering.

The Presidential Early Career Award for Science and Engineering (PECASE) Awards Program

ODNI recently established an IC mechanism for participation in the PECASE Awards Program administered by the White House Office of Science and Technology Policy (OSTP). PECASE recognizes outstanding scientists and engineers at the outset of their independent research careers who show exceptional potential for leadership in advancing scientific knowledge.

DNI S&T Fellows Program

Since 2006, the Office of the Director of National Intelligence (ODNI) Science and Technology Fellows Award has been granted to 46 exemplary IC researchers, scientists and technologists. DNI S&T Fellows are top S&T officers, who receive research funding to pursue novel and high-impact technical research that directly addresses IC mission needs.

IC S&T Awards Program

The annual IC S&T Awards Program recognizes one individual and one team throughout the IC enterprise who made exceptional contributions in basic and/or applied research, or advanced technology development in such a way as to enhance the IC's ability to meet its mission.

IC Centers of Academic Excellence in National Security Studies (IC CAE)

The IC has the ability to access a cadre of future S&T talent by directly engaging more than 30 colleges and universities through the IC Centers of Academic Excellence in National Security Studies.

IC Postdoctoral Research Fellowship Program

The IC's connection to ground-breaking research being conducted in academia and the national laboratories has been strengthened through the IC Postdoctoral Research Fellowship Program. Since 2000, the IC Postdoc Program has funded 266 Fellows from more than 90 institutions who are conducting unclassified basic research in areas of strategic interest to the IC.

Efforts For Ensuring the Health and Sufficiency of the IC S&T Enterprise Workforce *(Continued)*

The Undergraduate Training and Assistance Program (UTAP)

UTAP is supported by the Central Intelligence Agency (CIA), Defense Intelligence Agency (DIA), National Geospatial-Intelligence Agency (NGA), and the National Security Agency (NSA). It provides college students, particularly women and minority students majoring in computer science and engineering with a research experience and annual salary.

The National Reconnaissance Office (NRO) Technology Fellowship Program

The NRO's Technology Fellowship Program objectives include stimulating industry participation in R&D areas critical to the NRO and the IC, supporting the development of future technology leaders, and forging strategic relationships.

The National Geospatial-Intelligence Agency STEM Career and Professional Development Roadmap

NGA recently established a Science, Technology, Engineering, and Mathematics (STEM) Career and Professional Development Roadmap as a framework for providing knowledge of long-term career pathways. The program helps S&T employees craft an individual development plan that includes training and education, mentoring, diverse assignments, and experiences.



The Intelligence Science and Technology Partnership



For more information, please contact S&TInvestment@dni.gov

Key In-STEP documents include:

Translate Intelligence Challenges into Anticipated Technical Needs



February 2014

FY2015-2019 IC S&T Investment Landscape — TS/SCI version

- Projects the science and technology (S&T) Needs of disparate stakeholders — including the National Intelligence Managers, the combatant commands, and other IC customers and specialty groups, and
- Provides an auditable, rational structure within which both industry and IC elements link S&T investments to customer needs



April 2015

FY2015-2019 IC S&T Investment Landscape — SECRET//REL TO USA, FVEY version

- Further facilitates the sharing of the *Landscape* Needs with the combatant commands and foreign partners, and
- Provides a basis for leveraging allied capabilities and resources



February 2015

Partner Response to the FY2015-2019 IC S&T Investment Landscape — TS/SCI version

- Provides a high-level matching of public- and private-sector partners' existing, funded programs to the IC-wide Needs captured in the *Landscape*,
- Enables IC developers to achieve unprecedented insight into the commercial solution marketplace, and
- Extensive database of proprietary efforts available to US Government personnel



March 2015

Industry Snapshot — Summary of Partner Responses to the FY2015-2019 IC S&T Investment Landscape — UNCLASSIFIED version

- Provides a preliminary, non-proprietary market analysis of partner-proposed solutions to the *Landscape* Needs, and
- Offers a resource for industry and US Government-wide S&T planning as well as procurement and acquisition decision-making



May 2015

FY2016-2020 IC S&T Strategic Plan — TS/SCI and UNCLASSIFIED versions

- Acts as the charter document guiding the IC's S&T activities,
- Advances the IC's ability to manage risk across the National Intelligence Program,
- Incorporates insights from *Landscape* Needs-driven, industry-led S&T roadmap activities, and
- Informs IC elements' acquisition investment decisions

Survey Partners' Funded Efforts to Inform Decisions

Ensure Intelligence Advantage

