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STS 2016

(U) Revolutionizing Navy Research & Development Planning Through Enterprise Innovation Management

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(U) Abstract

(U) This paper addresses the United States Navy's need to transform its long-term strategic research, development, test and evaluation (RDT&E) planning process. It introduces and describes Enterprise Innovation Management (EIM), current processes used by the Department of Defense and the U.S. Navy for linking strategy to execution, challenges in implementing EIM, principles of effective EIM, and finally, the benefits of and recommendations for transforming the Navy's existing strategic planning framework to an EIM framework.

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1 (U) PURPOSE

(U) Uncertainty in the wake of a global recession and in the face of increasingly constrained federal discretionary spending creates dual challenges for Department of Defense (DOD) advanced technology development organizations, as well as the defense industry: the need to reduce cost while enhancing capability. When serving as United States Undersecretary of Defense for Acquisition, Technology and Logistics, Ashton Carter said that the DOD must "do more without more." [1] In fact in these austere and uncertain economic times, we need to **do more with less**.

(U) Today's defense industry and government teams face a critical imperative as they strive to bring more value to organizations and programs. They must find new ways to achieve desired outcomes, often with unprecedented resource constraints. In an unconstrained world, it is possible to expand the scope of resources by increasing budgets or by adding employees or contractors, but this strategy is not viable based on the current and projected federal fiscal environment.

(U) Senior decision makers recognize that innovation provides the most direct path to the successful deployment of advanced capabilities. A primary reason is that it promises game-changing capabilities rather than incremental improvements. However, innovation success depends upon the creation of a predictable, evergreen pipeline of concepts, their development, and the delivery of game-changing technologies and competencies, ensuring sustainable capabilities for today, tomorrow and beyond. Enterprise Innovation Management (EIM) undergirds the capability delivery pipeline.

(U) The journey to sustainable EIM can be long and difficult. There are many reasons why organizations struggle on the way, but research and experience indicates these causes fall into four distinct categories.

(1) **(U) Product "bad bets"**: Some organizations continually place "bad bets" on losing projects;[2]

(2) **(U) Too few good ideas**: Most organizations have no lack of ideas, but instead may suffer a shortage of good, high-value ideas;[3]

(3) **(U) Execution challenges**: Many programs and organizations struggle with the cross-functional execution of their hierarchical decision making processes, aka, gated processes. While most organizations have gated processes in place, a slim majority say that the processes are not followed as intended.[4] One of the common consequences is missed deadlines; and[5]

(4) **(U) Lack of alignment between strategy and execution**: Although most organizations identify areas of strategic focus for innovation, a large percentage fail to connect those areas to resource allocation.[6]

(U) This paper addresses the need for EIM in support of the Navy's technology development lifecycle, its implementation in the effective management of their portfolio of innovation initiatives to focus investments on projects that provide maximum value and meet strategic objectives, its role in helping decision makers avoid "bad bets" that are destined to fail, and a discussion of broader gains made possible by using EIM processes and tools.

2 (U) BACKGROUND

(U) A dynamic national security landscape, growing fiscal constraints, and increasing technology competition characterized by disruption and rapid diffusion create an imperative for innovation. Innovation is the key to achieving productivity and capability gains, to doing more with less, and to delivering these gains faster in order to stay ahead of any adversary. Despite the extensive use of the word in defense strategy and planning literature, meaningful and deliberate innovation in the absence of crisis is the exception. To eliminate any confusion:

Innovation: action that changes, alters, revolutionizes, transforms, or achieves a break-through using new measures, methods and processes.[7]

(U) In 1993 Andrew Marshall introduced into public debate the concept of a Revolution in Military Affairs (RMA). It described emerging warfighting developments and applications and provided a framework for prioritizing the development of future combat systems, systems that would capitalize on advances in information processing and networking. The RMA framework served as a strategic foundation for expanding the second offset strategy of the United States, itself a response to the erosion of its nuclear deterrent advantage (and first offset strategy) to counter greater conventional forces. The second offset strategy began with smart precision weapons and extended their employment and effectiveness in a warfare environment built on information – information in greater volume exploited across better connected entities to enhance and accelerate collaboration and decision making. The result was a competitive advantage based on the ability to deploy smaller forces with greater effect than those of our adversaries.

(U) Global technology competition is unquestionably interactive and dynamic. Coupled with the increasingly disruptive and rapid diffusion of technology, the U.S. military today confronts the latest erosion to threaten its competitive advantage. The DOD has therefore embarked on a third offset strategy to restore and advance America's military competitive advantage, a strategy with an unambiguous emphasis on innovation. From a January 28, 2015 speech by Deputy Secretary of Defense Bob Work:

"...a third offset strategy will require innovative thinking, the development of new operational concepts, new ways of organizing, and long-term strategies."

(U) A look back confirms the revolution in the deployment of technology and warfighting envisioned by Andrew Marshall in 1993. The processes for strategic planning, decision making and execution that enabled and sustained the first two offsets, however, remain fragmented and stove-piped, and the tools to support these processes, used by resource sponsors, requirements action officers and senior decision makers in the science and technology (S&T), acquisition and operational communities – tools such as email, presentation briefings, spreadsheets and disconnected data sets - do not and will not support a successful third offset strategy calling for innovative thinking and new ways of organizing, especially in a fiscal environment that demands doing more with less, and in a technology development environment that must deliver productivity and capability gains faster to stay ahead of adversaries.

(U) Successful innovation relies on empowered individuals driven to accomplish a mission. It must enlist the Navy's workforce at every level, upending the status quo with faster, more successful paths to mission success. It recognizes that the whole workforce is critical as a part of an innovation team. The Department of the Navy (DON) Research, Development, Test and Evaluation (RDT&E) 30 Year Strategic Plan [8], along with the long term plans of other services, will greatly impact the success of the Department of Defense third offset strategy. Today's challenges, the nature of competition, and the requirement for genuine innovation point toward an interactive, dynamic development process and strategic plan. The challenge is moving beyond biennial updates of a static document with a limited shelf life. Existing processes and the means of organizing and sharing information actually inhibit innovation. New processes and tools are needed to empower problem solvers and decision makers by reinforcing reforms aimed at minimizing the time, resources, and political capital for moving from good ideas to new military capabilities.

(U) Innovation is not solely about technology. It involves people, training, planning and management. While warfighting has been revolutionized over the past decades, the same cannot be said for strategic planning and innovation management processes. Achieving a third offset requires new tools for sharing and organizing information and for connecting the Navy workforce to accelerate and optimize decision making in the same way that warfighting advanced over the course of the revolution in military affairs. Enterprise Innovation Management (EIM) represents a breakthrough, an upheaval, and a transformation based on collaborative, dynamic strategic planning tools, processes, and the means of organizing people and information; a sea-change to automate the innovation.

3 (U) ATTEMPTS TO LINK STRATEGY TO EXECUTION

(U) Space constraints preclude a debate about the culture of strategic thinking. Consider instead that the strategic planning process (form) that gives birth to Navy strategy products follows from tools and methods for organizing people and information (functions) that are out of step with the Navy's interactive and dynamic mission. Consider also how culture is shaped by tool availability and selection, and how inadequate tools/methods create conditions for form following dysfunction. Addressing the background challenge to delivering a purposeful and effective strategic plan includes acknowledging that existing strategic planning is organized around a **serial** process for generating **static** products (the strategic plans) in a competitive

environment that is **interactive** and **dynamic**. The innovation opportunity and a key driver for implementing EIM involve transformation from serial, static processes and products to interactive, dynamic processes and products.

(U) Reflecting on recent planning process products: "...only three and a half years after completing *A Cooperative Strategy for 21st Century Seapower*, its primary author is now in favor of crafting a new strategy. That strategy was published only four years after its predecessor, *Seapower 21*. And that one came eight years after *Forward...from the Sea*, which itself was a two-year tune-up of *From the Sea*, which replaced the *1986 Maritime Strategy*. In other words, the Navy has changed its strategy five times in 25 years - while its mission has remained unchanged for more than five decades."[9]

(U) The process of developing Navy long-term strategic plans involves a synthesis of several heterogeneous data sets representing 1) current force structure and capabilities, 2) the operating cost and service life of those capabilities, and 3) the status of research and acquisition programs to maintain and improve upon those capabilities in the face of 4) current and future threats based on 5) national security objectives. In a sentence: An effective long term strategy requires knowing where you are, what you've got, where you want to go, and what it will take to get there: a capabilities roadmap.

(U) The DOD has taken a step in this direction with Reliance 21, an attempt to establish an overarching framework of the Department's S&T joint planning and coordination process. To date the effort has created 17 S&T communities of interest (COIs) to improve collaboration, and while it has laudable goals – creating technology roadmaps to identify all existing capabilities, threats, gaps, and the ongoing/planned technology development to fill those gaps - the processes and tools used by the COIs are rooted in the serial and static. Each COI was tasked with a deadline to produce a briefing presentation based on COI working groups collecting and cataloging all national security related technology development efforts versus all gaps in what were referred to as technology roadmaps. The flow of information within each COI and its working groups is vertical with limited opportunities for dynamic interaction across COIs. The ability to conduct trade space analysis across COIs and portfolio optimization is not apparent. Despite claims that the "...role of the COI Lead is one with significant influence over technical policy and budget decisions..." there is no evidence that the COIs are using budget formulation or execution in their deliberations, and no evidence they are able to link their roadmaps to technology development or acquisition programs in execution. Though Reliance 21 is a new way of organizing people, the processes and tools to support these new organizations remain unchanged. Reference to the building blocks of Reliance 21 as technology roadmaps, when compared to industry best practice technology roadmapping, is a misuse of the term.

4 (U) DEFINING EIM

(U) EIM provides the link between strategy and the actual technology development investments. The governance process determines the types of projects that enter into the development pipeline. EIM has four goals:

(1) (U) Maximize the value of the technology development portfolio;

(2) (U) Establish an appropriate balance of research and development (R&D) projects and programs to meet Fleet requirements;

(3) (U) Prioritize innovation initiatives to ensure that resources are allocated to the best projects and programs;

(4) (U) Ensure that the portfolio is strategically aligned.[10]

(U) One practice central to the achievement of these goals is the regular review of the portfolio of projects by leadership with the authority to make and enforce resource decisions. These decisions require the collection and analysis of key project attributes and metrics, and evaluation of the portfolio against a dynamic, constantly changing set of variables and objectives. Organizations that focus only on financial metrics are generally less successful at managing their portfolios than those that focus on a range of attributes such as balance, strategy and value.[11] A current example is the annual undersea warfare (USW) science and technology (S&T) portfolio heath assessment produced by the office of the USW Chief Technology Office. Although this is a critical tool for leadership to assess the alignment of technology development initiatives, this static report alone is a painstaking and resource heavy task in terms of manpower and time to produce and is out of date soon after producing the report. Time and money spent producing this report can be better spent on managing the portfolio rather than spending time "crunching the data" to produce the report.

(U) Managing a portfolio involves prioritization of projects against strategic objectives and initiatives as well as against other projects. In its most basic form, it amounts to prioritizing and selecting to invest in one project rather than another. The implications of portfolio management decisions are far-reaching, as the allocation of resources is a tangible – and expensive – cost for the DoN.

(U) There are many ways to evaluate projects and initiatives. The challenge is to identify a few key measures that can be assessed consistently. Areas that are commonly evaluated are:

- (U) Project justification
  - (U) How does the project support strategic initiatives?
  - (U) Is there a clear gap in the requirements?
  - (U) What problems are we solving?
- (U) Financial analysis
  - (U) What will it cost us?
- (U) Resource visibility
  - (U) What resources are required to execute the project(s)?

- (U) Project status
  - (U) What are the associated risks?
  - (U) How long will this take?
  - (U) Is the initiative meeting key milestones?

(U) To be truly effective, EIM needs to tie strategic planning into the new technology development process. This allows an organization to connect its long-term strategy with decisions about innovation investments in the here and now. Over the past decade, attention was very often overly focused on short-term objectives (e.g., addressing urgent operational needs) at the expense of longer term initiatives that will provide capabilities for future platforms or requirements. The discipline of technology gap analysis as an aspect of roadmapping forces the organization to expand the horizon of thinking from today into the "tomorrow" and then the "beyond" timeframes. Developing this vision of the future – expressed in terms of technology trends, requirements and technology capabilities – is an important step in the development of a top-performing EIM process that is strongly linked to – driven by and supportive of - strategy.

4.1 (U) Strategic Buckets

(U) Strategic buckets are a fundamental and highly useful tool for translating strategic intent into a set of decisions that align resource investments with the strategic plan.

(U) The first step is to determine what the set of buckets will be. Roadmaps are a good starting point for this process. A bucket may represent different types of projects (e.g., game-changing vs. incremental) or specific areas of focus for the Fleet (e.g., develop key platform technologies). The organization then decides what amount of investment to allocate to each bucket. To help with this determination, some organizations will be forced to rank the importance of the buckets.

(U) Once the buckets are defined, agreement is reached on the information required to evaluate and prioritize initiatives in each bucket. Next, the initiatives in the buckets are prioritized. Forced ranking can again be very helpful in allocating resources across initiatives, but other prioritization techniques could also be used.

4.2 (U) The EIM Process

(U) The operational process of managing technology development should be placed within an overall innovation governance framework. The reason is that there are certain elements of innovation planning that tie into higher-level planning cycles, while other elements relate to the governance processes driving development and ideation. EIM should be integrated into decision-making meetings and strategic planning (both annual planning and strategic planning).

(U) The participants in the portfolio management process should be explicitly identified, and their roles and responsibilities defined. Decision-making and communication processes should also be clearly laid out.

4.3 (U) COMMON CHALLENGES IN EIM

(U) Innovation is a learning process which includes discovering and implementing new ways of using existing technology – in this case, information technology. To Automate the Innovation, by implementing an EIM process, the Navy can operate more efficiently and better align their strategic planning with mission execution. Beyond a more efficient approach, EIM also delivers an effective approach for responding to the likelihood of much greater fiscal constraints: in the terminology of the current DOD fiscal environment, EIM identifies "efficiencies" in planning and in execution. In the terminology of a resource allocation process, EIM capability roadmapping and portfolio optimization, core functions of EIM, bring to light technology development dependencies, capability gaps, and redundancies. The resulting increase in the transparency of resourcing decisions and program execution, which enables doing more with less and faster than a competitor, concurrently creates challenges for EIM implementation.

(U) To illustrate, not all capability development investments are unique and redundant investments are not always planned. A significant challenge facing EIM implementation arises from its effectiveness in providing high level decision makers greater awareness of gaps and redundancies. While distributed, localized information empowers program managers with the ability to mitigate the depiction of a "bad bet" or a program struggling to meet objectives, EIM capability roadmapping can provide access to information vertically (weapon system platform down to component level) and horizontally (across platforms based on capability). The ability to access, consolidate, and assess local information at higher decision making levels redistributes the power of information in a manner that not everyone may readily embrace. This illustrative challenge points to a set of problems that large organizations face in performing effective trade-space analysis.

(U) During the Sopheon Corporation's many years of working with organizations on their innovation processes and practices, they consistently faced five specific issues that underlie the challenge of effectively managing portfolios.

- **(U) "We lack accurate, real-time data."** - Access to "good" information cannot be taken for granted. Too often, organizations don't have a complete or readily accessible inventory of their projects. Or when they do, the project information is either incomplete or of low quality. Some organizations take up to 90 days to pull together the information required for portfolio reviews, only to find that by the time the business case discussion occurs, the data is already out-of-date.
- **(U) "How do I turn all this data into knowledge I can base decisions on?" -** Even when the data is current and of good quality, it is often complex and overwhelming in volume. This makes it difficult to grasp the big picture and answer even simple questions such as "What is in the development pipeline?" and "What are the criteria we should use to prioritize projects and make project selections?"
- **(U) "We can't assess the implications of different investment scenarios." -** All too often, decision-makers have difficulty assessing the impact of alternative

scenarios. Examples include, "If I add or remove a project from the portfolio, what are the implications to my plan? How will it affect my resource constraints or strategy? And is it even possible to complete the project in the timeframe we want?" In many instances, these questions cannot be answered clearly; sometimes it's hard to even know what the questions should be.

- **(U) "Our portfolio decisions are disconnected from our resources." -** Even when portfolio teams make good decisions, there is often a delay. Worse, there is often a disconnect between new priorities and the commitment of resources required to implement them. How many times have you found yourself with too many projects for the limited resources that are available?
- **(U) "We still need to achieve goals even though we are resource-constrained."** - Many of the organizations we work with are heavily resource-constrained and are challenged to look beyond that limitation to find new ways to achieve their objectives. When we first come to them, they often have poor visibility into the innovation projects in their portfolio, the potential value of those projects, and how those projects are impacting resource capacity. As a result, these organizations have trouble singling out the high-value projects and ensuring that those projects have the resources needed for them to be successful.

4.4 (U) Five Principles of Effective EIM

(U) Resources are the lifeblood of project execution, whether financial, people, facilities or equipment. Our team subscribes strongly to the view that innovation planning, portfolio planning and resource planning are so intertwined that they cannot be considered in isolation of one another. Figure 1 provides a view of the five principles of effective EIM.

Figure 1 (U) Principles of effective portfolio and resource planning.

4.4.1 (U) High Quality, Real-time Data

(U) The foundation of all portfolio planning activities lies in rich, robust data from cross-functional sources across the enterprise that is always up-to-date. Acquiring this data is, however, one of the most challenging aspects of portfolio planning, since it typically "lives" in many places and is owned by many different people. In the case of DOD technology development, there is an added complexity of working at varying levels of security classification.

(U) The key to good portfolio data lies in cross-functional input from directors of innovation and strategic planning, functional managers, financial analysts, R&D scientists, operations managers, program managers and project managers, among others.

(U) The trick is to capture the data without creating additional work for people who are already busy. You do this by ensuring that the EIM tool you use is tightly integrated with your existing innovation and technology development processes. It will then capture the data whenever and wherever it is created. This is the main reason why "one-off" systems that require double data entry are simply not sustainable and may thwart adoption of any EIM system.

(U) Not only is it important to collect and maintain quality data, it is also important to share and provide value back to those providing the data that reflects the role they play in the organization.

- **(U) Leadership** takes a holistic view of the organization's strategic objectives. They require a "big picture" presentation in order to prioritize and select projects for further investment.
- **(U) Project managers and/or team leaders** want to monitor project status and risk.
- **(U) Program managers** need to understand the impact of individual projects on their (U) strategies and goals.
- **(U) Team members** need to view and review the details of their day-to-day tasks and activities.

(U) Everyone, not only leadership, should be afforded the opportunity to view the data in a form that is meaningful to them - concept dashboards for idea managers, status and risk dashboards for project managers, resource dashboards for program managers, and views for team members that allow them to examine their project data. This provides value to each contributor and helps them to understand the value of contributing good data and keeping it up to date.

4.4.2 (U) Powerful Visualization

(U) Once an organization has confidence in its data, it must turn that data into knowledge. The workforce must be able to use it to gain insights into the current state of their programs and projects (what-is), assess technical risks, and make decisions during their regular reviews. The data must provide answers to the critical portfolio questions used to understand the business and strategic impact of existing projects and initiatives. This effort can range from gauging the risks

associated with technology development and insertion to measuring the current sufficiency of the portfolio, to mapping initiatives to the strategic plan.

(U) One of the best ways to support this analytical activity is to turn the lists and numbers comprising the data into meaningful graphic representations. Dashboard-style views can help people quickly get the big picture (spotting trends, identifying red flags before they create significant difficulties for the organization, and confirming that projects and initiatives are aligned with strategies) and help ensure that the resulting decisions contribute to maximizing success and value of the projects and program needs.

(U) Examples of the different views that are useful in portfolio reviews include:

- **(U) A simple inventory of project status and risk.** The most basic level of visualizations, this dashboard enables senior leaders who conduct operational reviews of the portfolio, often on a monthly basis, to assess risk.
- **(U) High-level views of timelines, cost and ROI.** This dashboard, useful during quarterly executive-level portfolio reviews, will answer such questions as "Are our investments aligned with our innovation strategy?", "Do they maximize value?" and "Are they balanced across multiple risk dimensions?" It helps assess the degree to which current investments are balanced across different stages of the program life cycle. For example, "Do we have sufficient investments at the front end of the cycle to ensure success in the long term?" Alternatively, you could look at the pipeline against calendar timelines to view the key phases of investment for each release, and when each product or technology will be transitioned to acquisition and most importantly to the warfighter. From a balance standpoint, this view will also tell you if roll outs are sufficiently spread out, or if they are stacked up during a narrow time period in a way that will likely cause problems.
- **(U) Portfolio risk vs. reward.** It is no surprise that high-value projects often entail significant levels of risk. As leaders push the organization toward more innovative capabilities it is important to not place all of your eggs in one basket. This view helps ensure that the mix of investments is appropriately weighted toward high-value projects, but with reasonable risk levels.

4.4.3 (U) Efficient Exploration

(U) While the high-level presentation of information discussed earlier plays a vital role in the decision-making process, it should be noted that once good data is in place it will probably also be put to use well beyond standard review meetings. Decision-makers and team leaders need to be able to drill down on demand for more detailed data relevant to a program, project, initiative, or point in time. It should be easy to explore the data dynamically, without developing code or creating new views or dashboards. For example, if a high-level dashboard indicates a disproportionate investment in a particular technology or capability, one should be able to easily

explore the more detailed underlying data to view and better understand the issues at play before any decisions are made on corrective action.

(U) Whatever portfolio management tool you employ, it should serve as a "trampoline" by allowing you to "bounce up and down" between the high-level and lower-level views required at different stages and by different roles in the portfolio management process.

4.4.4 (U) Insightful Scenarios (What-if)

(U) At certain points in the planning cycle, leaders need to evaluate multiple planning scenarios to resolve existing problems or to anticipate and avoid future hurdles. For example, they may need to address which projects in the portfolio could be prioritized or put on hold to close an identified gap between actual and desired portfolio value. Or, they may have to resolve a resource bottleneck created by over-allocation of resources.

(U) Insightful "what-if" analysis of real-time portfolio data enables powerful assessment of investment options, and planners must be able to visualize tradeoffs across a number of factors such as cost, reward, risk, resources, and timing.

(U) In defining potential scenarios for a given portfolio, decision-makers should prioritize initiatives using:

- (U) Project data (financials, schedule, risk assessments);
- (U) Scoring models; and
- (U) Techniques to align the portfolio with strategic plans, such as the strategic buckets discussed earlier.

(U) Decision-makers should look to determine the impact of adding, removing or delaying projects in the portfolio on the achievement of both long- and short-term business objectives and plans. Scenarios to maximize value or to minimize overall risk can be defined and compared with other possible portfolio decisions.

4.4.5 (U) Resource Commitment

(U) Without commitment of resources no project or initiative plan will succeed. The slightest misallocation of resources can create conflicts that lead to project delays and inefficiencies and, ultimately, lengthen and increase the costs of new innovation development cycles.

(U) As its EIM practices mature, an organization will increasingly incorporate resource planning information into decision-making processes. This, in turn, will improve its ability to explicitly use prioritization to ensure that it is executing the "right" projects. When teams are ready to commit to a revised "plan of record" they must make certain that required human and financial resources are available. An effective resource commitment process ensures that resources are secured and aligned to execute on new plans.

(U) Ideally, program managers should aim to:

- (U) Improve the visibility of resource requests and related product planning dependencies;
- (U) Centrally track and evaluate resource allocations and decisions;
- (U) Dynamically adjust allocations to keep resources focused on high-priority projects; and
- (U) Streamline the communication between team leaders and resource managers for innovation planning.

(U) The major challenge in incorporating resource planning into portfolio management is to make sure that the planning process is simple and scalable. It is all too easy to overly complicate this process by demanding data that is too granular or by focusing on actual resource utilization vs. forward-looking resource plans. The objective should be to collect the minimum amount of resource information required to manage the portfolio against organizational resource constraints. A typical approach is to use resource pool planning methodologies and appropriate tools.

5 (U) IMPLEMENTING EIM

(U) EIM will enable the Navy to operate more efficiently, affordably, and to better align its strategic planning with mission execution. The Navy's use of EIM will accomplish four goals:

- Maximize the value of the technology development portfolio in delivering Naval warfighting capabilities.
- Establish cross-domain balance among R&D projects and programs.
- Prioritize technology development initiatives to ensure resources are allocated to right-timed capability/program insertion points in support of the Navy mission.
- Ensure the Navy RDT&E portfolio is strategically aligned.

(U) A fully implemented EIM process, allows an organization to connect its long-term strategy with near-term technology development investments. The discipline of roadmapping gap analysis forces an organization to expand the horizon of thinking from today into the "tomorrow" and then the "beyond" timeframes. Developing this vision of the future – expressed in linked terms of present forces, threats, technology trends, requirements and capabilities – is critical in implementing an effective EIM process that binds strategy and execution. EIM systems provide the following capabilities:

- High quality, cross-functional, real-time data
- Powerful visualization
- Efficient exploration

- Alternate scenario development
- Resourcing-execution linkages

(U) EIM will improve strategic technology development planning by assisting leadership and management to perform the following functions:

- New idea and concept development
- Technology (i.e., capability) roadmapping
- Portfolio optimization
- Analytics
- Collaborative workflow
- Project, program and portfolio management
- Resource planning
- Strategic planning

(U) EIM harnesses information in greater volume across better connected entities (people, organizations, data sets) to enhance and accelerate collaboration, strategic planning, and decision making. It transforms existing technology development planning processes that use static representations masquerading as technology roadmaps and are only as deep as a presentation slide deck and a spreadsheet.

(U) EIM is manifest in a dynamic, collaborative enterprise information environment, the foundation for cataloging threats, capabilities (existing, under development, and planned), gaps and redundancies. It is an industry innovation management best practice and a proven solution for optimizing research and acquisition investment decisions across global organizations. It supports strategic planning and execution across near-, mid- and long-range horizons, at the DOD, military service, system, and sub-system levels. The reality is that implementing EIM requires the commitment of leadership at the highest levels and an implementation plan that acknowledges resistance to exposing investment redundancies and gaps, but which incrementally delivers the greater benefits of a dynamic enterprise innovation management environment.

"The most dangerous phrase in the language is, 'We've always done it this way.'"
— RADM Grace Hopper, USN

(U) A key component of EIM, capability roadmapping, is in the process of being implemented within Team Submarine by the Navy's Under Sea Warfare Chief Technology Office (USW CTO). Over the last year, USW CTO has conducted numerous technology roadmapping workshops and produced preliminary roadmaps for several Team Submarine program offices. Following the acquisition of a commercial EIM tool, the roadmaps will be populated by USW CTO with the most current data to form a technology baseline and uploaded into the roadmapping environment. It is especially noteworthy that this effort has taken

significant time and resources to get to this point due to the onerous information systems and procurement mandates that must be satisfied to implement even a relatively small instantiation of this capability. In almost every case and at every level, USW CTO staff were urged not to pursue this course of action because it would be too hard, take too long, and cost too much - in reality, the implementation of an EIM system will help better align technology development, produce real-time data that can be used to make informed decisions, and ultimately save time and money while allowing the Navy to concentrate on developing those promising capabilities that better respond to the Fleet's prioritized needs.

(U) The National Aeronautics and Space Administration (NASA) Marshall Space Flight Center (MSFC) has also successfully implemented the EIM process and tools, institutionalizing a more disciplined and automated management methodology that improves decision making, significantly lowers costs, and avoids rework. MSFC leadership, commitment and clear communication served to help the workforce understand the value of the process and tools, whereby innovation became a team sport oriented toward greater enterprise efficiency and effectiveness. Their program and business data management processes, previously estimated to be 10% automated and 90% manual entry and manipulation, have inverted such that presently 90% of the process is supported by automation with 10% requiring manual entry and manipulation. For this accomplishment, the NASA MSFC implementation team won one of the first ever NASA MSFC Innovation awards given by MSFC Office of Chief Technologist.

6 (U) CONCLUSION

(U) The Navy can no longer afford to wait for a crisis to spur innovation. Absent a crisis, meaningful, deliberate innovation and the high likelihood of further cuts in Defense budgets, the Navy faces the prospect not of doing more with less, but of doing less with less. EIM presents an opportunity for technology development strategists to lead with actions that revolutionize strategic planning processes and achieve a break-through using new programmatic measures, methods and processes.

EIM is no easy-button and requires the commitment of leadership at the highest levels – the Chief of Naval Operations (CNO), the Deputy CNO for Integration of Capabilities and Resources (N8), the Navy Chief Information Officer (CIO), and Program Executive Office, Enterprise Information Systems (PEO-EIS). It requires a long-haul commitment as it involves every level of the Navy workforce, new tools to leverage the existing enterprise information infrastructure, and workforce training and certification akin to the Defense Acquisition Workforce Improvement Act (DAWIA). Figure 1 illustrates the benefits of transitioning from current processes and tools to EIM.

To further inform the Navy's consideration of EIM as a means of revolutionizing Navy R&D strategic planning, it is recommended that the next step involve a pilot project, a proof of concept for implementing EIM functionality centered in a planned or newly forming single program, with implementation built out horizontally across the program's critical S&T nodes and vertically to connect decision makers at the highest levels, through the program office and down to

operational end-users: an enterprise-enabled community of interest organized around a single program.

The EIM pilot would demonstrate 10 key performance parameters that increase the effectiveness of strategic planning products and advanced capability development at lower cost through sustainable innovation, while driving significantly higher technology transition to acquisition programs of record and ultimately to Naval warfighters. These requirements are:

- Provide an integrated platform for the program's R&D initiatives and opportunities with dynamic links between the strategic plan and the acquisition program.
- Support the full acquisition lifecycle from strategy to new program concept development, program of record, operational capability, fielding, through weapons system retirement.
- Support all dimensions of planning and decision making.
- Provide a knowledge base for enhancing organizational agility and the speed and quality of decision making.
- Define measurable performance improvements.
- The ability to scale as demand for EIM changes.
- Provide a framework for new program concept development.
- Provide capabilities requiring no more training than Defense Acquisition University's Program Management curriculum.
- Co-exist with current DON business software systems, such as the Navy Enterprise Resource Planning (N-ERP) System.
- Implementation guided by an entity that understands the Navy's technology development process and acquisition lifecycle.

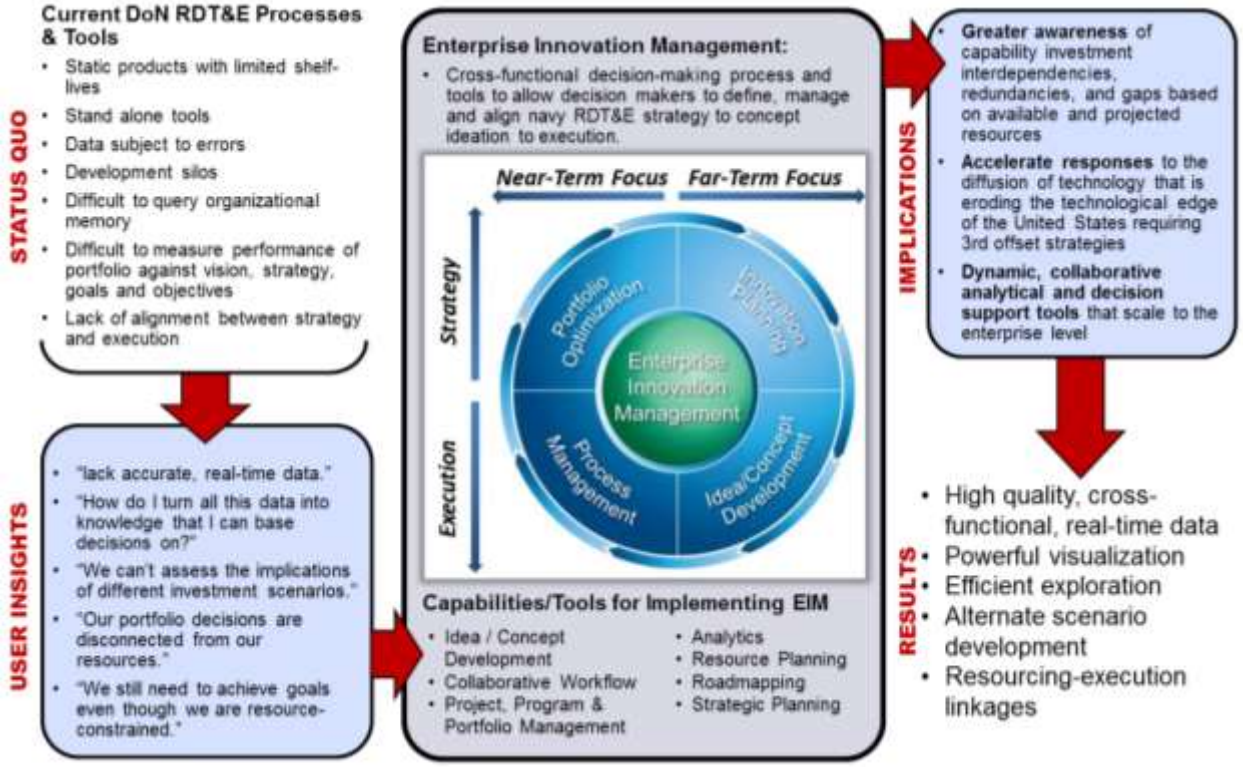

Figure 2 (U) Benefits of Implementing Enterprise Innovation Management Processes and Tools

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8 (U) ACRONYMS AND ABBREVIATIONS

CIO	Chief Information Officer
CNO	Chief of Naval Operations
COI	Community of Interest
COMSUBFOR	Commander, Submarine Forces
CTO	Chief Technology Officer
DAWIA	Defense Acquisition Workforce Improvement Act
DCNO	Deputy Chief of Naval Operations
DOD	Department of Defense
DON	Department of the Navy
EIM	Enterprise Information Management
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
N-ERP	Navy Enterprise Resource Planning
PEO-EIS	Program Executive Office, Enterprise Information Systems
R&D	Research and Development
RDT&E	Research, Development, Test and Evaluation
RMA	Revolution in Military Affairs
S&T	Science and Technology
USW	Undersea Warfare

9 (U) BIOGRAPHIES

(U) Tory D. Hill is a retired Submarine Chief Sonar Technician and IT professional with over 23 years of Naval service. He currently serves as a Senior Program Analyst for Trenchant Analytics, LLC. Since joining the company in 2013, he has served as the Technology Roadmapping Lead to the Undersea Warfare Chief Technology Office and Advanced Submarine Systems Development Program Office.

Prior to his current position Mr. Hill served at the Pentagon in OPNAV N3N5 where he implemented the Knowledge Management program for the Chief of Naval Operations Service Watch floor and all of N3N5 directorates. Before retiring, Mr. Hill served as the Submarine Force Pacific Fleet Manning Analyst at COMMANDER SUBMARINE FORCE in Norfolk VA. He maintained and monitored the enlisted manning requirements and levels of 71 nuclear

submarines ensuring the placement of over 18,000 personnel for tactical/surveillance readiness as assigned.

Prior to COMSUBFOR, Mr. Hill served in various Navy and DOD commands including assignments at NAVSEA PMS 450 as Project Manager for Virginia Class Testing Team (C.O.A.T.S), on three SSN LA Class and two SSBN 640 Class submarines.

Mr. Hill earned a degree in Engineering Management from the Grantham University.

(U) Robert F. Medve is a retired Naval Aviator with over 20 years of Naval service. He currently serves as the Director of Operations for Trenchant Analytics, LLC. Since joining the company in 2012, he has served as Senior Program Advisor to the Undersea Warfare Chief Technology Office (USW CTO) and Advanced Submarine Systems Development Program Office (NAVSEA 073).

Before retiring, Mr. Medve served as Deputy, C4ISR Department and Director, Applications and Transitions and Electronics, Sensors and Networks Research Divisions at ONR. Prior to ONR, Mr. Medve served in various Navy and DOD commands including assignments at the Defense Science Board, Defense Threat Reduction Agency, Air Test and Evaluation Squadron One, Helicopter Antisubmarine Squadrons Eleven and Fifteen and the 2515th Navy Air Ambulance Detachment.

Mr. Medve received a B.S. in Industrial (Product) Design from the Ohio State University, a M.S. in Systems Engineering from Johns Hopkins University. He is a Certified Acquisition Workforce Professional (Level III Program Management, SPRDE Systems Engineering and Test & Evaluation, Level II International Affairs and Level I Science & Technology Management). Mr. Medve is a member of the Project Management Institute and the National Defense Industrial Association.

(U) Sheila Plunkett is Vice President of North American Sales at Sopheon

Ms. Plunkett leads North American Sales for Sopheon. She has over 30 years of software sales executive and management experience with enterprise solutions for Fortune 500 companies, including leadership roles with FICO, Cullinet, SAP and Dexma.

(U) Tom Sherbet, Regional Director at Sopheon, has more than 10 years of experience developing and implementing roadmapping methodologies and strategic planning processes, including the integration of software support. He has played a key role in establishing best-in-

class roadmapping solutions for major corporations in a range of industries. Tom previously worked at Honeywell International, where he spearheaded the company's enterprise roadmapping efforts.

(U) Michael L. Szymanski is the founder and president of Trenchant Analytics, LLC. He is a retired Naval Officer, qualified in Submarines and Surface Warfare, with over 25 years of professional experience supporting DOD research and development and managing U.S. Navy acquisition programs. He was the Deputy Program Manager for Business and Financial Management in the Navy's Air-to-Air Missile Program Office, including the Joint Navy-Air Force Sidewinder (AIM-9X) major acquisition program, and the Deputy Director (Resources) for the Submarine Warfare Directorate on the Chief of Naval Operations staff. Since retiring from active duty, he has specialized in innovative technology-based program formulation including requirements analysis, cost estimating, procurement, and contract management. He has over 15 years of experience supporting the Defense Advanced Research Projects Agency (DARPA), Naval Research Laboratory, and the Program Executive Office (Submarines).

Mr. Szymanski holds a Master's Degree (Finance) from the Naval Postgraduate School and a Bachelor's Degree (Accounting) from the University of Notre Dame. He completed the Defense Acquisition University Program Management Course and is a Certified Acquisition Workforce Professional (Level III Business, Cost, Estimating, and Financial Management).

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