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Naval Information Warfare Center (NIWC) Pacific Increasing Senior Technical Leadership Involvement in Internal Research and Development (IRAD) Investment Process

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ADMINISTRATIVE INFORMATION

The work described in this report was performed by the S&T Forecasting, Investment and Transition Division of the Cyber S&T Department, Naval Information Warfare Center Pacific (NIWC Pacific), San Diego, CA.

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1. PURPOSE

The purpose of this technical document is to document an effective process utilized by the NIWC Pacific Science and Technology (S&T) Forecasting, Investment and Transition Division to increase the involvement of senior technical leadership and/or subject matter experts (SMEs) in the predominant Internal Research and Development (IRAD) program at NIWC Pacific, the Naval Innovative Science and Engineering (NISE) program. Specifically, the senior technical leadership consisted of NIWC Pacific Senior Scientific Technical Managers (SSTMs), Senior Level (SL) and Scientific and Professional (STs). These senior technical leaders provide guidance to Principle Investigators (PIs) and support to the NISE Program by authoring and updating the Special Emphasis Areas (SEAs) before each year's NISE solicitation.

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2. BACKGROUND

For the past three years, the NIWC Pacific NISE proposal cycles have been guided by the Special Emphasis Areas (SEAs) in conjunction with other Navy and NIWC Pacific strategic and guidance documents. The SEAs document is comprised of approximately 15 (number may vary slightly each year) technology/capability areas. The SEAs provides the PIs a technology area description of critical importance. The division compiles the senior technical leadership's inputs and ensures the document is updated prior to the NISE program call for proposals during the second quarter of each fiscal year.

The division requested updates via email from each SEA owner (senior technical leader), compiled the inputs into a single SEA document, and requested all the SEA owners to review and provide comments. In addition, early in the second quarter a full day workshop was scheduled to provide the opportunity for the senior technical leaders to describe their SEA and to provide feedback on all of the SEAs directly to the SEA owners. The workshops are well attended and assist in developing a more robust SEAs document.

While this level of involvement has been valuable, anecdotal feedback from the senior technical leaders and PIs indicated that further engagement would be beneficial to all. PIs could benefit by their proposal being more relevant to the goals of NIWC Pacific and senior technical leaders could benefit from focused research in their respective areas. In response to the feedback, the division launched a study to obtain suggestions from the SEA owners for the purpose of increasing the engagement of the senior technology leadership at NIWC Pacific with the NISE internal investment program.

In addition to the stakeholder's feedback, the application of industry/government best practices provides an independent assessment that lends credibility and guidance to an idea or methodology. In this case, the Code 72110 Analysis Group had previously completed a study on the industry best practices for investment of internal funding in technology [1]. The best practices study provided additional evaluation criteria that was valuable in analyzing and prioritizing the suggestions received. Specifically, the Code 72110 Analysis Group referenced a GAO study [2] that surveyed eight major technology companies and documented their best practices for internal technology investments for application to DoD organizations. The GAO study along with other academic/industry studies were used to compare NIWC Pacific's NISE Program processes with the leading technology companies. The study found that many of the industry leading companies' best practices for internal technology investments were applicable to NISE, most of the best practices were already implemented at NIWC Pacific, and some were not necessarily pertinent to a government organization.

The following two best practices clearly support greater involvement of senior technology leadership in the internal investment process:

1. The GAO study identified that industry leading companies solicit input from top leadership responsible for setting the company's overall strategy and funding and, scientists and technologists who plan for future technology development and identify when technologies are ready for integration [2].

2. Research has shown that team members' benchmarking strategies are more successful when there is early management buy-in and greater clarity of project goals [3].

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3. PROCESS

3.1 INTRODUCTION

The S&T Forecasting, Investment and Transition Division highly values the current involvement of the senior technical leaders in the NISE Program. However, it was not necessarily clear what additional involvement would be most beneficial to NIWC Pacific and the NISE program. The analysts were challenged to determine additional engagement that would be beneficial and cost effective to NIWC Pacific, the senior technical leaders, the PIs, and the NISE Program.

To derive the greatest value for the senior technical leaders, it was important for them to be involved in developing the way ahead. Since the senior technical leaders have been involved in the NISE process they already had experience with the PIs and a vested interest in the successful application of the NISE funding to their technology areas.

The approach of the division and the analysis group was to interview the senior technical leaders that authored SEAs each year prior to the NISE call for proposals. Interviewing the senior technical leaders was deemed preferable to a data call since interviews facilitate open-ended questions, follow-on questions, and more detailed explanations, if necessary. Advance planning for the analysis of the results brought up additional concerns that a data call could be misinterpreted and may not be as complete as an interview process. Thus, the analysts used a pre-determined set of open-ended questions (see Appendix A) to interview each SEA owner for one half hour that would guide the discussion to obtain comparable information and also allow the SSTM an opportunity to discuss their observations and concerns.

3.2 PROCESS OVERVIEW

After selecting the interview approach to obtain information from the senior technical leaders, the analysis group developed a process for collecting and evaluating the feedback for implementation by division, shown in Figure 1.

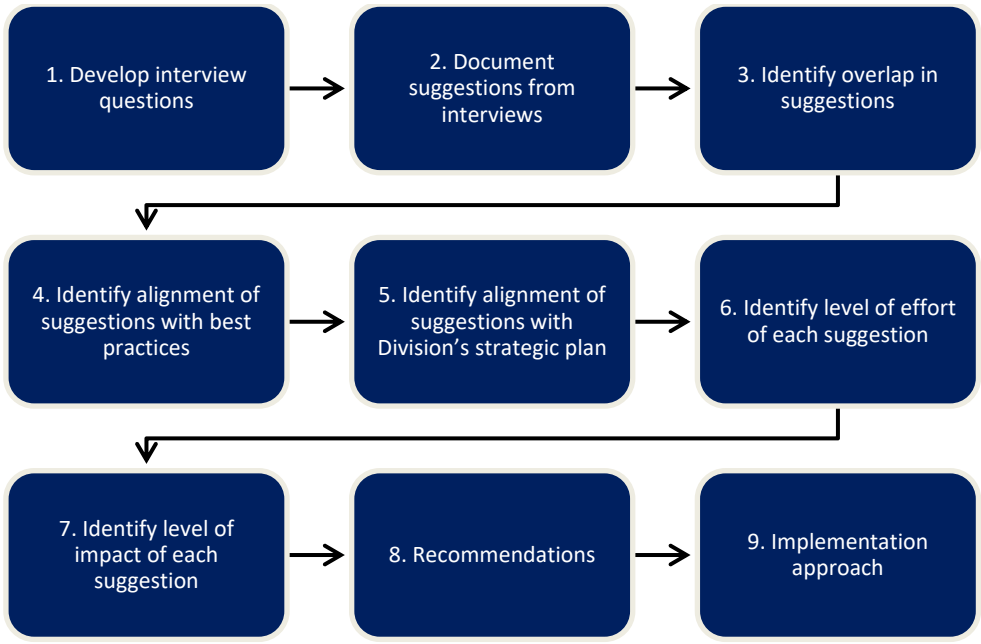

Figure 1. Senior Technical Leaders Suggestion Analytical Process.

1. Develop interview questions

Given that the analysis group selected the interview process as the most effective way to gain buy-in from the leaders and obtaining relevant suggestions for NISE process improvement, the first task was to determine the desired data for the analysis. Recognizing that data from interviews would be more subjective and thus more difficult to quantify than a standard data call, a set of interview questions were developed. Open-ended questions would provide some structure to the feedback and maximize the limited time available for the interviews.

The intent of the questions was to guide the conversation and to allow the senior technical leaders to provide their view of the utilization and value of the SEAs, specifics on their SEA and update requirements, discuss potential increases in involvement, and potential significant technologies/capabilities in their technology area.

The end goal of the data collection from the interviews was to summarize and analyze the feedback into a list of suggestions for evaluation and potential implementation.

With the primary goal of the study to involve subject matter experts (SMEs) in an established process that could benefit from their support, questions were developed to solicit information in a one half hour conversation (see appendix A).

2. Document suggestions from interviews

During the interviews, it was important to listen at least 95 percent of the time. Listening makes documenting the interviews easier and the interviewee feels that they had the opportunity to express their thoughts without being led to a pre-determined outcome. Documenting the interviews in writing is valuable in analyzing and comparing the results to obtain an accurate view. Documenting the interview also may provide information for future reference.

3. Identify overlap in suggestions

After each interview, the senior technical leaders' suggestions for each area of questions were summarized in an Excel spreadsheet with the answers/suggestions in rows and a column for each senior technical leader. If a suggestion was mentioned by multiple interviewees, it was noted in the spreadsheet along with any variation. This methodology allowed a relatively quick summary at the end of the interviews. Suggestions that were received from multiple senior technical leaders were weighted heavier. However, a single good idea was also considered valuable. Documenting the interviews and entering the pertinent information in the spreadsheet just after the interview facilitated a more accurate view of their comments since the conversation had just occurred.

4. Identify alignment of suggestions with best practices

As discussed earlier in the background, the 72210 Analysis Group had recently completed a study (Maximizing the Value of NISE Investments) on industry best practices in making internal technology investments. Aligning the industry best practices presents a stronger case for implementation of the suggestion. Again, the NISE Program is aligned with many of the best practices; however, there is always an opportunity for improvement. The focus was to implement best practices that are applicable to NIWC Pacific and NISE. Not surprisingly, the senior technical leaders' suggestions often aligned with industry best practices and aligning them provided a way to validate and prioritize the implementations.

5. Identify alignment of suggestions with Division's strategic plan

The S&T Forecasting, Investment and Transition Division developed a Strategic Plan beginning late in FY20 and rolled it out to the division in March of 2021. Interestingly and not surprisingly, several of the suggestions aligned with the Division's Strategic Plan goals and strategies. This alignment provided another opportunity to prioritize the implementation of the suggestions.

6. Identify level of effort of each suggestion

In addition to evaluating the suggestions based on industry best practices and the Division's Strategic Plan, the 72110 Analysis Group identified two other criteria for evaluation: level of effort and level of impact. The level of effort was assessed to be either high (red), medium (yellow) or low (green) based on the following criteria:

- Implementation requires higher level of approval including Commanding Officer and Executive Director?
- Are there significant resources required to implement or execute?
- Does implementation or execution require a significant amount of time from the senior technical leader or other stakeholders?
- Are there political obstacles to overcome?

Identifying the level of effort also helped prioritize the implementation of the suggestions. Some suggestions could be easily implemented while others required one or multiple efforts within the categories listed above.

7. Identify level of impact of each suggestion

As with level of effort, the level of impact was assessed to be either high (green), medium (yellow), or low (red). This evaluation when used in conjunction with the level of effort helped with the evaluation and prioritization of suggestions. Priority for implementation was focused on high impact recommendations.

8. Recommendation

After assessing each suggestion based on the four criteria: alignment with best practices, alignment with division's strategic plan, level of effort, and level of impact, the 72110 Analysis Group recommended that the division prioritize the suggestions based on the following:

- Low to moderate level of effort
- High level of impact
- Alignment with best practices or division's strategic plan

Using the criteria above reduced the number of suggestions for implementation and provided a rough order prioritization for implementation. High impact, low level of effort suggestions were the first analyzed for implementation.

9. Implementation approach

Implementing suggestions requires resources to at least develop an implementation plan and follow up to ensure that the tasks are accomplished. Since the S&T Forecasting, Investment and Transition Division's Strategic Plan aligns with the suggestions recommended for implementation, the 72110 Analysis Group recommended that the division utilize the strategic plan framework to implement the senior technical leadership's suggestions.

4. CONCLUSIONS

The S&T Forecasting, Investment and Transition Division and the 72110 Analysis Group has received positive feedback from the senior technical leaders regarding their experience during and after their interview. The suggestions that they provided were largely supported by industry best practices and were very valuable as they were specifically tailored to the NIWC Pacific organization. The division plans to implement many of the suggestions and has already begun to do so. The division also plans to continue engagement with the senior technical leaders in the future, with the expectation that they will continue to provide valuable guidance to maximize the internal S&T investments which will provide great benefit to the warfighters.

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REFERENCES

1. Maximizing the Value of NISE Investments by Paul Shigley, Summer Hierholzer, and Gale Pennoyer (October 2020)
2. U.S. Government Accountability Office (GAO) Report to Congressional Committees: DEFENSE SCIENCE AND TECHNOLOGY Adopting Best Practices Can Improve Innovation Investments and Management (June 2017); GAO-17-499 Innovation Best Practices
3. Instilling the Entrepreneurial Spirit in Your R&D Team: What Large Firms Can Learn from Successful Start-ups by Tucker Marion, Denise Dunlap, and John Friar (Academic Paper); IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT, VOL. 59, NO. 2, MAY 2012
4. 721 Strategic Plan by Alex Phipps (February 2021)

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APPENDIX A
INTERVIEW QUESTIONS

- Are SEAs still current/relevant to their goals and strategies or does the SEA need to be updated?
  - Do you think the SEAs is a good way to share your vision and strategy with the workforce to influence NISE proposals?
    - If no, do you have any other ideas about how to accomplish this?
  - Is your SEA still current/relevant to your goals and strategies or does your SEA need to be updated?
  - What is your preferred way to update your SEA? Process? i.e. workshop, email request, etc.
- Should senior technical leaders have a greater role or more influence in the NISE process?
  - Assuming no limitations on time or budget, what role should they have in NISE process?
  - Given the constraints we have today, what role(s) should senior technical leaders have in the NISE process? For example: voting on proposals, yea or no decisions; mentoring; etc.
- What is the most critical or important technology the NISE Program should fund for your SEA?
  - What is the expected impact of this technology to the Navy/warfighter?
  - Where is the maturation of this technology to the Fleet 1-2 years/3-5 years/5+ years
  - What is the ballpark cost of developing this technology?
  - Does the lab currently have the qualified workforce to effectively develop this technology?
  - Are there complimentary technologies required to effective deliver this capability to the fleet?

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14. ABSTRACT

This document outlines a process utilized by the NIWC Pacific Science and Technology (S&T) Forecasting, Investment and Transition Division to increase the involvement of senior technical leadership and/or subject matter experts (SMEs) in the predominant Internal Research and Development (IRAD) program at NIWC Pacific, the Naval Innovative Science and Engineering (NISE) program. The S&T Forecasting, Investment and Transition Division highly values the current involvement of the senior technical leaders in the NISE Program. However, it was not necessarily clear what additional involvement would be most beneficial to NIWC Pacific and the NISE program. The analysts were challenged to determine additional engagement that would be beneficial and cost effective to NIWC Pacific, the senior technical leaders, the PIs, and the NISE Program.

15. SUBJECT TERMS

NISE, IRAD, investment decision process, technical leadership engagement

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