Naval Information Warfare Center PACIFIC

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Naval Information Warfare Center (NIWC) Pacific Naval Innovative Science and Engineering (NISE) Success Story

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ADMINISTRATIVE INFORMATION

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APPENDICES

FIGURES

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1. INTRODUCTION

1.1 PURPOSE

The purpose of this document is to provide a "how to" guide for technical managers to develop a visual aid that highlights the enduring value that early Naval Innovative Science and Engineering (NISE) investments have over a period of time, which typically extends beyond individual projects. This guide is modeled after the NIWC Pacific NISE Success process [1]. Specific references to databases and reports that may not exist at other organizations or commands have been replaced by generic references to the type of data used.

1.2 BACKGROUND

NIWC Pacific is one of fifteen Naval Warfare Centers (WC) that operate primarily using a Working Capital Funding (WCF) model. The WCF model is contractual in nature, where 100% of WC costs are funded by customers (e.g. Science & Technology (S&T) projects, acquisition programs, Fleet Commands), and funded orders must be received before work can begin. The working capital funded model has both pros and cons. In one sense it ensures that the Naval Warfare Centers activities are fully aligned to tasking that supports program priorities, but it is also cited as a primary reason that our focus has shifted from "long term mission needs to shorter term customer funded efforts... while (this) might lead one to conclude that the warfare centers are broken, this is not the case. They are doing what they have been funded to do" [2].

The NISE program was established by Section 219 of the 2009 National Defense Authorization Act (NDAA) [3] and has proven extremely impactful in accelerating the development of priority Naval capabilities and in developing the Science & Engineering workforce through research projects, technical training, laboratory infrastructure investments, and workforce development innovations. It is prioritized and executed on a yearly basis, and because ultimate decision authority is delegated to the lab Director, i.e. the NIWC Pacific Executive Director (ED), the investments can be readily re-prioritized within the execution year. The inherent flexibility of this program allows the NIWC Pacific ED to make investments in key technical areas that precede acquisition programs, and it has been shown to precede, even formal S&T programs.

The NIWC Pacific NISE program continues to execute at high-standards of technical excellence and has been a model program demonstrating the critical role that NISE plays in our national defense and the technical health of the Department of Defense (DoD) laboratories. However, because it is executed yearly, the final reports and standard yearly reporting templates, do not lend themselves to acknowledging the cumulative value of multiple NISE projects in a technology portfolio. While the technologies developed may transition into to formal acquisition programs, this multi-year technology portfolio-based perspective is helpful to illustrate the out-sized effect of a practiced and expert technical workforce in priority areas and in advance of major S&T and/or acquisition programs. At the time of this publication, the NISE program is only funded by the Department of the Navy at half of the amount authorized by law. Even at these funding levels, it has not only transitioned technologies to acquisition programs, but can now also be recognized for the value that an inherently flexible funding mechanism has on ensuring our technical workforce is practiced in the art of applying emerging technologies for Naval applications.

These NIWC Pacific-led NISE success stories that begin with early NISE technology investments demonstrate how those investments in the workforce (via NISE seedlings) have resulted in critical increases in capability and outsized results, including substantial increases in external investments which further cements NIWC Pacific's role of significant technical leadership at the national level.

One example is in the final entry of 2020 of the Machine Learning (ML) NISE Success Story, NIWC Pacific scientists were hand-selected to lead several major S&T ML programs, and also to facilitate the Chief of Naval Research's Artificial Intelligence Industry Session with Google.

1.3 PROCESS

1.3.1 Introduction

In order to communicate the benefits to the Department of Navy (DoN) of the NIWC Pacific NISE program, the Cyber/S&T Department Head has documented a story narrative in a supporting presentation format to show applicable data and information.

To date, NIWC Pacific has demonstrated the effect of utilizing the NISE program investments for technology research, funding infrastructure, training the workforce, assisting in technology demonstrations, and promoting new technology applications for the DoN. The NISE story is summarized in a single "story" slide (with related backup information) containing multi-year workforce, financial, and project data from past and current NISE projects together with information from other projects within the same technology. To develop the NISE technology story, use the PowerPoint (PPT) and Excel template files. A copy of the NISE story slide and the Excel Sand Chart is provided in Appendix A.

After selecting a technology to feature as a NISE story, the following sections document the process of developing the technology story and the associated artifacts to reveal and communicate the efficacy of early investment in technology by the NIWC Pacific NISE program.

1.3.2 Process Overview

Figure 1 is an overview of the entire process used to develop a viewgraph and backup information that communicates a NISE program investment story. Each of the boxes in Figure 1 will be explained in detail in the following sections of this document. Steps 1, 2, and 3 may be done in parallel.

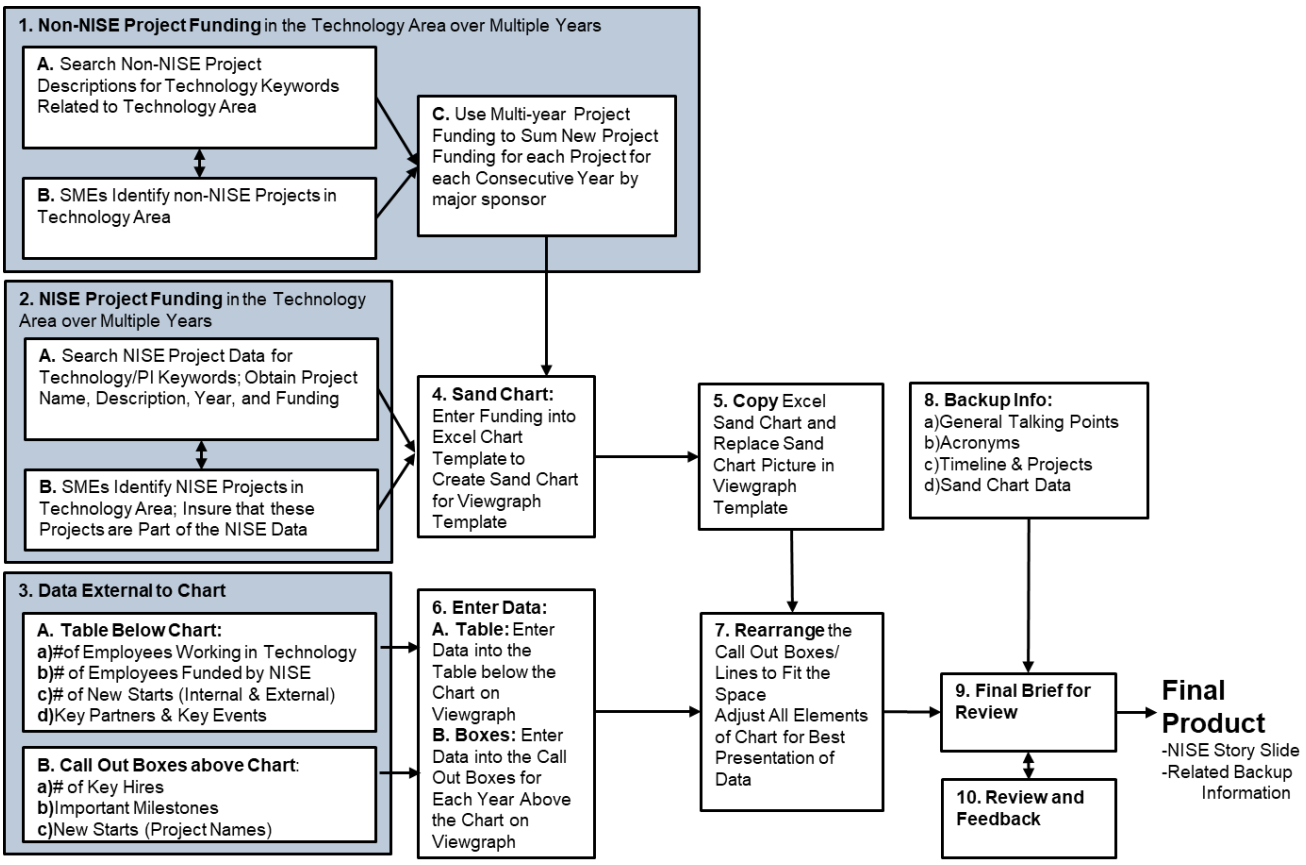

Figure 1. Overall Process Chart for Developing NISE Investment Story.

1. Non-NISE Project Funding in the Technology Area over Multiple Years:

There are two types of funding required for a NISE story; NISE project funding and Non-NISE project funding (direct funding from external sponsors). The Non-NISE funding received from sponsors' supports the technology area related projects and generally utilizes a portion of the workforce that was developed using NISE funding. Projects may be identified by the technology area Subject Matter Expert (SME) or if possible searching a project database may create a more complete list of technology related projects. The goal is to identify Non-NISE technology related projects and the project funding by fiscal year by sponsor.

A. Search Non-NISE Project Descriptions for Technology Keywords Related to Technology Area:

Obtain project data that includes the fields: Project Name (or unique project identifier), Work Description (a more robust description is useful), and additional fields that may be required for a cross-reference to the project funding. Determine the relevant keywords used to describe work in the technology area. Then search the Work Description field for the technology key

words to identify projects potentially related to the technology area. Determine if the projects in the search results are actually related to the technology area; some projects may utilize the keywords in the description field but not necessarily be applicable to this technology story. Capture the project names determined to be related to the technology story. The list of projects will be used to summarize funding for each fiscal year by sponsor using the financial data (in Step 1C).

B. SME's Identify Non-NISE projects in Technology Area:

SMEs provide project names of known technology related projects; the list of projects will be used to summarize funding for each fiscal year by sponsor using the financial data (in Step 1C).

C. Use Multi-year Project Funding to Sum New Project Funding for each Project for each Consecutive Fiscal Year by Major Sponsor:

Use multi-year project funding beginning with the first year of the technology investment and ending with the most recent period of the current year. Use the Project Name from the technology keyword searches and/or the SMEs to summarize the Project funding for each project for each year by major sponsor. If there are several sponsors, select the top two or three and sum the remaining sponsor funding into "Other". You may need to make a judgement call as to the applicability of specific sponsors' funding on large projects to determine if funding is applicable to the technology or the funding applies to other tasks within the project.

The final product of Step 1 is a summary of the top two to three major sponsors' funding (plus "Other" category of funding if applicable) by fiscal year. (The funding will be used in combination with the NISE funding to create a chart in the Excel template that will be copied to the PPT slide.)

2. NISE Project Funding in the Technology Area over Multiple Years:

Identify all NISE project funding within the technology area by year using a NISE project database and/or SME identified projects.

A. Search NISE Project Data for Technology/PI keywords; Obtain Project Name, Description, Year, and Funding:

If NISE projects are in a data base, search projects based on various criteria (keywords, principle investigator, etc.). Verify that the projects are applicable to the technology area.

B. SMEs Identify NISE Projects in Technology Area; Ensure that these Projects are Part of the NISE Data:

SMEs provide NISE project funding by year. Will need to resolve any overlap with data obtained in 2A.

The final product of Step 2 is a list of NISE projects with associated funding by fiscal year. (The sum of the funding by fiscal year will be used in combination with the Project funding by sponsor to create the chart in the Excel template that will be copied to the PPT slide.)

3. Data External to Chart:

A. Table below Chart:

Located just below the chart on the viewgraph template is a table. The information in the table is separate from the chart (the data in the table is not the x or y axis of the chart above). If the number

of employees working on the project is not known, the number of employees may be calculated by estimating the cost of a project direct work-year or the cost of a NISE work-year and dividing that number into the funding respectively. When calculating project direct work-years divide the project funding by average annual labor rate to obtain the number of work-years and for NISE projects divide the NISE project funding by $150K for the number of work-years. The number of work years may be used for the # of employees working in a technology on direct or NISE projects.

a. # of Employees Working in Technology:
The number of employees working in the technology is separate from those employees funded by NISE. These employees are charging direct work-years to a sponsor of a project in the technology area. As stated in 3A, the number of employees/work-years per fiscal year may be obtained by dividing the project funding for each year by the average direct work-year funding of an ND-04. However, actual work years are preferred if that data is available from the project or a work year report.

b. # of Employees Funded by NISE:
This refers to the number of employees working in the technology on NISE funded projects. As stated in 3A, the number of employees/work-years per fiscal year may be obtained by dividing the NISE funding amount for each year by $150K to obtain the number of employees. Since NISE funding largely supports only labor, this calculation is sufficiently accurate.

c. # of New Starts (Internal/External):
This refers to the number of new projects that began in each fiscal year to include both internally funded (NISE) and external funded (external sponsor) projects.

d. Key partners and key events:
Key partners refers to partners in industry or academia that are working with the NISE or other projects. Key events include Command participation in conferences, meeting, etc. that are important events within the technology area.

B. Call Out Boxes above Chart:

Above the chart there are “call out boxes” for each fiscal year with the following information.

a. # of Key Hires:
Key hires is a count of the number of new hires working in the technology or hired specifically to work in the technology. Identify employees by name who worked on the previously identified projects contributing to the technology. Then, use the workforce database (DCPDS) to provide the specific start date of the employee (year of hire) to determine which employees were new hires when they began working in the technology. Additionally, the technology area SMEs are a good source for identifying key hires by year.

b. Important Milestones:
Short list by fiscal year of important milestones for the technology area.

c. New Starts (Project Names):
Significant new projects that began in the fiscal year.

The final product is the information that highlight the progress/funding of the technology by fiscal year to complete the table below the chart and the call out boxes above the chart.

4. Sand Chart: Enter Funding into Excel Chart Template to Create Sand Chart for Viewgraph Template:

Enter the financial data by fiscal year by sponsor from Steps 1 and 2 above into the Excel area chart template to create a chart for the viewgraph (a.k.a. Sand Chart). The data for the area chart is organized so that each data series is a sponsor, the y-axis is the funding, and the x-axis is the fiscal year. The funding is relative and there are no y-axis labels so the units can either be $, $K, or $M as long as the units are consistent across the series and fiscal years. If there are more or less sponsors, or more or less fiscal years, on the template than required for the technology, expand or contract the chart appropriately. The chart has the fiscal years on the x-axis turned on as they will be transferred with the chart to the viewgraph.

The final product is an Excel chart that can be copied and pasted into the viewgraph (see Section 5).

5. Copy: Excel Sand Chart and Replace Sand Chart Picture in Viewgraph Template:

Use the Excel template to create the area/Sand Chart and the legend for the viewgraph. Note that in the template there are two charts. One with a legend and one without the legend. They are both populated from the same data. The chart with the fiscal years on the x-axis is the chart that will be copied and moved to the viewgraph. The additional chart is so that the legend can be moved separately for more flexibility on the viewgraph.

After the data is entered into area chart in Excel, the next step is to move the chart without the legend into the viewgraph. Prior to moving the area chart from Excel, select the area/Sand Chart on the viewgraph and delete it. Then copy the area chart in Excel and paste it into the viewgraph as a picture. If the boxes conflict with the chart data, the chart may be made vertically smaller by selecting the chart and pulling the top of the chart down to reduce the height of the chart data.

Note that the area chart has no border and no fill; however it is now in the front of the viewgraph; the horizontal lines of the area/Sand Chart will cross the call out boxes above the chart. Before moving the area chart to the back of the viewgraph, align the fiscal years (x-axis of chart) to the table below by moving and resizing the chart. Then 1) Move the area chart to the back of the viewgraph and 2) Move the table to the back of the viewgraph by selecting the object, right mouse click, and selecting ‘send to back’.

The final step in this section is to copy the legend. After deleting the current legend on the viewgraph, use a screen capture application (e.g. *Snagit*) and capture just the legend in the Excel template by taking a picture, copying the picture, and pasting the legend into the viewgraph as a picture. This will allow the legend to be moved as needed to accommodate the boxes above the chart since on the viewgraph the legend is not connected to the chart.

The final product is a viewgraph with the new technology area chart and a new legend.

6. Enter Data:

A. Table: Enter Data into Table below the Chart on Viewgraph:

Enter the data/information gathered in 3A (a through d) above into the table below the Sand Chart. The number of data columns needs to equal the number of fiscal years in the chart; may need to insert or delete table columns. After the correct number of columns are in the table, size the table by

first selecting the data columns and adjusting the width of all data columns to be the same width for each fiscal year (select the columns, then use the column width box under Table Tools, Layout).

B. Boxes: Enter Data into the Call Out Boxes for Each Year Above the Chart on Viewgraph:

Enter the data/information gathered in 3B (a through c) above into the appropriate fiscal year call out boxes above the chart in the viewgraph template.

The final product is a table aligned with the chart above by fiscal year complete with entries and call out boxes that contain the project milestone, etc. data.

7. Rearrange the Call Out Boxes/Lines to Fit in the Space; Adjust all Elements of Chart for Best Presentation of Data

To complete the viewgraph slide, adjust the boxes above the Sand Chart and the lines to the boxes so the boxes do not overlap and the lines connect each fiscal year to its appropriate call out box. This will require selecting the lines and moving them to the back behind the chart and selecting the boxes and moving them to the front of the chart. When selecting lines to move or lengthen, it may be useful to begin at top of viewgraph and pull down a window that will include the line; this will highlight the line so that it can be moved to back, lengthened, or relocated. The goal is to locate boxes over the chart so that they line up reasonably well, do not to cover the data in the chart, and connect each box (roughly) by a line to the appropriate fiscal year.

8. Backup Info:

This section is intended to provide a description of the supporting information required in the backup slides.

A. General Talking Points:

Add slides for general talking points; provide discussion on each point. If the points are bullets, for clarity use complete sentences to describe each point vice just a few word summary. This section can be a few points or many but should be enough to completely describe what is behind the slide data; key events, important or large projects, etc.

B. Acronyms:

Provide a list of acronyms that spell out every acronym that is used on the slide; terms, projects, etc.

C. Timeline & Projects:

Provide a list of the projects, key events, etc. by fiscal year with short description.

D. Sand Chart Data:

Provide a copy of the data chart that was built in the Excel template; this can be a copy that is pasted as a picture. Also, provide the list of sponsors that are included in “Other $”.

9. Final Brief for Review:

The final brief needs to include the Story Slide (slide with Sand Chart) with complete information as described in sections 1 through 7 and the backup slides detailed in section 8.

10. Review and Feedback:

Make corrections and or provide more information as necessary after the review/feedback.

REFERENCES

1. NIWC Pacific NISE Success Story Internal Technical Document
2. Naval Research and Development Enterprise Senior Review Team report, DTD May 22, 2019.
3. 2009 National Defense Authorization Act (NDAA)
4. NISE Story Template (PowerPoint)
5. NISE Sand Chart Template (Excel)

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APPENDIX A: NISE STORY TEMPLATES

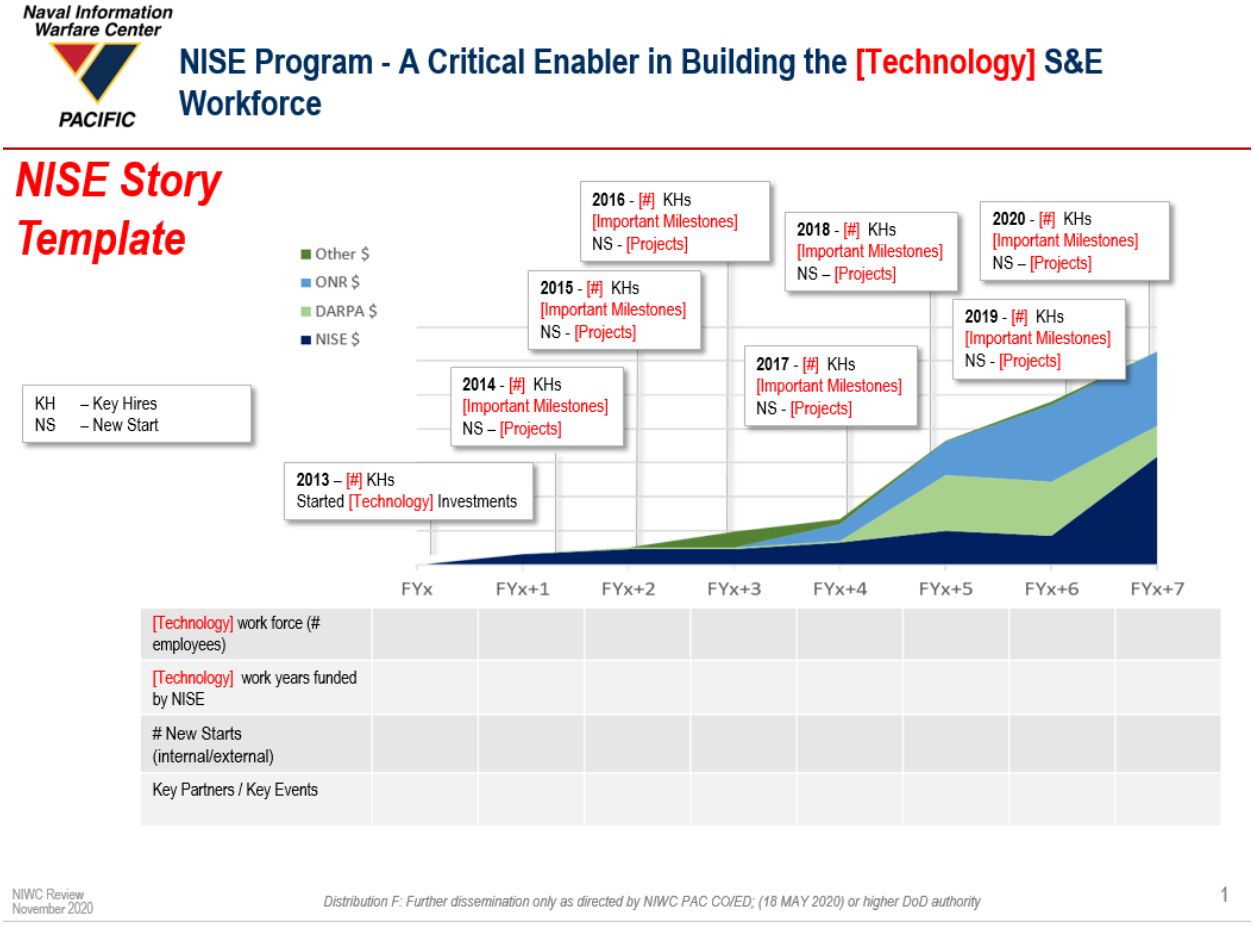

Figure A-1. NISE Story Template (PowerPoint).

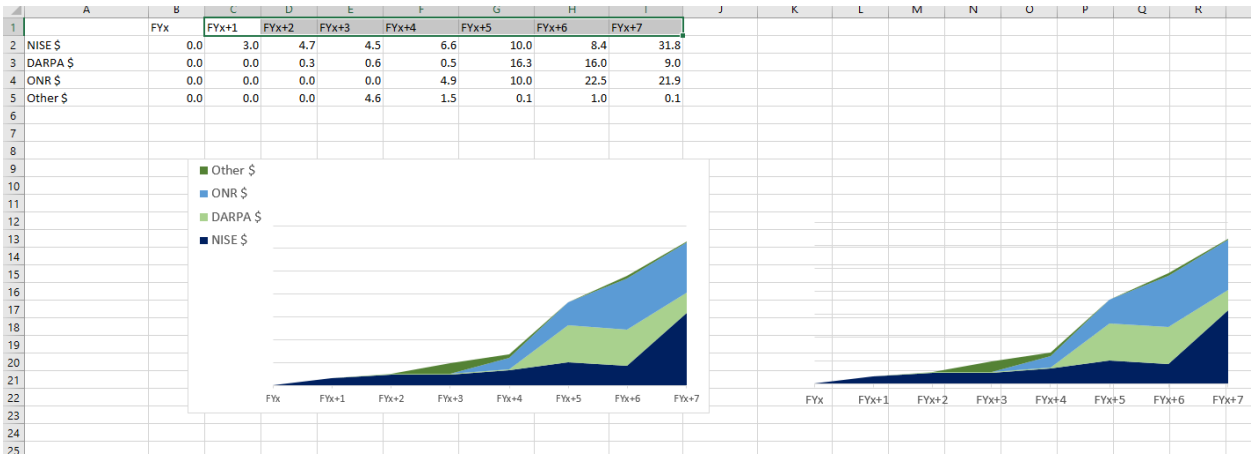

Figure A-2. NISE Sand Chart Template (Excel).

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13. SUPPLEMENTARY NOTES

14. ABSTRACT

To communicate the benefits to the Department of Navy (DoN) of the NIWC Pacific Naval Innovative Science and Engineering (NISE) program, the Cyber/S&T Department Head has documented a story narrative in a supporting presentation format to show applicable data and information.

To date, NIWC Pacific has demonstrated the effect of utilizing the NISE program investments for technology research, funding infrastructure, training the workforce, assisting in technology demonstrations, and promoting new technology applications for the DoN. The NISE story is summarized in a single "story" slide (with related backup information) containing multi-year workforce, financial, and project data from past and current NISE projects together with information from other projects within the same technology.

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