

Case Study: National Institute of Standards and Technology

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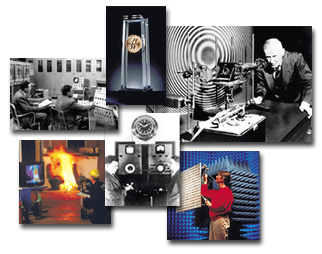
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# Introduction

For more than 100 years, the National Institute of Standards and Technology has aided in keeping the United States in the technology forefront. Founded in 1901, it was originally named the National Bureau of Standards and one of the first federal research laboratories.[[1]](#footnote-2) As part of the Department of Commerce, for over the past 100 years, NIST’s major accomplishes have had a huge impact on industry, science and technology, and the national economy. A non-regulatory federal agency, its mission: “To promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life”.[[2]](#footnote-3)

As a role required by the U.S. Constitution, NIST has maintained the national standards of measurement and has been supplying the measurements and tools to help U.S. industry successfully compete in the world and national markets. NIST has two major locations: its headquarters in Gaithersburg, Maryland and the other in Boulder, Colorado. At the Boulder, Colorado facility, NIST maintains the official time scale for the United States using nine atomic clocks and a complex measurement system to determine the exact time. It is calibrated by a cesium fountain atomic clock, which neither gains nor loses one second in 80 million years. NIST employs about 3,000 scientists, engineers, technicians, and support and administrative personnel, about 2,700 collaborative associates from academia, industry, and other government agencies, and more than 1,300 partner manufacturing specialists and staff at more than 400 service locations around the country.[[3]](#footnote-4) NIST carries out its mission through the following programs:

* The NIST Laboratories, conducting world-class research, often in close collaboration with industry, that advances the nation's technology infrastructure and helps U.S. companies continually improve products and services;
* The Hollings Manufacturing Extension Partnership, a nationwide network of local centers offering technical and business assistance to smaller manufacturers to help them create and retain jobs, increase profits, and save time and money; and
* The Baldrige Performance Excellence Program, which promotes performance excellence among U.S. manufacturers, service companies, educational institutions, health care providers, and nonprofit organizations; conducts outreach programs; and manages the annual Malcolm Baldrige National Quality Award which recognizes performance excellence and quality achievement;
* From 2007 to 2011, NIST provided cost-shared grants through the Technology Innovation Program, and between 1990 and 2007, it managed the Advanced Technology Program.3

# Planning

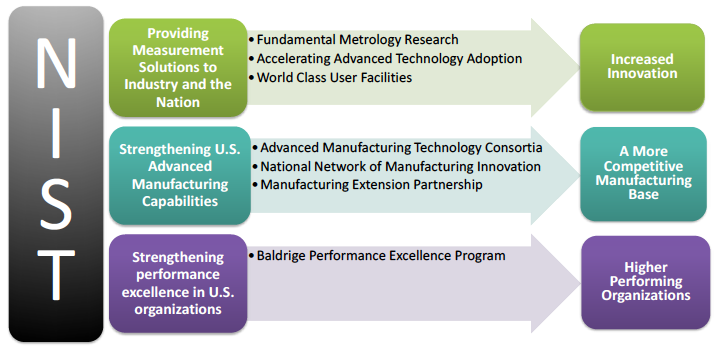
The America COMPETES Act of 2007 outlines the major roles for NIST in promoting national competitiveness and innovation. NIST is required to submit a three-year programmatic plan concurrent with the submission of the President’s budget request to Congress.As a result, it releases a three-year programmatic plan annually.

NIST’s annual programmatic plans summarize the focus of NIST programs for use in planning and prioritizing investments over a three-year period. Although not specifically stated in its programmatic plan, NIST’s vision states how “NIST will be the world’s leader in creating critical measurement solutions and promoting equitable standards. Our efforts stimulate innovation, foster industrial competitiveness, and improve the quality of life”.[[4]](#footnote-5)

In the Fiscal Year (FY) 2014 – 2016 programmatic plan, NIST goals aim to ensure that NIST retains the technical capabilities and adaptability necessary to carry out its key role in the Nation’s innovation ecosystem:

* **Strengthen NIST’s laboratories and facilities to ensure U.S. leadership in measurement science**. The strength and vitality of the NIST laboratories are crucial to meeting the complex and demanding measurement and standards challenges associated with new technologies. NIST will continue to invest in the high-performing facilities, equipment, infrastructure, and personnel.
* **Fortify U.S. advanced manufacturing capabilities**. The Nation’s long-term competitiveness relies on its global leadership in advanced manufacturing capabilities. NIST will develop and deploy unique tools to support U.S. advanced manufacturing through programs including the Hollings Manufacturing Extension Partnership, the Advanced Manufacturing Technology Consortia Program, and the National Network for Manufacturing Innovation.
* **Maximize NIST’s impact through effective collaboration and coordination**. NIST’s research and development activities have the greatest impact when the knowledge and technology generated is transferred to industry, universities, standards organizations, and other government agencies. NIST will continue expanding its efforts to pursue partnership opportunities with other organizations through multiple technology transfer mechanisms including delivery of measurement solutions to industry and other government agencies, providing access to unique measurement capabilities through its user facilities, participation in standards-setting organizations, convening consortia, licensing of intellectual property, and continued attraction and training of high quality research associates.

Figure . NIST FY14 - FY16 Programmatic Plan "Delivering on the NIST mission"5



* **Develop world-class operations and support**. NIST’s activities are most efficient and effective when supported by exceptional business practices, strategic planning, and operational offices. NIST will improve its practices to enhance the business of NIST.[[5]](#footnote-6)

In addition to its goals, in each annual programmatic plan, NIST states its priorities for the upcoming fiscal years. Many of which coincide with their core competencies of measurement science, rigorous traceability, and development and use of standards.[[6]](#footnote-7) Figure 1 shows how NIST intends to accomplish its mission during the upcoming fiscal years. Between each annual programmatic plan, there is a special emphasis on priority updates from the previous years plan. In the recent programmatic plan, there were three priority updates from the FY 2013-2015 plan. These updates were in technology and commercialization; NIST advanced manufacturing portfolio; and cybersecurity. Each of these updates were driven by responses to administrative guidance and internal reviews requiring policy changes that in turn help them update their priorities. It is extremely important to note that their priorities are updated and driven by external input from Presidential orders/memorandums and also internal performance reviews and policies. NIST goes on to state that “the challenges and technology needs enumerated in [their] plan represent many of the areas important to NIST; however, they may not be fully comprehensive and are subject to continual reassessment”.[[7]](#footnote-8) In the end, these priorities that are set and stated in their programmatic plan help drive their Program Coordination Office to determine how resources are allocated and distributed.

Looking at the organization as a whole, NIST’s annual 3-year programmatic plan is an effective one. With such a large organization with so many programs, their programmatic plan effectively maintains a review of their mission and accomplishments. NIST continually reviews and updates their priorities annually. By submitting it with their budget requests, it helps validate their annual increase in revenue. Based on the level of detail and thoroughness there is very little that can be improved.

# Programming

Within NIST’s annual three-year programmatic plan, it states “to most effectively accomplish its mission, NIST must be capable, relevant, and effective”.[[8]](#footnote-9) Meaning that NIST must continue to be forward-looking in order to build and maintain world-leading scientific capacity in the technology areas that will shape future industries, while at the same time having the situational awareness and flexibility to build programs that apply NIST’s technical capabilities to the Nation’s most immediate needs. In addition, NIST must continue to strengthen and improve the internal processes necessary to accomplish its mission with the greatest efficiency and effectiveness possible.8



Figure . NIST Strategic Framework9

To accomplish this, NIST views the possible landscape of activities through the lens of its mission. Through a variety of mechanisms including meetings, workshops, industry visits, objective peer review of its programs, NIST continually collects information on major national issues, shifting trends in science and technology, and the performance of key operational processes. This input is then used to make decisions on where NIST needs to develop specific capabilities, how best to marshal existing resources to address current issues effectively, and how to continually optimize the organization for improved performance.8

The above information, as stated in NIST’s FY 2014-2016 programmatic plan, is the guideline that the internal Program Coordination Office uses to provide recommendations to the NIST Director and Deputy Director on allocation of funds to projects and programs. The recent programmatic plan broadly discusses the two strategic perspectives (seen in Figure 2) of what they consider National Priorities and Long-Term Trends. They do this to summarize NIST activities in areas of current national priority and highlighting where NIST needs to build capacity in the future. [[9]](#footnote-10)

The NIST Program Coordination Office provides staff support to the Director and Deputy Director and offers developmental opportunities to selected NIST staff. The Program Coordination Office works closely with the line organizations and the other staff offices, particularly the Budget Division, Congressional and Legislative Affairs, and Public and Business Affairs. Activities include:

* Generating strategies, guidelines and formats for planning and supporting planning functions;
* Performing program and policy analyses, especially those that cross the Institute's program and organizational lines;
* Carrying out economic impact analyses for NIST as a whole and providing analytical leadership for impact assessment efforts of the Operating Units and programs;
* Working closely with the NIST Budget Division in developing budget documents and in developing analytical techniques for reviewing NIST programs;
* Articulating and documenting NIST program plans and status for internal and external use;
* Coordinating and carrying out issue studies;
* Administering multi-organization processes such as the Competence Program competition;
* Collecting, organizing, verifying, and presenting Institute-level data relating to activities, accomplishments, and impacts.[[10]](#footnote-11)

With the Program Coordination Office and support of other internal organizations, as discussed in the previous section, there is little to improve upon in regards to planning and programming at NIST. The efforts taken by the office as demonstrated by their programmatic plans are thorough and effectively reflect realistic programmatic plan goals and objectives. They clearly state a path in which to effectively meet their goals, objectives, and mission. Upon review of their programmatic plans for the last few years, there are many continual core ideas and approaches but by going back annually to update their plans demonstrates that NIST is recognizing changes and appropriately accommodating them. This is important such that the organization will continue to progress and not become stagnant.

# Budget System & Process

NIST uses a combination of performance and program based budgeting systems. Individual programs are funded annually through appropriations that are submitted through the U.S. Department of Commerce (DoC). The changes in programmatic funding are then justified in part by performance. For FY 2015, the President’s budget request to Congress of $900 million aligns with the NIST’s vision for expanding and strengthening its programs in a number of key national priority areas. Programs like forensic science, lightweight vehicle alloys and bioengineering measurement tools. Seen in Figure 3, the request is a $50 million increase from FY 2014 enacted levels and targeted with specific programmatic goals. The submitted budget request reflects the Administration’s continued commitment to enhancing innovation and economic growth through NIST’s broad array of research, standards development and services. The intent of the FY 2015 budget request will help NIST increase regional and national capacity for innovative manufacturing, advance the cybersecurity of critical infrastructure and the digital economy, and remain at the forefront of measurement science and technology research and development.[[11]](#footnote-12)

The total FY 2015 budget request is broken into three major categories:

* Scientific and Technical Research and Services (STRS), $680 million
* Industrial Technology Services (ITS), $161 million
* Construction of Research Facilities (CRF), $59 million

Figure . NIST Budget Enacted/Requested FY 2012 – FY 2015

Inside the budget submission to Congress, NIST breaks down their budget to individual resource programs. The appropriation account material for each resource program is composed of:

* Summary of resource requirements,
* Justification of adjustments to base,
* Justification of program and performance, base program summary, and initiative program change summary,
* Summary of requirements by object class,
* Appropriations requiring authorizing legislation,
* Advisory and assistance services.

To justify the increase in funding, the individual budget sub-programs receiving direct obligations describe their program, list their accomplishments, and state their priority objectives for the upcoming fiscal year. Each budget program justifies their requests based on:

* Individual past performance,
* Current legislation or executive mandated direction,
* Priority objectives,
* Schedules and milestones with specific actions and deliverables.[[12]](#footnote-13)

An exception to this is NIST’s Reimbursable Program. As described in the FY 2015 budget request, NIST provides reimbursable services consisting of technical work performed for other Federal agencies, state and local governments, and the private sector. These services include calibrations and special tests, advisory services, and the sale of Standard Reference Materials. The unique measurements and standards expertise developed with appropriated funding gives NIST the capability to perform these services on a reimbursable basis. NIST accepts other agency work based on an established set of criteria, which include:

* The need for traceability of measurements to national standards;
* The need for work that cannot or will not be addressed by the private sector;
* Work supported by legislation that authorizes or mandates certain services;
* Work that would result in an unavoidable conflict of interest if carried out by the private sector or regulatory agencies; and
* Requests by the private sector for NIST action or services.

NIST's reimbursable program is estimated to be $154.3 million in FY 2014 and $142.4 million in FY 2015. Essentially, this is another source of revenue for NIST outside appropriations funding by providing actions and services.[[13]](#footnote-14)

In addition to Reimbursable Programs, NIST also finances its research and technical services performed for other Government agencies and the public through a Working Capital Fund (WCF). These activities are funded through advances and reimbursements. The fund also finances the acquisition of equipment, standard reference materials, and storeroom inventories until issued or sold.It is important to note that submitted budget request does not account for any WCF amounts nor were there any enacted funding given by the federal budget in previous fiscal years.14

As a part of the internal NIST Office of Financial Resource Management, their Budget Division is tasked with budget formulation and justification. It produces three major budget submissions a year: to Department of Commerce in May, to Office of Management and Budget (OMB) in September, and to the Congress in February with additional background exhibits and supplemental requests as necessary. In addition, the Budget Division also:

* Tracks appropriation activities and bills affecting NIST through the legislative process prepares budget requests for adjustments-to-base;
* Assists in integrating program planning with the budgetary process;
* Prepares, reviews, analyzes and consolidates budget estimates, program justifications and detail pricings for all NIST budget submissions; and
* Ensures that justifications and pricings are complete, accurate, and consistent in order to defend the funds requested from the DoC, OMB, and the Congress.[[14]](#footnote-15)

As a large government agency with many programs, the combination of program and performance budget system that NIST utilizes makes sense. However, some specific programs may possibly be managed in a different format that may possibly yield a more cost-effective approach. The reimbursable programs that NIST provides could be managed in a line-item budget system. The reason why is that many of the specific programs are individual items or services and require extensive overhead to adequately evaluate and monitor the individual programs. Currently, the programs are grouped together and certain standards and items may out-perform, are more up-to-date, or more useful to the current industry than others. By using line-item style budget systems to management small programs like individual standards, the budget allocation based on simple historical data on use and purchases will provide sufficient amount of data. This data can assist in how to determine spending needed to continue support, maintenance, and updates to the standards in subsequent fiscal years. The analysis of individual standards may not be as robust as a specific performance review. But just looking at the raw information, trends can be determined more easily and emphasis/efforts may be put into that program item vice ones that may be more outdated and less utilized.

# Budget Execution

The Budget Division at NIST is designated with budget execution and financial management. They monitor the spending of appropriated funds against the Congressional Budget benchmark, essentially NIST’s spending plan, and continually determine if a formal reprogramming is required. The Budget Division provides controls spending by allocating and controlling all budgetary resources as required by relevant statutes, and as specified by the Office of Management and Budget (OMB). To assist in the solution of budget and financing problems specific to each NIST organization unit, the Budget Division monitors each NIST organization by performing quarterly financial reviews to ensure accurate resource utilization in order to gain a better understanding of the organizations financial status. This keeps NIST management informed of potential problems, recommendations and any new or unexpected issues that may have arisen. As a written quarterly review, this information helps feed external miscellaneous reporting requirements.[[15]](#footnote-16)

In addition to the duties listed above, the Budget Division also:

* Allocates and monitors the spending of STRS reserve funds;
* Reviews and allocates carryover from appropriated and invested equipment funds, monitors FTE actual and estimated ceilings;
* Monitors local overhead accounts; review and process local overhead rate changes develops allocations;
* Allocates and analyzes the Technology Service’s (TS) fee-supported programs;
* Approve fees and monitors collections and expenses;
* Manages the bills for the DoC Programs, including the bills from the DoC’s Working Capital Fund and Advancements and Reimbursements;
* Approves and monitors Expense and Income (E&I) project-tasks.16

In terms of budget execution, NIST’s process is very similar to other government agencies. Being a federal government organization, the spending of the overall organization is strictly monitored and controlled. It is important that NIST has a designated internal organization to control and monitor it’s spending. Using a quarterly financial review system, NIST continually monitors its financial status and utilizes that information for external requirements. The system as seen from an external perspective appears to be effective and there are not any obvious areas that require any specific improvement.

# Accounting

Based on available information, NIST utilizes some type of accrual based accounting system. Accounts are tracked once income is earned and records deductions when the expenses are incurred. The NIST’s Finance Division performs the accounting for the organization. Their mission is to provide accurate and timely accounting data in an efficient manner to the NIST community and the eight cross-serviced customer bureaus within the Department of Commerce.[[16]](#footnote-17)

Inside NIST’s Finance Division, the Accounts Payable Group is charged with performing all of the accounting functions relating to commercial payments of contracts and purchase orders, miscellaneous payments, and for recording accruals, obligations, and de-obligations in the accounting records; and reconciles accounts and ensures NIST compliance with the Prompt Payment Act. This ensures that NIST pays vendors in a timely manner even after incurring an expense. Otherwise, an assessment of late interest penalties is incurred against NIST in the event of late payment.

NIST provides other services to industry and the public through reimbursable programs. To account for the potential earned income, the Receivables Group performs in the Accounts Receivable area. It accounts for all billings and collection functions for NIST and customer bureaus; debt management of all receivables; and prepares the Treasury Report on Receivables. In the reimbursable area, the group also reviews and processes reimbursable agreements for NIST and customer bureaus; formally accepts NIST reimbursable agreements; bills for advances; reconciliations; month-end and year-end carryover processing; and closeout of expired agreements.

Lastly, the Reconciliation Group completes cash reconciliations for all bureaus serviced by NIST; prepares the monthly SF-224 statements of transactions; reconciles the Treasury Statement of Difference; oversees the NIST Working Capital Fund (WCF); monitors and analyzes the assigned general ledger accounts of the Working Capital Fund while clearing reconciling items and inaccuracies in data; inputs cost data into NIST's Property system, calculates amortization/depreciation; and accounts for real property, software and leases.[[17]](#footnote-18)

It is not exactly clear what method NIST utilizes for accounting. Based on available information it was inferred that it uses possibly a full accrual based accounting system like many federal agencies. Based on the nature of some of the other revenue programs, NIST provides as services to industry through the reimbursable area and WCF, individual programs like standard reference material services that NIST provides revenue outside the normal federal appropriations system. This means NIST could use a modified accrual based accounting system as defined by the U.S. Generally Accepted Account Principles (GAAP). With a combination of cash and full accrual accounting, revenue is recognized when it is measureable and available.[[18]](#footnote-19) This is important because NIST can utilize this revenue even if new revenue from the federal appropriations system is not made available at the beginning of a new fiscal year. This way expenditure can be incurred once the measureable revenue is made available.

# Financial Management

NIST’s Office of Financial Resource Management (OFRM) is the designated internal organization that is charged managing NIST’s finances. OFRM’s mission “is to increase the value of Commerce resources by supporting our customers agencies in the fulfillment of their missions. By increasing the value of NIST resources we are supporting the NIST Operating Units in their quest to promote U.S. innovation and industrial competitiveness”.[[19]](#footnote-20) OFRM is composed of three divisions: Budget, Finance, and Business Systems.

The Business Systems division acts as more of a customer service division. As already discussed, the Budget Division’s mission is to provide advice and assistance to NIST leadership on all budget matters and to coordinate the preparation, review, justification, presentation, and execution of NIST's budget, including financial management, resource allocations, and the monitoring of NIST's total resource expenditures. It also is the external liaison with the DoC, OMB, the Congress, and the public on all budgetary matters related to NIST. It provides services in four major areas: budget, formulation, and justification; budget execution and financial management; liaison, representation and customer service; and organizational process and effectiveness.[[20]](#footnote-21) The mission of the Finance Division is to provide accurate and timely accounting data in an efficient manner to the NIST community and the eight cross-serviced customer bureaus within the Department of Commerce.[[21]](#footnote-22)

Other than expenditures directly and internally used at NIST, they also provide grants and awards like many other research and development agencies to external organizations. The NIST Grants and Agreements Management Division (GAMD), under the Office of Acquisition and Agreements Management, is a dynamic, customer-oriented organization committed to excellence in administrative support for all grants and cooperative agreements awarded by NIST. The GAMD exists to provide advice, assistance, policy direction and direct administrative support during all phases of the various NIST financial assistance programs. GAMD supports NIST programs by assisting with the preparation of funding announcements, by reviewing proposals and budgets, by ensuring recipient compliance with all applicable policies and regulations, and by providing key administrative functions to both award recipients and NIST program officials.[[22]](#footnote-23)

Due to the nature of its mission, NIST uses its internal organization, the Economic Analysis Office (EAO), to assist in its financial management. The EAO is a unit of the NIST Associate Director for Innovation and Industry Services. EAO provides economic, technology assessment, and strategic planning expertise for NIST­wide policy analysis and planning activities. EAO conducts cross­cutting strategic planning, economic impact, and economic role/policy studies that benefit several operating units or NIST as a whole; provides methodological assistance to operating units conducting their own economic analysis; and represents NIST in external economic policy exercises where technology is a major factor.[[23]](#footnote-24) The efforts taken to understand current world economics and industry assessments and impact help drive how they manage their finances from their reimbursable revenue source to how it incurs expenditures.

As discussed in the previous recommendation in accounting, NIST could potentially manage their finances using a modified accrual accounting system. It is important to understand that since NIST provides services to industry at a cost, like standard reference materials. It has another source of revenue outside the federal appropriations process. With multiple internal organizations managing NIST’s finances, it appears to be effective. NIST if for some reason required further revenue outside what the its reimbursable and WCF funds can provide it would have to request further funding from Congress. This would require substantial justification outside its annual budget submissions. However, at the individual program level through grants and collaboration with industry and other government agencies could provide another source of revenue at that individual program level. Otherwise, internally it will be up to the above offices to reallocate funds in accordance with OMB framework to appropriately address any problems in efforts related to completing its mission.

# Financial Reporting

At NIST, the Financial Statements Group is the designated group for generating financial reports. As part of its duties, the Financial Statements Group:

* Prepares external financial reports to Department of Commerce, Office of Management and Budget, and the Department of Treasury as well as internal financial reports for internal NIST management and customer bureaus;
* Prepares and processes various financial data that feed the financial system;
* Proactively analyzes data and identifies conditions and trends and offers guidance and recommendations regarding financial status; and
* Maintains and monitors the integrity of the expanded trial balance.[[24]](#footnote-25)

In coordination with the Budget Division, NIST provides quarterly financial data in a single database for preparation of quarterly review materials as an organizational wide process. In addition, some of the specific financial reports include multiple exhibits for the OMB A-11 Circular, including but not limited to:

* Exhibit 52 – “Report on Resources for Financial Management Activities”
* Exhibit 53 – “Agency IT Investment Portfolio”
* Exhibit 300 – “Capital Asset Plan and Business Case” for both IT and non-IT major assets[[25]](#footnote-26)

As an organization, NIST’s Budget, Finance, and Financial Statements Group coordinates miscellaneous reporting requirements to assorted agencies: Catalog of Federal Domestic Assistance, Research and Development in the United States, National Science Foundation, Budget Data Requests from NIST customers, the Department of Commerce, Office of Management and Budget, or Congress.[[26]](#footnote-27)

The financial reporting system at NIST is straightforward. There are external and internal requirements that are defined. With multiple groups completing and reviewing these reports, it utilizes them to effectively manage their performance and finances.

# Performance Management

As previously discussed above, NIST annually justifies its budget requests to the President and Congress, in part, based on its performance. NIST evaluates its programmatic performance over time by utilizing a diverse, yet complementary set of performance indicators and measures. NIST has designed its performance evaluation system to accommodate the Institute’s diverse outputs as well as to respond to the intrinsic difficulty of measuring the results of investments in scientific and technological products and services. NIST evaluates its performance and plans its work through several distinct evaluation methods: economic impact studies, peer review and other forms of external assessment, customer feedback, and quantitative output metrics. NIST reports its performance through Department of Commerce Government and Performance Review Act (GPRA) documents as well as through the NIST Financial Statements.[[27]](#footnote-28)

Within the FY 2015 budget submission, NIST performance results states their goals and objectives with quantitative target and actual values. They clearly state if they have met their objective and the trends i.e. negative, varying, stable, or positive. If the goal is not met, they attempt to explain the reason why. They also state what actions are to be taken in future plans and any adjustments to the target with a justification. NIST also defines how they validate and verify their performance; they define the data source, frequency of the review, data storage type, internal control procedures, data limitations, and any other actions to be taken to improve their validation/verification process. Any gaps in information in determining their performance are stated as well. External objectives as governed by the Department of Commerce are also addressed in their performance review. That means both internal and external objectives are stated, reviewed, and their plans for the future justified.

Lastly, internal to NIST is the National Research Council. “Since 1959, the National Research Council (NRC) has assessed the technical merit, relevance, and quality of NIST's laboratory programs in the context of NIST's mission. The NRC review is independent, technically sophisticated, and extensive. From FY 2007- FY 2011, the NRC conducted an assessment process where half of the NIST Laboratories were reviewed each year to promote the technical exchange between NIST scientists and the NRC expert review panels. The NRC selects is panel members from leaders in industry, academia, non-profit organizations, and other federal agencies and government. In FY 2012, the NRC assessments were restructured to focus on NIST-wide ongoing needs and activities. For FY 2013 and beyond, the NRC will return to conducting technical assessments of selected NIST laboratories for their scientific impact, beginning with the NIST Center for Neutron Research”.[[28]](#footnote-29)

As of FY 2013, the NRC has lowered its technical assessment of only selected NIST laboratories. As reported in the performance inside the FY 2015 budget, the performance is all based on 2013. Initially, the results seem positive. But now that assessments will happen less often of individual laboratories, there is a potential that there will not be sufficient data on performance for justification of budget increases. In addition, by lowering the review interval laboratories have more of a potential to falter and under-perform without any real notification other then what can be determined by its quarterly financial reports. With only a few assessments and almost at random (since there is no clear available list), it could be a number of years before an individual laboratory could be evaluated again. Therefore, the recommendation is that NIST may want to return back to its annual reviews given a fiscally unconstrained environment or determine a process to more regularly audit and review the performance of their laboratories at a smaller scale.

# Risk Management

Even after contacting NIST, it was easily apparent on how and if NIST does any type of risk management at an organizational level. Although, it was not obviously apparent whether they do risk management as an entire organization. NIST does provide guidance for Information Systems on how to conduct risk management. Inside NIST Special Publication 800-30, Guide for Conducting Risk Assessments, and Special Publication 800-39, Managing Information Security Risk: Organization, Mission, and Information System View, NIST provides a thorough definition and method for risk assessment and management. NIST states that: “risk management is a comprehensive process that requires organizations to:

* Frame risk (i.e., establish the context for risk-based decisions);
* Assess risk;
* Respond to risk once determined; and
* Monitor risk on an ongoing basis using effective organizational communications and a feedback loop for continuous improvement in the risk-related activities of organizations”.[[29]](#footnote-30)

In the Special Publication 800-39, NIST states “risk management is … a holistic, organization-wide activity … ensuring that risk-based decision making is integrated into every aspect of the organization”.[[30]](#footnote-31)

NIST describes risk management and divides it into four components (as seen in Fig. 4):

1. How organizations frame risk or establish a risk context.

The purpose of the risk-framing component is to produce a risk management strategy that addresses how organizations intend to assess risk, respond to risk, and monitor risk—making explicit and transparent the risk perceptions that organizations routinely use in making both investment and operational decisions. The risk management strategy establishes a foundation for managing risk and delineates the boundaries for risk-based decisions within organizations.[[31]](#footnote-32)

1. How organizations assess risk within the context of the organizational risk frame.

The purpose of the risk assessment component is to identify: (i) threats to organizations (i.e., operations, assets, or individuals) or threats directed through organizations against other organizations or the Nation; (ii) vulnerabilities internal and external to organizations; (iii) the harm (i.e., adverse impact) that may occur given the potential for threats exploiting vulnerabilities; and (iv) the likelihood that harm will occur. The end result is a determination of risk (i.e., typically a function of the degree of harm and likelihood of harm occurring).31

1. How organizations respond to risk once that risk is determined based on the results of risk assessments.

The purpose of the risk response component is to provide a consistent, organization-wide response to risk in accordance with the organizational risk frame by: (i) developing alternative courses of action for responding to risk; (ii) evaluating the alternative courses of action; (iii) determining appropriate courses of action consistent with organizational risk tolerance; and (iv) implementing risk responses based on selected courses of action.31

1. How organizations monitor risk over time.

The purpose of the risk monitoring component is to: (i) determine the ongoing effectiveness of risk responses (consistent with the organizational risk frame); (ii) identify risk-impacting changes to organizational information systems and the environments in which the systems operate; and (iii) verify that planned risk responses are implemented and information security requirements derived from and traceable to organizational missions/business functions, federal legislation, directives, regulations, policies, standards, and guidelines are satisfied. 31

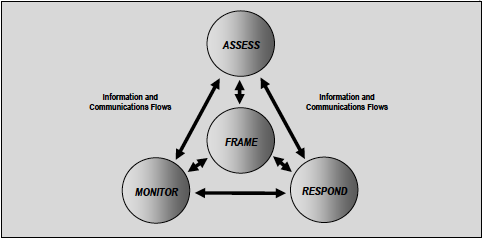


Figure . Risk Management Process[[32]](#footnote-33)

At an organizational level, Special Publication 800-39 states that the key output of the evaluating risk as described above is a risk management strategy. NIST describes that an organization-wide risk management strategy be composed of:

* Explicit the specific assumptions, constraints, risk tolerances, and priorities/trade-offs used within organizations for making investment and operational decisions.
* Any strategic-level decisions and considerations on how senior leaders/executives are to manage information security risk to organizational operations and assets, individuals, other organizations, and the Nation.
* An unambiguous expression of the risk tolerance for the organization, acceptable risk assessment methodologies, risk response strategies, a process for consistently evaluating risk across the organization with respect to the organization’s risk tolerance, and approaches for monitoring risk over time.
* Risk-related inputs from other sources both internal and external to the organization to ensure the strategy is both broad-based and comprehensive.30

Since NIST defines the standard for risk assessment and management of information systems for both government and industry information systems, it thoroughly defined how it should be done. The only recommendation is that they would apply the same principles to the organization as a whole as thoroughly as they defined for everyone else.

# Continuity

Like risk management, the information on NIST, as an organization, continuity planning was not readily available online. After some inquiries, there were no finite useful responses. However, once again NIST being a non-regulatory organization in information systems does reflect some of its thoughts as an organization on how it regards continuity planning like risk management. In NIST Special Publication 800-34, the Contingency Planning Guide for Federal Information Systems discusses both expectations for business continuity plans (BCP) and continuity of operations plans (COOP).

The BCP, as described by Special Publication 800-34, is focused on sustaining an organization’s mission/business processes during and after a disruption. It is indented to address only the functions deemed to be priorities of the organization. A BCP may be used for long-term recovery in conjunction with the COOP plan. This allows for additional functions to come online as resources or time allow.

NIST states that a COOP focuses on restoring an organization’s mission essential functions (MEF) at an alternate site. The expectation is perform those functions for up to 30 days before returning to normal operations. Additional functions, or those at a field office level, may be addressed by a BCP. Minor threats or disruptions that do not require relocation to an alternate site are typically not addressed in a COOP plan.

NIST states that the standard elements of a COOP plan include: program plans and procedures, continuity communications, risk management, vital records management, budgeting and acquisition of resources, human capital, essential functions, test, training, and exercise, order of succession, devolution, delegation of authority, reconstitution, and continuity facilities.[[33]](#footnote-34)

Within in NIST Special Publication 800-34, NIST outlines how a contingency plan is developed in six steps.

1. Develop the contingency planning policy: a clearly defined policy that defines the organization’s overall contingency objectives and establish the organizational framework and responsibilities for system contingency planning;
2. Conduct the business impact analysis (BIA): to correlate the system with the critical mission/business processes and services provided, and based on that information, characterize the consequences of a disruption;
3. Identify preventive controls: measures taken that deter, detect, and/or reduce impacts identified by the BIA that can be mitigated or eliminated;
4. Create contingency strategies: created to mitigate the risks for the contingency planning family of controls and cover the full range of backup, recovery, contingency planning, testing, and ongoing maintenance;
5. Ensure plan testing, training, and exercises: organizations can improve their ability to prepare for, respond to, manage, and recover from adverse events; and
6. Ensure plan maintenance: To be effective, the plan must be maintained in a ready state that accurately reflects system requirements, procedures, organizational structure, and policies.

Even as a guide for information systems for both the government and non-government use, the steps and topics discussed are accurate and concise on how a COOPs plan should be developed.

In accordance with HSPD-20/NSPD-51, FCDs 1 and 2, and the National Continuity Policy Implementation Plan (NCPIP), every federal organization is mandated to have a COOP. Even though the plan was not accessible, NIST must have a COOP. It is recommended that NIST would employ the guidance out of Special Publication 800-34. Since it is a publication from NIST, the hope is that it would be employ its own thorough guidance. As discussed in 800-34, there is a differentiation between an information systems contingency plan (ISCP) and a COOP.

# Conclusions & Recommendations

As reviewed above, NIST’s has had a long legacy in working with industry. From its beginnings as the National Bureau of Standards, NIST has continued to successfully execute its mission and effectively help science and innovation for the federal government and U.S. industry. With its close ties with the world economy and its effect on industry, it is vital that NIST continues to successfully execute its mission.

At the end of each section above there is a review and/or recommendation on how NIST manages or should manage its organization. Upon completing this evaluation, the extent in which NIST does its planning and programming by continually evaluating their performance is very effective. By annually updating their mission, values, and goals, NIST has validated and justified their continued increase in annual budget. Since its budget receives revenue from both the federal government and other external sources from services provided, a line-item budgeting system maybe considered to help manage the individual programs like their reimbursable programs. With other potential revenue sources, if not already done, NIST should employ a modified accrual accounting system as its method of accounting and financial management. To ensure NIST can continue to adequately prove and justify its performance, the interval at which it self-monitors its performance should return to at least an annual basis or another process implemented to continually monitor performance. Lastly, in terms of risk management and continuity planning, NIST should employ its own standard guidance, if it does not already do so, as written in its information system special publications. NIST has been a national agency succeeding in its mission for more than 100 years, in part to its standard setting execution of organizational management controls.

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