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How NIST applies standards to its research papers for its virtual library: a case study

Publications Knowledge Management Program

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Abstract

The National Institute of Standards and Technology (NIST) is a non-regulatory agency within the United States Commerce Department's Technology Administration. NIST's mission is, "to develop and promote measurements, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life". NIST Laboratories conduct research in a variety of physical and engineering sciences that promotes the nation's technology infrastructure.

The Information Services Division (ISD) is a tri-part information services organization within NIST's Technology Services that includes the Research Library, the Electronic Information and Publications Group, and the Museum and History Program.

This paper centers on the NIST publications program and knowledge management efforts in the publications area. An overview of NIST research focuses on NIST as a producer of

standards and measurement related data and information. Included is a description of NIST's major publications and database vehicles and web based information.

NIST publication distribution channels and how these channels contribute to open access to science and technology literature and specifically NIST information are discussed. In particular, the paper explains how the integrated efforts of ISD's Knowledge Management functions (Research Library, the Publications Group, and the Museum and History Program) combined with ISD initiatives provide full text and open access to NIST publications. Included is a look at the standards employed to assure high-quality bibliographic information and accessible, compliant, permanent, secure electronic access.

Background

The National Institute of Standards and Technology (NIST) is a non-regulatory agency within the United States Commerce Department's Technology Administration. NIST's mission is to develop and promote measurements, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life. NIST Laboratories conduct research in a variety of physical and engineering sciences that promotes the nation's technology infrastructure.

Founded in 1901, NIST is located in two sites. Headquarters are situated in Gaithersburg, Maryland, a suburb of Washington D.C. (234-hectare/578-acre campus). The second site is in Boulder, Colorado (84-hectare/208-acre campus). NIST employs about 3,100 scientists, engineers, technicians, and support and administrative personnel. About 1,800 guest researchers complement the staff. In addition, NIST partners with 2,000 manufacturing specialists and staff at affiliated centers around the country.[1]

Formerly, known as the National Bureau of Standards (NBS), NIST's roots as a key player in the nation's standards infrastructure are linked to the United States Constitution in Article I, Section 8. In 1787, the founders of the United States mandated that, "Congress shall have the Power to…fix the Standard of Weights and Measures;…".

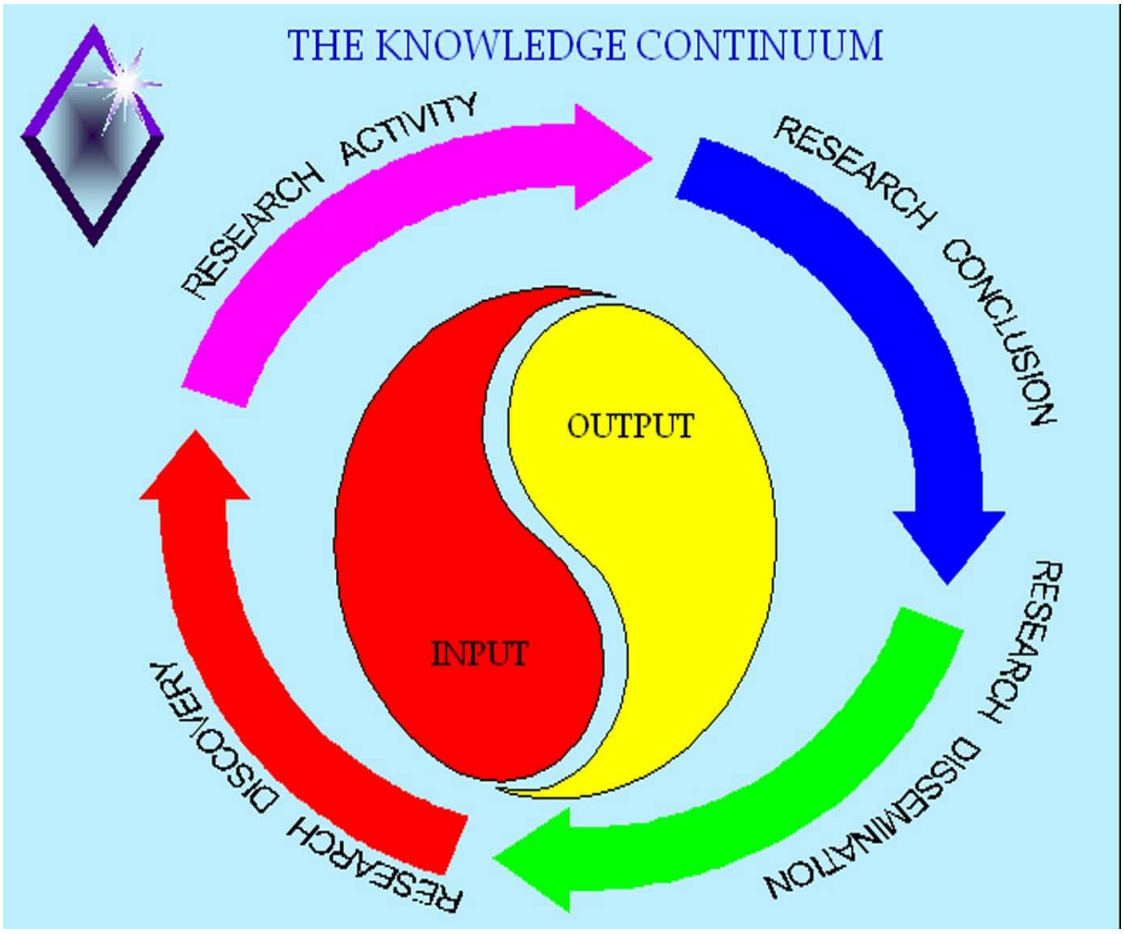
The Information Services Division

The Information Services Division (ISD) is the information services organization within NIST's Technology Services that includes the NIST Research Library, the Electronic Information and Publications Group, and the Museum and History Program. Together these three integrated programs are the crux of the NIST publications and knowledge management efforts. These programs will be discussed in more detail later in this paper as will ISD's knowledge management initiatives. ISD's mission is to support and enhance NIST's scientific and technological community through a comprehensive program of knowledge management and superior customer service. It is ISD's role to assist NIST researchers through the research and publishing cycle.

[1]The National Institute of Standards and Technology (NIST) web page http://www.nist.gov/public_affairs/general2.htm.

ISD's vision is far reaching—to be globally recognized as the premier Science and Technology information resource. Therefore, I am delighted to have this opportunity to share with this global audience, details about the information that NIST produces and how you might use the NIST Virtual Library to access NIST's scientific output. ISD operates within the framework of a Knowledge Continuum (KC)[2] assisting research efforts, producing, publishing, and dispersing NIST research and preserving NIST knowledge.

Knowledge Continuum (KC) = research---creation--- dissemination---preservation.



ISD's role and interactions with NIST scientists is best understood within the context of NIST areas of research, and the types of NIST information products and their distribution channels.

[2]Paul Vassallo. The Knowledge Continuum – Organizing for Research and Scholarly Communication, *Internet Research: Electronic Networking Applications and Policy* **9**(3), 232-242 (1999).

NIST Research Areas

Scientists in NIST's Laboratories, "conduct research in a wide variety of physical and engineering sciences. The labs respond to industry needs for measurement methods, tools, data, and technology. NIST researchers collaborate with colleagues in industry, academic institutions, and other government agencies."[3] The following are abbreviated descriptions of these Laboratories and their expertise. Full descriptions are available at the NIST web page http://www.nist.gov/public_affairs/labs2.htm.

- Building and Fire Research Laboratory (BFRL) -- works to improve quality and productivity in U. S. construction. BFRL works to reduce human and economic loss due to fires, earthquakes, wind, and other hazards.
- Chemical Science and Technology Laboratory (CSTL) -- conducts research in measurement science and develops the chemical, biochemical, and chemical engineering measurements, data, models, and reference standards that are required to improve public health, safety, and environmental quality.
- Electronics and Electrical Engineering Laboratory (EEEL) -- provides measurement science and technology and by advancing standards for electronics and electrical industries. EEEL provides the fundamental basis for all electrical measurements in the United States. EEEL also provides metrology support to other federal and local government agencies.
- Information Technology Laboratory (ITL) -- conducts research and develops test methods and standards for emerging and rapidly-changing information technologies. ITL focuses on technologies to improve the usability, reliability, and security of computers and computer networks for work and home.
- Manufacturing Engineering Laboratory (MEL) -- develops measurement methods, standards, and technologies to improve U. S. manufacturing capabilities and improved measurements and standards, both dimensional and mechanical. MEL maintains the basic units for measuring mass and length in the United States.
- Materials Science and Engineering Laboratory (MSEL) -- provides technical leadership for the nation's materials measurement and standards infrastructure. MSEL expertise is in ceramics, polymers, metallurgy, neutron characterization, and materials reliability in areas such as microelectronics, automotive, and health care. MSEL provides standard reference materials and develops measurement methods. The Laboratory houses the Nation's only fully equipped cold neutron research facility, NIST Center for Neutron Research.
- Physics Laboratory—supports U.S. industry by providing measurement services and research for electronic, optical, and radiation technology. Researchers develop new physical standards, measurement methods and data, and collaborate with industry to commercialize inventions and discoveries.
- Technology Services—provides products and services to U.S. industry and the public in collaboration with NIST Laboratories, federal agencies, national measurement institutes, state and local governments, and the private sector. These products and services include support for NIST calibrations, Standard Reference

[3]NIST web page http://www.nist.gov/public_affairs/labs2.htm.

Materials, Standard Reference Data, and Weights and Measures, coordination of documentary standards activities, and the NIST Research Library. [4]

The results of NIST scientists' work in these research areas culminate in manuscripts, the development of software tools, and the creation of databases or web sites thus completing the knowledge cycle.

NIST Information Products and Their Distribution Channels

NIST is a prolific producer of measurement and standards related information, publications, databases, software, and web information. NIST documents are distributed through several official government avenues although there may be other distribution channels. Many documents, software, and web information are available via http://www.nist.gov.

NIST authors produce over 2,500 manuscripts annually. The majority of manuscripts are published in scholarly journals. However, approximately 10% of these scientific and technical findings, reports, and studies are published internally in NIST publications in one of the following formats: journals, monographs, various kinds of technical reports, or handbooks.

To ensure high quality, accurate published information for all NIST authored manuscripts, NIST follows a stringent peer review process before releasing any technical material for publication. All official findings must be approved whether published by NIST, a professional society, or a commercial publisher.

Overview of the NIST Peer Review Process

The peer review system consists of an Editorial Review Board (ERB) at each NIST location. The Washington Editorial Review Board (WERB) is employed at headquarters and the Boulder Editorial Review Board (BERB) is employed at the Colorado campus. Each Board is composed of a Chairman, Vice-Chairman, and 30 member reviewers from the Laboratories.

ISD provides the WERB Secretariat. The WERB Secretariat role in the process is to prepare the materials to be reviewed by the members, to track all bibliographic data, to track where the paper is in the process pending approval, and to issue letters of approval once a decision is made by the Board. ISD supplies manuscript review guidelines compiled by WERB, to authors and reviewers. The list of standards for authors and reviewers is intended to ensure that the scientific work is well presented and that the paper adheres to established writing and style standards. A checklist brings the author's and reviewer's attention to such matters as:

- Appropriate use of International System of Units (S)I units
- Proper statement of uncertainties of measurement

[4]NIST Web Page http://www.nist.gov/public_affairs/labs2.htm.

- Copyright issues including an explicit statement that the manuscript is not subject to copyright
- Use of commercial product disclaimers
- Correct format of figures and tables
- Patent issues

Manuscript Submission Process

The review process begins at the Division/Laboratory level. Laboratories differ in their internal review requirements and this is apart from the WERB/BERB process. When the Division/Laboratory level process is completed authors submit their paper manuscript and review/approval form to the appropriate ERB. The review form includes contact information, author(s) details, paper titles, intended publication vehicle, abstract, and appropriate Division/Laboratory approval signatures. A reader from outside of the author's division is assigned to read the manuscript and an ERB member form within the author's Lab is assigned to sponsor the manuscript. Readers and sponsors work with the authors to make appropriate changes necessary for approval. When this par of the process is complete, the sponsor presents the paper to ERB for approval. The Board meets weekly to briefly review and discuss all papers ready for approval that week. Authors may not submit a manuscript for publication until after the review process has been completed. After ERB approval, the author is issued an approval letter authorizing release of the paper.

ISD continues to track the paper until it is actually published. At that time ISD reviews all the bibliographic and publication data and enters that information into the tracking database. The manuscript may take one of the following formats.

Publications

Journals

NIST produces two journals, The Journal of Research of the National Institute of Standards and Technology and *The Journal of Physical and Chemical Reference Data (JPCRD). The Journal of Research* is published by NIST and the *JPRDC* is published by the American Institute of Physics (AIP).

The Journal of Research of the National Institute of Standards and Technology is a NIST peer reviewed publication used by NIST scientists to report their research in metrology and related areas such as physical science, biotechnology, statistics, applied mathematics, and information technology. The *Journal* is indexed and ranked by the published by the Institute for Scientific Information (ISI) in their *Science Citation Index.* It is also indexed in other major indexing services such as Cambridge Scientific Abstracts and the Directory of Open Access Journals.

Although the title has changed several times, the *Journal* has been published continuously since 1904.[5] Since 1997 the *Journal* has been published both as a print and an electronic publication. Citation analysis reveals that older journal articles are in demand so in the spirit of open access, efforts are being made to convert pre-1997 *Journal* articles. Currently full text of articles published since 1982 are available free at http://nvl.nist.gov/nvl1.cfm?doc_id=130. Subscriptions are available from the Government Printing Office call, (202) 512-1800, or fax: (202) 512-2250 or order online at http://bookstore.gpo.gov.

The Journal of Physical and Chemical Reference Data (JPCRD) http://www.nist.gov/srd/jpcrd.htm. publishes information on physical and chemical properties of materials under the National Standard Reference Data Act. *JPCRD,* "provides a means of systematizing and compacting the major components of the primary research literature, bringing together the research reported in widely dispersed journals and distilling the essential information into a manageable package." [6]

Published bimonthly by the American Institute of Physics for NIST, *JPCRD* began in 1972 as part of an effort to distribute standard reference data to a wider audience. *JPCRD* has been available electronically since 2001. Subscriptions to *JPCRD* and separately published graphs and supplements can be ordered from the American Institute of Physics, Circulation and Fulfillment Division, Suite 1NO1,2 Huntington Quadrangle, Melville, NY 11747-4502.

Other Publications

- **Monographs (MN)** -- Subjects related to the Institute's scientific and technical activities.
- **Technical Notes (TN) --** Studies or reports complete in themselves but restrictive in their treatment of a subject. Analogous to monographs but less comprehensive in scope and treatment of the subject area. TNs often serve as a vehicle for final reports of work performed at NIST under the sponsorship of other government agencies.
- **Handbooks (HB**) -- Recommended codes of engineering and industrial practice including safety codes.
- **Special Publications (SP)** -- Proceedings of conferences sponsored by NIST, NIST annual reports, and other publications such as wall charts and bibliographies.
- **Building Science Series (BSS)** -- Presents research results, test methods, and performance criteria related to the structural and environmental functions and the durability and safety characteristics of building elements and systems.

[5]Former titles include the *Bulletin of the Bureau of Standards, Scientific Papers of the Bureau of Standards, Technologic Papers of the Bureau of Standards,* and *Bureau of Standards Journal of Research.*
[6]NIST Web Page http://www.nist.gov/srd/jpcrd.htm.

- **Voluntary Product Standards (VPS)** -- Developed under procedures published by the Department of Commerce in Part 10, Title 15, of the Code of Federal Regulations. The standards establish nationally recognized requirements for products, and provide all concerned interests with a basis for common understanding of the characteristics of the products. NIST administers this program in support of the efforts of private-sector standardizing organizations.

- **Federal Information Processing Standards Publications (FIPS PUB**) -- These publications collectively constitute the Federal Information Processing Standards Register, the official source of Federal Government information regarding standards issued by NIST.

- **NIST Interagency or Internal Reports (NISTIR)** -- Interim or final reports on work performed by NIST for outside sponsors. NISTIRs may also report results projects of transitory or limited interest, including those that will be published subsequently in more comprehensive form.

- **National Standard Reference Data Series (NSRDS)** -- Provides quantitative data on the physical and chemical properties of materials, compiled from the world's literature and critically evaluated. Developed under a program coordinated by NIST under the authority of the National Standard Data Act (Public Law 90-396). [7]

Databases

NIST produces hundreds of scientific and technical databases. These databases are in totality, a significant NIST knowledge base but as they are independently managed by the various Laboratories they are not addressed in detail in this paper.

As part of its Measurements Services, NIST offers collections of evaluated standard reference technical data for use in developing new materials or improving industrial processes. Physical reference data are physics resources that include recommended values of fundamental constants, Guidelines for measurement uncertainty. The NIST Data Gateway http://srdata.nist.gov/gateway provides links to the NIST data systems. The Gateway can be searched by property, substance name, or keyword. Over 90 of these databases are free and information is provided on a similar number of NIST PC databases available for purchase. Some major databases include

- The International Comparison Database (free web access) http://icdb.nist.gov
- Protein Data Bank (free web access) http://www.rcsb.org/pdb/
- Surface Structure Database (SSD) (available for a fee) see http://www.nist.gov/srd/nist42.htm for information.

[7] NIST web page http://nvl.nist.gov/nvl2.cfm?doc_id=63.

Web Sites

The NIST web site http://www.nist.gov serves as a directory to NIST information, products, and services. Each of the Laboratories has a web site. Technology Services http://ts.nist.gov is a key provider of measurements and standards products and services offers access to NIST calibrations, Standard Reference Materials, Standard Reference Data, and Weights and Measures. Some major information sites include:

- **NIST Virtual Library (NVL)** http://nvl.nist.gov—a product of ISD's Research Library, the NVL is the primary electronic resource network for the NIST scientists. The NVL offers electronic access to major scientific databases, indexes, and other Web resources. Maintained by a content management system (CMS) the NVL offers one stop searching of the e-resources, the online catalog, and interlibrary loan (ILL). The NVL complies with Privacy Act and Section 508 of the Rehabilitation Act Amendments of 1998 standards.
- **NIST Virtual Museum (NVM)** http://museum.nist.gov—also a product of ISD, *Scientific American* http://sciam.com named the NVM one of 50 best Scientific and technology Web sites of 2004. The NVM offers a look at NIST history and scientists through artfully presented artifacts, photo gallery, and a timeline.
- **Standards.gov** http://standards.gov—A product of Technology Services' Standards Services Division, Standards.Gov is a document rich site. Standards.gov offers background information, links, and search tools for locating information about the use of **standards** in government. The primary focus is on U.S. Federal agency use of standards for regulatory and procurement purposes. The site includes a link to a library of downloadable publications on Standards and Conformity Assessment Activities. This link includes annotated lists of publications on such topics as Reports On The U.S. Standards System, Reports on the U.S. Conformity Assessment System, Reports on Regional Standards, and Reports on International Standards and Conformity Assessment Systems.

Open Access Software

Some NIST scientists develop software tools in the course of their official duties. Pursuant to title 17 Section 105 of the United States Code this software is not subject to copyright protection and is in the public domain. Therefore it is open access. These software packages are generally accompanied by the following disclaimer, "*…is an experimental system. NIST assumes no responsibility whatsoever for its use by other parties, and makes no guarantees, expressed or implied, about its quality, reliability, or any other characteristic. We would appreciate acknowledgement if the software is used.*"

Following is a sampling of the type of software available.[8]

- Dataplot—multiplatform software system for scientific visualization, statistical analysis, and non-linear modeling.
- Conformance Test Suite Software—testing measures whether a product faithfully implements an information technology specification.

[8]NIST web page http://www.nist.gov/public_affairs/software.htm.

- Guide to Available Mathematical Software (GAMS)--a cross index and virtual repository of mathematical and statistical software components of use in computational science and engineering.
- Smoke Plume Modeling/ALOFT-FT—predicts the downwind distribution of smoke particulate and combustion products from large outdoor fires.
- Synchronize your computer's clock to the correct time
  - dial-up service—Automated Computer Time Service
    - via the Internet—Network Time Service

Distribution Channels

U.S. Government Printing Office (GPO)

Very early in U.S. history our forefathers determined that open access to government information was essential. Since 1813 the U.S. Government Printing Office (GPO) has been designated the primary responsibility for providing centralized printing and dissemination of all Federal documents according to a uniform set of Federal specifications. GPO's mission is to make available the work of all branches of the Federal Government to all Americans.

NIST therefore is required to submit all official publications to GPO for printing and dissemination. GPO maintains the Federal Depository Libraries Program (FDLP), a national network of 1,300 libraries in the 50 states, the District of Columbia, and U.S. territories that provides free access to official publications. In 2003 the GPO closed all of its bookstores nationwide, except for the main bookstore in Washington, DC. However, GPO now offers access to its official online bookstore for the purchase of U.S. Government publications from the U.S. Government Printing Office.

The FDLP also manages the International Exchange Service (IES) Program (44 USC 1719) of the Library of Congress. This law allows for the official exchange of public documents between the United States and foreign governments specifically, "for distribution to those foreign governments which agree, as indicated by the Library of Congress, to send to the United States similar publications of their governments for delivery to the Library of Congress."

To purchase copies of NIST/NBS publications from GPO you must have a GPO stock number. GPO accepts checks, money orders, VISA, Mastercard, or Discover, or you can establish a deposit account. Orders should be sent to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402-9325. For more information, or to place an order, call (202) 512-1800 or fax (202) 512-2250.

The National Technical Information Service (NTIS)

Another major distribution point for NIST publications is the National Technical Information Service (NTIS). NTIS is a central resource for the sale of government-funded scientific, technical, engineering, and business related information. The NTIS collection contains over 3 million publications covering over 350 subject areas.

To purchase copies of NIST/NBS publications from NTIS, send orders to NTIS Springfield, Va. 22161. NTIS accepts check, money orders, VISA, Mastercard, American Express, Discover, or you can establish a deposit account. For more information, call (703) 605-6000. Place orders call (800) 553-6847, fax (703) 605-6900, or view www.fedworld.gov. While GPO is the official distribution channel open access will depend on whether the electronic publications are offered free of charge. NTIS operates on a cost recovery basis. Open access by definition is free online availability.

Open Access

Open access refers to Internet free access to scholarly materials. Free access to peer reviewed journals is a lofty and controversial goal. Several models exist. One of these models is the Public Library of Science (PLoS). PLoS is an interesting group since it is composed of research scientists willing to make their research findings free world wide to other scientists. Several NIST scientists in the Physics and Materials Science and Engineering Laboratory support this idea. The National Institutes of Health (NIH) and the U. S. National Library of Medicine have both taken steps to share their knowledge, including making PubMed Central and BioMed Central available. However, it will be some time before any standard model is created.

In 1997, NIST began making its research findings easily and freely available by offering the *Journal* available electronically for free. Since then ISD has added many volumes to the archive. ISD collects Open Access resources and offers them on the NVL. ISD has begun a major project that will offer access to all NIST official documents, both past and future, free.

ISD's Role in NIST Knowledge Management (KM) and Open Access

"Knowledge Management is defined as an orderly process of finding, selecting, organizing, condensing and presenting information in a way that improves one's comprehension in a specific area of interest. KM delivers the right knowledge to the right person in the right context at the lowest possible cost, allowing us to be more effective in our workplace." [9]

As stated before, ISD's KM role and interactions with NIST scientists is best understood within the context of NIST areas of research, and the vast array of NIST information products, and their distribution channels. In their quest to assist industry with measurement methods, tools, data, and technology, NIST scientists create an incredible number of knowledge products.

ISD's role is to assist NIST researchers through the research phase, publishing their results in electronic/print format, and distributing the publication is through official channels. ISD is also responsible for creating a means to preserve and access these publications. While the concept of KM is simple, the implementation is more complex.

To better understand ISD's approach and initiatives, what follows is an explanation of how the three parts of the organization come together in the KM process.

[9] Jo Ann Remshard, What is KM—Knowledge Management—Really? *Information Services Directions*, Volume 3, Issue 10, February 2005.

The NIST Research Library

At the start of the Knowledge Continuum (KC) is the research effort. The NIST Research Library, a WiFi hot spot, is situated in a three-story building on the NIST headquarters campus. The WiFi system operates within IEEE Standard 802.11b local area wireless network which provides excellent, fast signal coverage in all areas of the Library and the adjoining portico. Laptops are loaned to customers each equipped with static IP addresses, anti virus software, personal firewall, and virtual private network.

The Research Library is open to NIST staff 24 hours a day 7 days a week. Recently redesigned as a state-of-the art Information Commons, the facility includes collaborative areas, private work spaces, and a café. Creating a physical space conducive to collaboration paves the way for introducing planned KM innovations that will allow scientists to collaborate electronically.

ISD is staffed by 31 NIST employees and 2 contractors. Of these 31 employees, 15 are professional librarians, 18 employees have advanced degrees, and 5 have earned undergraduate degrees. The Research Library has a staff of 16 and serves a population of approximately 3,100 scientists and other professionals. Benchmarked in 2001 against 7 libraries of similar type and size the results showed that the NIST Research Library is able to achieve a full complement of services with the highest ratio of customers per staff member of its benchmark partners. [10]

ISD operates within a cross-functional team concept. This operating philosophy allows ISD to use the talents of any of the staff in any situation. This continually breathes life into programs and allows employees to experience a variety of challenges outside their immediate area of expertise. Teaming is particularly useful in creating new initiatives such as ISD's most recent initiative, Knowledge Innovations for Physics (KIP).

Named the Federal Library of the Year 2003, the Research Library offers a comprehensive program of reference and knowledge services including: standard reference services, a virtual library site, the NVL http://nvl.nist.gov, interlibrary loan and document delivery services, and customer education. The NVL offers NIST staff electronic access to hundreds of journals and databases. ISD is doing its part to make Open Access, peer reviewed resources available on the NVL by creating links to these resources. They can be found under Open Access at http://nvl.nist.gov/nvl2.cfm?dynamic=browse_subj&typeid=3&subjectid=82**.** Major open access journals, including the *NIST Journal of Research* are listed in the Directory of Open Access Journals at http://www.doaj.org/.

ISD operates a UNIX-based, integrated library system (ILS). This system is the basis for the Web-based catalog. The online catalog is available 24/7 via the NVL from both inside and outside NIST.

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[10] Paula Deutsch, Diane Cunningham, Lisa Greenhouse, Susan Makar, Warren Overman, Susan Sanders, and Barbara Silcox, *NIST Research Library Benchmark Study, 2001 Summary Report,* NISTIR 7008, June 2003.

Reference Services include scientific research assistance online searching via a staffed reference desk, an e-mail based service. Under an initiative to improve service ISD is currently experimenting with instant messaging (IM) and PDAs as alternate reference query paths. The collection consists of over 300,000 volumes and over 1,000 current subscriptions.

As the central repository for NBS/NIST publications the Library collection includes both an archive and circulating copies of these publications. ISD manages this collection through the integrated library system, creating metadata files that will link from the publications management system currently under development to electronic versions of the documents in the digital library that is also under development.

There is also a growing demand for ISD's Lab Liaison Program. This unique program partners reference librarians with individual Labs prior to the start of the KC. The intent is for these librarians to provide research consulting services unique to the individual labs needs. This arrangement promotes two-way communication and strengthens relationships between scientists and librarians. This is KM at its simplest level; getting to know customers and recording their needs and preferences. As lab liaisons work with individual divisions they establish profiles that include current projects, emerging topics, resources preferences, and time frame needs. This profile plays an important part in collection development and reference programs strategic thrusts.

Reference librarians also are integral part of NIST Strategic Working Groups (SWG) for the NIST Strategic Focus Areas (SFAs) -nanotechnology, homeland security, health care, and information/KM. In a more active KM role, librarians create intranets, recommend content, establish RSS feeds, and manage the SWG's intellectual capital. ISD has a strategic objective regarding the SFAs as part of ISD's strategic plan.

The Electronic Publications and Information Group (EIPG)

The Electronic Publications and Information Group (EIPG) has an intricate role of bridging the continuum from research to publication. EIPG's function is twofold: to publish NIST knowledge and to devise methods to improve content management to deliver effectively and efficiently ISD expertise. EIPG creates tools and manage information in ways that enable customers to easily find what they are looking for and highlight information the customer may not have been aware of. EIPG enhances the WEB content through management. New initiatives include using tools such as Wiki to create content on the fly.

Knowledge Management Initiative

NIST Integrated Knowledge EditorialNet (NIKE) is a knowledge management system that captures, organizes, and streamlines the publication workflow. When complete, NIKE will combine a web-based manuscript submission, approval, and tracking system with the Library's ILS online catalog. The bibliographic information of the submission section will be transferred to the cataloging records. These in turn will be linked to the

heart of NIKE, a digital, full-text library stored as PDF documents, a completely open access library of NIST research publications.

NIKE is a customer driven knowledge system. When completed NIKE will facilitate capture, organization, retrieval, and dissemination of NIST publications. NIKE will reengineer the entire knowledge system through an improved publication process creating a unified enterprise wide KM system.

For the past year EIPG has been building the digital library by creating all NIST publications as searchable electronic documents. Additionally, EIPG is also enlarging the digital library by converting older NIST documents to PDF. EIPG thus creates open access to all NIST technical publications. Preservation is accomplished and distribution is on demand.

NIST Museum and History Program

The final phase of the KC is preservation. The Museum and History Program celebrates and preserves NIST accomplishments. Located at the entrance to the NIST Library, the NIST Museum houses and displays artifacts related to the work and research performed at NIST. The newly installed Hall of Standards is a series of exhibits located in the hall connecting the Administration Building lobby to the Museum and Library. Major exhibits include the Rabinow Room honoring Jacob Rabinow, inventor extraordinaire, who was inducted into National Inventors Hall of Fame in March 2005; the Bat Missile; an exhibit honoring Nobel prize winners William Phillips and Eric Cornell; and the Ferdinand R. Hassler exhibit; as well as official weights and measures standards.

A recently completed online registrar's database converts the manual system into a web based KM tool for both staff and the public. It will soon become part of the NVM. The registrar's database includes high resolution photos of all museum objects whether on display or in storage. The registrar's system is fully searchable and will link to other documents and web information as appropriate.

The History Program is a most important KM activity at the end of the knowledge continuum. The program serves to preserve the activities of NIST's 100+ years of history. The major program publications include a three volume historical series covering NIST history through 1996. ISD was publisher for the last two volumes. The publication team relied heavily on the KM archive, biographical, historical, and photographical collections. The versatility of the Museum presents a fascinating knowledge management challenge.

The overarching goal of the three programs is to complete the NIST knowledge continuum through well organized, federated search approach based on the principles of open access.

Conclusion

NIST will of course, continue to release its research findings via the official channels. ISD will also continue to develop the digital library and other avenues for distributing open access of NIST knowledge. Working with NIST scientists, ISD also aspires to demonstrate the value of open access and to assist them in publishing their non-NIST published manuscripts in open access environments as appropriate.

In this World Year of Physics, an international celebration of physics and the contributions of Albert Einstein, ISD has launched a new initiative called Knowledge Innovations in Physics (KIP). As the world acknowledges the importance of physics discoveries, ISD, through KIP will introduce new knowledge tools for scientific collaboration. In this way, ISD intends to foster research partnerships and aid publishing efforts. And finally, ISD will contribute to the Year of Physics celebration by honoring NIST's achievements in this arena. And so the continuum begins again - research---creation---dissemination---and preservation.

This paper will also be available free online at http://nvl.nist.gov/.