

Measuring the Impact of NIST Research: The Analytical Tools of Lab Liaisons

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Introduction

The National Institute of Standards and Technology (NIST), as an agency of the U.S. Department of Commerce, supports basic research in the physical sciences and engineering that has potentially high impact on economic competitiveness. Under the President's American Competitiveness Initiative, NIST's budget will double over the next ten years. NIST must demonstrate its impact and effectiveness on the Nation's economic security and quality of life. To help measure NIST's impact, librarians within the Information Services Division (ISD), acting as "lab liaisons," perform literature and publication analyses through collaborative efforts with NIST scientists. What follows are examples of some of the tools we use and the various types of analyses we conduct.

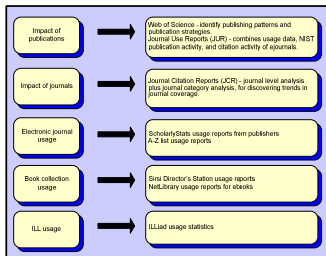


Lab Liaisons measure the impact of NIST research by performing citation, publication, and content analyses using a wide collection of analytical tools.

ISD Lab Liaisons use various strategies and methods to study the body of literature produced by NIST researchers and measure the impact of their research.

Analytical Tools

Lab Liaisons support NIST research, innovation, and discovery through the delivery of ISD's analysis capabilities. A variety of tools are used to collect and analyze data related to measuring the impact of NIST research.



Tools and resources used to support analyses

Citation Analysis

The *Journal of Research of the National Institute of Standards and Technology (JRes)*, published by various titles since 1904, serves as a major mechanism for NIST scientists to report on their research in metrology and related fields of physical science, engineering, applied mathematics, biotechnology, statistics, and information technology. Today it is both an electronic and print publication published six times a year.

ISD has performed citation analyses of *JRes* and studied the ISI impact factor of the *Journal*. The citation frequency of the *Journal's* most highly cited special issues is shown below.

Citation Frequency of Top Five JRes Special Issues Published (2006)

Citation frequency	Journal of Research Volume, Issue, Date, Special Issue Title	Number of articles
475 times	v.101(4) 1996 (Bose-Einstein Condensation)	15
407 times	v.93(3) 1988 (Accuracy in Trace Analysis) conference	130
276 times	v.102(2) 1997 (40 Years of Entropy & the Glass Transition) conference	8
209 times	v.98(1) 1993 (NIST Cold Neutron Research Facility)	10
117 times	v.101(3) 1996 (Crystallographic Databases) conference	24

Publication Analysis

Publication analysis is used to identify publishing patterns, alternative publishing venues, and publication strategies to increase reach and impact. NIST produces over 2,200 publications a year and about 65% are published in the journal literature.

Subject analysis of NIST-authored publications is conducted as well. Over 90 search concepts and keywords were searched against ISD databases to create an extensive bibliography of NIST nanotechnology publications. NIST biosystems and health publications were identified in a similar manner. Two subject bibliographies were then generated using a bibliographic software application.

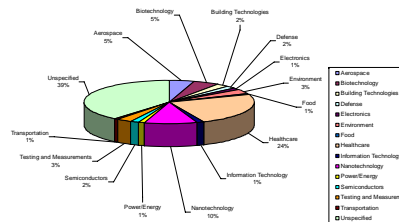
ILLiad	GCR	JPCR	JRES	Other	NISTIR
BBFL	3	0	9	1	25
CTTL	0	15	36	0	0
IEEE	0	4	26	4	0
ITL	3	0	21	12	30
MEL	0	0	17	2	11
MEML	0	0	30	0	3
PL	0	9	30	0	2
Total	6	28	214	7	133

Impact Analysis

One way of looking at NIST's impact is the number of papers it has co-authored with researchers in other agencies, organizations, and academic institutions. In this analysis ISD studied NIST's impact on Maryland industry and academic research efforts through co-authorship of journal articles.

Below is a pie chart that shows the breakdown of NIST papers co-authored with Maryland researchers by industry sectors. Bibliographic information for each paper, including title, abstract, and keywords, was examined to determine industry sector. Authors' organizations were also useful in determining industry sectors.

Breakdown of NIST Papers Co-authored with Maryland Organizations by Industry Sector (2002-2006)



Collection Analysis

ISD evaluates the collection by gathering customer requirements, assessing their satisfaction, and looking at usage. ISD ensures that its collection reflects continuing customer needs by monitoring the usage of journals, books, and ILL.

Book Collection
The Top 10 of The Top 100 Call Numbers

Rank	Score	Subject Area	Topic	Call No.
1	199.3	Biological Chemistry	Enzymes Analysis, Source	Q579
2	144.6	Chemical Engineering	Chemical Engineering	QD24
3	127.6	Computers and Social	Computer Topics, Security	QA76.9
4	121.1	Chemical Engineering	Chemical Engineering	QD24
5	112.7	Information Programming	Soft. Syst. Design Physics	QA76.9
6	108.9	Mathematics	Mathematics	QA
7	105.9	Mathematics	Mathematics	QA
8	101.7	Mathematics	Mathematics	QA
9	99.1	Mathematics	Mathematics	QA
10	95.1	Mathematics	Mathematics	QA

Most Frequently Used Journals in 2007

Journal Title	Jan-07	Feb-07	Mar-07	YTD-07
Nature	1559	1383	1306	4227
Science	1202	1229	1184	3615
Physical Review Letters	815	716	907	2438
Applied Physics Letters	645	560	706	1911
The Journal of Chemical Physics	693	543	543	1779
Langmuir	514	610	523	1647
Macromolecules	529	548	508	1585
Journal of the American Chemical Society	512	428	524	1464
Journal of Physical Chemistry B	422	382	332	1136

Content Analysis

Content analysis involves conducting research to answer specific questions. Lab Liaisons identify, collect, organize, synthesize, package, and disseminate data and information to meet customer's specific needs. A typical request requiring in-depth research and content analysis, and the key resources used in responding to the request are shown below.

Sample Questions

- What are other countries, particularly China, the European Union, and to a lesser degree Japan, investing in physical infrastructure at universities and non-industrial institutions for research & development (R&D)?
- For the countries that have invested in their R&D infrastructure, are talents being drawn away from the U.S. for these types of R&D ventures, i.e. brain drain from U.S.?
- For U.S. Universities, have new departments been created in Science and Technology? What are the departments and the faculty & student demographics? In what industries are students from those departments taking jobs?
- Looking at the balance of trade (product and service levels) in all technology sectors, what is the balance of trade between the U.S. and other countries, particularly China and the European Union? What is the balance of trade between the U.S. and China; U.S. and Germany; and Germany and China? What data sets exist to help answer this question?

Key Resources

- Web of Science
- Engineering Village
- Worldcat
- ABI-Inform
- Wilson SelectPlus
- BusIndustry
- National Academies
- National Science Foundation
- OECD reports
- RAND Research Briefs
- UNESCO
- Government statistics bureaus
- Council on Competitiveness
- Google

Future ISD Analysis

ISD plans to perform other analyses of NIST publications including:

- Further analysis of NIST publications at the NIST lab, division and/or group levels
 - Society publications (ACS, AIP, APS, IoP, etc.)
 - Trends within subject disciplines
 - Conference proceedings
- Citation analysis of NIST publications
 - Papers cited by NIST authors
 - Papers citing NIST authors
- Program research and analysis

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