Bibliometrics and Impact Analyses at the National Institute of Standards and Technology

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Presentation Outline

- Overview of NIST and ISO
- Discussion of analyses conducted
  - Institution as a whole
  - Lab-level
  - ISO impact
- How we conduct analyses – best practices
- Analysis tools used

National Institute of Standards and Technology

- Non-regulatory Federal agency made up of about 3,000 science and technology researchers
- NIST promotes U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology
- The Information Services Office supports and enhances research activities of the NIST scientific community through a comprehensive program of knowledge management

Analysis Studies for the Institution as a Whole

Bibliometrics

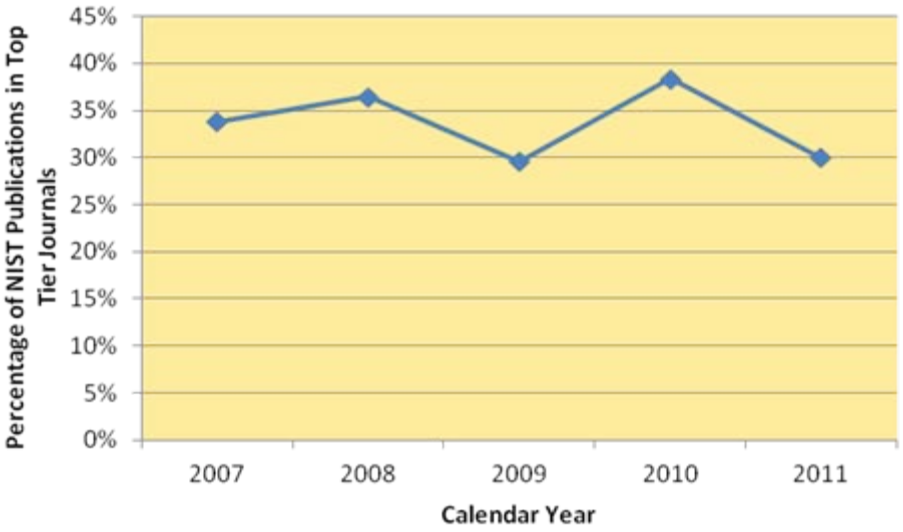
Analysis Studies to Assess ISO Impact

Analysis Studies for the Labs

Analysis Studies for the Institution as a Whole

- Identify NIST publications in “top tier” journals using Impact Factor rankings (NIST Balanced Score Card metric)
- Analyze outside NIST collaborators on NIST publications to assess NIST’s impact
- Study institutions utilizing or citing NIST patents to determine impact of patents
- Track detailed bibliometrics of NIST-published journal, *Journal of Research of the National Institute of Standards and Technology* to help guide editorial decisions

NIST Publications in Top Tier Journals



Percentage of NIST Publications in Top Tier journals, 2007-2011

- Developed methodology for assessing the impact of NIST research publications that can be replicated by others
- ISO continues to perform this trend analysis for the NIST Balanced Scorecard

NIST Publications in Top Tier Journals

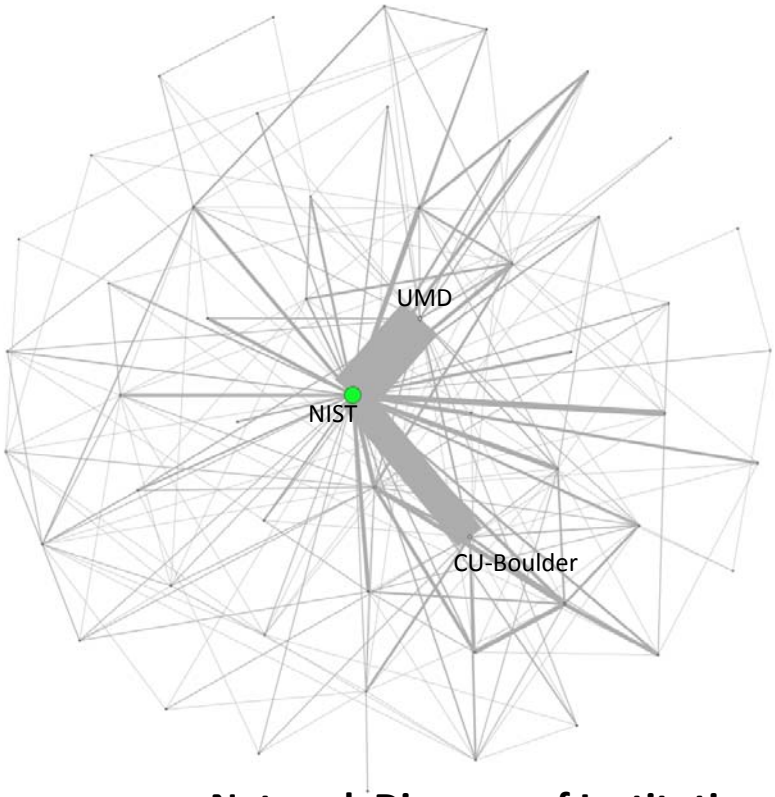
- Determined number of NIST authored publications in “top tier” journals
- Challenge: What is a “top tier” journal?
- Used by NIST Management to assess the extent of NIST’s impact

	Number of NIST-Authored Papers
Physical Review Letters	56
Optics Express	31
ACS Nano	19
Astrophysical Journal	19
Journal of the American Chemical Society	18
Analytical Chemistry	17
Soft Matter	14
Advanced Materials	14
Journal of Physical Chemistry C	13
Optics Letters	10
Environmental Science & Technology	10

Number of NIST-authored papers in top tier journals in CY2011

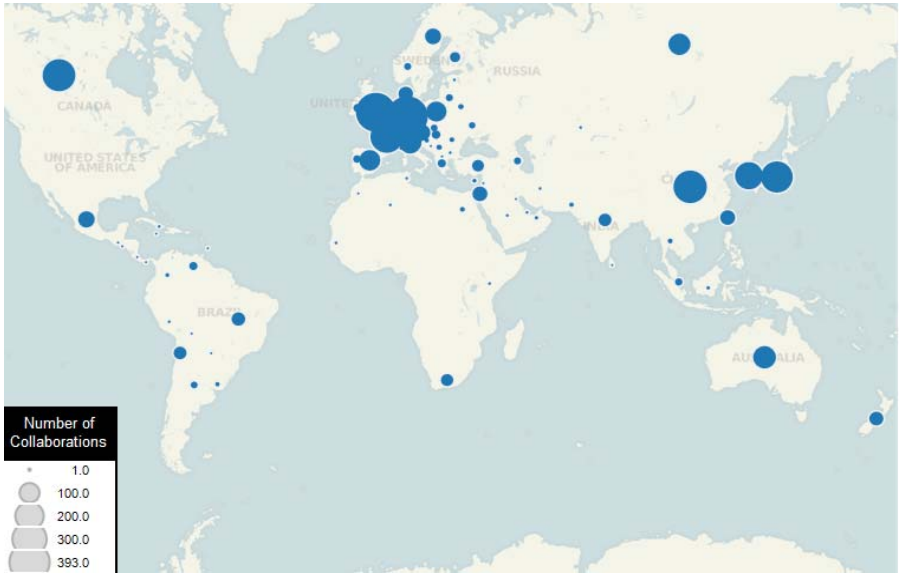
Collaborations with Outside Organizations

- Determined number of unique non-NIST co-authors and number of unique institutions collaborating with NIST
- Used by NIST Management to assess the extent of NIST's impact



Network Diagram of Institutions Collaborating on NIST Publications, 2012

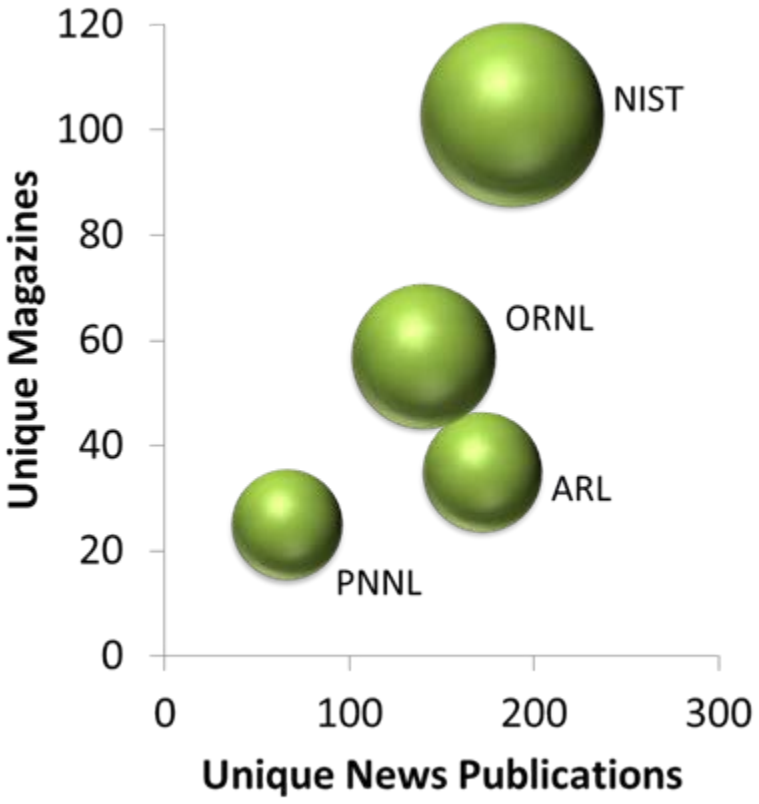
Collaborations with Outside Organizations



Countries of Authors/Institutions Collaborating on NIST Publications, 2008-2012

- Investigated the number of countries and organizations with whom NIST collaborates
- Used data visualization tools to convey and demonstrate impact

News Analysis for NIST and Comparable Organizations



News and magazine mentions of NIST and comparable National Labs, Q1 & Q2 FY13

- Compared news stories and magazine articles mentioning NIST to those mentioning select National Labs
- Identified top 10 publications mentioning NIST most frequently
- NIST mentioned in more stories/articles and unique publications than the comparable labs

Analysis Studies for the Labs

- Calculate individual h-indexes for promotion packages
- Quantify impact of a report on its intended audience
- Help promote NIST conference with bibliometric analysis of past conferences
- Analyze division output over extended time periods for group h-index, citation counts, and more
- Recommend journal and conference venues for publishing
  - Individual publications
  - Proactively for group, program, or division

Analyze Division Outputs

- A chemistry division wanted a comprehensive publications analysis
  - H-index for entire division
  - Total times cited and average citation rate per paper
  - List of most highly cited papers and authors
  - Collaboration metrics (co-authors and institutions)
  - Comparison of citation rate between NIST and the field as a whole
  - Publishing and citation patterns in the journal literature

Analyze Division Outputs

- Challenge was capturing the papers of hundreds of authors over the course of several decades
- Citation impact of papers relative to subject area was 1.86
- Collaborations with countries on six of seven continents

	Papers	Citations	Cites/ Paper	Relative Impact
NIST	1,178	32,056	27.21	1.86
U.S.	51,258	1,236,120	24.12	1.65
World	327,497	4,793,592	14.64	1.00

Relative Citation Impact of NIST Chemistry Division Papers, 1981-2012

Quantify Impact of a Report

- Technical Report published in 2004 targeted to practitioners in design, construction, and operation and maintenance
- Bibliometric analysis of scholarly publications and gray literature; full-text download analysis; and news, trade literature, and blog analysis

Types of Citing Publications

Quantify Impact of a Report

- Cited frequently in literature; downloaded even more frequently
- Impacted literature in subject fields and geography beyond intended audience
- News and trade literature showed impact on practitioners in field

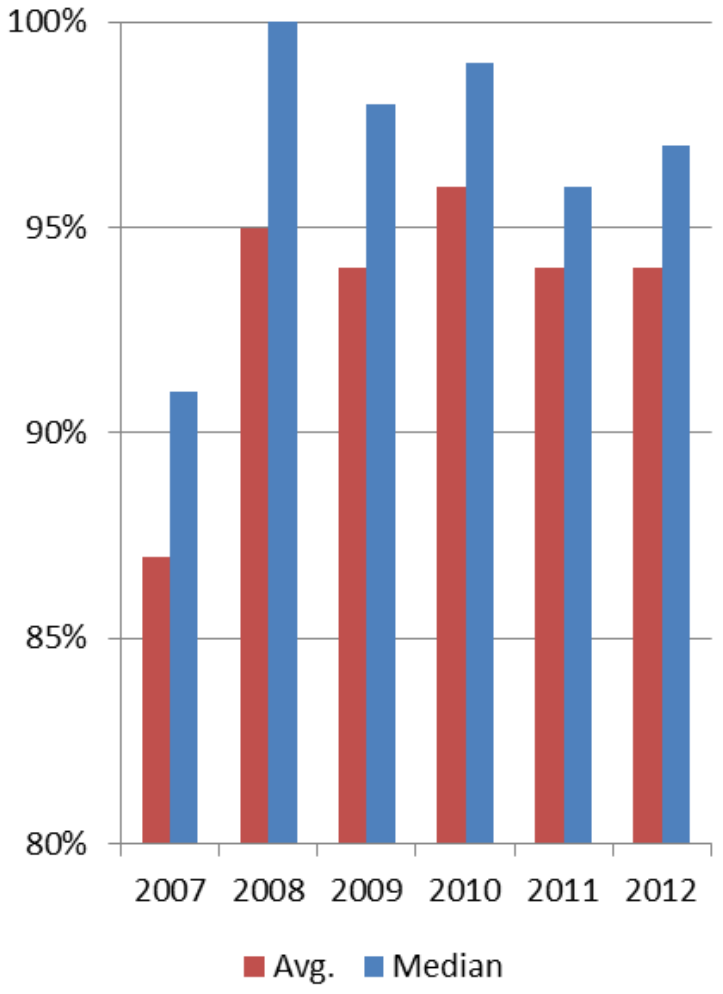
Locations of Conferences of Citing Papers

Analysis Studies to Assess ISO Impact

- Assess impact of journal collection
- Perform evidence-based collection development using bibliometrics
  - Journal collection
  - Book collection

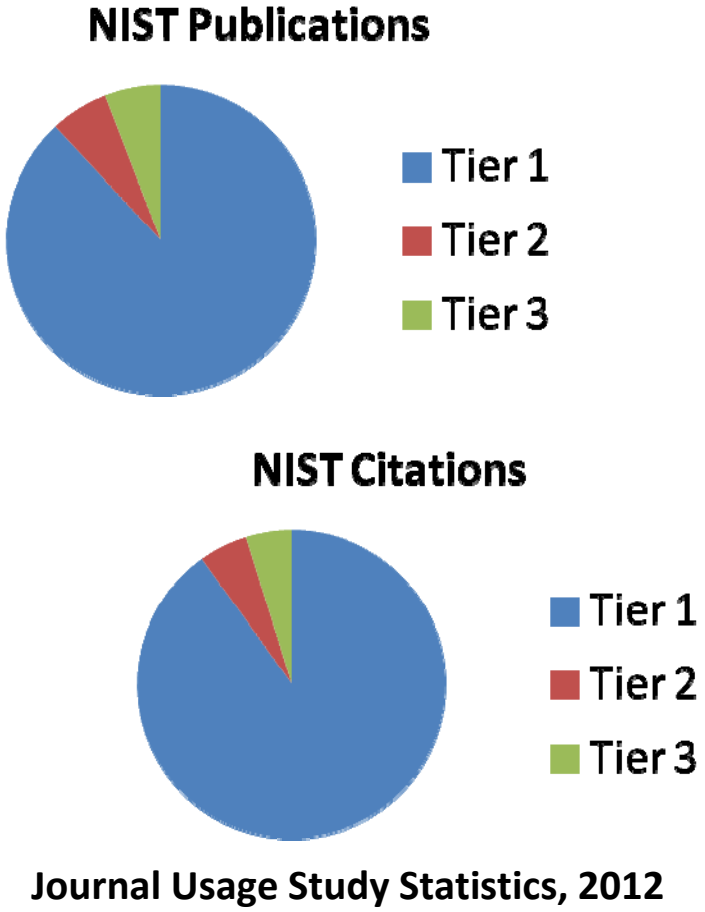
Assess Impact of Journal Collection

- Annual study of 50 most-cited NIST publications from previous year
- Valuable to ISO, researchers, and to NIST Management
- Assisted in journal collection development



% of Citations Subscribed

Evidence-Based Collection Development



- Used bibliometrics of NIST publication venues and citations
- Combined with traditional collection development statistics
- Categorized and prioritized journals for the collection and for alternative access
- More robust method than cost-per-use or downloads

How We Conduct Analyses: Best Practices

- Conduct extensive interviews with customers
- Use established internal review process through different stages of analysis
- Collaborate with Lab Liaison team members with the right expertise – program analyst, metadata librarians, etc.
- Use formalized report structure and template
- Share with Lab Liaison team
  - Lab Liaisons meet regularly to share experiences
  - Final reports posted to shared drive

Analysis Tools

- Web of Science
- Journal Citation Reports (JCR)
- InCites
- Google Scholar
- MS Excel and Access

Note: The identification of any commercial product or trade name does not imply endorsement or recommendation by the National Institute of Standards and Technology.

Data Visualization Tools

- MS Excel
- Tableau
- Wordle
- Sci^2
- Gephi
- Neo4J
- Anaconda (Python-based packages)

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Questions?

More bibliometric presentations available at:

http://www.nist.gov/nvl

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