

Using OpenURL, Open Source and DOIs for Intelligent Linking Services

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Hanford Technical Library, PNNL

Increasing use of electronic products in libraries, especially online journals

▶ We need to:

- Link resources in a meaningful way
- Optimize the accessibility and use of resources

▶ The goal:

- Provide seamless and intelligent navigation between library resources

▶ Our solution:

- Use of a link server or link resolver
- SFX by Ex Libris
- Additional functionality with other vendors

What is OpenURL? What is SFX?

- ▶ Brief history of OpenURL and SFX development
- ▶ Open URL 0.1 and 1.0
- ▶ ANSI/NISO Z39.88 2004
 - Backwards compatibility
- ▶ What does OpenURL-enabled mean for the library user?
- ▶ Vendor and publisher increased use of the standard
- ▶ Solves the “appropriate copy” problem

Anatomy of an OpenURL

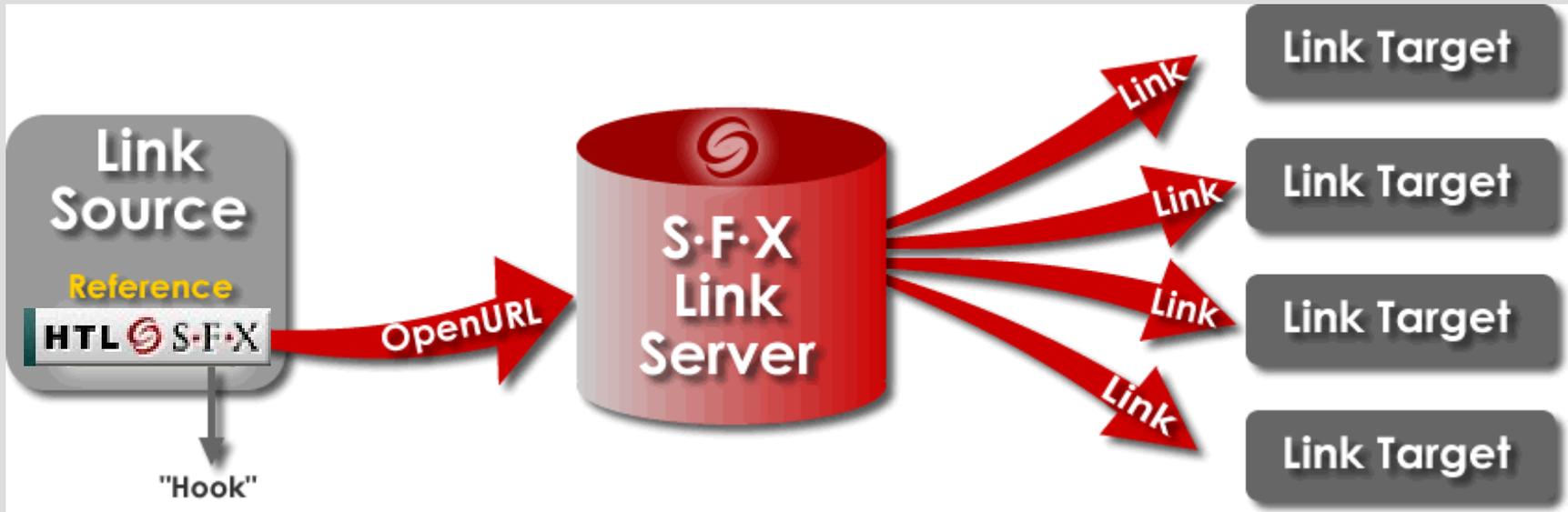
▶ OpenURL 0.1

<http://openurl.proquest.com/in?service=pq&issn=0040781X&volume=157&issue=5&spage=33>

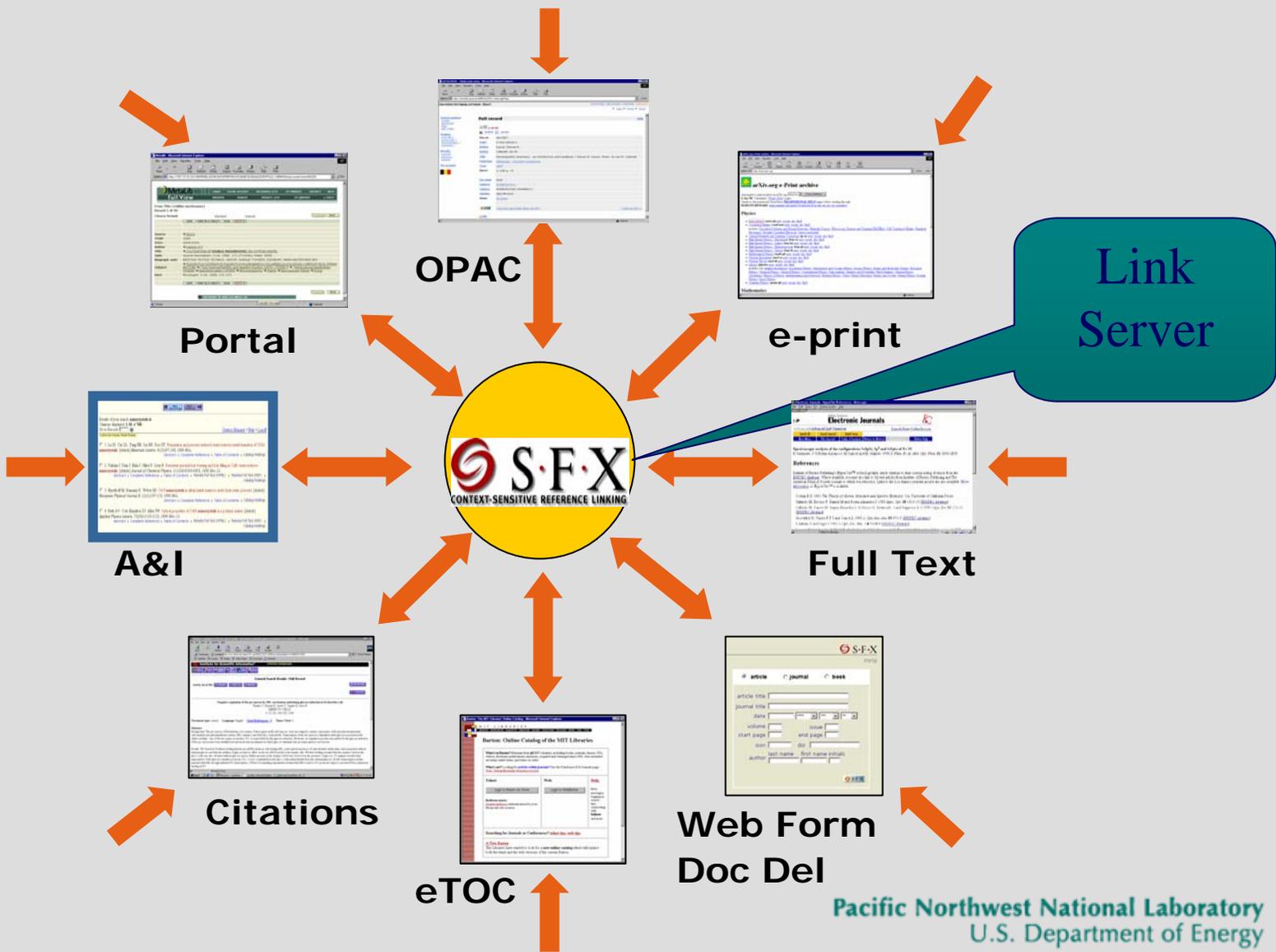
▶ OpenURL 1.0

http://gateway.proquest.com/openurl?ctx_ver=Z39.88-2004&res_id=xri:pqd&rft_val_fmt=ori/fmt:kev:mtx:journal&genre=article&jtitle=Lancet&issn=0140-6736&atitle=Models of Malaria&date=2003-03-08&volume=361&issue=9360

Smart Linking with SFX



SFX – an independent link server



Project Planning I



- ▶ In 2003
- ▶ 2-day on-site training from Ex Libris
- ▶ Factors to consider
 - Internal
 - External
 - ASP (Application Service Provider)
 - Who has access to SFX?
 - PNNL
 - Hanford Site Staff
 - Bechtel Hanford (now Washington Closure Hanford)
 - Public library workstations

Project Planning II

- ▶ Talked with Sandia National Laboratory SFX implementation team for advice
- ▶ Talked with PNNL network group for advice
 - Port issues
 - Firewall issues

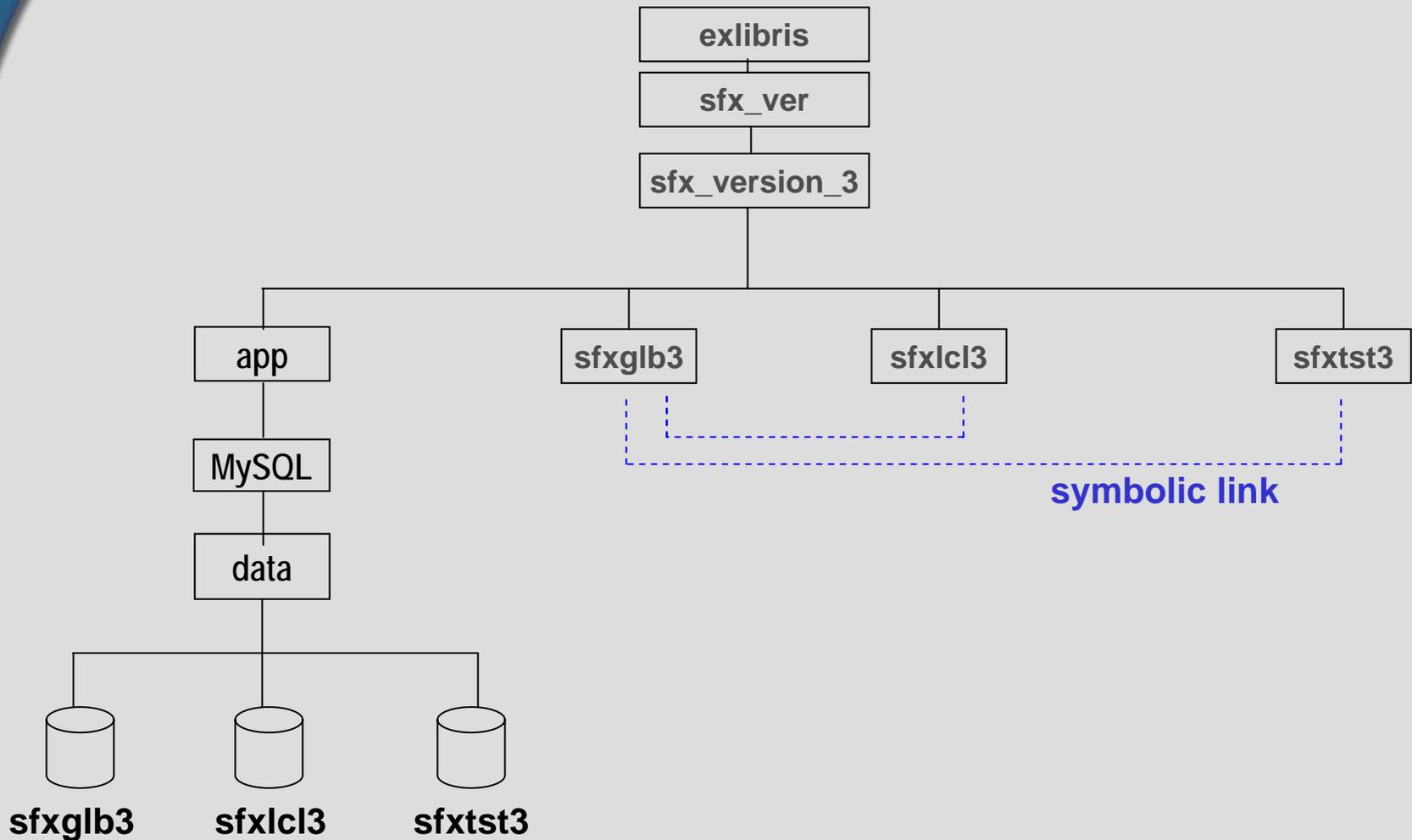
Final Decision

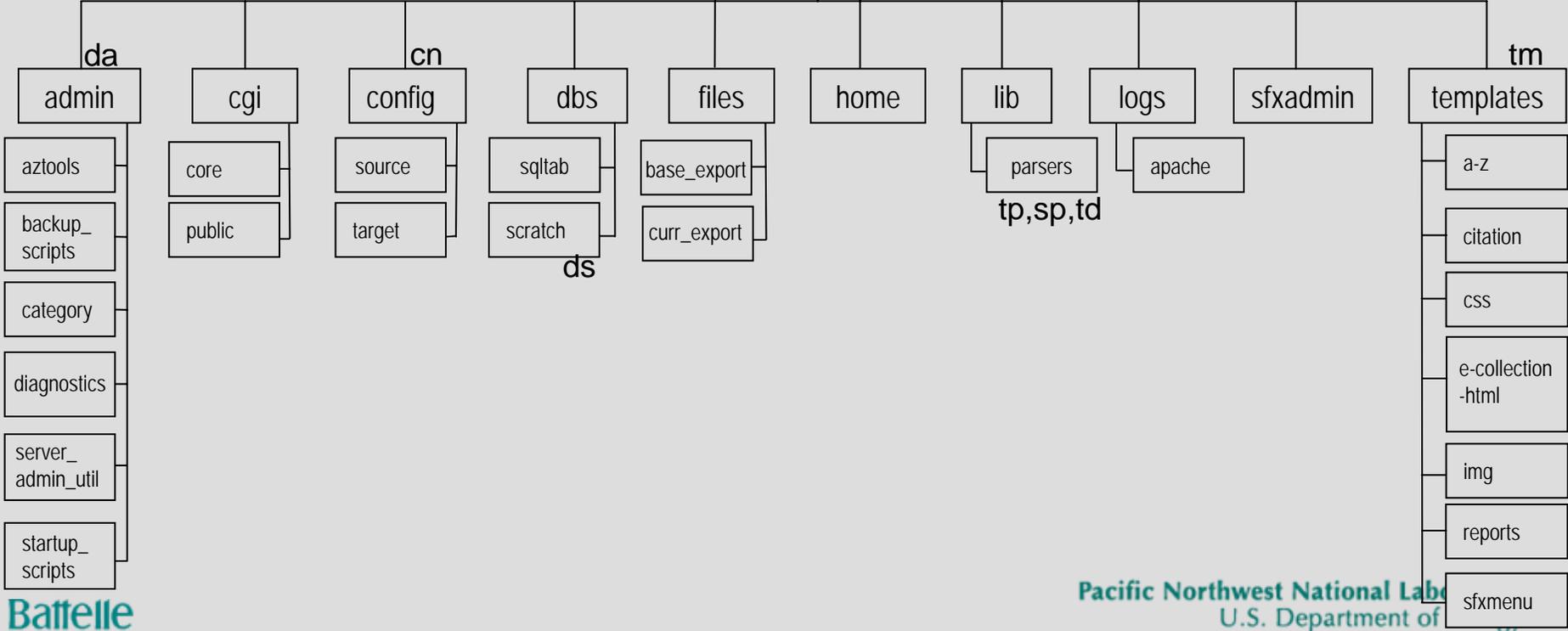
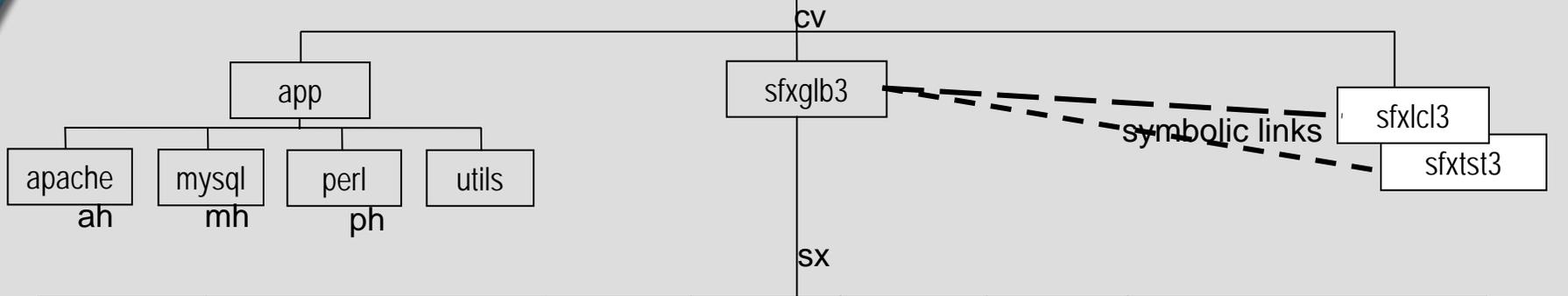
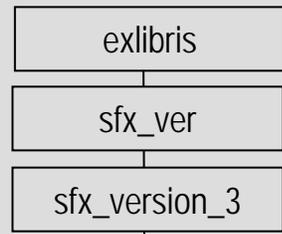
- ▶ Extranet and outside of PNL domain
- ▶ Numerous tests
- ▶ Several revisions of Server Security Plan
- ▶ Open firewall for access
- ▶ Launched Version 2 on Oct. 1, 2003
- ▶ Launched Version 3 on Dec. 8, 2005

SFX application

- ▶ RedHat Linux Enterprise ES 3.0
- ▶ All under /exlibris file system
 - MySQL [v. 4.1.8]
 - Apache Web server [v. 2.0.50]
 - Perl [v. 5.8.5]

SFX Package –standard installation





KBupdates

- ▶ KnowledgeBase Update
- ▶ Provided by Ex Libris monthly
- ▶ Includes:
 - latest journal holding information
 - bug fixes
- ▶ Requires front-end configuration
- ▶ Manual update because of firewall restriction

SFX menu configuration

header.gif

tl_sfx.gif

banner.tpl

ico_go.gif

sfxmenu.tpl:

grouping_yes.tpl

SFX, A service of Hanford Technical Library - Microsoft Internet Explorer

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Marine biotechnology is poised more than ever to benefit from confluences in fundamental research. Broad advances in interdisciplinary science, such as information technology, *nanotechnology* and biocomplexity, furnish major ...
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- [2. *Star Trek replicators and diatom nanotechnology*](#)
[Drum, RW](#); [Gordon, R](#), *Trends in Biotechnology* [*Trends Biotechnol.*]. Vol. 21, no. 8, pp. 325-328. Aug 2003.
... compete with the lithography techniques of present day *nanotechnology*, which has limited 3D capabilities. Alternatively, their fine detail could be used for templates for MEMS (micro electro mechanical systems), or their silica deposition systems ...
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2. [Star Trek replicators and diatom nanotechnology](#)
 Drum, RW; Gordon, R. *Trends in Biotechnology* [Trends Biotechnol.]. Vol. 21, no. 8, pp. 325-328. Aug 2003.
 ... compete with the lithography techniques of present day **nanotechnology**, which has limited 3D capabilities. Alternatively, their fine detail could be used for templates for MEMS (micro electro mechanical systems), or their silica deposition systems ...
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Database:
ASFA: Aquatic Sciences and Fisheries Abstracts

Descriptors:

Address: p://sciserver.lanl.gov/pdflinks/05110514081701131--journals--01677799--v21i0008--325_stradn.pdf

Star Trek replicators and diatom nanotechnology

Ryan W. Drum¹ and Richard Gordon²

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²Department of Radiology and Electrical & Computer Engineering, University of Manitoba, Room CA256, Health Sciences Centre, 820 St. Charles Street, Winnipeg, MB R3A 1R9 Canada

Diatoms are single celled algae, the 10⁶-10⁷ species of which create a wide variety of three-dimensional amorphous silica shells. If we could get them to produce useful structures, perhaps by computer selection experiments (i.e. forced evolution of development or evolution), their exponential growth in suspension cultures could compete with the lithography techniques of present day nanotechnology, which have limited 3D capabilities. Alternatively, their fine detail could be used for templates for MEMS (micro electro mechanical systems), or their silica deposition systems isolated for guiding silica deposition. A recent paper has demonstrated that silica can be replaced atom for atom without change of shape - a step towards the Star Trek replicator.

Diatoms are beautiful to behold (Figs. 1a-c and Fig. 2). Some investigators get carried away producing art only visible through a microscope, made of arrays of diatom valves (see <http://khalimaqa.gov.au.edu/foralimage04.html>).

Diatom reality
 At first, diatoms were thought to be animals (A.P. Thwaites et al., in preparation) because what are now called raphe diatoms move as speeds of up to 25 µm s⁻¹ when attached to surfaces. They do this with no moving parts, although a "raphe fluid" is exuded. A slow moving debate has occurred over those decades as to whether the motive force for diatom gliding motility is in the hydration and capillary of the raphe fluid (2), exerted by actin (3), or whether actin provides the motive force (4). A model for cytoskeleton motility identical to the capillary model for diatoms has been proposed (5), as well as a similar one for cyanobacterial gliding motility (6) (common ancestor or

CrossRef Implementation (2003)

- ▶ Library Affiliate Member
- ▶ CrossRef provides technology infrastructure for linking based on using the DOI. It enables linking *to* and *from* specific journals. *It holds no full text content.*
- ▶ Use CrossRef as a source of metadata to enhance OpenURL-based local link resolvers:
 - Use the DOI look-up to resolve a citation <http://dx.doi.org>
 - Use the DOIs found as a reference citation in a journal and access the cited article
- ▶ In order for CrossRef to function properly with SFX, thereby resolving to the “local copy,” the user needs to place a cookie on his/her computer.

Anatomy of a DOI

- ▶ DOI stands for *Digital Object Identifier* - it is analogous to the UPC bar code for physical objects
- ▶ It is an alphanumeric string created to uniquely *identify/name* a piece of electronic content, and to serve as a *stable and persistent link* to that content's location on the WWW.
- ▶ Anatomy of a DOI

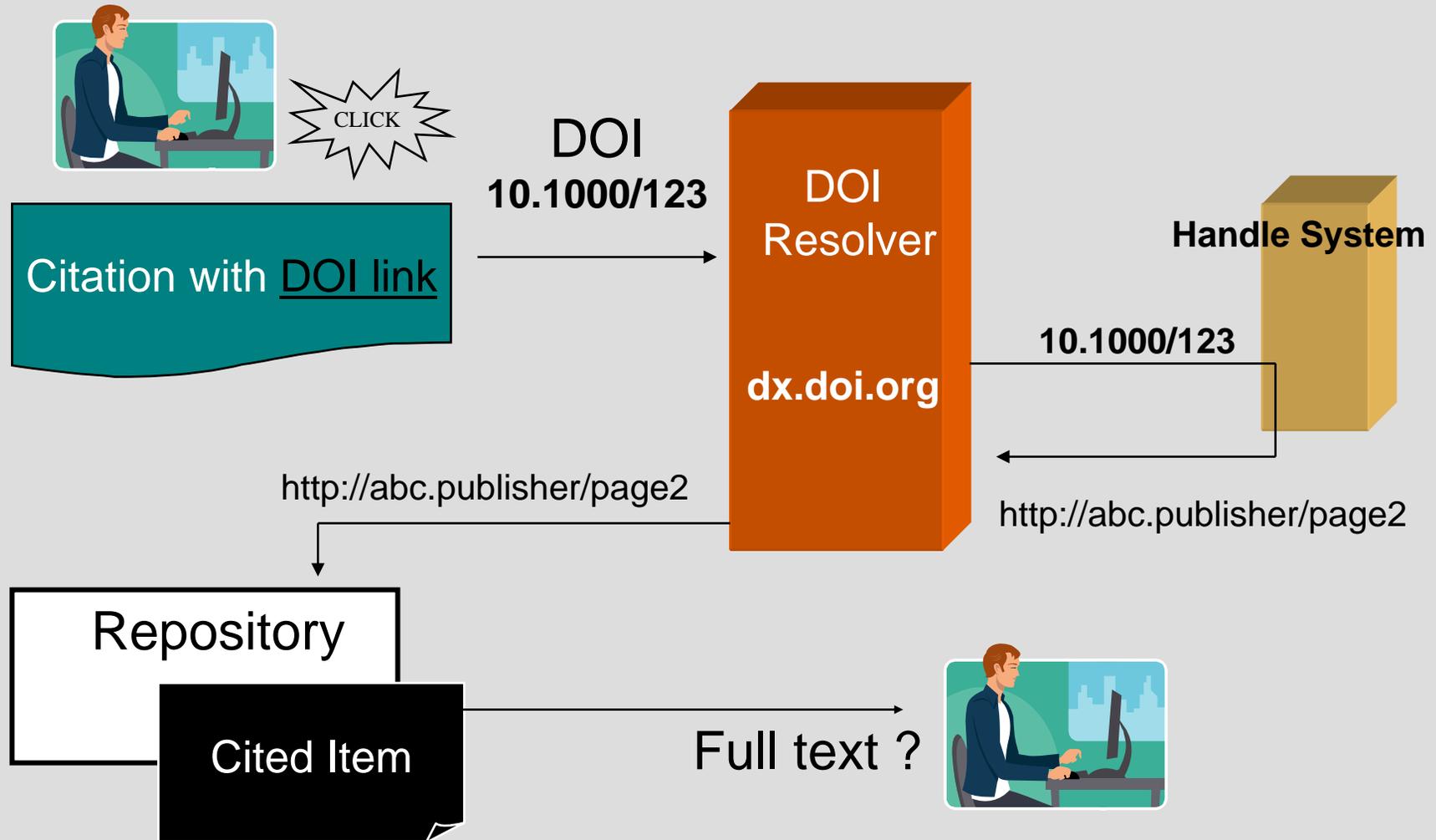
<http://dx.doi.org/10.1099/mic.0.C0117-0>

DOI Directory Prefix Suffix

DOIs are everywhere

- ▶ Print journal articles
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- ▶ Online Full-text
- ▶ E-first publishing
- ▶ Online Reference Citations
- ▶ PubMed
- ▶ Google

CrossRef/DOI Linking



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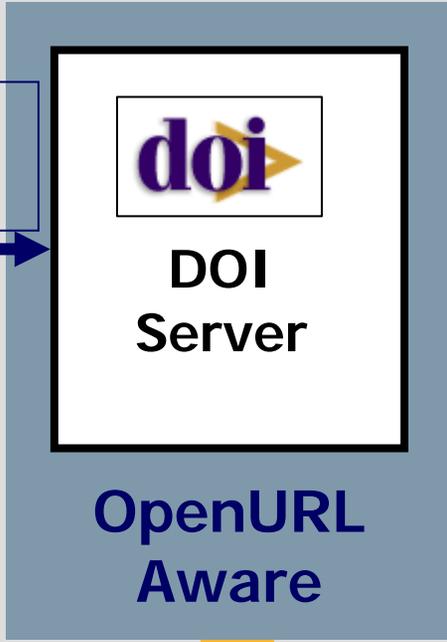
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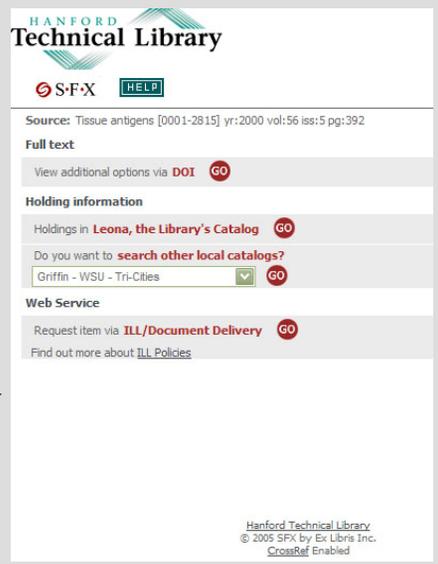
References

<http://dx.doi.org/doi=10.1034/j.1399-0039.2000.560502.x>

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Extending Linking Options

The break-up of heavy electrons at a quantum critical point - Microsoft Internet Explorer

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10. Kadowaki, K. & Woods, S. B. Universal relationship of the resistivity and specific heat in heavy-fermion compounds. *Solid State Commun.* **58**, 507-509 (1986) | [Article](#) | [ChemPort](#) |

Internet

ChemPORT Implementation (2004)

- ▶ ChemPORT can be customized as an in-house link service allowing users to link directly from a CAS or STN record to the full text of the article (if available) and to other supporting resources and services using SFX. It is available to registered users and active account holders of SciFinder and STN.
- ▶ SciFinder is an end-user service that gives researchers direct access to scientific literature and patent references published in Chemical Abstracts.
- ▶ STN offers current and archival information from over 200 scientific, technical, business, and patent databases STN is a full-featured service designed for searchers who are familiar with using a command language to search online databases.

SciFinder ChemPORT configuration



- Noonan, Albert F.; Dodd, David A.; Jatake, Deborah F.; Rainey, Thomas E.; Reich, Frederick R.; Thomas, Thomas R. **Technical approach characterization of residual waste at Hanford tank sites in support of waste retrieval and tank closure alternatives.** Science and Technology for Disposal of Radioactive Tank Wastes, [Proceedings of the American Chemical Society Symposium on Science and Technology for Disposal of Radioactive Wastes], Las Vegas, Nev., Sept. 7-11, 1997 (1998), Meeting Date 1997, 101-116. CODEN: 67BHAF CAN 130:174262 AN 1999:4575 CAPLUS
- Noonan, Albert F.; Fredriksson, Kurt; Nelen, Joseph. **Phase chemistry of the Umanun basalt, a reference repository host in the Columbia Plateau.** Scientific Basis for Nuclear Waste Management (1981), 3 51-8. CODEN: SBNMDS ISSN:0275-0112 CAN 95:191867 AN 1981:591867 CAPLUS
- Olson, Edward J.; Bunch, T. E.; Jarosewich, Eugene; Noonan, Albert F.; Huss, Glenn I. **Happy Canyon: a new type of enstatite achondrite.** Meteoritics (1977), 12(2), 109-23. CODEN: MERTAW ISSN:0026-1114 CAN 87:170831 AN 1977:570831 CAPLUS
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- Noonan, Albert F.; Jarosewich, Eugene; Clarke, Roy S., Jr. **Relative nitrogen mineralization and nitrification in soils of two contrasting hardwood forests: effects on initial soil chemistry.** Forest Ecology and Management (1987), 21(1-2), 21-36 CODEN: FEGMDW; ISSN: 0378-1909
- Noonan, Albert F.; Nelen, Joseph A.; Jarosewich, Eugene; Fredriksson, Kurt; Dube, Ananda. **Equilibration in chondrites: implications for the Earth Sciences (1977), 19 96-103. CODEN: SCESBH ISSN:0081-0274**
- Fredriksson, Kurt; Dube, Ananda. **Equilibration in chondrites: implications for the Earth Sciences (1977), 19 96-103. CODEN: SCESBH ISSN:0081-0274**
- Clarke, Roy S., Jr.; Jarosewich, Eugene. **Relative nitrogen mineralization and nitrification in soils of two contrasting hardwood forests: effects on initial soil chemistry.** Forest Ecology and Management (1987), 21(1-2), 21-36 CODEN: FEGMDW; ISSN: 0378-1909
- Merritt, Robert L.; Noonan, Albert F. **Removal of pollutants from crops.** PGT Int. Appl., 26 pp. CODEN: PGTINT
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signal intensity and the possibility of its compensation
AU Kovalenko, S. G.; Sinyavskii, N. Ya.
CS Kalininograd Military Institute. Kalininograd
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Russian Physics Journal
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- [US Patent and Trademark Office \(USPTO\) Databases](#) ...more info
- [World Intellectual Property Organization \(WIPO\)](#) ...more info

PubMed and LinkOut (2005)

- PubMed, a service of the National Library of Medicine, includes over 15 million citations for biomedical articles back to the 1950s.
- ▶ Linking options
 - Outside Tool (direct linking using SFX)
 - LinkOut (load holdings then link via SFX)
- ▶ LinkOut provides users with links from PubMed to a wide variety of relevant web-accessible online resources, including full-text publications.
- ▶ Must be user configured

PubMed MyNCBI configuration

The screenshot shows the PubMed website interface. At the top, it says "A service of the National Library of Medicine and the National Institutes of Health". The search bar contains "technetium and salmon". Below the search bar, there are buttons for "Limits", "Preview/Index", "History", "Clipboard", and "Details". The results are displayed in a table with columns for "Display", "Show", "Sort by", and "Send to". The first result is "1: Bioconjug Chem. 2005 Jul-Aug;16(4) pp 939-948; (Article) DOI: 10.1002/jbm.b.30282".

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Water-Soluble Phosphines for Direct Labeling of Peptides with Technetium and Rhenium: Insights from Electrospray Mass Spectrometry
William E. P. Greenland¹ and Philip J. Blower^{1,2}
Bioconjugate Chem.; 2005; 16(4) pp 939 - 948; (Article) DOI: 10.1002/jbm.b.30282

[Abstract](#) Full: [HTML](#) / [PDF](#) (211K)

All users may click on the [Abstract] link to view the abstract article. If you are not a subscriber, you may purchase and

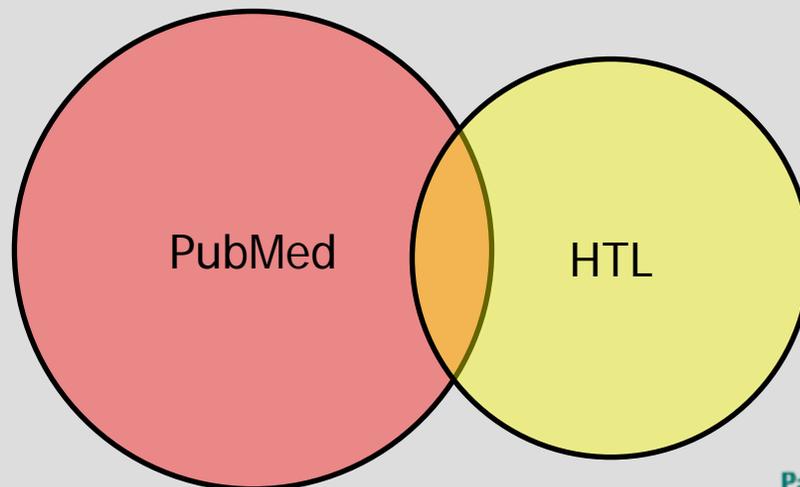
The screenshot shows the full article abstract page. The title is "Water-Soluble Phosphines for Direct Labeling of Peptides with Technetium and Rhenium: Insights from Electrospray Mass Spectrometry". The authors are William E. P. Greenland¹ and Philip J. Blower^{1,2}. The journal is Bioconjugate Chem., 2005, 16(4) pp 939-948. The abstract text reads: "Direct labeling of salmon calcitonin (sCT) is possible in one step using water-soluble phosphines (sulfonated triethylphosphines) as the reducing agent both for disulfide and for perchlorate. Phosphines were the most efficient reducing agent for disulfide bonds among those examined. The phosphines both reduced the perchlorate to Tc(III), and contributed to the hexadentate coordination sphere in the labeled product. In contrast, the phosphines did not reduce rhenium below oxidation state V, nor did they participate in the rhenium coordination sphere in the labeled peptide. Instead, the expected oxorhenium(V) moiety was incorporated. Both Tc and Rh labeling processes gave rise to dimers with two peptides linked by the metal center, as well as simple monomeric species. Positive mode electrospray mass spectrometry not only revealed the presence of phosphine bound to technetium and oxygen bound to rhenium in the metallopeptides but also revealed the oxidation state of the metals. Electrospray mass spectrometry is proving to be an exceptionally valuable technique for characterizing radiopharmaceuticals. Although the one-step direct labeling method described gives mixed products and poor receptor affinity when applied to the small peptide sCT, it might be readily adapted to monoclonal antibodies."

view the [Abstract] link.

Linking SFX and PubMed

► Journals

- PubMed indexes over 18,000 journals
- Library has access to over 9,000 journals
- Resulting in 2,500 journals that we both carry



PubMed's List of Journals

- ▶ Text file of journals indexed by PubMed is generated daily

```
JrId: 22043  
JournalTitle: Foot and ankle clinics.  
MedAbbr: Foot Ankle Clin  
ISSN: 1083-7515  
ESSN:  
IsoAbbr: |  
NlmId: 9615073  
-----  
JrId: 22044  
JournalTitle: Journal of the history of the neurosciences.  
MedAbbr: J Hist Neurosci  
ISSN: 0964-704X  
ESSN:  
IsoAbbr:  
NlmId: 9441330  
-----  
JrId: 22046  
JournalTitle: Current pain and headache reports.  
MedAbbr: Curr Pain Headache Rep  
ISSN: 1531-3433  
ESSN: 1534-3081  
IsoAbbr:  
NlmId: 100970666  
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Problems with PubMed's LinkOut

- ▶ XML file generated by SFX for submission to PubMed
 - Includes the ISSN/ESSN and years that we have access to

```

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  - <ObjectList>
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Problems with PubMed's LinkOut

- ▶ Multiple sources for the same journal
 - Two different lines with same ISSN and different dates (holdings)

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  <Query>"0002-2365" [is] AND 1998:2010 [dp]</Query>
  <Query>"0002-7766" [is] AND 2004:2004 [dp]</Query>

```

Solution

- ▶ Generate Python script in house
- ▶ Needs to...
 - Generate list of journals that PubMed indexes and library subscribes to online
 - Fix dates in this list so that only one range of dates is listed in the given file
 - Deal with other problem entries

Benefits of Intelligent Linking

- ▶ Library benefits:
 - User navigation to the article level leads to increased usage of electronic resources
 - Control of who sees what (based on IP)
 - Usage statistics analysis aids in understanding user behavior and user needs
- ▶ User benefits:
 - Full-text linking from A&I databases saves time
 - Linking to the “appropriate copy” saves money
 - ILL form, DOI (CrossRef linking) and Google Scholar links extend access to content not owned by the library
- ▶ Use of standards increases the availability and accessibility of information and enables interoperability among computing systems using different formats and structures.

Current and Future Applications

▶ OpenURL

- Personalization i.e., *MySFX*
- Extending beyond traditional “scholarly communities” - Shopping carts, maps, people
- Moving beyond bibliographic linking - Digital Library environment: repositories and complex digital objects
- Use of COINS - Encodes meta-data in HTML page so OpenURL plug-in can create OpenURL from it

▶ DOIs

- OSTI assigning DOIs to technical reports
- Scientific community assigning DOIs to scientific datasets
- Registration of additional content types (graphs, tables, images, programs, audio and video files) as well as theses, dissertations, standards, and patents

▶ Other

- *CrossRef Web Services* and the *Search Partner Program*

Resources

- ▶ Ex Libris <http://www.exlibrisgroup.com/>
- ▶ CrossRef <http://www.crossref.org/>
- ▶ ChemPORT <http://www.cas.org/chemport/>
- ▶ PubMed
<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?DB=pubmed>
- ▶ LinkOut <http://www.ncbi.nlm.nih.gov/entrez/linkout/>
- ▶ OpenURL, ANSI/NISO Z39.88-2004
http://www.niso.org/standards/standard_detail.cfm?std_id=783
- ▶ DOI, ANSI/NISO Z39.84-2005
http://www.niso.org/standards/standard_detail.cfm?std_id=480
- ▶ OpenURL Theme Song, “Weapon of Choice”
<http://www.astralwerks.com/fbs/woc/>



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 - Christine.Noonan@pnl.gov

- ▶ Hanford Technical Library External Website
<http://libraryweb.pnl.gov>