NASA Technical Memorandum 109928

NASA STI Program Seminar

September 29, 1994

Electronic Documents
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Electronic Documents

September 29, 1994
10:30 a.m. - 4:00 p.m.
NASA Headquarters

Welcome and Introductions
Terese Ohnsorg
NASA STI Program

Electronic Documents Management at the CASI
Roy Stiltner
NASA Center for AeroSpace Information

The Impact of Electronic Publishing on User Expectations and Searching
Gary Marchionini
College of Library and Information Services
University of Maryland

Image Record Management
Don Willis
I-NET
Secondary Publisher Considerations for Electronic Journal Literature
Andrea DiDonato
BIOSIS

The Technical Manual Publishing On Demand System
Steve Sherman
Defense Printing Service
Welcome and Introductions

Terese Ohnsorg
NASA STI Program
Washington, DC

Electronic Documents Management at the CASI

Roy Stiltner
NASA Center for AeroSpace Information (CASI)
Linthicum Heights, MD

Roy Stiltner provided a comprehensive look at the multifaceted program underway at the CASI to implement electronic documents management — where it is and where it's going. Stiltner emphasized that CASI efforts extend far beyond simply modernizing automatic data processing (ADP) capabilities and, in fact, include technological and workflow upgrades at the infrastructure level. All of these initiatives complement other modernization efforts underway at the facility.

The program's objectives include improving NASA researcher access to STI, minimizing waste and trimming costs, and eliminating or at least drastically reducing environmental hazards caused by the use of processing chemicals and related materials.

All of these efforts are unfolding in conjunction with similar activities at NASA Centers and across a broad range of NASA STI exchange partners.

Stiltner's presentation included a discussion of steps in capturing information for a bibliographic record in paper and microfiche (current and proposed), and both a general and a detailed conceptual look at electronic documents management at the CASI in terms of STI acquisition, processing, and dissemination. Closing visuals highlighted the NASA STI Program's ongoing migration to an electronic document management system rooted in state-of-the-art communications technology.
• Objectives

- Provide improved access of scientific information and materials to NASA scientist and engineers

- Permit improved workflow processes and procedures

- Minimize waste and reduce the cost of producing and distributing printed material

- Eliminate or severely reduce environmental hazards caused by the use of chemicals and other production materials

- Support and compliment other modernization efforts underway at the CASI
• Coordination With NASA STI Community

- NASAwide Electronic Publishing System -- STI Electronic Document Distribution

  - GSFC
  - LeRC
  - ARC
  - LaRC
  - Other Centers
  - Exchange Partners
Workflow
Concept
Electronic Document Management

- Magnetic & Optical Data
- Document Scanners
- Microfiche Scanners
- Electronic transmission
- Other Sources
- Server
- External Networked Databases
- Internet
- User/Customer
- Magnetic & Optical Media
- High Speed Printer
- Computer Output on Microfiche
- Remote High Speed Printer
- CASI Databases
- On Demand
• Functional Requirements
  – Information Acquisition
  – Information Transformation (Conversion & Storage)
  – Information Retrieval & Dissemination
The Impact of Electronic Publishing on User Expectations and Searching

Gary Marchionini
College of Library and Information Services
University of Maryland

Gary Marchionini offered a look at the world of electronic documents. He recounted trends in electronic publishing, especially the tremendous growth in end users and such related developments as listservs and news groups; electronic journals; such for profit services as America Online, Opus Global, and Dialog; and the delivery of government data via the Internet.

After examining an array of interfaces for electronic text and the special challenges and opportunities of electronic publishing (including the as yet unresolved issue of how to handle chargebacks for copyrighted material), Marchionini suggested new roles information specialists must adopt to survive in this brave new world of the information age.

His envisioned roles require that information specialists develop greater facility with a range of specialized skills; enlarge their roles as teachers, information consultants, evaluators, and validators; and hone their expertise as entrepreneurs for new information products and services.

He suggested that the forte of information specialists is services, not products. In the coming years, Marchionini predicted an as yet unrecognized array of new markets that will likely emerge for these services.

Marchionini then focused on the capabilities offered by one particular search engine, the Wide Area Information Server (WAIS). He alluded to research he and several colleagues have conducted which identified both WAIS advantages and disadvantages.

Marchionini concluded, perhaps providentially, that this is the golden age of opportunity for information specialists. If the current opportunities are handled properly, information specialists will flourish in the coming decades. If not, they will disappear.
Impact of Electronic Publishing on User Expectations and Searching

Gary Marchionini, PhD
College of Library and Information Sciences
University of Maryland
march@umsl.umd.edu

Electronic Documents

NASA STI Seminar

September 29, 1994
Trends

More end users

Government Data via Internet/WWW (NII/GII)
Primary Data Sets (NASA, LC, GPO, etc.)
Indexes and Directories (e.g., OPACs)

Specialized corpuses
Listservs & News groups
Electronic Journals
For Profit Services (e.g., Dialog, America Online, Opus Global)

Tools for access (WAIS, gopher, Mosaic, Harmony, Greenpages)

G. Marchionini, U. of Maryland
Interfaces for Electronic Text

- Learnable and Usable Systems
  Direct manipulation, help, adaptability
- Searching and Filtering Tools
  multiple indexes, TOCs, string search, SDI profiles
- Browsing Tools
  levels of representation, zooms & pans
- Reading Tools
  cut and paste, logs
- Value added features
  multimedia, links

G. Marchionini, U. of Maryland
Challenges and Opportunities

1. The NET blurs document boundaries
2. Common interfaces are LCDs
3. Black boxes and Glass boxes
4. Real costs ($ and time)

Consider two modes of publication

- Shared or Public
  - (accessible via NET)
- Personal or Private
  - (owned by individuals)

G. Marchionini, U. of Maryland
Roles for Information Specialists

1. Expanded need for specialized skills
   maximize recall or precision for critical needs by using advanced tactics (e.g., proximity, field limits, thesauri, etc.)
   open the opaque box

   professional discipline avoids NET seduction and disorientation

2. Expanded roles as teachers and consultants

3. Expanded roles as evaluators, validators

4. Expanded roles as entrepreneurs for new information products and services

G. Marchionini, U. of Maryland
Focus on Services, Not Products

1. The NET is about communication, NOT information delivery! simplex dissemination is moving to full duplex asynchronicity is blurring into synchronicity point to point is moving to multicasting

2. There will be MANY usage-sensitive charges in the NET

3. New markets will emerge for services

4. People like to own THINGS, publishers must provide a mix or products and services

G. Marchionini, U. of Maryland
Possibilities with WAIS

1. Easy to use
2. Inexpensive (relative to time)
3. No query language required
4. Typically gives SOME hits
5. Editable/copyable/pastable functionality
6. Combining multiple databases
WAIS Results

1. Less Recall/Precision Control
2. "Black box" effect
3. Highly learnable & usable
4. Relevance feedback not useful in our limited trials
5. Distribution of relevant documents in the ranked lists not predictable from ranking
6. Query length seems important
   (task and database variable)
Implications

1. What strategies are useful? query length relevance feedback multiple servers query report and user understanding

2. What evaluation metrics are useful? time queries iterations/screens/windows records viewed/saved cost satisfaction
Current and Future Steps

Underway
1. Replicate terse searches with Dialog Target
2. Develop strategies for comparing ranked lists of output

Pending
1. More analysis of query size, especially considering the uses of cut and paste abstracts or paragraphs
2. More analysis of relevance feedback effects
3. Examine interface effects
   learnability, usability
   browsing, cost effectiveness
4. Develop guidelines for information-seeking strategies in highly interactive network environments such as WAIS
5. Develop interfaces for controlling the multiplicity of variables in advanced IR applications (an information-seeking workstation)
Don Willis offered a wide-ranging look at image databases and online document delivery. He noted that the explosion of information has created a need for tools to facilitate the access and processing of these exponentially increasing levels of information. Similarly, there is a need for electronic document delivery through a variety of means.

After looking at document delivery today, tomorrow, and further into the future, Willis focused on the image component of the document delivery system, saying there simply is no other technology available now, or in the near future, that can provide this capability as cost-effectively. Imaging, for instance, can represent chemical and mathematical formulas and symbols, graphics and line drawings, halftone pictures, foreign languages, and built-in editorial intelligence.

Willis said that putting the image database on CD-ROM, with its wide array of capabilities, is a logical outgrowth of this reality. A detailed look at the many facets of CD-ROM technology and its potential followed, proceeding from this premise: CD-ROMs are an emerging technology that can support the creation, storage, and network dissemination of large volumes of digital data ... a capability that is essential for the successful implementation of information and imaging distribution management concepts.

Willis referred to the tremendous storage capacity of digitized page images on CD-ROMs. For instance, a one-year stack of all the journals indexed by medicine would rise to more than 800 ft, compared with a dramatically smaller pile of only 960 CD-ROMs holding the same quantity of information. From another perspective, CD-ROM strengths are reflected in their improved economy (stated in cost per megabyte) compared with a variety of media, including removable hard disk, paper, floppy disk, and mag tape.

Looking to the future, Willis discussed such diverse storage possibilities as three-dimensional storage, storage at the atomic level, and optical computing.
The Information Explosion

- Journal literature is the primary mode of distribution for scientific information

- The number of published journals doubles every 15 years

- There were over 500 new journals introduced in 1990 and 1991

What's needed ----- tools to facilitate access and processing
The Need for Electronic Document Delivery

1. No library is self-sufficient

2. Access to a copy of the article is usually necessary to satisfy user research needs

3. Reduces "satisfaction time"

4. Reduces cost
Types of Electronic Information Access

- Bibliographic database of article citations (on-line or CD-ROM)
- Full text ASCII databases (on-line or CD-ROM)
- Facsimile transmission of journal articles
- Image databases on CD-ROM
- Combination of above
Document Delivery -- Today

- Information Search
  -- Paper indexes, online, local CD-ROM databases

- Document Search
  -- Library Shelves, microfilm archives

- Document Ordering
  -- Other libraries, commercial sources

- Document Receipt
  -- Days to weeks
Document Delivery -- Today

- Mostly manual
- Often complex
- Time consuming
- Escalating costs
- Non-Integrated
- Mostly unresponsive
Document Delivery -- Future

- CD-ROM Image databases of journal articles
  coupled with

- Remote document delivery
  o Fax
  o Network
Document Delivery -- Future

- Highly integrated
- Easy to operate
- Low cost per document
- Responsive
- Delivery to desktop
Hierarchy of Image Database Access

- Small database of frequently-used reference and research info.
- Larger database of less frequently-used more general technical/business info.
- Larger more general database--business or library oriented
- Least frequently-used image databases at information distributor

- Personal Standalone CD-ROM Database
- Departmental Level, Networked CD-ROM Database
- Institutional Level Library, Corporation
- Information Distributor Level
Communication & Article Delivery

From all levels of the hierarchy document delivery and resource sharing possible using networking and facsimile technology
THE PAGE IMAGE FORMAT

Imaging:

... *The least common denominator*

..........*for information delivery*

Imaging can represent:
- Mathematical formulas and symbols
- Chemical formulas and symbols
- Graphics and line drawings
- Halftone pictures
- Foreign languages
- Built-in editorial intelligence

There is no other technology available now, or in the near term future, that can provide this capability at a similar cost per page
DIAGRAM OF CCD SCANNER

Heat Absorber

Reflector

Condenser

Document

Projection Lens

Motor

CCD Sensor

Lead Screw

Motion Sensor

Used with permission of G. Walters, Rothchild Consulting
PUTTING IMAGE DATABASE ON CD-ROM

Creation:
- Scanning
- Compression
- Temporary storage
- CD-ROM build (ISO 9660 format)
- Mastering and Replication

Retrieval:
- Decompression
- Printing/Display
CD-ROM is an emerging technology that can support the creation, storage, and network dissemination of large volumes of digital data which is essential for the successful implementation of Information and Imaging Distribution Management concepts.
Does CD-ROM handle different types of data?

- Graphics (Raster Images) plus:
  - Text & SGML
  - Data
  - Software
  - Vector Images
  - Audio & Video...i.e. MultiMedia

AllM CD-ROM Task Force
What are the Trends in the Industry?

- Growth in # of Discs, # of Drives,
- Decreasing Costs
- Standards Driven
- Networkable now, Jukeboxes coming
- Application diversity
- All industries affected

AIIM CD-ROM Task Force
CD-ROM Titles

Source: Optical Publishing Association

AIIM  CD-ROM Task Force
CD-ROM INDUSTRY DRIVER

Cost Per Megabyte

Source: Meridian Data (1988)

Media Type
KEY
1 Removable hard disk
2 Hard disk
3 Paper
4 Floppy disk
5 Magneto-optical
6 Mag tape
7 WORM
8 CD-ROM

AllM CD-ROM Task Force
US Government Conclusions:

Estimated Costs Per Library Per Year for Distribution of the Bound *Congressional Record* to Depository Libraries, Various Formats

<table>
<thead>
<tr>
<th></th>
<th>Paper Copies</th>
<th>Paper Index</th>
<th>Microfiche Copies</th>
<th>CD-ROM Copies</th>
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<tr>
<td><strong>Printing Cost</strong></td>
<td>$569.70</td>
<td>$30.30</td>
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<td><strong>Production Cost</strong></td>
<td>-</td>
<td>-</td>
<td>$28.27</td>
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</tr>
<tr>
<td><strong>Duplication Costs</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$3.00</td>
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<tr>
<td>CD-ROM</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$5.00</td>
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<tr>
<td>Floppy Disk</td>
<td>-</td>
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<tr>
<td><strong>Postage</strong></td>
<td>$55.30</td>
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<td><strong>Handling</strong></td>
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<td>$54.50</td>
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<td><strong>Documentation</strong></td>
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<td><strong>Total</strong></td>
<td>$632.83</td>
<td>$33.74</td>
<td>$83.62</td>
<td>$10.05</td>
</tr>
</tbody>
</table>


AIIM  CD-ROM Task Force
Can CD-ROM be Updated?

Now: CD-ROM can be supplemented with magnetic data or a new CD-ROM can be created.

Future: CD Recordable is on the horizon.
Orange Book update to ISO 9660 provides Appendable CD-ROM's.
Are CD-ROM Drives fast or slow?

Slow: Compared to Magnetic disk (or Rewritable)

Fast: Compared to manually searching 680 MegaBytes of data or text

Fast Enough: To add a lot of value
Are CD-ROM’s Networkable?

Yes:

Networkable to a Local Area Network (LAN)
 " Mainframe - terminal Network
 " Wide Area Network (WAN)
CD-ROM Networking

Any High Sierra or ISO 9660 CD-ROM

CD-ROM Tower

Source: Meridian Data

AIIM CD-ROM Task Force
Where does MultiMedia fit with CD-ROM?

- Logical extension of text plus graphics
- May supercede videogisc
- Many CD variations to accommodate audio, video
- Success linked to compression
- Current use in training and point-of-sale
EVOLUTION OF TECHNOLOGY

Communications:

- National network funded 1991
  - National Research Education Network (NREN)
- Bandwidth increases - Gb capacities by 1995
- Cost decreases
- By 2000 networking is a way of life
- Fiber optic cable to home by 2010
- Cable TV, communications (voice and data), fax, value-added networks MERGE
- Home networks using electric lines by 1995
INCREASING COMMUNICATION BANDWIDTH

Used with permission from AT&T Bell Labs

* Images are compressed at 10:1
<table>
<thead>
<tr>
<th>Document</th>
<th>Voice and 2400 bps</th>
<th>DDS-Wideband 56 kbps</th>
<th>T-1 1.5 Mbps</th>
<th>Fiber Optics 1.7 Gbps</th>
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<tr>
<td>Page</td>
<td>8 sec</td>
<td>.34 sec</td>
<td>.013 sec</td>
<td>1.13x10^-5 sec</td>
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<tr>
<td>Book</td>
<td>.67 hr</td>
<td>1.7 min</td>
<td>3.84 sec</td>
<td>.0034 sec</td>
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<tr>
<td>Dictionary</td>
<td>2.3 days</td>
<td>2.38 hrs</td>
<td>5.3 min</td>
<td>.28 sec</td>
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<tr>
<td>Encyclopedia</td>
<td>5 days</td>
<td>11.6 hrs</td>
<td>5.15 hrs</td>
<td>.61 sec</td>
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<td>Local Library</td>
<td>7.4 years</td>
<td>116 days</td>
<td>4.32 days</td>
<td>5.49 min</td>
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<td>College Library</td>
<td>74 years</td>
<td>3.17 years</td>
<td>43.2 days</td>
<td>.92 hrs</td>
</tr>
<tr>
<td>Library of Congress</td>
<td>1,900 years</td>
<td>815 years</td>
<td>3 years</td>
<td>23.5 hrs</td>
</tr>
</tbody>
</table>

* Currently possible in laboratory environment

NOTE: Used with permission from AT&T
The Future of CD-ROM

- Transfer rate increases:
  2x - 1992 - 300 kByte/sec.
  4x - 1994 - 600 kBytes/sec.

- Capacity increases
  2 - 4x within next two years
  (increase laser bandwidth {spotsizer})

- Writable CD-ROM
- Smaller Multi-functional Drives and Media
**EVOLUTION OF TECHNOLOGY**

**Personal Computer:**  
PC introduced 1981 - 10 years ago

<table>
<thead>
<tr>
<th>Year</th>
<th>Microprocessor</th>
<th>MPS</th>
<th>#Transistor</th>
<th>Power Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>8088</td>
<td></td>
<td>29,000</td>
<td>1</td>
</tr>
<tr>
<td>1982</td>
<td>80286</td>
<td>1</td>
<td>130,000</td>
<td>5</td>
</tr>
<tr>
<td>1985</td>
<td>80386</td>
<td>3</td>
<td>275,000</td>
<td>25</td>
</tr>
<tr>
<td>1989</td>
<td>80486</td>
<td>15</td>
<td>1,000,000</td>
<td>75</td>
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**Future**

<table>
<thead>
<tr>
<th>Year</th>
<th>Microprocessor</th>
<th>MPS</th>
<th>#Transistor</th>
<th>Power Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>80586*</td>
<td>100</td>
<td>4,000,000</td>
<td>250</td>
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<tr>
<td>1996</td>
<td>80686</td>
<td>400</td>
<td>25,000,000</td>
<td>1,000</td>
</tr>
<tr>
<td>2000</td>
<td>80786</td>
<td>2,000</td>
<td>100,000,000</td>
<td>5,000</td>
</tr>
</tbody>
</table>

* Mainframe equivalent
## EVOLUTION OF TECHNOLOGY

### The Thirteen Year Old PC:

<table>
<thead>
<tr>
<th>Original PC</th>
<th>Contemporary PC</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAM 16KB</td>
<td>8 MB</td>
<td>X 500</td>
</tr>
<tr>
<td>CPU 8088</td>
<td>80486</td>
<td>X 14</td>
</tr>
<tr>
<td>CLOCK 4.77mhz</td>
<td>66mhz</td>
<td>X83</td>
</tr>
<tr>
<td>MIPS 0.3</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Disk None</td>
<td>150 MB</td>
<td>X 9</td>
</tr>
<tr>
<td>Floppy 160 KB</td>
<td>1.44 MB</td>
<td>X 9</td>
</tr>
<tr>
<td>Display Character based monochrome</td>
<td>Graphical color</td>
<td></td>
</tr>
<tr>
<td>Software 5</td>
<td>22,000</td>
<td>X 4,000</td>
</tr>
<tr>
<td>Cost 3,000</td>
<td>$2,500</td>
<td>[- 20%]</td>
</tr>
</tbody>
</table>

Sources: Wall Street Journal, 8/13/91, A7 Scannell, Ed; "The Secret History of the IBM Gamble", Infoworld 8/12/91 page 47. (Updated by Author 9/94)
GENERAL ADVANCES IN TECHNOLOGY:

- Technology advances by a factor of 10 every 10 years
- Number of transistors in a chip triples every 2-3 years
- A single chip 386 available now (Computer on a Chip)
- Computer hardware costs decrease by 25%/year
- Network bandwidth increasing dramatically: 100 Mbps LAN's by '95 commonplace
- Fiber LAN to desktop by 2000: unlimited bandwidth
- Optical tape stores one terabyte (equivalent of 1500 CD-ROM's) 60 second end-to-end search speed
- 4mm and 8mm hylical scan tapes: quadruple density
- Fax machines as common as copier

Faster — Cheaper — Smaller — More Powerful
A LOOK INTO THE FUTURE

Three Dimensional Storage
Storage at the Atomic Level
Optical Computing

- Philips Research:
  - Creating pits in silicon 10,000 times more dense than optical disc (Electronics 3/90)

- University of California:
  - Storage of data in 3-D polymer cubes
  - One trillion bits/cubic cm.
  - 100,000 times more dense than optical disc (Computer Design 11/90)

- IBM Scientists create one atom switch
  - 1,000 times more dense than current chips (Wall Street Journal 8/15/91)

- Researchers isolate bacteria protein ... [to] miniaturize computers
  - Syracuse University researchers create 3-D optical storage
  - Entire Library of Congress on six (6) one cm³ cubes (Wall Street Journal 9/4/91)

- Hundreds of trillions of bytes on ... CD-ROM size surface
  - Oak Ridge National Laboratory (Mini-Micro Systems 3/89)

- AT&T Bell Labs develop optical computer
  - Photons vs. electrons (Time, 2/12/90)
Evolution of Technology

Communications:

All of the world's information will someday be accessible instantaneously.

Bill Gates calls it "Information at Your Fingertips."
Secondary Publisher Considerations for Electronic Journal Literature

Andrea DiDonato
BIOSIS

As access to networks by end users increases, more and more information, including journals, is being published in electronic form.

Andrea DiDonato examined key considerations for secondary publishers in this modern publishing environment.

Offering a case study from BIOSIS dealing with the *Online Journal of Current Clinical Trials*, DiDonato recounted her organization's experience with this online literature as its initial venture with the secondary publishing of electronic journal literature. BIOSIS soon discovered the tremendous unevenness of this medium, offering as it does quick access — but unsteady availability — to information.

DiDonato provided a variety of relevant issues for secondary publishers of electronic journals to consider, including inconsistency in format and delivery. She also noted the need to standardize the processing system and address questions of copyright and liability.

DiDonato concluded that electronic journals are becoming commonplace and, therefore, important sources of information that responsible secondary publishers cannot ignore.
Secondary Publisher Considerations for Electronic Journal Literature

Andi DiDonato
September 29, 1994
Secondary Publisher Considerations for Electronic Journal Literature

I. "Online Journal of Current Clinical Trials" (OJCCT)
   --BIOSIS experience

II. Future Coverage of Electronic Journals
   --issues to be aware of
   --generalizations

III. Summary of Issues
   --quality
   --processing
   --copyright
I. "Online Journal of Current Clinical Trials" (OJCCT)

Selection / Coverage Considerations

Post-Selection Processing Considerations

Processing Considerations

--BIOSIS experience--vehicle for discussing broader issues

--elementary example--not the future mechanism

--adapted to BIOSIS requirements
Selection / Coverage Considerations

1. Selection & Retrieval

-OCLC direct hookup via Guidon software

-monitor output--daily

-download & print out appropriate articles

-selectively cover contents: original research

-don't cover: articles of editorial or philosophical nature; letters; articles from Morbidity & Mortality Weekly Reports (MMWR) (cover original)

-dual publication of some articles in Lancet
Selection / Coverage Considerations (cont.)

2. Bibliographic Citation

- based on National Library of Medicine form

- adapted for our processing and product requirements

- some information unique to electronic publications

- cross-reference to *Lancet* abridged version

- standards only in infancy
THE EFFECTIVENESS OF NICOTINE REPLACEMENT THERAPIES IN SMOKING CESSION ABRIDGED VERSION OF THIS PAPER PUBLISHED IN LANCET 343 8889 1994 PAGE 139-142/ META-ANALYSIS SERIAL ONLINE HUMAN NICOTINE ANTIADDICTIVE-DRUG GUM TRANSDERMAL PATCH INTRANASAL SPRAY INHALED PREPARATION EFFICACY
The effectiveness of nicotine replacement therapies in smoking cessation: (Abridged version of this paper published in Lancet 343 (8889): 1994 page139-142)

Silagy C; Mant D; Fowler G; Lodge M
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To determine the effectiveness of nicotine replacement therapies (NRTs) (including gum, transdermal patch, intranasal spray, and inhaled preparations) in facilitating smoking cessation, and to determine whether the effect was influenced by the clinical setting in which the smoker was recruited and treated, the level of nicotine dependency, the dosage of NRT used, or the intensity of additional advice and support offered to the smoker. Data Sources: Published trials of NRT were identified by a systematic search of 7 electronic databases, published reviews, reference lists from clinical trials, conference abstracts, smoking and health bulletins, and a bibliography on smoking and health. Unpublished trials were identified by approaching manufacturers of NRT. Study Selections: A total of 53 trials (42 gum, 9 patch, 1 intranasal spray, and 1 inhaler), with data from 17,703 patients, were included in the analyses. Only trials that assessed abstinence at least 6 months after the commencement of therapy were included. Data Extraction: Data were extracted from the trial reports by 2 authors independently. Where the methodology was unclear or the results were not expressed in a form which allowed extraction of key data we wrote to the investigators for the required information. Data Synthesis: Use of NRT increased the odds ratio (OR) of abstinence of 1.71 (95% confidence interval (CI), 1.56 to 1.87) compared with those who had been allocated to the control interventions. The OR for the different forms of NRT were 1.61 for nicotine gum (95% CI, 1.46 to 1.78), 2.07 (95% CI, 1.62 to 2.62) for transdermal patch, 2.92 (95% CI, 1.49 to 5.74) for nasal spray, and 3.05 for inhaled nicotine (95% CI, 1.42 to 6.57). These odds were not significantly higher in patients with higher levels of nicotine.
dependence (Fagerstrom score ≥ 7; -0.06), but they were largely independent of the intensity of additional support provided or the setting in which the NRT was offered. Conclusion: We conclude that the currently available forms of NRT are effective therapies to aid smoking cessation.

Descriptors/Keywords: META-ANALYSIS; SERIAL ONLINE; HUMAN; NICOTINE; ANTIADDICTIVE-DRUG; GUM; TRANSDERMAL PATCH; INTRANASAL SPRAY; INHALED PREPARATION; EFFICACY

Concept Codes:
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*12512 Pathology, General and Miscellaneous-Therapy (1971- )
*14001 Digestive System-General; Methods
*16001 Respiratory System-General; Methods
*18501 Integumentary System-General; Methods
*21004 Psychiatry-Addiction-Alcohol, Drugs, Smoking, etc
*22005 Pharmacology-Clinical Pharmacology (1972- )
*22024 Pharmacology-Neuropharmacology
*22026 Pharmacology-Psychopharmacology
*22100 Routes of Immunization, Infection and Therapy
*22501 Toxicology-General; Methods and Experimental
10060 Biochemical Studies-General

Biosystematic Codes:
86215 Hominidae

Super Taxa:
Animals; Chordates; Vertebrates; Mammals; Primates; Humans
Nicotine-replacement therapy (NRT) by gum, transdermal patch, intranasal spray, or inhalation is expensive but how effective is it? We have done a meta-analysis of controlled trials to see how effects on abstinence rates are influenced by the clinical setting, the level of nicotine dependency, the dosage of NRT, and the intensity of additional advice and support offered. Published or unpublished randomized controlled trials of NRT that have assessed abstinence at least 6 months after the start of NRT were identified and 53 trials (42 gum, 9 patch, 1 intranasal spray, 1 inhaler), with data from 17,703 subjects, were included in the analyses. Use of NRT increased the odds ratio (OR) of abstinence to 1.71 (95% confidence interval 1.56-1.87) compared with those allocated to the control interventions. The ORs for the different forms of NRT were 1.61 for gum, 2.07 for transdermal patch, 2.92 for nasal spray, and 3.05 for inhaled nicotine. These odds were non-significantly higher in subjects with higher levels of nicotine dependence but they were largely independent of the intensity of additional support provided or the setting in which NRT was offered. We conclude that the currently available forms of NRT are effective therapies to aid smoking cessation.
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Post-Selection Processing Considerations

1. Log-In/Receipt History

- adapted to system designed for routine processing of print journals
- log-in of downloaded paper copy
- each article included in receipt history
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Considerations (cont.)

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Processing Considerations

1. Format of Article

   - downloaded version processed after log-in: cite/text input, indexing

   - must "clean-up" the abstract before data entry: headings, numbering, OCLC conventions

   - arrangement of article is specialized: abstract, introduction, objective, materials, methods, results, discussion, conclusion, appendices, references, tables

   - CORRECTIONS -- OJCCT has published--not covered by us since didn't affect our material

The effectiveneness of nicotine replacement therapies in smoking cessation

**THE EFFECTIVENESS OF NICOTINE REPLACEMENT THERAPIES IN SMOKING CESSATION**

Christopher Silagy, David Mant, Godfrey Fowler, Mark Lodge

Department of Public Health and Primary Care, Radcliffe Infirmary, Oxford University, Oxford OX2 6HE, United Kingdom

**Abstract**

**Objective:** To determine the effectiveness of nicotine replacement therapies (NRTs) (including gum, transdermal patch, inhaled preparations) in facilitating smoking cessation, and to determine whether the effect was influenced by the clinical setting in which the smoker was recruited and treated, the level of nicotine dependency, the dosage of NRT used, or the intensity of additional advice and support offered to the smoker.

**Data Sources:** Published trials of NRT were identified by a systematic search of 7 electronic databases, published reviews, reference lists from clinical trials, conference abstracts, smoking and health bulletins, and a bibliography on smoking and health.

THE EFFECTIVENESS OF NICOTINE REPLACEMENT THERAPIES IN SMOKING CESSATION

Christopher Silagy, David Mant, Godfrey Fowler, Mark Lodge Department of Public Health and Primary Care, Radcliffe Infirmary, Oxford University, Oxford OX2 6HE, United Kingdom

Metaanalysis
metaanalysis, nicotine, smoking cessationMET

19940114
(1) **Parallel Publication:** The abridged version of this paper appeared as follows: Silagy C, Mant D, Fowler G, Lodge M. Meta-analysis on efficacy of nicotine replacement therapies in smoking cessation. Lancet 1994 Jan 15:343(8889):139-142.

ABSTRACT

(2) **Objective:** To determine the effectiveness of nicotine replacement therapies (NRTs) (including gum, transdermal patch, intranasal spray, and inhaled preparations) in facilitating smoking cessation, and to determine whether the effect was influenced by the clinical setting in which the smoker was recruited and treated, the level of nicotine dependency, the dosage of NRT used, or the intensity of additional advice and support offered to the smoker.

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(4) **Study Selection:** A total of 53 trials (42 gum, 9 patch, 1 intranasal spray, and 1 inhaler), with data from 17,703 patients, were included in the analyses. Only trials that assessed abstinence at least 6 months after the commencement of therapy were included.

(5) **Data Extraction:** Data were extracted from the trial reports by 2 authors independently. Where the methodology was unclear or the results were not expressed in a form which allowed extraction of key data we wrote to the investigators for the required information.

(6) **Data Synthesis:** Use of NRT increased the odds ratio (OR) of abstinence to 1.71 (95% confidence interval [CI], 1.56 to 1.87) compared with those who had been allocated
to the control interventions. The OR for the different forms of NRT were 1.61 for nicotine gum (95% CI, 1.46 to 1.78), 2.07 (95% CI, 1.62 to 2.62) for transdermal patch, 2.92 (95% CI, 1.49 to 5.74) for nasal spray, and 3.05 for inhaled nicotine (95% CI, 1.42 to 6.57). These odds were not significantly higher in patients with higher levels of nicotine dependence (Fagerstrom score 4 to 7; \( P = 0.06 \)), but they were largely independent of the intensity of additional support provided or the setting in which the NRT was offered.

(7) **Conclusion:** We conclude that the currently available forms of NRT are effective therapies to aid smoking cessation.

INTRODUCTION

(8) Nicotine replacement therapy (NRT) is frequently used as an important component of smoking cessation strategies. It minimizes many of the physiological and psychomotor withdrawal symptoms usually experienced following smoking cessation and, therefore, may increase the likelihood of remaining abstinent. 1

(9) The first type of NRT to become widely available was chewing gum. The nicotine resin complex is presented in a buffered chewing gum base to enable the nicotine to be absorbed directly through the buccal mucosa, resulting in plasma concentrations which are approximately half that produced by smoking a cigarette. 2 Nicotine chewing gum is available either as a 2 mg or 4 mg preparation, and in many countries the lower dose is sold over-the-counter, without a prescription from a medical practitioner. Several factors limit the usefulness of nicotine chewing gum in some smokers, including oral and gastric side effects, 3 impaired absorption when taken with coffee or acidic beverages, 4 and a risk that some smokers may transfer their dependency from cigarettes to the gum. 4

(10) More recently, other forms of NRT, aimed to avoid many of the problems associated with nicotine gum, have been developed, including transdermal nicotine patches, intranasal nicotine spray, and nicotine inhaler devices. The last 2 are still undergoing research and have not been licensed for general clinical use.

(11) Transdermal patches were approved for use as an aid to smoking cessation by the Food and Drug Administration in the United States in 1992. Available in several different sizes, the patches deliver between 7 mg and 22 mg of nicotine over a 24-hour period and result in plasma levels similar to the trough levels seen in heavy smokers. 5

(12) The introduction of transdermal patches has been accompanied by strong marketing campaigns over the past 12 months in a number of countries,
targeted both at smokers and physicians, encouraging use of the patch as a "proven and effective" smoking cessation strategy. This has caused much debate about the role of NRT in smoking cessation; including which group(s) of smokers should be offered NRT, which preparations should be used, in what dose regimen, and whether NRT is effective when used alone or only together with some form of additional support strategy.

(13) There have been several previous attempts to systematically review the effectiveness of nicotine gum 7-8 and transdermal patches. In 1987, a metaanalysis of 14 trials of nicotine chewing gum concluded that this form of NRT was most effective when used in specialized smoking-cessation clinics, and was of questionable value when used in general medical practice. These findings were reinforced in a more recent review of pharmacological aids to smoking cessation. However, since both of these reviews, there have been over 20 new randomized controlled trials examining the effect of nicotine gum in facilitating smoking cessation.

(14) Two systematic reviews of randomized controlled trials of transdermal nicotine patches were published in 1992. The results suggest that this form of NRT is also highly effective but neither of the reviews used comprehensive methods to identify all the relevant published and unpublished trials, nor did they use quantitative techniques to synthesize the data and test for homogeneity or statistical significance.

(15) Since NRT is widely available and costly, it is important to establish the effectiveness of the different forms of NRT when offered to smokers who have varying levels of dependency and motivation to quit, in a range of clinical settings, and with or without additional support programs.

OBJECTIVE

(16) To determine the effectiveness of NRT (including gum, transdermal patch, intranasal spray, and inhaled preparations) in achieving long-term smoking cessation, we wished to test the following hypotheses (see Appendix A):

(17) 1. use of NRT is more effective than placebo or "no NRT" intervention in promoting smoking cessation (Comparison 1);

(18) 2. NRT is more effective when offered to smokers who are motivated to quit and will, therefore, be more effective in clinical settings which selectively recruit motivated smokers (Comparison 2);

(19) 3. NRT is more effective in highly dependent smokers compared with those who are only moderately dependent (Comparison 3); and
4. The provision of high-intensity support, in addition to the use of NRT, will be more effective in producing abstinence than addition of low-intensity support programs (Comparison 4).

MATERIALS

Criteria for Considering Trials for This Review

Types of Intervention

(21) Bullet All randomized controlled comparisons of NRT (including nicotine chewing gum, transdermal nicotine patches, nicotine nasal spray, and nicotine inhalers) versus placebo or no NRT control.

(22) Bullet Randomized trials of different doses of NRT.

Types of Patients

(23) Smokers of either gender were included irrespective of the setting from which they were recruited and/or their initial level of nicotine dependency. Studies which randomized therapists, rather than smokers, to offer NRT or a control were included providing that the specific aim of the study was to examine the effect of NRT on smoking cessation. Trials which randomized physicians or other therapists to receive an educational intervention, which included encouraging their patients to use NRT, were not included but are being handled as part of a separate review.

Types of Outcome Measures

(24) We confined the review to a comparison of the effects of NRT versus control on smoking cessation, rather than withdrawal symptoms. Trials in which follow-up was of short duration (less than 6 months), or which did not include measurement of smoking cessation, were also excluded. Trials for which no data were available were excluded (Table 1).

(25) In each study the strictest available criteria to define abstinence were used. For example, in studies where biochemical validation of cessation was available, only those participants who met the criteria for biochemically confirmed abstinence were regarded as being abstinent. Wherever possible a sustained cessation rate, rather than point prevalence, was used. In trials where patients were lost to follow-up they were regarded as being continuing smokers.

Search Strategy for Identification of Trials

(26) A computerized literature search was conducted with DataStar
THE EFFECTIVENESS OF BREAST CANCER SCREENING BY MAMMOGRAPHY IN YOUNGER WOMEN: CORRECTION

age factors, breast neoplasms, mammography, mass screening, oncology, radiography, randomized trials

19940331
(1) When updating the analysis in the original article 1, we detected a small error in Table 10, in the line referring to Malmo. As a result of the correction of that error, the last line (Total) of the table also changed. Corrections to Table 10 appear in boldface.

(2) Associated alterations of the text occur in paragraph 62, quoted below. The corrections appear in boldface.

Corrected Paragraph 62, Doc No 32

(3) The breast cancer mortality experience of older women was analyzed identically to that of younger women. Table 10 presents the effect of screening older women from 5 of the 6 published studies at 7 years of follow-up. **Overall, a reduction in breast cancer mortality of 31% was achieved, with 95% CI, from a 17% to a 42% reduction.** The reductions ranged from 20% in Edinburgh to 43% in Stockholm, being significant overall and in the HIP and S2C trials. Inclusion of the results of the Canadian study produced little change in the effect and only resulted in a slight increase in the **overall relative risk to 0.72 (95% CI, 0.61 to 0.82)**, although it may not be entirely appropriate to add the Canadian data as that trial compares 2 different modalities of screening. Table 8a, Table 8b, and Table 8c show the ratio of cumulative breast cancer mortality rates in the intervention compared to the control groups for older women in the RCTs. A small excess mortality is seen in the 1st year, but a sustained reduction in mortality occurred from the 2nd year of follow-up which was confirmed by the mortality rate ratios for the individual years of follow-up (Table 11). The mortality rate ratios did not vary significantly, and showed no evidence of a trend, with increasing years of follow-up. This pattern of relative risk with successive years of follow-up is different from that seen among younger women.

(4) These changes do not alter the conclusions reached in the article.

Mark Elwood Brian Cox Ann Richardson Hugh Adam Cancer Epidemiology Unit,
Processing Considerations (cont.)

2. Indexing

- like any other article for database
- use downloaded copy
- add keyword: "serial-online"
  (hyphenated for retrieval)
Processing Considerations (cont.)

3. Document Delivery

-available for document delivery from downloaded version (articles are usually long)

-store articles from single release together--like any other issue of journal (sometimes only one)

-OJCCT available on Internet: could probably download--no need for document delivery
II. Future Coverage of Electronic Journals

-coverage of individual electronic journals a problem: variation in formats, delivery mechanisms, etc. for each

-most likely scenario: from large publisher to transmit a number of journals

-trial proposal of tapes in SGML format

-feasibility greater now: either tape or electronic transmission
II. Future Coverage of Electronic Journals (cont.)

-drawbacks identified in study still true:

- hard copy of article
- critical mass to be cost-effective
- inconsistencies & variations in content
- dual processing (most of material processed is still print journal form)
- variation with multiple providers

- "header" information more cost-effective
- several publishers now offering
II. Future Coverage of Electronic Journals (cont.)

-most considerations faced with OJCCT but on larger scale:

- quality/consistency of distribution & content

-selection: e.g., select parts of the journal, unless taking everything

-log-in/acquisitions/receipt history (for both electronic & hard copy subscriptions)
  - variable receipt timing

- coverage statistics
II. Future coverage of Electronic Journals (cont.)

-possible system adaptation:

- streaming of data into system
- content for log-in/receipt files ??
- serials control for journal information (title, editor, profile changes, etc.) ??
- procedures for coping with format variation
  (particular procedures in A&I's based on products: e.g., tags, special sections, special issues, meetings)
- uploading for citation and abstract input
  (clean up data for format compatibility)
- uploading for indexing ??
  - esp. for material with only abstracts (meetings)
  - esp. if parallel processing desirable
- uploading for translations ??
  - possible "mini-system": selection, cite & abstract input, indexing)
- uploading for post-processing analysis ??
  - for special products/projects done after mainline processing
III. Summary of Issues

- quality; resources; standards; property rights

**Inconsistency in formats**

-experimental formats—meant to be "more meaningful"

-variety of formats: individual publications; large publishers

**Inconsistency in delivery**

-large publishers dependable; still coordinate hard copy and electronic

-individual publications bigger problem:
  -predicting volume: affects resources, production planning
III. Summary of Issues (cont.)

Adapting processing system

- irregularity in schedules, content, formats
- large effort for system development & data processing
  - dual processing
- rely on few publishers -- critical mass
- need hard copy for indexing, post production
- lack of standards
  - formats & delivery mechanisms

Copyright / Liability

- copyright problems for infrequent publications
- agreement with large publishers
- probable encoding to assure notice of ownership
- storage of electronic full text -- A&I or publisher?
  - liability issues much as are now
    - more problematic for individual, truly electronic publications
The Technical Manual Publishing On Demand System (TMPODS)

Steve Sherman
Defense Printing Service (DPS)

Steve Sherman offered a description of the DPS, beginning with its establishment in April 1992. As the former Navy Publishing and Printing Service, DPS is the consolidated organization for printing and duplicating in the Department of Defense.

Sherman described the DPS corporate structure, mission, advantages, and major automation initiatives, including the Technical Manual Publishing On Demand System (TMPODS).

The basic system design for TMPODS involves technical manual entry, scanning, storage, order processing, data management, and production. Under TMPODS, Navy technical manuals are stored in a digital database in a raster format on CD-ROMS configured in "jukeboxes."

This new digital approach has reduced a variety of costs associated with Navy technical manuals, including printing, dissemination, and, especially, storage — since the paper-based documents were eliminated. Sherman explained how these documents are produced on demand at hundreds of DOD facilities throughout the world — even aboard ships at sea.

Other benefits of TMPODS include the delivery of fully updated technical manuals, rapid order turnaround, delivery in either hardcopy or digital format, the capability to bundle technical manual collections, and greatly reduced distribution costs.
Defense Printing Service (DPS)

- Defense Management Report Decision 998 - Effective 6 April 92
  - Established DPS (formerly Navy Publishing and Printing Service)
  - Consolidated Organization for Printing and Duplicating in DOD
  - Responsible for a coordinated DOD program covering production, procurement and distribution of publications through conventional and alternative means
  - Provide products on a "fee for service" basis under the Defense Business Operations Fund (DBOF)
- Organizational Structure
  - DPS Headquarters - Washington Navy Yard
  - 7 Area (Regional) Offices
  - 100 Detachment & Branch Offices (270 total locations)
Mission

The Defense Printing Service is responsible for the Department of Defense duplicating and printing program, and document automation, encompassing value-added conversion, electronic storage, output and distribution of hardcopy and digital information. Value to the customer includes quality products and services, which are competitively priced, and delivered on time.
DPS Advantages

- Worldwide presence
  - Co-located with major DOD activities

- Chartered as DBOF activity in 1992
  - Fee for service

- Track record as cost-effective, innovative business
  - DPS makes up front investment in systems and people
  - Customer pays unit rate for services rendered

- DOD leader in conversion/output technology
DoD Digital Information Flow

Hardcopy
POD
Electronic Duplicating
Traditional Printing
CD
On-Line

LAN
WAN
Disk

User Formats

Index, Store, Retrieve

Composition

Author Formats

LAN
WAN
Disk

Bulk Conversion

DPS Strategic Planning

Defense Printing Service
# Data Format Characteristics

<table>
<thead>
<tr>
<th>Authoring Format</th>
<th>User Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics</td>
<td>Characteristics</td>
</tr>
<tr>
<td>Editable/Reviseable</td>
<td>Designed for View &amp; Print</td>
</tr>
<tr>
<td>Still developing technology</td>
<td>WYSIWYG-Just as Intended</td>
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<tr>
<td>Variety of Options</td>
<td>Navigatable</td>
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<tr>
<td></td>
<td>Simple Implementation</td>
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## Legacy Conversion Issues

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<tr>
<th></th>
<th>Low Conversion costs</th>
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<tbody>
<tr>
<td></td>
<td>Little QA</td>
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</tbody>
</table>

### Examples

- Word Processing, SGML
- Publishing Formats
- Vector Format Drawings
- Indexed Raster, Intelligent Raster, PDF
- SGML
PDF User Format Advantages

- HARD COPY
- WORDPERFECT
- FRAMEMAKER
- ARBORTEXT
- ANY PUBLISHING PROGRAM

CONVERT TAG

INDEXED PORTABLE DOCUMENT FORMAT (PDF)

-view

PRINT

CD ON-LINE
Major Automation Initiatives

- Automated Document Management & Publishing Systems (ADMAPS)
- Automated Document Conversion (ADC) Test
- Technical Manual Publish On Demand System (TMPODS)
- Electronic Document Repository and Distribution System (EDRADS)
- Electronic Page Printing Systems (EPPS)
- Shipboard Electronic Publishing Center (SEPC)
• Digital Database of Navy Technical Manuals
  Initially in Raster Format
  Eventually in ASCII/SGML & IETM
  Supports CALS Data Standards

• Fill Individual MILSTRIP Requests
  Focus on Secondary Distribution
  Paper Output - W/Changes Collated Into Basic TMs

• Capability to Ship ‘Bundled’ Digital TM
  Digital Output For CD-ROM
  Supports ATIS/ATIS - AIR User Platform
• Deliver Fully Updated Manuals
  
  Increase Accuracy of Revision Level
  Reduce Admin/Handling Time
  Reduce Printing and Mailing of Changes

• Eliminate Deficiencies in Warehouse Stocking
  
  Reduce Disposal of Obsolete Pubs by 1.2 M Manuals Annually
  Eliminate Physical Storage and Manual Retrieval
  Improves Response Time

• Operate Within the CALS Data Formats
  
  Central Repository Supporting Common TM Formats
  Delivering Digital Data to the Fleet
• Scan Existing TMs in Intelligent Raster Format
• Applicable CALS Specs, Initially
  Navy Implementation of Raster Specification
  MIL-R-28002 - ‘Raster Graphics Representation in Binary Format’
  MIL-M-29532 - ‘Master Library Index Specification’

• Accept New TMs in Full Intelligent Format
  Delivered From Industry Via ADMAPS
  SGML - Per MIL-M-28001
  Graphics in Raster, CGM, and IGES
  IETM - Per Draft MIL-D-87268,69

• PDL/PDF - Intelligent Storage and Output Format
- **ADMAPS**: Automated Document Management and Publishing System
  - Assures CALS compliance of TMs submitted digitally
  - Supports Document Editing and Creation in CALS Data Formats
  - Provides TMs to TMPODS in a Common Data Format
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<tr>
<th>Sponsor</th>
<th>Total TMs</th>
<th>Converted</th>
<th>QA'd</th>
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<tr>
<td>NAVSEA</td>
<td>38.5K</td>
<td>33.6K</td>
<td>22.6K</td>
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<tr>
<td>NAVAIR</td>
<td>45K</td>
<td>43K</td>
<td>43K</td>
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<tr>
<td>SPAWAR</td>
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<td>.2K</td>
<td>.15K</td>
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<tr>
<td><strong>Total</strong></td>
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<td><strong>76.8</strong></td>
<td><strong>65.75</strong></td>
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<td><strong>On TMPods</strong></td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>45.5K</strong></td>
<td><strong>76.8</strong></td>
<td><strong>82.5</strong></td>
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</tbody>
</table>
Workload

- **306,000 MILSTRIP Orders in CY95**
  - 85 + % of all TM MILSTRIP Requests
    - (Non-Std Printing, Classified, Large Volume Orders Excluded)
  - Issue 858K Manuals Annually

- **Printing Volume in CY95**
  - 107M Impressions 8 1/2 X 11
  - 32M Running ft Foldout pages

- **Digital Output Volume in CY95- 1040 CDs**
## TMPods Cost Benefits

<table>
<thead>
<tr>
<th>CURRENT COST</th>
<th>TMPods COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per TM, Printing -</td>
<td>$11.72</td>
</tr>
<tr>
<td>Cost per MILSTRIP Req -</td>
<td>$41</td>
</tr>
<tr>
<td>Cost of Automatic Change Distribution</td>
<td>$3.2M</td>
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<tr>
<td>Annual Cost of TM's Disposed -</td>
<td>$14.2M</td>
</tr>
<tr>
<td>Annual Cost to the Navy to Fill Requests</td>
<td>$40.6M</td>
</tr>
</tbody>
</table>

Not Calculated Costs:

- Elimination of Manual Collation of Change Pages by Users
- Value of Digital Information vice Paper
• Tech Manual Entry
• Scanning
• Storage
• Order Processing
• Data Management
• Production
• TMs Delivered Fully Updated
• Rapid Order Turnaround
• Hardcopy or Digital Delivery
• Bundling Capability (TM Collections)
• Common Data Formats Stored
  For Use by Authors
  For Delivery to Users
• Reduces Warehouse Storage
• Reduces Obsolete Shelfstock
• Reduces Distribution Costs
The theme of this NASA Scientific and Technical Information Program Seminar was electronic documents. Topics covered included Electronic Documents Management at the CASI, the Impact of Electronic Publishing on User Expectations and Searching, Image Record Management, Secondary Publisher Considerations for Electronic Journal Literature, and the Technical Manual Publishing On Demand System (TMPODS).