



Office of Scientific and Technical Information  
U.S. Department of Energy

# The Search for Hidden Treasure: R&D Results in the Deep Web

*Dr. Walter L. Warnick, Director*

*Office of Scientific and Technical Information*

**STIP Meeting**

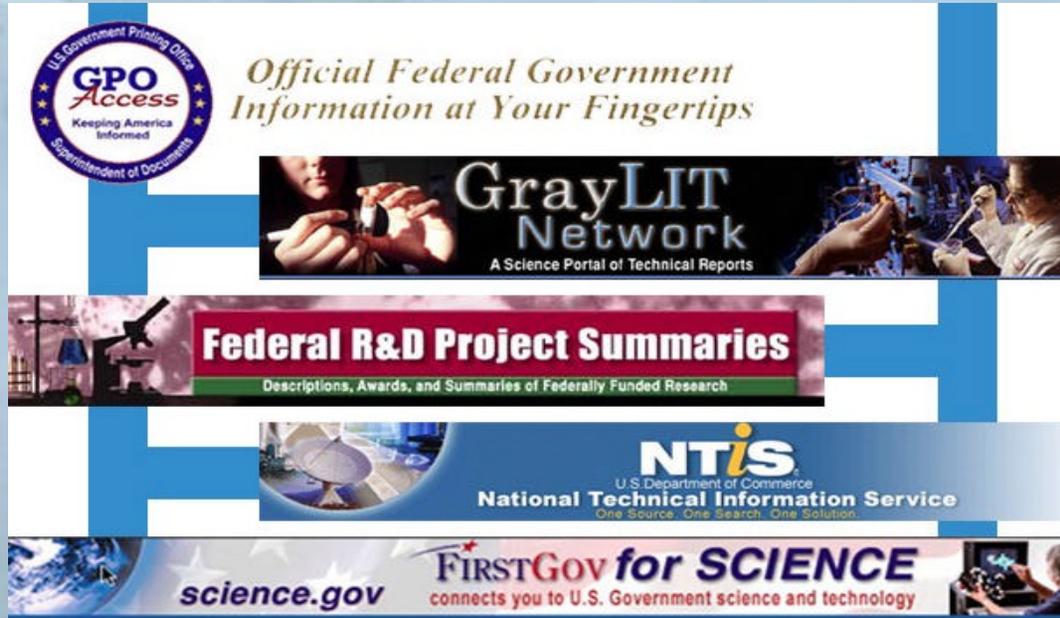
April 30, 2003

[www.osti.gov](http://www.osti.gov)





# Interagency Partnerships



## Leveraging STI Resources for DOE

- Long-standing agency-to-agency partnerships with GPO, NTIS, and DTIC
- DOE representative of CENDI and Science.gov Alliance



# Science.gov Is Latest Success Story



**science.gov**

**FIRSTGOV for SCIENCE**  
connects you to U.S. Government science and technology



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Science.gov enables you to search two kinds of information - selected Web sites and the databases listed below of technical reports, journal articles and other published materials. These can be searched simultaneously or separately.

Select the number of records to retrieve from each choice:

Enter search terms:

Search capabilities provided by [DOE/OSTI](#) and [USGS](#)

Choose up to 10 resources to search:

[Science.gov Web Sites](#) – Selected Web Sites

### Agriculture, Food, and Nutrition

- [AGRICOLA](#) - References to agricultural literature from the National Agricultural Library
- [Agriculture Technology Transfer Automated Retrieval System](#) - Summaries of selected recent Department of Agriculture

### Health and Medicine

- [Biologics Evaluation and Research](#) - Blood, vaccines, therapeutics and related products information from the FDA.
- [ClinicalTrials.gov](#) - Current information from NLM

## Science.gov Launch: December 2002 AAAS Demonstration: February 2003

- Science.gov Alliance of 14 information offices from 10 major science agencies is similar to the DOE STIP collaboration.
- OSTI is DOE's representative, and we are the "home" of science.gov.
- Web portal indexes over 1400 resources, with DOE S&T in over **400 DOE URLs**.
- Deep Web searching of 30 databases is a key feature, developed by OSTI.
- Deep Web search tools offer greater access to R&D results.

***Science.gov aims to bring the substantial resources of the federal science and technology enterprise together, in one place. Working together, federal agencies have assembled countless pages of government research, data, and reports. The site is a great example of e-government in action.***

-Dr. John H. Marburger, Director, Office of  
Science and Technology Policy



# Surface vs. Deep Web

## The Web Has Two Parts

### Surface Web

Accessible by  
Traditional Search  
Engines; e.g., Google

### Deep Web

**Not** Accessible by  
Traditional Search  
Engines

Surface Web and Deep Web  
Intersect at Pages Where Patrons  
Launch Searches of Databases



# Database Searching

**Most Information Residing Within  
Databases Is in the Deep Web;  
e.g., DOE R&D Reports**



## Easy Search

Search  Sort By   ascending order  
 descending order

(Phrase in Double Quotes)

For

The Easy Search allows you to search the OCR full-text and bibliographic record, bibliographic record only, title, creator/author, and identifier number. Click on the drop-down arrow next to the search query box and highlight the field you want to search. To search for an exact phrase, use double quotes around the phrase entered in the query box. Go to [Help](#) to obtain additional Search information and for a list of [DOE Program Offices](#), [Research Organizations](#), and [DOE Subject Categories](#).

For full system and searching capability, refer to [Technical Requirements](#).

   
DOE Home OSTI Home  
   
GPO Home EnergyFiles

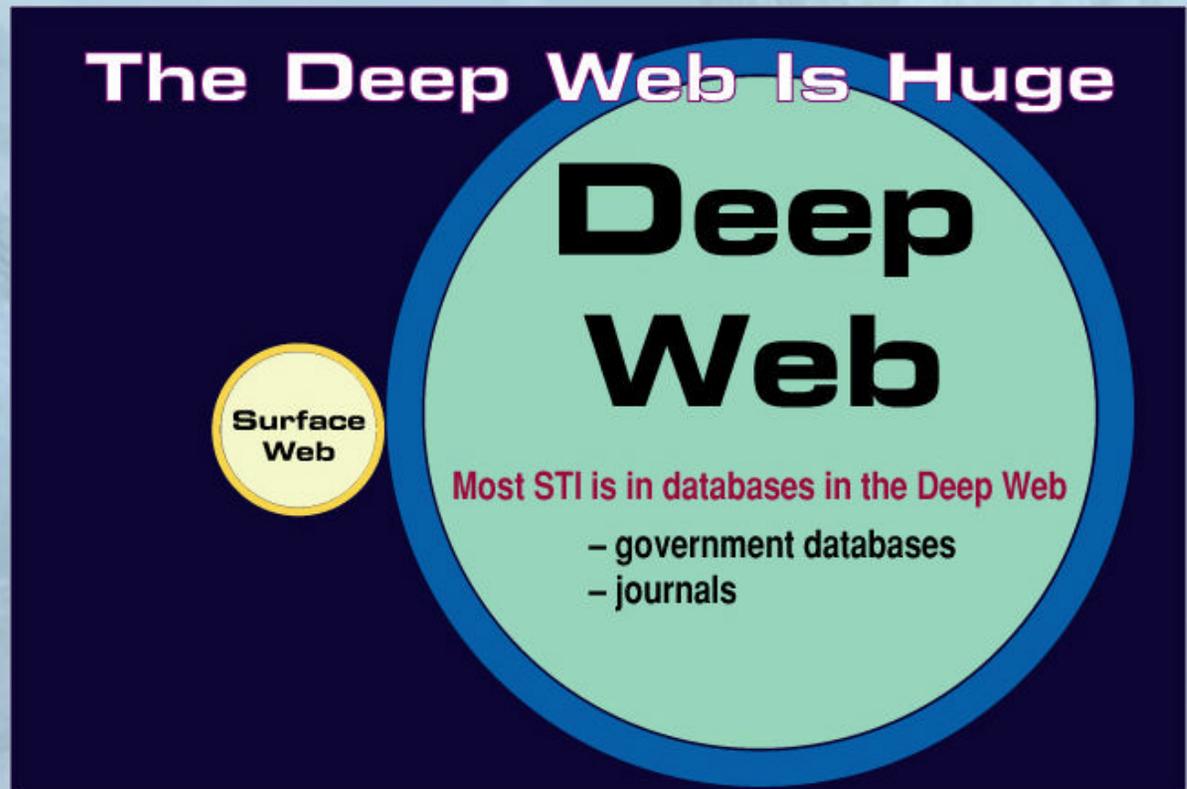
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**508 Bobby**  
APPROVED



# Volume of Information

- The Surface Web has 3 billion pages and is accessible to crawlers of popular search engines.
- The Deep Web is not accessible to such engines, but it is hundreds of times larger than the Surface Web.





## Relevance of Results

Among popular search engines, Google is experiencing increasing traffic. Why?

***The reason is relevancy ranking –***

**The item you want is most likely to be among the first ones listed.**

**To increase traffic in DOE R&D results, make the relevant information easy to find.**

*Information that is easy to locate is information that is much used.*

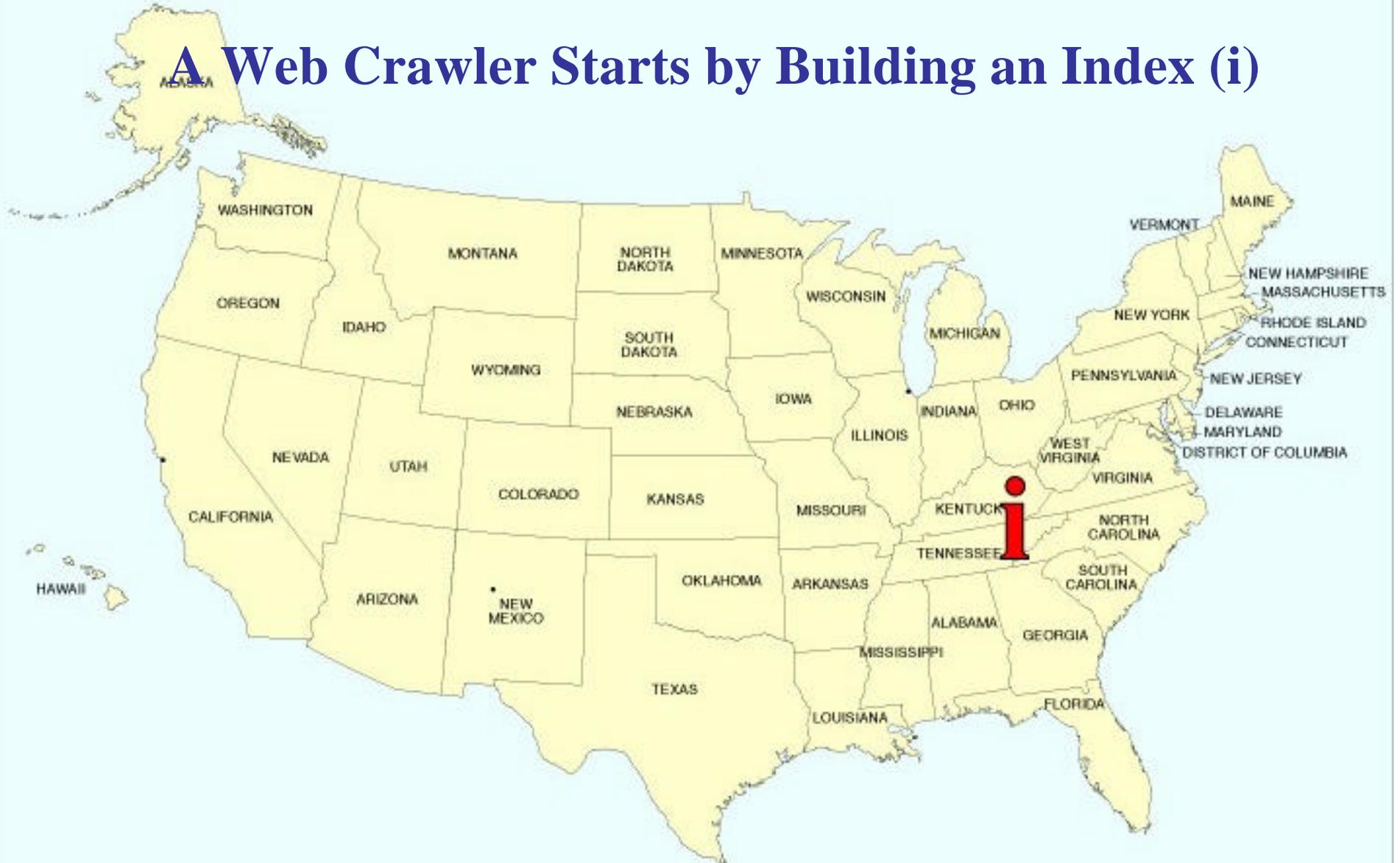


# Approaches to Searching

- **For the Surface Web: Web Crawlers**
- **For the Deep Web: Distributed Search**

(The differences are shown in the following charts.)

# A Web Crawler Starts by Building an Index (i)



**Information is gathered from a site**



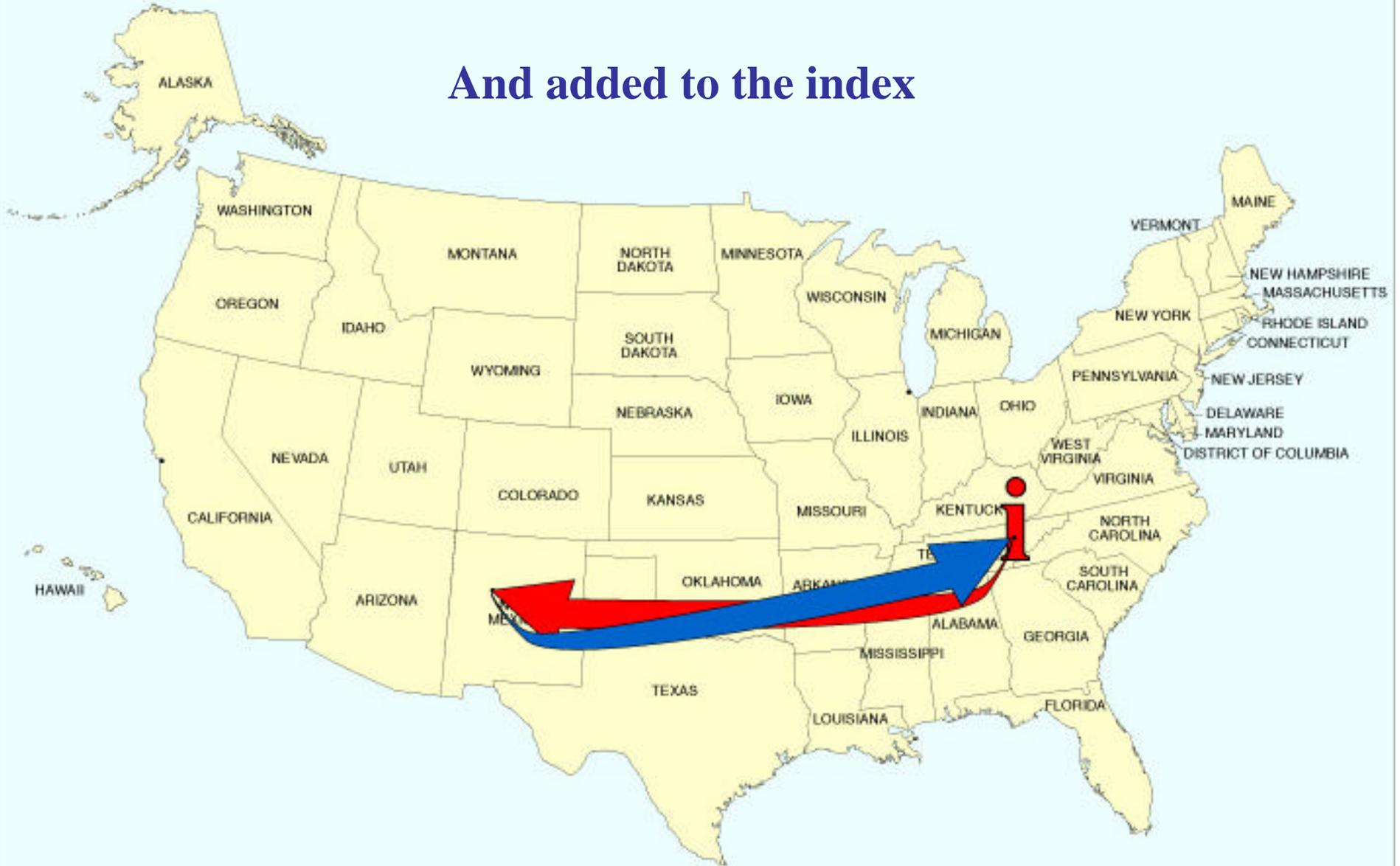
And added to the index



Then information is gathered from another site



**And added to the index**



**Then the index is used to provide results  
to the patron**





# The Problem with Crawlers

**Global search tools for the surface web, e.g., Google:**

- **Seldom allow fielded searches, i.e., searching author, title, etc.**
- **Do not include databases of the Deep Web.**

**To search across databases of the Deep Web, distributed search is the only way.**

**Global distributed search tools for the Deep Web are not available.**



# The Challenge

## Challenge for OSTI:

**Make the Deep Web as searchable as the Surface Web**

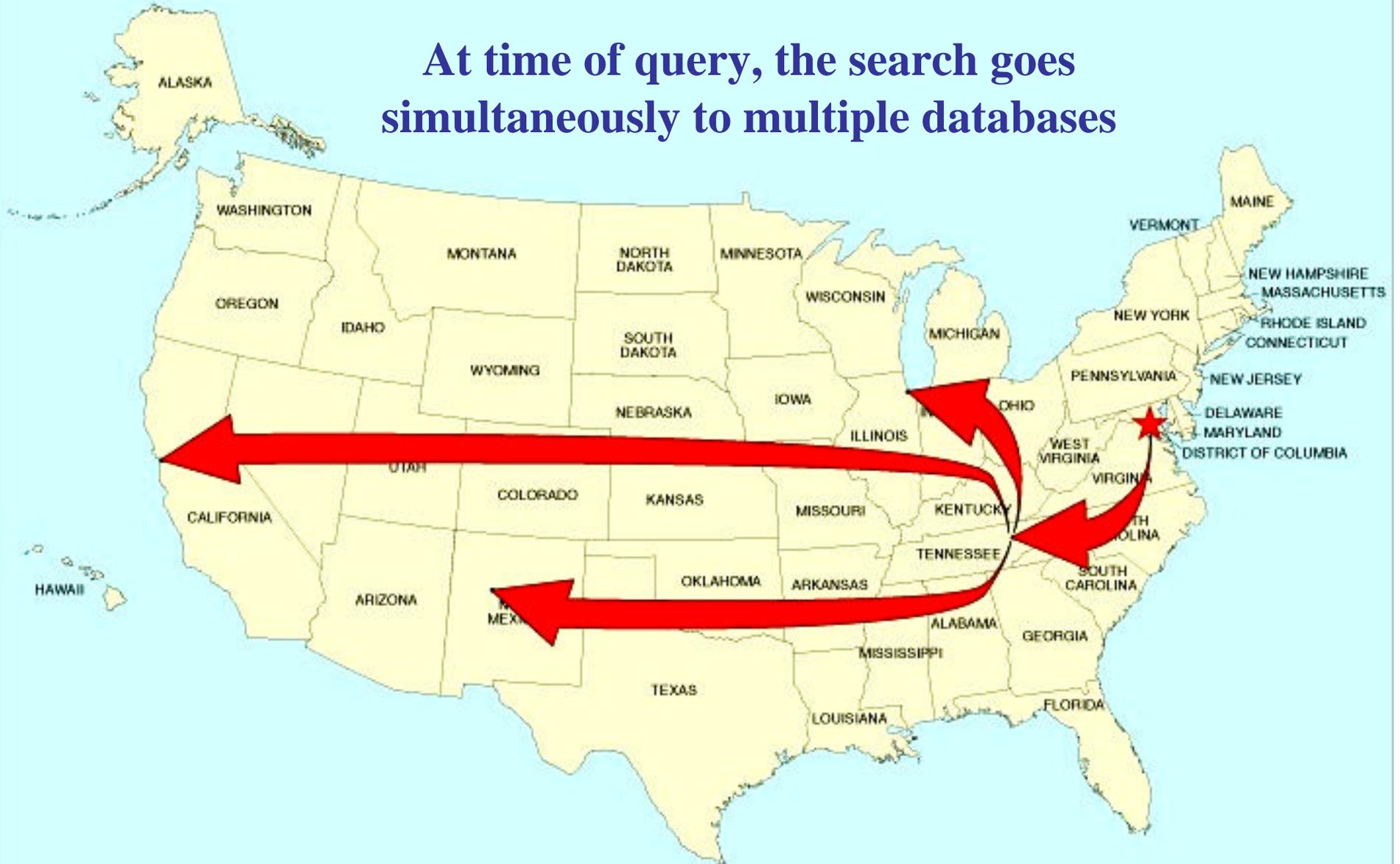
## OSTI Strategies:

- 1. Develop Deep Web search capabilities – described in the remainder of this presentation**
- 2. Create Surface Web Links to Deep Web Resources – deferred to a future presentation**

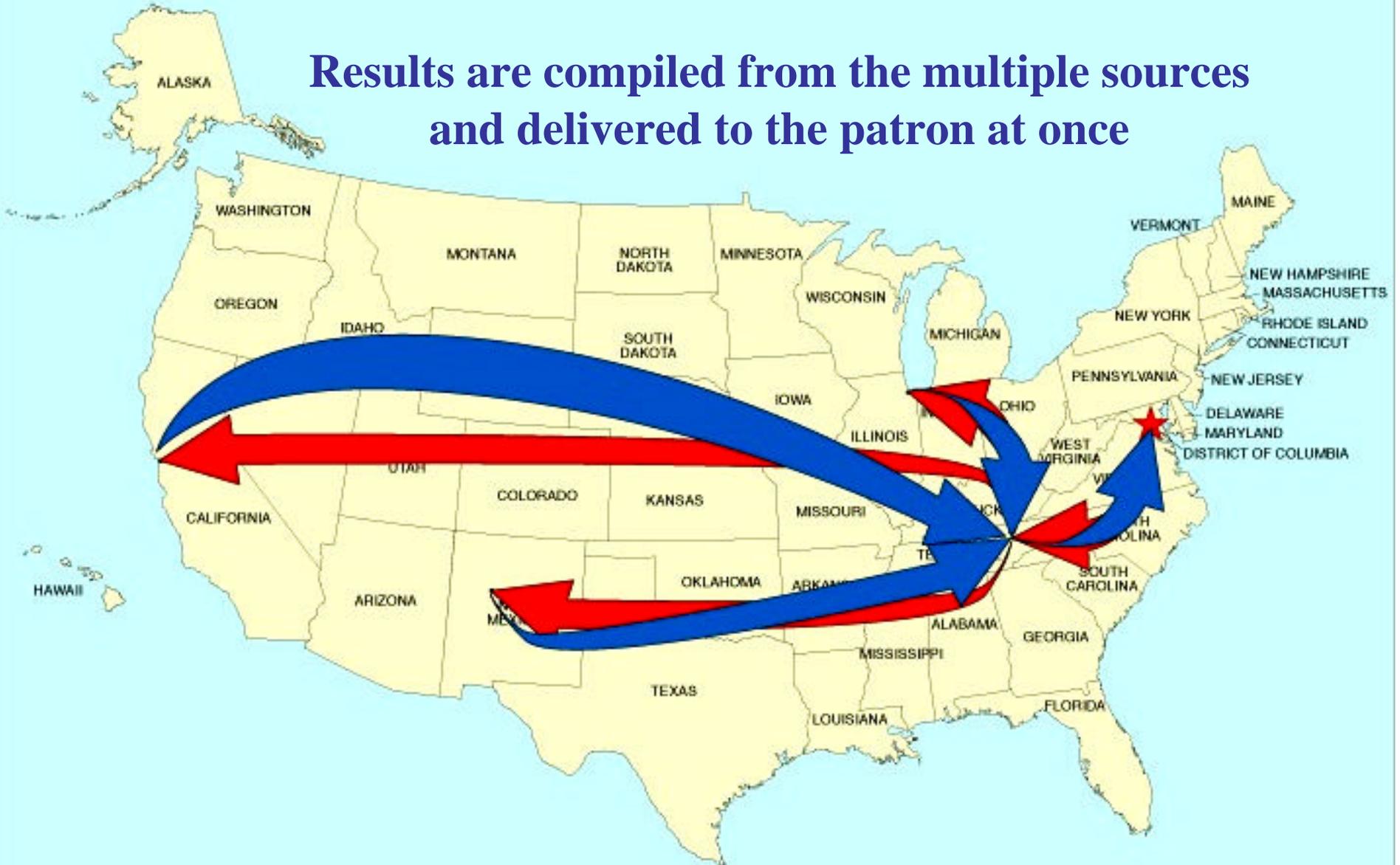
# A Distributed Search Starts with the Patron's Query



**At time of query, the search goes simultaneously to multiple databases**



**Results are compiled from the multiple sources  
and delivered to the patron at once**





# Current Limitations of Distributed Searching

**Distributed searching of the Deep Web has great strengths, but it is not a panacea.**

- It is hard to determine if a key database has been overlooked.**
- User may receive a glut of information to sort through due to lack of relevancy ranking of search results.**

**The focus of OSTI in the near term is to strengthen distributed searching tools for the Deep Web.**



## Benefits from STIP and for STIP

The STIP Collaboration accrues benefits beyond DOE, in the interagency and international STI circles.

- The distributed electronic environment pioneered by all of us here in DOE is now at work for U.S. science information
- The harvesting system initiated with some of you now will soon be tested with our Nordic exchange



## Today's Agenda

**As you work these topics during the meeting:**

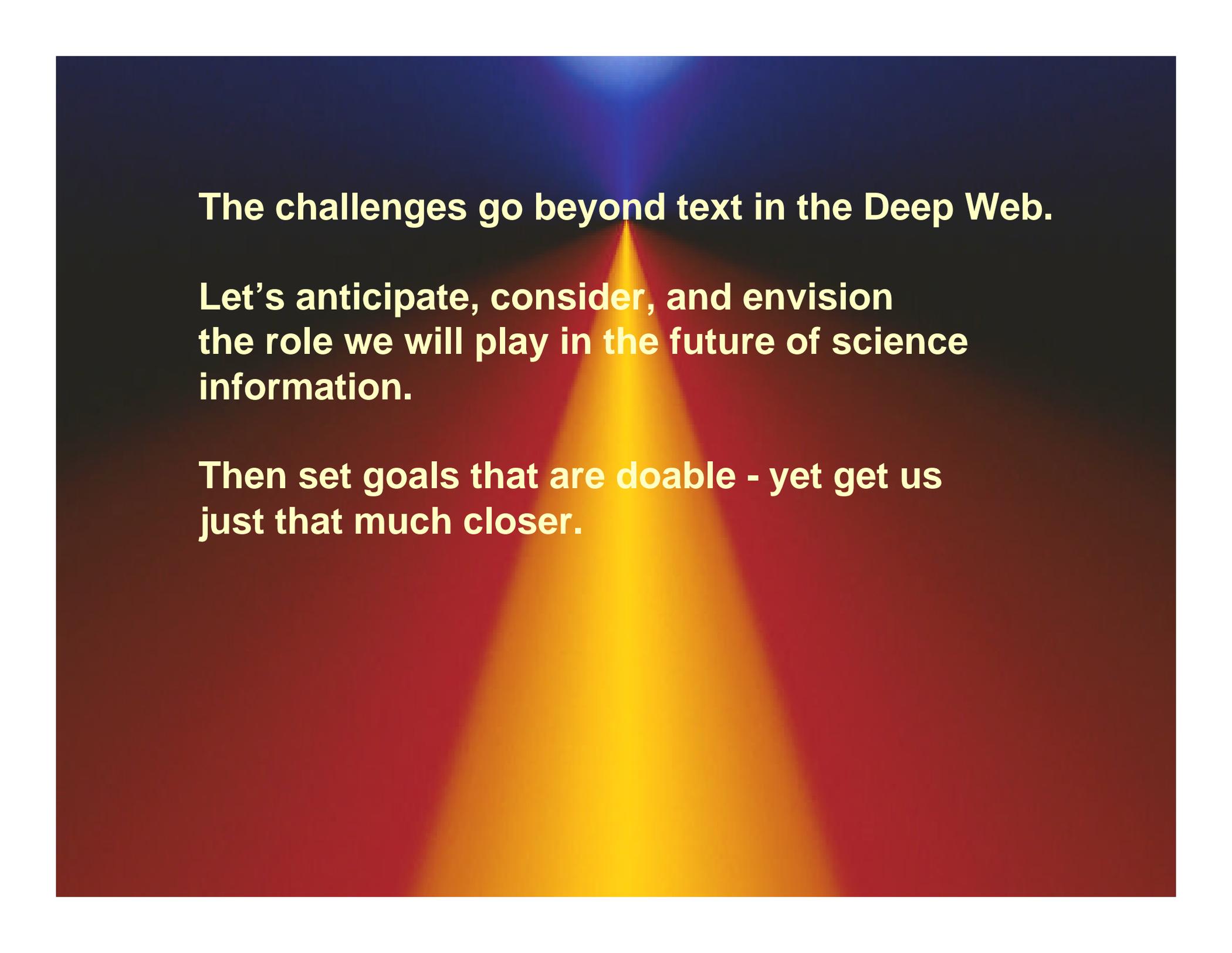
- **Harvesting**
- **Products and services**
- **Institutional repositories**
- **Data and full text processing**
- **Forms and formats**
- **Preserving legacy collections**
- **Homeland security**
- **Goals and metrics**
- **And a range of other items, large and small**

**Keep in mind that each puzzle piece is needed to complete the picture.**

# The STIP Partnership Has Come a Long Way



**With Electronic Documents conquered, what will the next challenge be?**



**The challenges go beyond text in the Deep Web.**

**Let's anticipate, consider, and envision  
the role we will play in the future of science  
information.**

**Then set goals that are doable - yet get us  
just that much closer.**