Scientific and Technical Information (STI) Management Training

Training for DOE federal and contractor employees for ensuring that DOE fulfills its STI management responsibilities for identifying, collecting, reviewing, controlling, preserving, and disseminating its STI.

Training Sections

Purpose and Background

- What is STI?
- The Landscape of DOE Research Communities
- Steward and Agents

The Flow of R&D Information

- How is STI Collected?
- How is STI Preserved?
- How is STI Disseminated?

The Basics of STI

- Types of STI
- Submitting STI

Policy & Guidance

- DOE O 241.1C
- Public Access

What is My Role?

- Researchers

Benefits & Impact

- Discovery
- Benefits

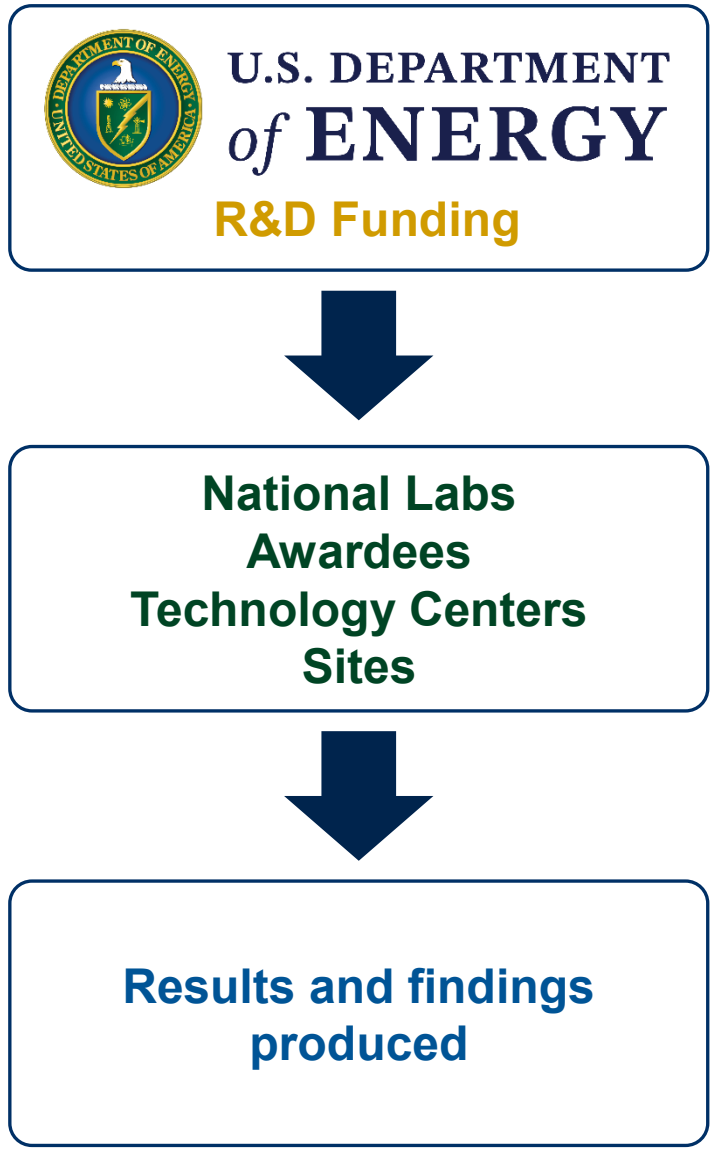
Purpose & Background

What is STI?

Science and technology progress is a cornerstone of **DOE's mission**.

DOE invests billions of dollars each year on research and development (R&D) to **advance science and innovate technology** to support the Nation's security and prosperity.

As a result, knowledge is gained and scientific and technical information, or **STI**, is produced.



Since 1947, DOE has been **required by law** to manage and maintain its STI and ensure that the STI it generates is made **available to the American taxpayer**, and public at large, in a timely manner, without unnecessary delays or limits to access.

Energy Policy Act of 2005, P.L. 109-58, Section 982

"The Secretary, through the Office of Scientific and Technical Information, shall maintain within the Department publicly available collections of scientific and technical information resulting from research, development, demonstration, and commercial applications activities supported by the Department."
(42 U.S.C. Sec. 16322)

STI Definition:

Information products which contain findings and technological innovations **resulting from R&D** efforts and scientific and technological work of scientists, researchers, and engineers, whether Federal employee, contractor, or financial assistance recipient.

DOE-funded STI originates primarily from **research** and other activities performed by site/facility management contractors, direct DOE-executed prime procurements, DOE-operated research activities, and financial assistance recipients, in addition to DOE employees.

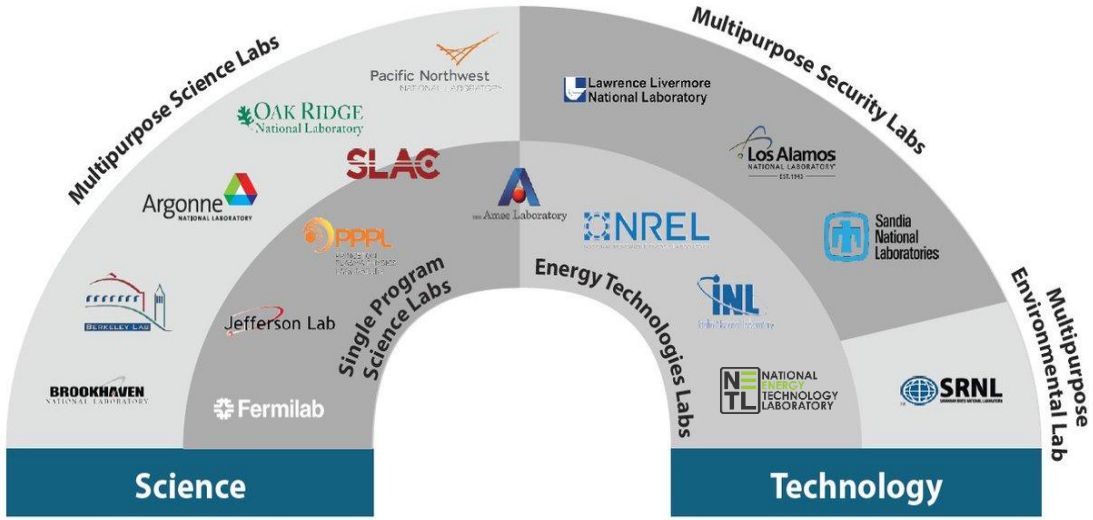
There are different types of STI produced through **various media** (textual, multimedia, audiovisual, and digital) and in a range of different products, such as journal articles, scientific/technical reports, scientific software, and scientific data.

The Landscape of DOE Research Communities

DOE research arises from throughout the DOE complex and is performed all across the United States.

Within DOE, there are two key research communities

National Laboratory Network

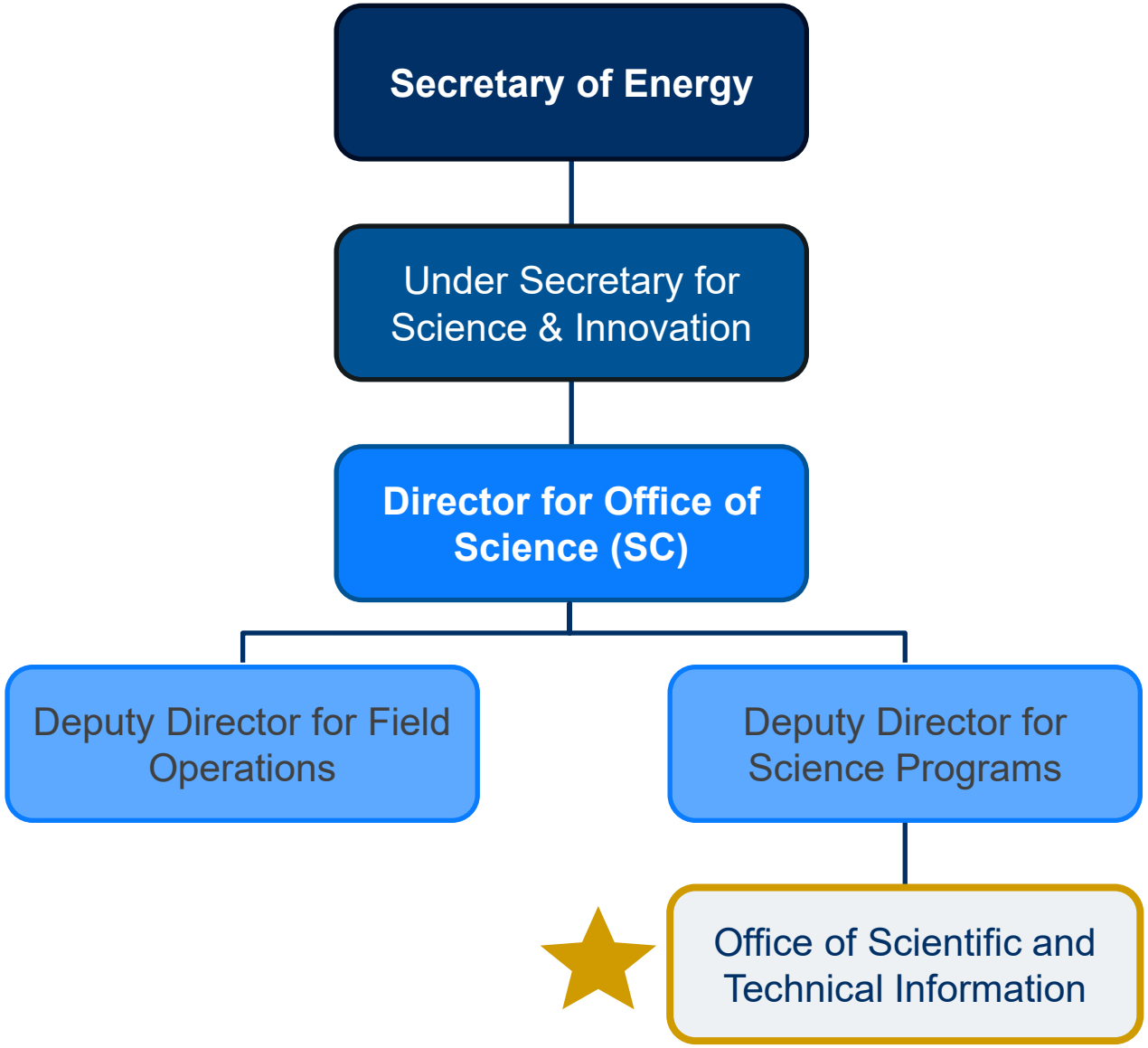


Financial Assistance Awardees

Grants Funded by:

- Office of Science
- Office of Nuclear Energy
- Office of Energy Efficiency & Renewable Energy
- Office of Indian Energy
- Office of Environmental Management
- Advanced Research Projects Agency – Energy (ARPA-E)
- Office of Fossil Energy and Carbon Management
- National Nuclear Security Administration

Steward and Agents



OSTI is an Office of Science organization with a corporate DOE-wide mission for ensuring access to DOE R&D results.

OSTI's **mission** is to "advance science and sustain technological creativity by making DOE's R&D findings available and useful to the public and DOE researchers and to provide strategic support to the DOE Office of Science and other partners."

OSTI's **core functions** are to Collect STI, Preserve STI, and Disseminate STI. OSTI provides public access to unclassified, unlimited STI and restricted access to classified and limited STI.

The Scientific and Technical Information Program, or **STIP**, is a Department-wide collaboration coordinated by OSTI.

It is required by a DOE Directive, but it is a **collaborative partnership**.

STIP is comprised of designated representatives from Headquarters Programs, DOE Operations and Field Offices, DOE laboratories and technology centers, sites and facilities.

STIP ensures that DOE **effectively manages** DOE-sponsored STI, and it provides a framework for routine communication, coordination, and information exchange.

The Flow of R&D Information

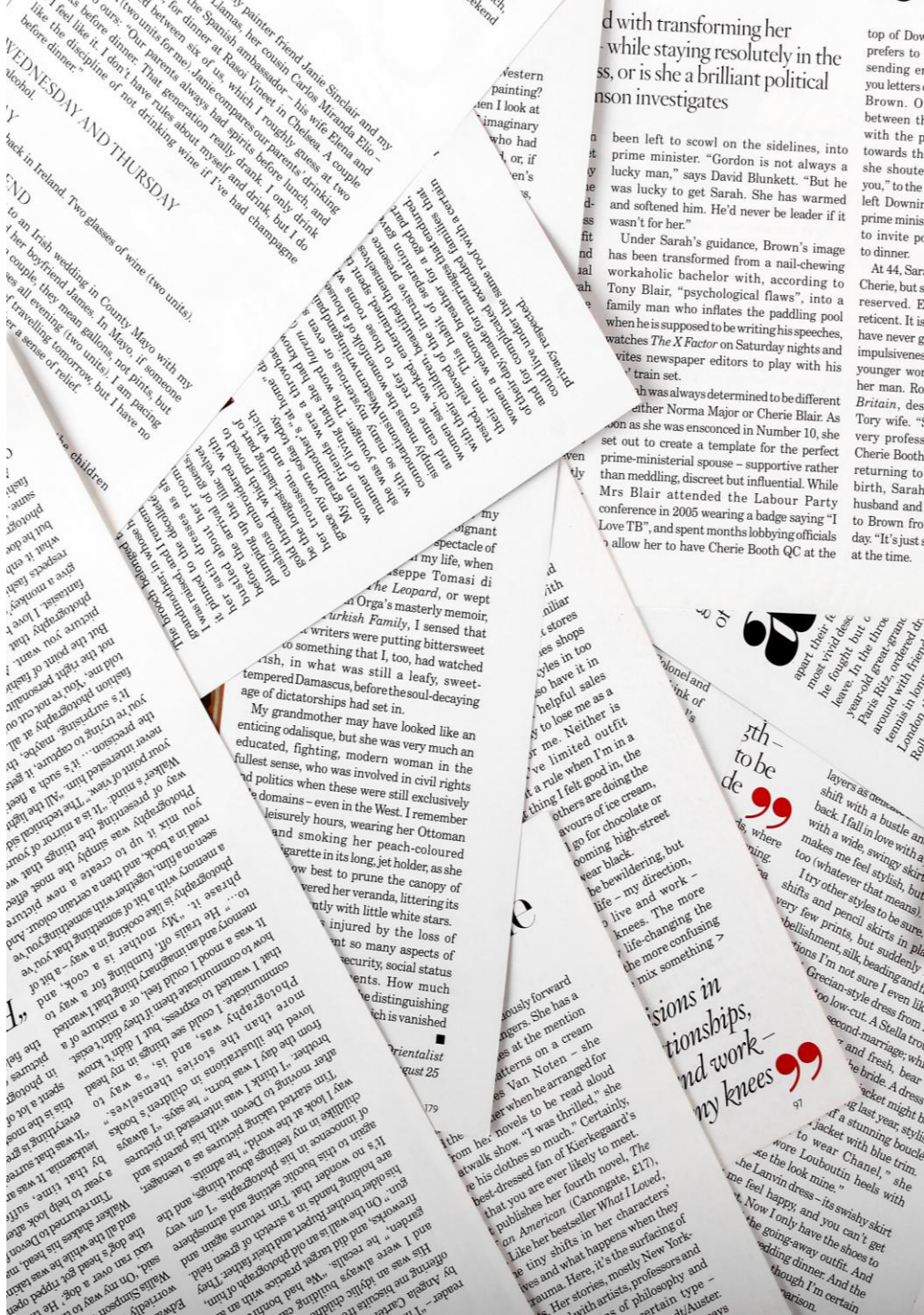
How is STI Collected?

Through STIP, STI is collected from the 17 national labs, plus sites and facilities, DOE program offices, DOE awarding offices/site offices, and financial assistance recipients.

All categories of STI are collected, including

- unclassified/unlimited,
- controlled unclassified information (CUI) (including SBIR/STTR, CRADAs, etc.),
- Unclassified Controlled Nuclear Information (UCNI),
- and Classified.

There are around **50,000** STI products collected annually, not including datasets.



OSTI provides three mechanisms for STI submissions

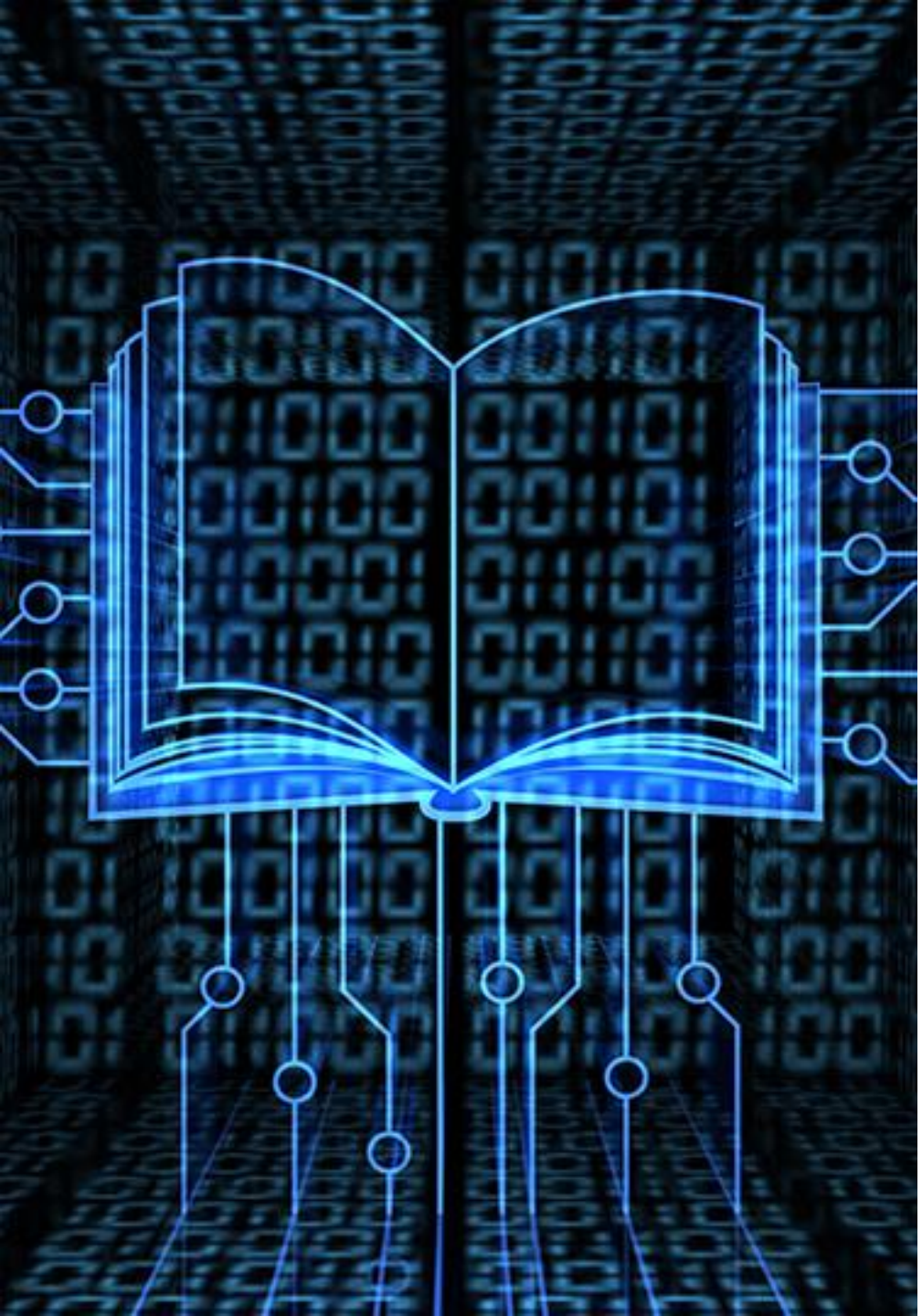
- **E-Link** – for most STI product types
- **DOE CODE** – for scientific software
- **Classified E-Link** – for classified and UCNI STI

How is STI Preserved?

OSTI's unclassified collection boasts over **one million** permanent physical records dating from the Manhattan Project to 2000, when OSTI established policies for the electronic submission of STI.

The collection contains reports authored by figures of note such as Enrico **Fermi**, Edward **Teller**, and Glenn T. **Seaborg**.

While this collection is predominantly paper records, OSTI also houses a significant amount of microfiche, microfilm, and aperture cards.



In addition to physical preservation efforts, this historic collection is being **digitized** to promote long-term usability and wider accessibility.

This also supports both the National Archives and Records Administration's (**NARA**) requirements for the digitization of physical records (per 36 CFR Part 1236) and OSTI's obligation to maintain a central repository of STI developed by the Department of Energy and its contractors (per the Department of Energy Research and Development Records Schedule, Appendix A).

OSTI also maintains a primary, secondary center, and tertiary cloud replicas for **disaster recovery** to maximize survivability of DOE's STI corpus.

How is STI Disseminated?

OSTI develops and hosts **search tools** to make DOE R&D results discoverable and available to the public.

OSTI.GOV is the primary search tool that includes **all** unlimited STI

Specialized search tools:

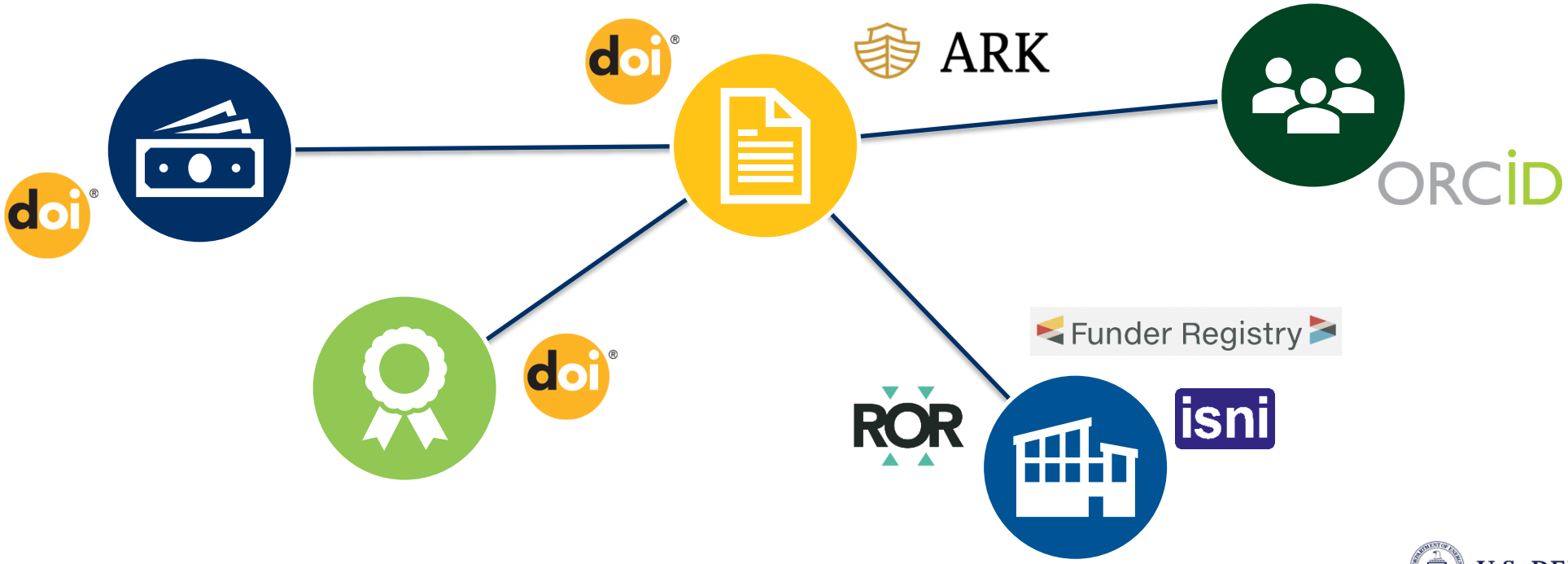
- DOE PAGES *(journal article accepted manuscripts)*
- DOE Data Explorer *(datasets)*
- DOE CODE *(software)*

DOE-funded STI is also included in **Science.gov**, the federated search tool across U.S. federal science agencies.

OSTI also works with Google, Bing, and others to ensure DOE's STI content is indexed and discoverable in web search engines.

OSTI helps connect research outputs with the individuals, organizations, and related research with **persistent identifiers**.

Persistent identifiers, or PIDs, are long-lasting, managed, and registered **unique digital reference** (often in the form of a URL) to an object (e.g., person, organization, research output, award) that can be represented or described online. The identifier is a string of numbers, letters, and/or symbols assigned to the digital object. Common PIDs include ORCID iDs (for people), ROR IDs (for organizations), and DOIs (for R&D outputs and awards).



The Basics of STI

Types of STI

Click each of the icon of each type of STI to learn more

Technical Reports / Workshop Reports

Journal Articles / Accepted Manuscripts

Conference Papers, Presentations, Posters, or Proceedings

Scientific Research Datasets

Scientific and Technical Software

Scientific Videos

Scientific Factsheets

Patents

Program Documents with STI content

Theses and Dissertations

Books / Monographs

More on
Software

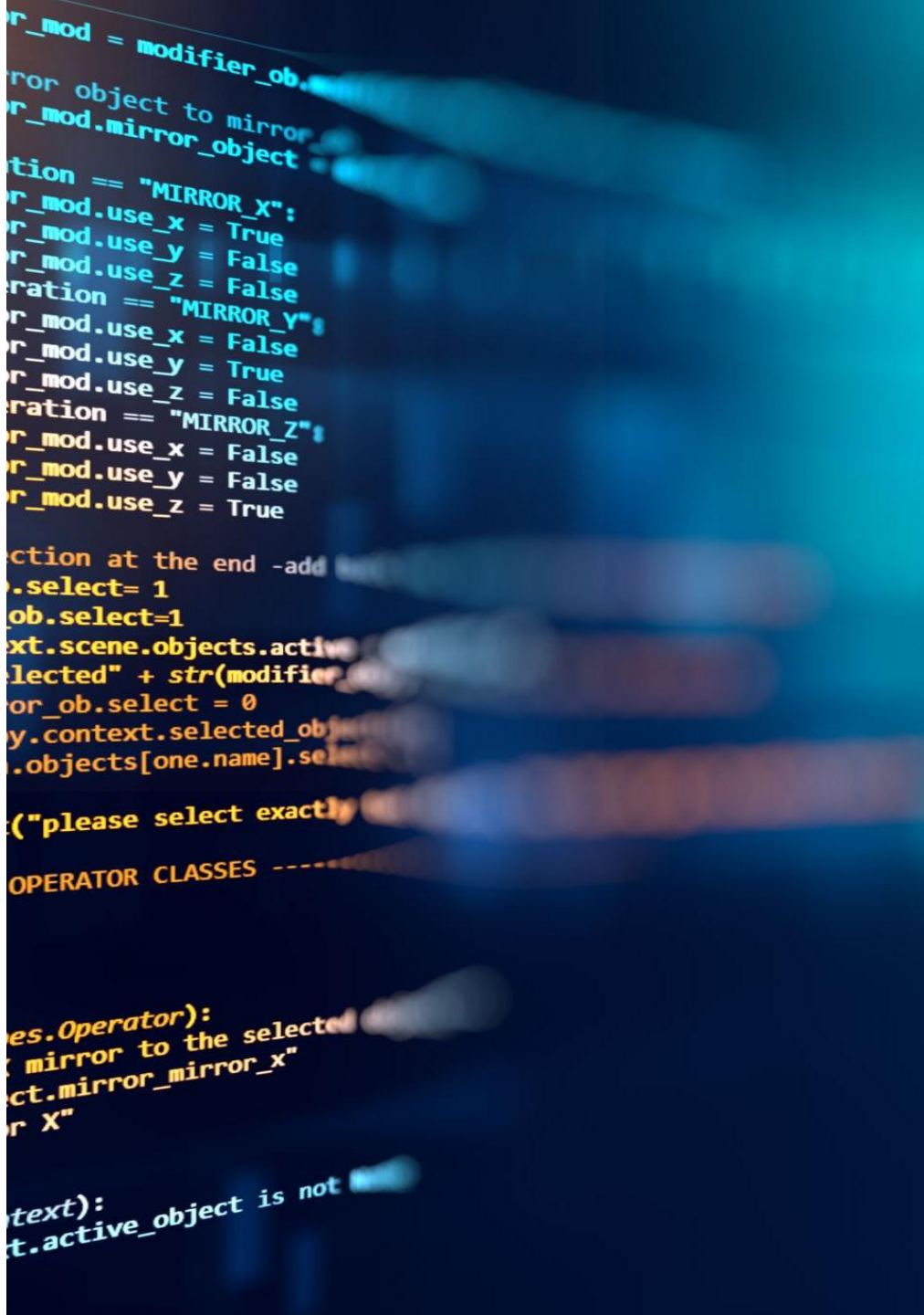
Individual software records and associated metadata are directly provided by the developer or the developing organization to DOE through **DOE CODE**, DOE's software services platform and search tool.

Supports submission and announcement of:

- Unclassified/Unlimited availability software (including closed source, proprietary)
- Limited availability software
- Scientific and Business software

Submitted software may be assigned a **DOI** if they do not already have one.

When announcing software, a link to a landing page or repository or contact email must be provided. A **DOI** will be assigned to announced software if one is not already assigned.



osti.gov/doecode/

doecode@osti.gov

U.S. DEPARTMENT *of* ENERGY

More on

Scientific Data

Dataset metadata records are assigned DOIs upon submission to OSTI (if they do not already have one) through the **DOE Data ID Service**, which is a free service for all DOE-funded datasets for the assignment of DOIs through DataCite.

OSTI does not host data so the submitter must host the dataset in a data repository that follows the NSTC's Desirable Characteristics of Data Repositories for Federally Funded Research.

The dataset landing page URL must be added during submission.

osti.gov/pids/doi-services/doe-data-id-service

doedataid@osti.gov

Submitting STI

Submissions to E-Link can be done by one of **two ways** – single submission or web services.

Single submission	Web services
Submission of STI one at a time using the online submission interface in E-Link.	Bulk submission of STI through API.

When submitting STI in E-Link, there are **required metadata** fields depending on the type of STI.

With the exception of scientific data, the **full-text file** of STI must be submitted with the metadata.

Required Metadata

- Report/Product Number (for technical reports)
- Title
- Author(s)/Contributor(s)
- Persistent identifier for each DOE employee and DOE contractor Author
- Description/Abstract
- DOE Contract/Award Number(s)
- Originating Research Organization
- Sponsoring DOE Program Office
- Issue Date/Date of Publication
- Intellectual Property/Distribution Limitations
- Releasing Official Information

Additional metadata unique to software or datasets:

- Description, Related Resource (e.g., if related to a specific journal article or technical report), Landing pages, Software or Data Contact

Useful Additional Metadata

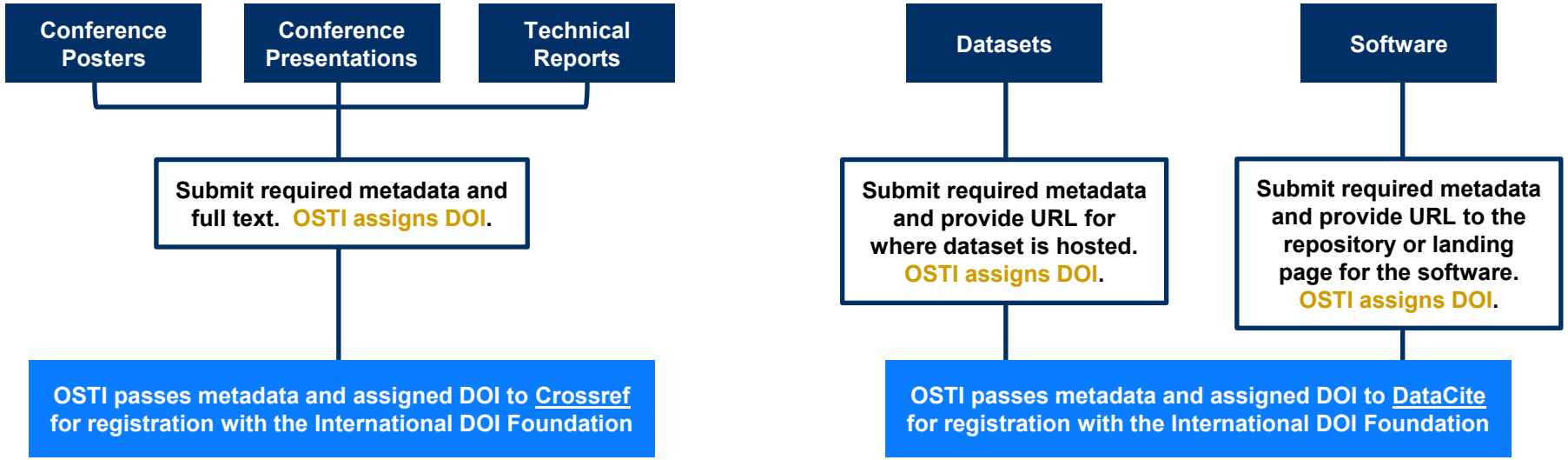
- Subject Categories
- Keywords
- Digital Object Identifier (DOI)
- Contributing Organizations

To learn more about metadata requirements click here

If you already have a **DOI**, it can be entered in the DOI metadata field within E-Link or DOE CODE.

If not, OSTI will **assign** one for the product types below. DOIs will be registered for unlimited, publicly releasable STI.

Journal articles will have a DOI already assigned by the publisher.



For more information on how OSTI assigns DOIs to STI, please visit the DOI Assignment Flowchart.

When submitting STI, be sure to include a **persistent identifier** (e.g., an ORCID iD) for any DOE federal and contractor employees listed as authors.

More information and links about DOE PID requirements can be found at PIDs@OSTI.GOV's PID Policy page

Not all STI is publicly available. The majority of STI is publicly releasable information, but the DOE STI collection also encompasses classified and statutorily **limited information**.

It is the responsibility of the Originating Site to review STI to **determine appropriate release** and apply any necessary statutory or program-driven announcement and/or availability restrictions, and to apply to the STI product any **restrictive markings required** and include any legal disclaimers.

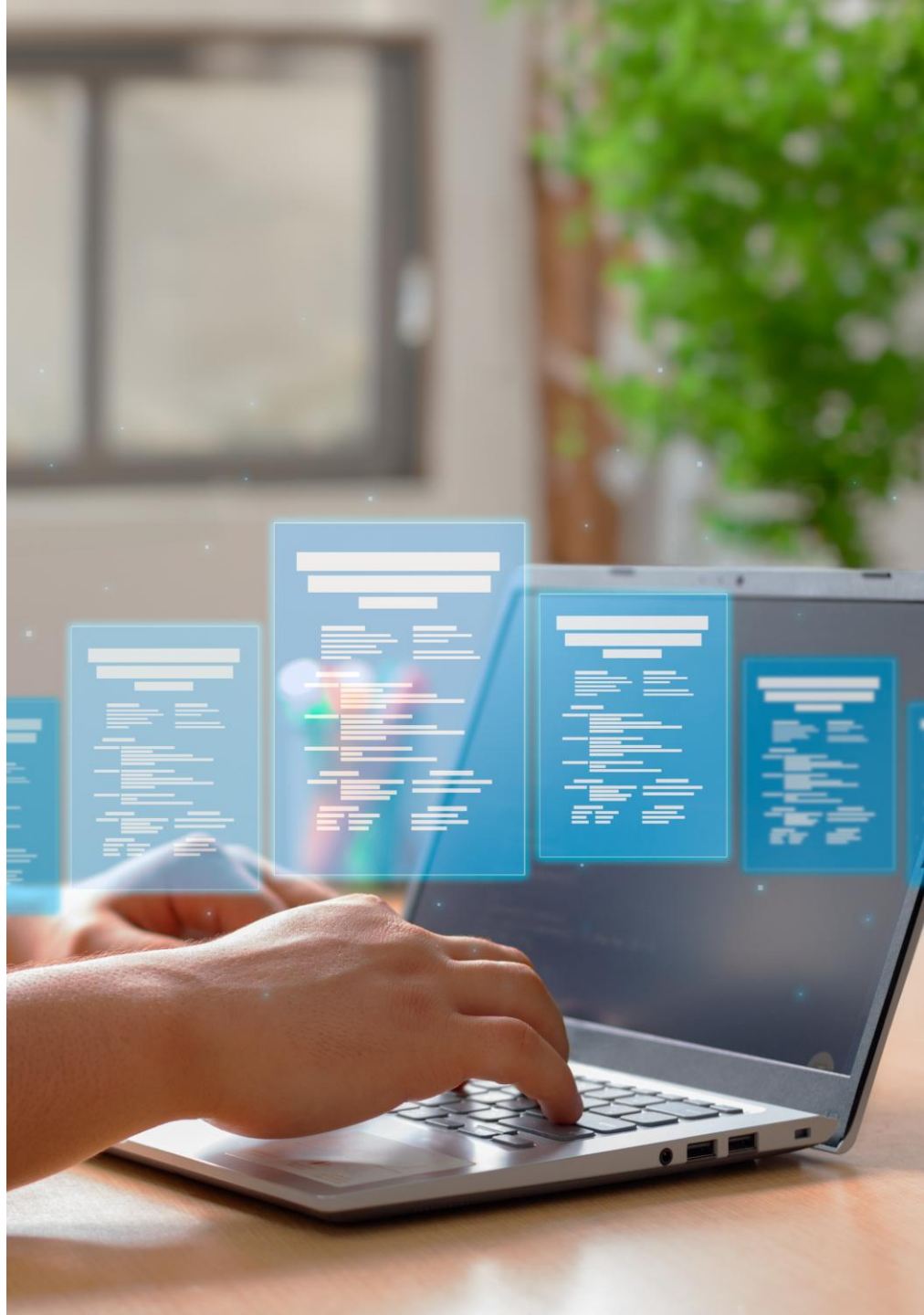
In addition, sites/offices should update any change to an Access Limitation in E-Link and ensure the full text is appropriately marked/remarked.

DOE Order 471.1, on **Controlled Unclassified Information**, was issued in February 2022. This directive lays out how the department should identify and protect sensitive but unclassified information.

The DOE CUI Program Office developed DOE **CUI Category List** which provides 55 applicable CUI Basic and/or Specified Banner Markings, **authorized for DOE use** for marking material containing CUI information.

Latest information and links can be found on the CUI Powerpedia page

- DOE CUI Categories List
- CUI Waiver Memorandum for Legacy Information and Data
- Training slides
- CUI Community Working Group (CCWG) Meeting slides



As a result of updates to the **DOE Science and Technology (S&T) Risk Matrix** made by the Deputy Secretary in June 2023, requirements for National Laboratories and sites to notify DOE program offices of achievements in restricted areas, as identified in the S&T Risk Matrix, prior to publication, have been established in DOE O 241.1C.

> *"Review processes must include **appropriate review and approval steps** for restricted Science and Technology topic areas as identified in the most recent version of the DOE Science and Technology (S&T) Risk Matrix. For completed research that is determined to be a Restricted S&T topic, notification to the DOE sponsoring program office and the sponsoring program office providing stewardship over the laboratory must occur **prior to public release or publication**."*

For additional guidance, see the DOE Office of Science (SC) Laboratory Policy Research Security webpage where a link with introductory information about the S&T Risk Matrix is provided.

Policy & Guidance

While there are many **DOE directives** that are relevant to the management of STI, this training will primarily focus on DOE O 241.1C, *Scientific and Technical Information Management*.

Click on each of the directives below for additional resources you should be familiar with.

DOE O 142.3B *Unclassified Foreign National Access Program*	DOE O 200.1A *Information Technology Management*	DOE O 206.1A *Department of Energy Privacy Program*	DOE O 243.1C *Records Management Program*
DOE O 412.1A *Work Authorization System*	DOE O 413.2C *Laboratory Directed Research and Development*	DOE O 452.7 *Protection of Use Control Vulnerabilities and Designs*	DOE O 452.8 *Control of Nuclear Weapon Data*
DOE O 457.1A *Nuclear Counterterrorism*	DOE O 471.1B *Identification and Protection of Unclassified Controlled Nuclear Information*	DOE O 471.6 *Information Security*	DOE O 471.7 *Controlled Unclassified Information*
DOE O 475.2B *Identifying Classified Information*	DOE O 481.1E *Strategic Partnership Projects [Formerly Known as Work for Others (Non-Department of Energy Funded Work)]*	DOE O 483.1B *DOE Cooperative Research and Development Agreements*	DOE O 484.1 *Reimbursable Work for the Department of Homeland Security*

DOE O 241.1C

DOE O 241.1C, **Scientific and Technical Information Management**, lays out the requirements for managing STI.

This directive applies to all **federal employees** that have programmatic and business management responsibilities to implement, execute and administer/monitor the R&D that is funded or supported (e.g., contracts, financial assistance agreements, and/or other transactions).

The Order also establishes requirements for **contractors** as part of a Contractor Requirements Document (CRD).

Requirements include:

- All classified and unclassified STI must be submitted to OSTI
- STI must be reviewed for public release
- Peer-reviewed scholarly publications must be submitted upon publication
- Persistent Identifiers for STI and individuals
- Data Management and Sharing Plans (including immediate public access to data underlying publications)
- STI Training
- S&T Risk Matrix reporting to DOE prior to publication (CRD)

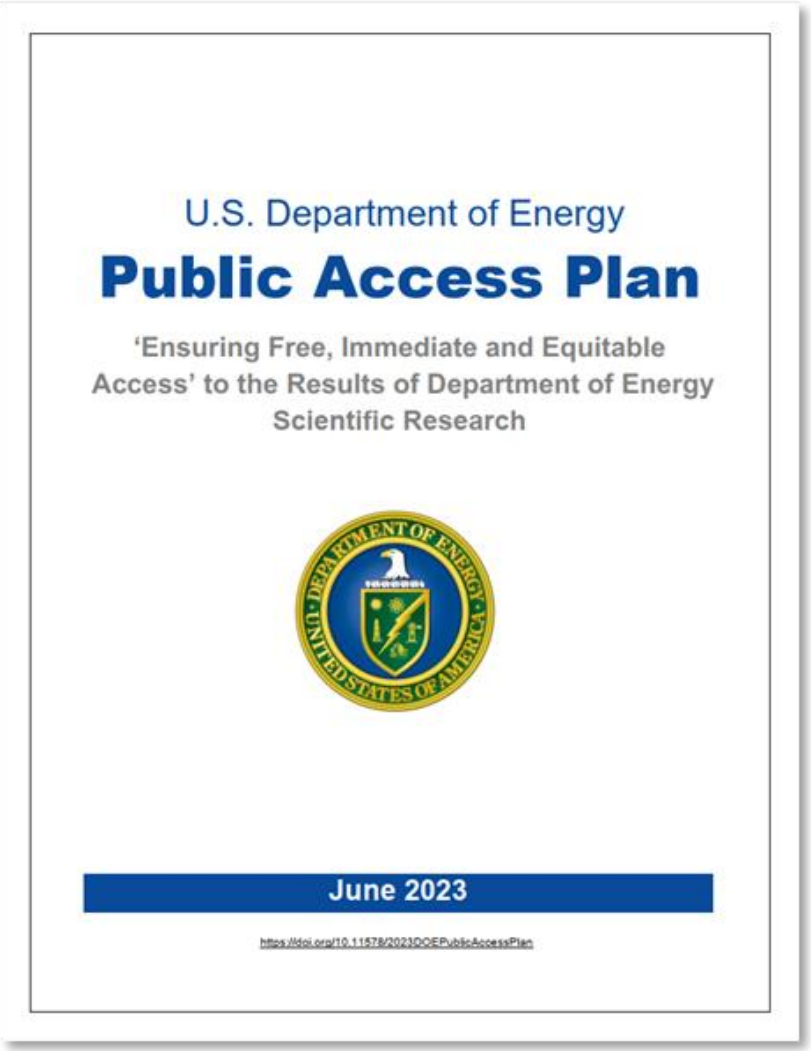
OSTI's responsibilities include:

- Ensure collection and preservation of DOE STI
- Lead and coordinate STIP
- Make STI appropriately available through systems, exchanges, and partnerships

Public Access

In 2024, DOE O 241.1C was updated to include **new requirements** on scholarly publications, scientific data, and persistent identifiers as laid out in the 2023 DOE Public Access Plan.

The Plan describes the Department's commitment to ensuring DOE-funded research and digital data are more **open and available** to the public and ensuring scientific and research integrity through the use of persistent identifiers.



The **key points** in DOE O 241.1C from the Public Access Plan include:

Immediate access to peer-reviewed scholarly publications

Peer-reviewed scholarly publications must be made available without any embargo or delay after publication.

Data Management and Sharing Plans (DMSP)

R&D activities funded or supported by DOE must provide a Data Management Plan (DMP) or Data Management and Sharing Plan (DMSP) for scientific data generated by the award or any other authorized work

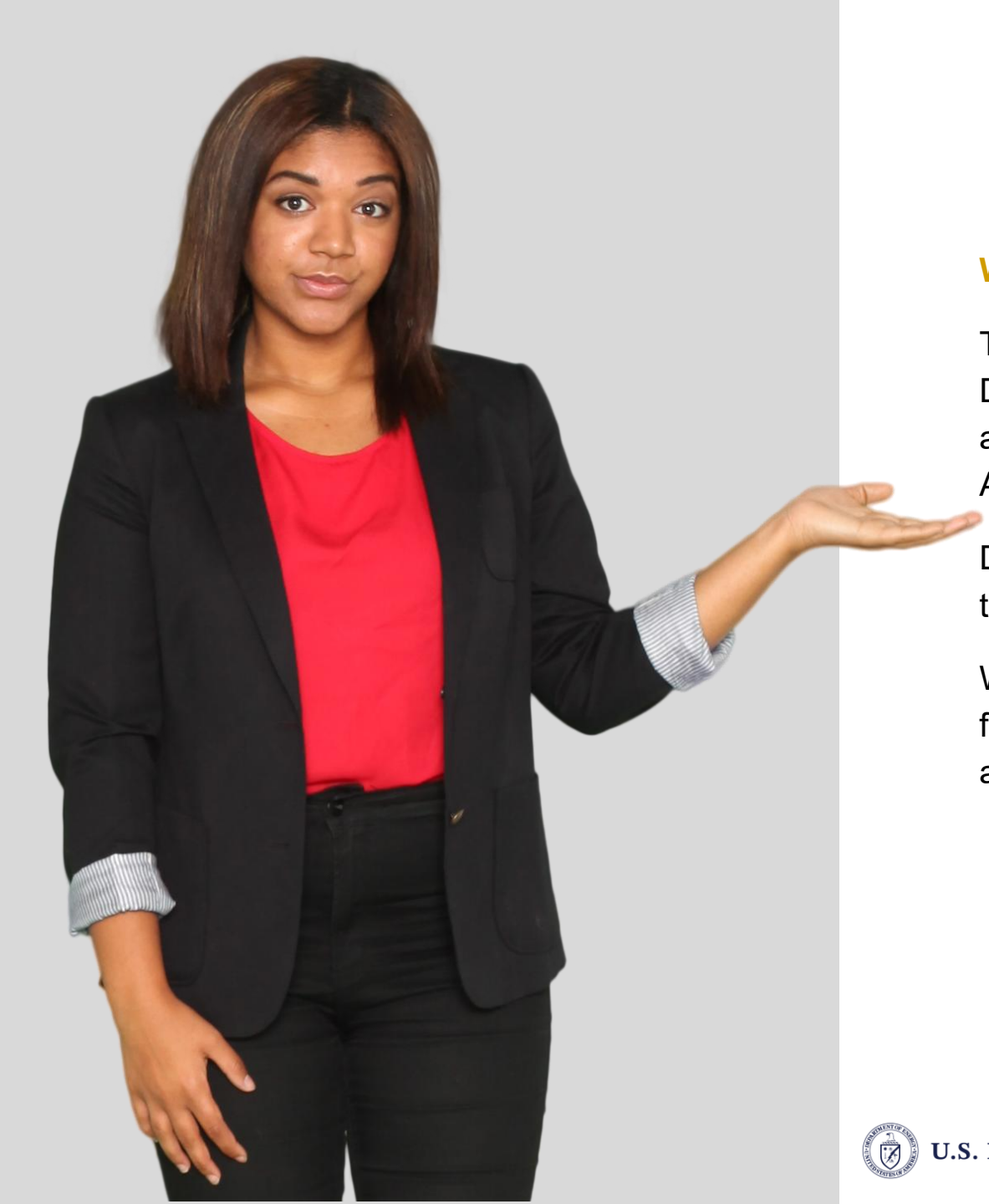
Immediate access to data displayed in or underlying publications

Scientific data that are shared publicly, as described in an approved DMSP, must be reported as STI to DOE and through any other applicable reporting requirements.

Persistent Identifiers (PIDs) for STI and individuals

A PID (e.g., digital object identifier [DOI]) must be associated with accepted manuscripts/journal articles, scientific data, technical reports, and scientific software.

DOE federal and contractor employees conducting R&D work must obtain a persistent identifier (PID) for themselves that meets the common/core standards specified in the NSPM-33 Implementation Guidance or successor guidance (e.g., ORCID iD). The PID must be used by these employees in published research outputs when available and be provided to OSTI with STI metadata records.



What you should know about “immediate access” to publications:

The Federal government **retains a license** to the content; therefore, DOE-funded authors can meet requirements by submitting their accepted manuscripts to OSTI in accordance with the DOE Public Access Plan.

DOE-funded authors are free to submit to and publish in journals of their **choice**.

While the payment of reasonable open access fees is **allowable**, DOE-funded authors can fulfill public access requirements by submitting the accepted manuscript to OSTI in lieu of paying an open access fee.

DOE's **"federal purpose" license** (the authority to collect and disseminate accepted manuscripts) does not affect an author's or publisher's ability to copyright an article. This license is described in regulations:

- 2 CFR 200.315 for DOE financial assistance awardees (grantees)
- 48 CFR 970.5227-2 for Management and Operating (M&O) contractors (National Labs)

Contractors are expected to make government license **clear to publishers** when submitting manuscripts (per Department of Energy Acquisition Regulation):

> Notice: This manuscript has been authored by [*insert the name of the Contractor*] under Contract No. [*insert the contract number*] with the U.S. Department of Energy. The United States Government retains and the publisher, by accepting the article for publication, acknowledges that the United States Government retains a non-exclusive, paid-up, irrevocable, world-wide license to publish or reproduce the published form of this manuscript, or allow others to do so, for United States Government purposes. (End of notice)

Public Access vs. Open Access, Explained

"Public Access" refers to **Federal** policies to increase access to federally-funded R&D results such as publications, data, and software. "Open Access" (OA) generally refers to **publisher** models for providing access to journal articles.

The most widely known OA model is "Gold OA," where the author or their institution pays a fee to the publisher to have an article made freely accessible.

Another OA model is "Green OA," where the author deposits their final, accepted manuscript into an institutional repository.

DOE enables Public Access activities through the **government's reserved license** to the author's final accepted manuscript.

In terms of OA models, DOE's preferred approach is most closely aligned with **Green OA**, where the author deposits the accepted manuscript into DOE PAGES, the agency's designated repository for scholarly publications.

DOE-funded authors are free to publish in journals of their **choice**. Authors may choose to pay reasonable publishing fees, but it is not necessary to pay these fees in order to comply with Public Access obligations.

What is My Role?

Researchers

The STI lifecycle starts with our **researchers** – the professionals who are on the front lines of discovery, development, and innovation.

DOE defines researchers, for the purposes of this training, as:

> *"All DOE federal, contractor employees, and financial assistance awardees who author, create, manage, or otherwise directly contribute to the production or review of STI".*

Cutting-edge research funded by DOE takes place all over the country and around the world at DOE national laboratories and facilities and at universities and other institutions, and it's important to ensure the STI resulting from that research is **appropriately managed** as part of the DOE mission to enable the advancement of scientific knowledge and technical innovation.

Requirements for **labs and major facilities** are laid out in the DOE O 241.1C Contractor Requirements Document (CRD) and included in national lab and major facility contracts.

- *"… each contractor is required to manage STI produced under the contract as a direct and integral part of the work and ensure its broad availability … by submitting STI and/or associated metadata records to DOE's central STI coordinating office, the Office of Scientific and Technical Information (OSTI) …"*
- *"..identify, prioritize, and submit STI products and metadata records resulting from DOE supported R&D and related activities to DOE OSTI... the STI may be identified as publicly releasable (unclassified/unlimited), controlled unclassified information (CUI), or classified."*
- *"… include STI funded by DOE, resulting from work performed from DOE funding, or developed under Strategic Partnership Projects (formerly Work for Others) (unless specifically excluded in the agreement under which the work is done) or Cooperative Research and Development Agreements. STI produced at DOE scientific user facilities, but not funded by DOE, may be made available to OSTI, consistent with user agreements."*

Regulatory requirements for the acquisition process are set forth in the Federal Acquisition Regulation (FAR) and are supplemented in the Department of Energy Acquisition Regulation (DEAR).

OSTI also provides guidance for DOE Labs and Sites on the STIP website.

Your responsibilities as a researcher

- ☑ Obtain a PID for yourself (e.g., an ORCID iD). Use that PID in applications for federal funding, publishing, and reporting outputs to OSTI.
- ☑ Work with your STI Manager to submit all STI to OSTI through your lab's submission workflow.
- ☑ Find out who your software contact is at the lab for submitting to DOE CODE.
- ☑ For sensitive STI, be sure to work with your STI Manager and Classification Officer to properly review and mark STI before submission to OSTI.
- ☑ Follow similar protocols for any STI that will be published that falls on the yellow and red sections of the S&T Risk Matrix, and report to your program office prior to publication.
- ☑ Work with your STIP contact and data management librarian to determine the best data repositories for storing your data (that align with the NSTC's Desirable Characteristics of Data Repositories for Federally Funded Research) and eventually submitting the dataset metadata record to OSTI.
- ☑ Work with your STIP contact and data management librarian to prepare your Data Management Plans (DMPs) and Data Management and Sharing Plans (DMSPs). DOE provides guidance for data management on its DOE Requirements and Guidance for Digital Research Data Management webpage. Updates to address the DMSP requirements will be provided as new guidance is developed.

Top 10 reasons to submit your R&D results to OSTI

1 Required

Required by legislation and DOE Directive; represented in M&O Contracts and Financial Assistance Awards

2 Expectations

Program Managers want documentation of research results; some expect an OSTI Identification # to be assigned

3 Duty

DOE research is funded by American taxpayers and therefore should be available to the public

4 Funding

Research dollars are saved by reducing duplication; research results can be leveraged/applied to new questions when they're accessible

5 Recognition

The important research taking place within DOE – AND your role in it – can be recognized

6 Retrieval

Assignment of DOIs through OSTI enables long-term access and retrieval

7 Preservation

Your research is part of DOE's historical scientific record; it may make a difference today – or 50 years from now

8 Access

Submitting research to OSTI allows so much of the scientific community to access federally funded science

9 Searchability

OSTI works to make your research findable on major search engines; submission to OSTI enhances the 'google-ability' of your research

10 Visibility

Your research is worth being noticed! Proclaim your world-class discoveries and innovations!

Benefits & Impact

Discovery

OSTI fulfills the Department's responsibility to disseminate R&D results through search tools and services, ensuring the Department's R&D information is **publicly available** and useful to the DOE research community.

OSTI.GOV serves as the primary **search tool** for science, technology, and engineering research information funded by DOE.

OSTI.GOV search functionality makes over 75 years of research results from DOE and predecessor agencies **discoverable** and provides results for all forms of STI.

In addition to the OSTI.GOV user interface, application programming interfaces (APIs) are also available to **support larger-scale searching** and analysis of DOE R&D results.

Other OSTI tools offer discovery of **specific types** of DOE-funded R&D results for a more specialized search experience.

DEPARTMENT OF ENERGY
DOE PAGES®
Public Access Gateway for Energy & Science

Journal articles / Accepted manuscripts

DOE Data Explorer

Scientific data

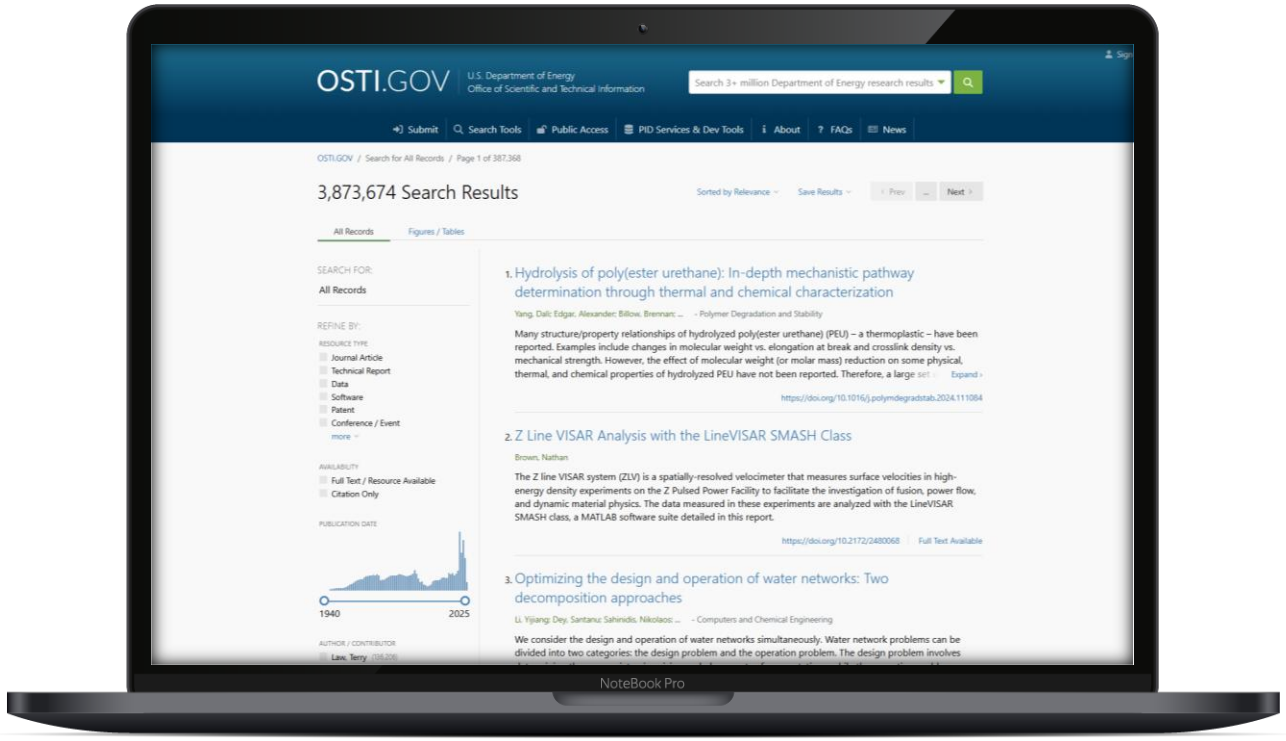
DOE CODE

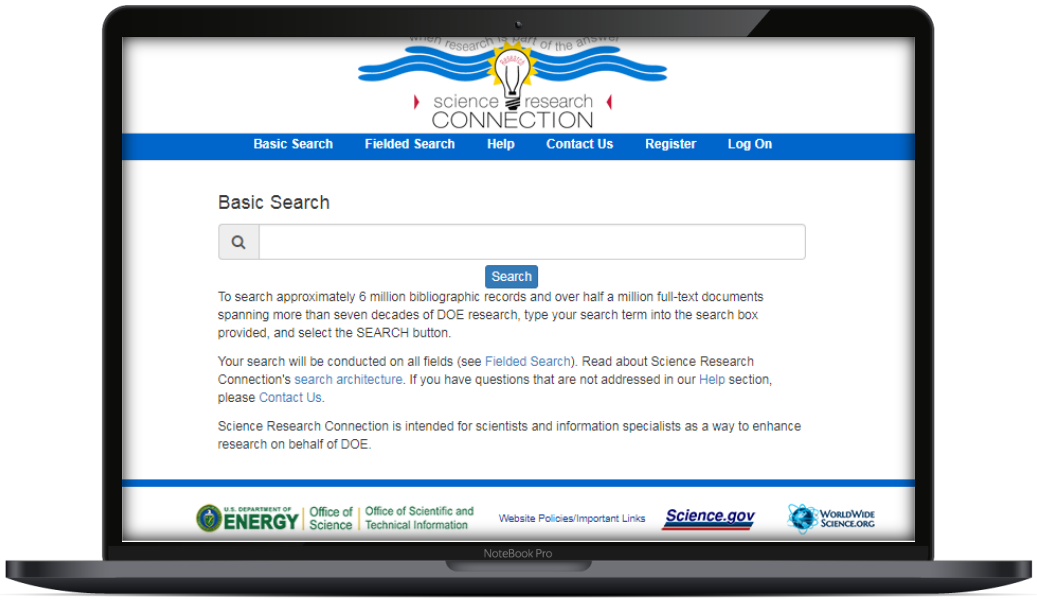
Software code

science research CONNECTION

Limited access (DOE only)

OSTI works to ensure that DOE's information is indexed by search engines like Google, Google Scholar, and Bing, making the STI more **discoverable** and accessible to the public.





OSTI also provides a search tool **exclusively** for DOE federal and contractor employees.

Science Research Connection (SRC) includes unclassified/unlimited, statutorily controlled information, and international information.

SRC users can **request** digitization of technical reports in OSTI's collection that have not yet been scanned.

Access to Limited STI is handled on case-by-case basis (i.e., Need-to-Know at the document level); password/logon required to search entirety of system.

OSTI also makes DOE STI available along with **other Federal research** on Science.gov.

Science.gov provides a search of over 60 scientific databases and 200 million pages of science information with just one query.

Benefits

Fulfilling your STI responsibilities provides many **benefits** to DOE and to the American public:

- Provides accountability
- Creates historical record
- Meets DOE's statutory mandates
- Ensures transparency
- Enables availability
- Saves research dollars
- Allows reuse of previous research
- Extends reach and impact of DOE's investment

PIDs can be utilized throughout the **research lifecycle**. Use PIDs within:

Applications for funding or facility use

- Autofill forms with investigator information and previous works
- Identify and connect affiliations and funder information
- Connect previous and current support and outcomes

The research process

- Make research outputs like data and software citeable for publication
- Show time spent at facilities and other resources leveraged

Publication and discovery

- Make publications discoverable and connect them with data and other research outputs
- Connect affiliations, funders, and facilities connected with the work
- Research outputs can be automatically added to researcher's PID

The benefits of PIDs

Trust
Improves trust through transparent metadata, provenance, and verification of entities

Burden Reduction
Reduces data entry burden and streamlines processes (e.g., applications and reporting)

Disambiguation
Allows for uniquely identifying researchers and organizations and can be used to distinguish entities with the same name

Proper Credit
Ensures that people and contributions are correctly identified, cited, discoverable, and recognized

Discovery and Access
Enables greater discovery, access, and reuse with broader indexing and using a unique resolvable link to the object and descriptive metadata

Interoperability
Increases interoperability with robust metadata and interconnected objects

Analytics and Impact
Provides consolidated metrics of work (citations, reuse, etc.) and facilitates impact evaluation through linked PIDs within associated metadata

Key Takeaways

- **Know your role** in the STI submission process and make sure STI is submitted without delay
- **Review submissions** for proper handling and release
- **Use persistent identifiers** to help connect research outputs, people, and organizations
  - **Researchers should get a PID** for themselves and use it throughout the research process, from funding application to publication
- **OSTI is always available** for support and to answer questions

Useful Resources

Quick Links

STIP Website

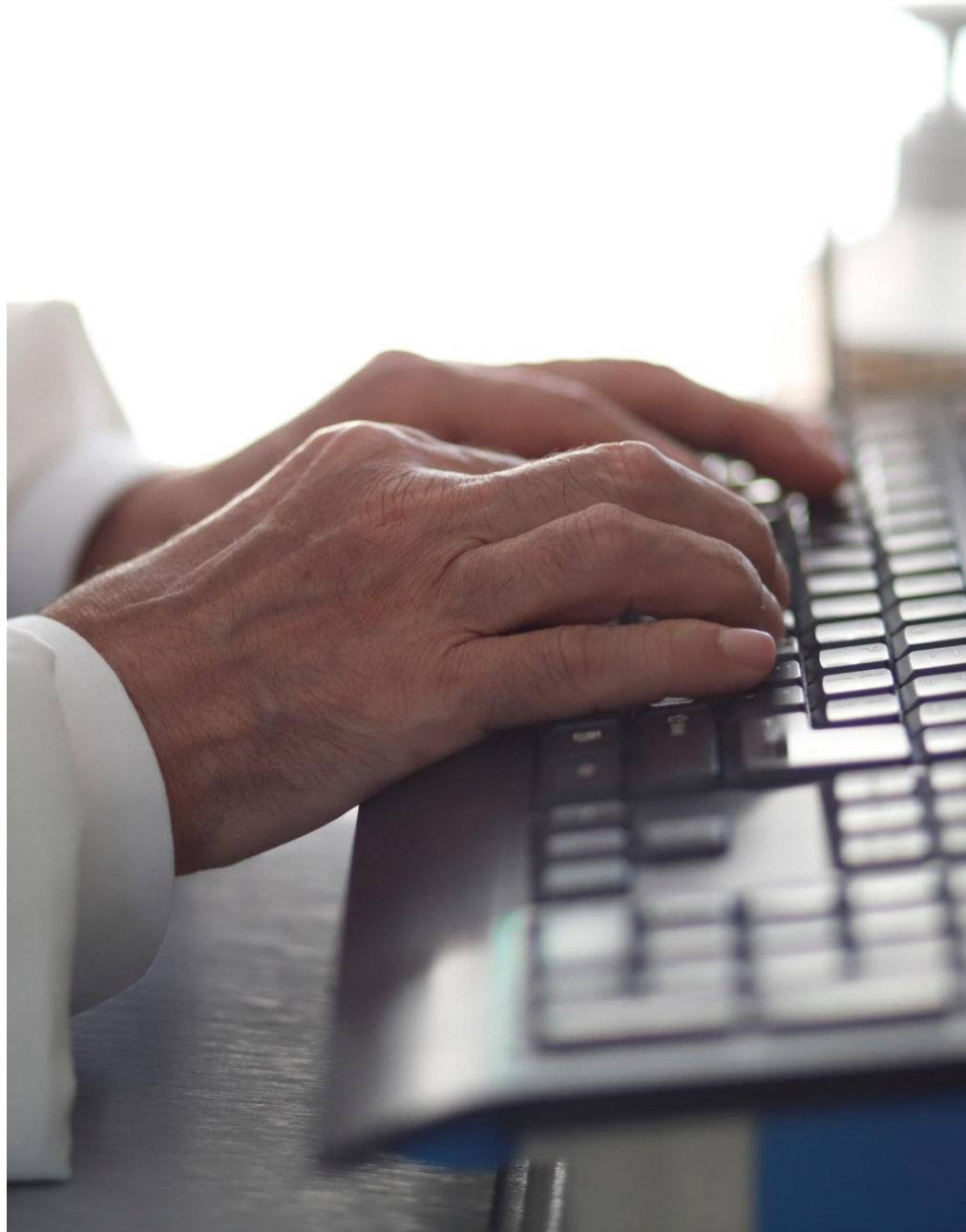
STI Product Fact Sheets
Submission Basics
STIP Community Members
FAQs

DOE Directives

STI Management
Controlled Unclassified Information

Submit and Search Tools

E-Link
OSTI.GOV
DOE PAGES
DOE CODE
DOE Data Explorer
Science Research Connection (SRC)

STI Related Record Schedules

R&D Records
R&D Technical Report Files