COMMUNITY for DATA INTEGRATION

Guidance Document
for the FY 2023
Community for Data Integration
Request for Proposals

For Fiscal Year 2023

Issue Date: September 6, 2022

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Overview

This document describes the CDI Request for Proposals (RFP) process for fiscal year 2023 (FY23). The CDI RFP consists of a two-stage process: Statements of Interest (SOI) and Full Proposals.

Contact *gs_cdi@usgs.gov* with any questions about the CDI RFP.

Additional resources for the RFP are available on the CDI SharePoint site (*https://doimspp.sharepoint.com/sites/CommunityforDataIntegration/Proposals/SitePages/CDI-Project-Proposals-and-Products.aspx*)

If you are outside of the Department of the Interior, you can request access to the CDI SharePoint at *https://forms.office.com/g/x1QsgvQABq*).

New in FY23

- **Theme for the FY23 Request for Proposals:** This year, the CDI executive sponsors are encouraging proposals that **increase connection, readiness, and equity of climate-related data and models.** This includes topics such as water management, impacts of climate extremes, ecosystem impacts, climate adaptation, conservation, carbon management, clean energy, and emissions mitigation. See more in the section "FY23 Topical Emphasis."

- **Travel guidance:** We require the budget to include travel funds to attend the 2023 CDI Workshop, May 2-5, 2023, at the National Conservation Training Center in Shepherdstown, WV.

- **Requested funds:** Proposals can request up to $55,000 per project, an increase from previous years.

- **Earlier lightning presentation file submission:** Your image and optional audio file for the Statement of Interest (SOI) Lightning Presentations are due at the time of submitting your SOI, not afterward.

Eligibility

Personnel from any USGS mission area, region, program, center, office, or duty station and their partner(s) are encouraged to apply. All proposals must specify a **USGS Federal employee** as lead Principal Investigator (PI). USGS personnel may be involved in more than one prospective proposal but may be the lead PI on only *one* proposal. Project partners outside of the USGS may be included, but please check with your Center's administrative team and your external partners on the requirements and timing for executing these partnerships.

Schedule for Submission, Review, and Awards

This is a tentative schedule, please check the schedule posted at the *2023 Proposals page (SharePoint site) for* any changes.

RFP Information Session	Wed, September 14, 2022	3 pm ET
Submission deadline for Statement of Interest	Fri, October 14, 2022	5 pm ET
Comment period begins	Tues, October 18, 2022	
SOI Lightning Presentation Session	Wed, October 19, 2022	1-2:30 pm ET
SOI voting opens	Wed, November 2, 2022	
SOI voting closing	Fri, November 11, 2022	11:59 pm ET
Applicants notified and Full Proposals requested	Early December 2022	
Invited Full Proposals due	Thurs, January 26, 2023	
Funded Projects announced	March 2023	
Awarded funds must be spent	September 30, 2023	

Estimated Available Funds and Distribution of Funds

Support for CDI projects varies from year to year and is directly influenced by the overall USGS budget. Since fiscal year 2009, CDI projects have been funded at a total of about $400,000 – $600,000 each year and it is anticipated that FY23 will be similar to previous years. Applicants can request funding up to $55,000 per project.

CDI will distribute funds to the lead USGS Science Center only, and the lead Science Center is in charge of further distributions to other Centers or external partners. If you are not familiar the process of distributing funds beyond your Center, please speak with an appropriate budget specialist from your Center and the CDI coordinator at gs_cdi@usgs.gov.

Project Reporting

A representative from each CDI awarded project will be required to attend the 2023 CDI Workshop, May 2-5, 2023 at the National Conservation Training Center in Shepherdstown, WV. Project teams must also participate in a separate informal mid-year briefing to the CDI facilitators to communicate the status of the project. Project teams contribute to a CDI project report, which will be compiled in early 2024. At that time, project leads must provide a brief written report describing the project accomplishments, benefits, and deliverables with links to products or publications.

Application Process

1. PIs Submit Statement of Interest and Present Lightning Talk

- **Plan.** To aid the development of statements of interest, CDI has set up the *FY23 RFP Collaboration channel on Microsoft Teams* for potential submitters to seek partners or other feedback. If you are external to the Department of the Interior, you can request access at *https://forms.office.com/g/x1QsgvQABq*.

- **Submit.** Use the SOI Instructions and Worksheet file to prepare information for submission on the online web form. The link for submission will be available on the *Proposals SharePoint site.* See *Appendix A – Statement of Interest (SOI) Guidance* for more details.

- **Present.** After SOIs are received, the CDI will host a virtual session for submitters to present their proposals to the community in a 90-second, one-slide lightning-talk format. The purpose of the session is to help submitters receive suggestions, gain support from the community, and help the community efficiently learn about the breadth of the SOIs.

2. Community Evaluates of Statements of Interest

SOIs will be reviewed by the CDI Community. The SOIs will be evaluated according to *the Evaluation Criteria for the Statements of Interest and Full Proposals.* Comments and discussion will be facilitated on the SharePoint site. CDI members on the *CDI GovDelivery mailing list* will receive ballots for voting by email.

3. CDI Invites Teams to Submit Full Proposal

Based on the SOI community evaluation, selected SOI applicants will be invited to submit a Full Proposal. Note that the CDI Executive Sponsors may also advance SOIs that support current USGS priorities or RFP themes. See *Appendix B – Invited Full Proposal Guidance* for more details.

4. Review Panel Evaluates Full Proposals

Full proposals will be evaluated according to the *Evaluation Criteria for the Statements of Interest and Full Proposals.* Proposals will be reviewed by a panel consisting of a professional peer group that is knowledgeable in USGS-related scientific disciplines, data management, information technology, and other relevant topics in the context of the CDI. Recommendations by the review panel will be presented to the CDI Executive Sponsors for final selection.

Description of the Request for Proposals

The CDI builds and shares knowledge about topics such as data integration, data stewardship, scientific computing, and approaches for knowledge delivery.

Guiding Principles

The main goal of CDI project support is to improve our collective knowledge about how to create better, longer lasting, and more accessible science products by leveraging the tools, methods, and datasets available to USGS-related science communities. The CDI places high value on innovative projects that, in the near-term, produce new and reusable ideas, methods or tools that have an impact beyond a single USGS Program, Center, Region, or Mission Area. CDI project proposals should follow these guiding principles:

- Focus on targeted efforts that yield near-term benefits to Earth and biological science
- Leverage existing capabilities and data
- Implement and demonstrate innovative solutions (e.g., methodologies, tools, or integration concepts) that could be used or replicated by others at scales from project to enterprise
- Preserve, expose, and improve access to Earth and biological science data, models, and other outputs
- Develop, organize, and share knowledge and best practices in data integration

FY23 Topical Emphasis

Each year, the CDI accepts statements of interest on any topic that follow the CDI guiding principles, noting that the CDI Executive Sponsors may select proposals that support current USGS priorities. In 2023, the CDI executive sponsors encourage statements of interest that address the following theme:

Increasing connection, readiness, and equity of climate-related data and models. This includes topics on water management, impacts of climate extremes, ecosystem impacts, climate adaptation, conservation, carbon management, clean energy, and emissions mitigation.

Examples of relevant projects include those that:
- Create connections between currently siloed data sources with each other, or with modeling tools, in a way that can be replicated for additional data and models.
- Demonstrate the process and value of transforming existing data into a format that is more readily analyzed in a programmatic and repeatable way.
- Pilot ways of making data and model interpretations more accessible to groups that don't traditionally consume them.

Links providing context for this theme:
- Department of the Interior Climate Action Plan ([webpage](#)) ([pdf](#))
- USGS Annual Bureau Guidance for Fiscal Year 2023 ([pdf on CDI SharePoint](#))
- Global Change Research Needs and Opportunities for 2022-2031 ([webpage](#)) ([pdf on CDI SharePoint](#))

Submissions do not need to address one of these themes. The CDI will accept submissions on any topic that follow the CDI guiding principles. Of total funding, CDI hopes to award approximately 50% of funding to qualified projects that are associated with the stated themes.

Unique Aspects of the CDI Request for Proposals Process

The CDI proposals process is unique: the selection process incorporates community-involvement and multiple ways for submitters to communicate about their statements of interest.

Gaining Community Support for Statements of Interest

All CDI members may comment and vote on the submitted SOIs. Therefore, it is in the submitter's interest to promote their idea to the community, and to communicate the value added to the CDI by the proposed activities. The CDI views this process as an opportunity to practice and improve plain-language communication about the value of the proposed activities.

The community comment period taps into the expertise of the CDI to make suggestions and improve on project ideas. These unique aspects help the CDI toward its goal of supporting the most useful and innovative ideas, as well as communicating across boundaries. A more traditional review process occurs in Phase 2, where a formal review panel evaluates the invited full proposals.

Statement of Interest Lightning Presentation

To help the CDI community learn about the statements of interest, we host a Statement of Interest Lightning Presentation Session at the beginning of the commenting and voting period. Each submitter has the chance to present their SOI idea in an online, 90-second lightning presentation. Submitted slides must follow a strict template with project title, Lead PI name and contact information, and a single image. Submitters have the option of pre-recording a 90-second presentation as an audio file, or they can present live. **The FY23 Lightning Presentation Session is on Wednesday, October 19, 2022, from 1-2:30p ET.**

CDI Science Support Framework

Project proposals must relate to elements of the CDI Science Support Framework (SSF), which categorizes and relates the activities and processes through which research data flows, and upon which the CDI operates. These elements include Data Management, Knowledge Management, the stages of the *Science Data Lifecycle Model*, Applications, Web services, Semantics, Information,

Data Assets, and Communities of Practice (*See Appendix C – CDI Science Support Framework (SSF)*).

Proposal Concepts that should *not* be submitted to the CDI

The CDI does not seek to supplant traditional natural science research or to fill a funding gap on a project supported elsewhere. Examples of topics that are a poor fit for CDI funding include:

- Supporting the collection of new data or field research.
- Monitoring, assessment, or dataset creation projects. Although the CDI may fund the creation of some broadly-usable ("foundational") data content, this is normally considered out of scope.
- Projects that would normally be funded by individual USGS Program Areas.
- Projects that would normally be funded by other proposal processes such as the *John Wesley Powell Center for Analysis and Synthesis.*

View examples of successful past CDI statements of interest and full proposals on the *CDI SharePoint Example Proposals* page.

View all past CDI Projects as a list on *sharepoint.com* and descriptions on *usgs.gov*

Evaluation Criteria for the Statement of Interest and Full Proposal

Both the SOIs and full proposals will be evaluated based on the following six criteria. SOIs will only be expected to provide a concise statement in each of the criteria while full proposals must provide more detail. The evaluation weights (percentages) will only apply to the full proposal evaluation. For instructions on submitting SOIs, see *Appendix A – Statement of Interest (SOI) Guidance*; for Full Proposals, see *Appendix B – Invited Full Proposal Guidance*.

Scope (25%)

Does the proposal adequately demonstrate the need for the effort or activity? How much does the proposal contribute to the guiding principles and element(s) of the CDI Science Support Framework? Does the effort have potential impact beyond a single Program, Center, Mission Area, or Region? What is the anticipated return on investment (e.g., cost savings, code utilization, publications, operational efficiencies, etc.).

Technical Approach (25%)

How reasonable is the technical approach applied to the problem? Is the approach innovative, *or* does it employ a proven, reliable technique that is appropriate to the problem? How appropriate are the steps, methodologies, technologies, and resources proposed to implement the project? This includes facilities, computational/analytic platforms and tools, hardware/software, and other equipment supporting the project and/or its products.

Project Experience and Collaboration (25%)

How appropriate are the experience, special qualifications, and skills possessed by team members for successful completion of the proposed project? Is there inter-disciplinary or cross-Mission Area/Region collaboration? Have partnerships been pursued where appropriate? Is there diversity of the project team in expertise and career stage?

Sustainability, Outreach, and Communication (15%)

How well does the proposal describe the intended sustainability of the project deliverables (products, tools, services, metadata) for long-term access, reusability, and potential for integration? Is there a plan for communicating the value of the products during and after the project is completed? All products resulting from CDI projects must comply with the *U.S. Geological Survey Manual Chapters* on data management (SM 502.6-502.9). These products must be freely shared and made available, without charge or restriction, to the CDI, the broader USGS community, and beyond as appropriate. Software products developed with CDI funding must be available on code.usgs.gov at the close of the funding period and follow the latest relevant USGS Instructional Memoranda (*IM OSQI 2019-01, Review and Approval of Scientific Software for Release*).

Budget Justification (5%)

Is the requested amount at or below $55,000? Does the budget meet the minimum 30% in-kind match? (A $55,000 request would require a $16,500 in-kind match.) The in-kind match demonstrates commitment of effort by the participating organizations. The in-kind match is commonly met by salary of team members that have time to contribute to the project. Travel cannot include field data collection. Travel funds of $2,000 must be included for at least one representative to attend the CDI Workshop, May 2-5, 2023 in Shepherdstown, WV. Is there justification of salaries and contractor costs, travel, and equipment/publication costs to show that they are appropriate to project needs? Are the proposed work hours reasonable within the timeframe? Projects with contractor support must describe how the contract work will be managed and documented to ensure that products are USGS property.

Timeline (5%)

Is there clear presentation of the project phases and milestones and the feasibility of the proposed workload given the short project duration? Although notification of award may come earlier, assume that funding will be awarded no sooner than May 31, 2023 and reference specific months or dates within FY23 or relative to time from date of award (e.g., 3 weeks after award date). **The timeline must demonstrate reasonable completion and complete use of funds by September 30, 2023.** Recognizing the USGS publication process may take additional time beyond the end of the project, indicate the anticipated publication date for any USGS publications resulting from the project.

Appendix A – Statement of Interest (SOI) Guidance

The instructions have been revised for FY23, make sure you only use materials from this year's RFP.

All documents and links mentioned can be found at the *2023 Proposals SharePoint Site.* (*Request access* if needed.)

Contact gs_cdi@usgs.gov if you have any questions.

The 6 steps for Phase 1 SOI Submission

Step 1.   Read the **Guidance Document** (this file).

Step 2.   Collect the information specified on the **SOI Instructions and Worksheet file**.

Step 3.   Complete the **SOI Template document** with your narrative and estimated budget.

Step 4.   Submit your information and files (including lightning files) at the **submission link.**

Step 5.   Prepare for the lightning presentations by practicing a **90-second pitch.**

Step 6.   Present your **90-second talk** at the Lightning Presentation Session.

More detail about the 6 steps of Phase 1: How and When

Step 1. Read the Guidance Document (this file).

How: Thoroughly.

When: As soon as possible.

Step 2. Collect the information specified on the SOI Instructions and Worksheet file.

How: The Instructions and Worksheet file can be downloaded from the *2023 Proposals SharePoint Site.* It describes all the fields that will be requested in the SOI Submission web form. We are providing this worksheet for you to type and save the information before

copying and pasting into the web form. This will avoid any loss of data if the web form malfunctions. Enter the fields requested into the .docx worksheet file, we recommend using the Microsoft Word <u>Desktop</u> App.

When: Before the submission deadline of October 14, ideally several days before the deadline, in case you have questions for the CDI team at gs_cdi@usgs.gov.

Step 3. Complete the SOI Template document with your narrative and estimated budget.

How: The file can be downloaded from the *2023 Proposals SharePoint Site.* We recommend using the Microsoft Word <u>Desktop</u> App to fill out the template. Do not change the document margins or font size. The template consists of two sections:

- o **The Project Narrative (1-page maximum):** Use the existing headers to identify each section and briefly describe each the evaluation criteria following this Guidance Document: Scope; Technical Approach; Project Experience and Collaboration; Sustainability, Outreach, and Communication; Budget Justification; Timeline. Do not exceed 1 page.
- o **The Estimated Budget Table:** Enter estimated values for the categories Personnel, Travel Expenses (including $2000 for travel to the 2023 CDI Workshop), and Other Direct Costs. Enter the total direct costs and the indirect costs due to relevant overhead. Enter the grand total. In Phase 1, it is suggested, but not required, that your budget be reviewed by a Center budget analyst, so that you have an accurate picture of how far the available funds will go.

When: Before the submission deadline of October 14, ideally several days before the deadline, in case you have questions for the CDI team at gs_cdi@usgs.gov.

Step 4. Submit your information and files (including lightning files) at the submission link.

How: The submission link will be on the *2023 Proposals SharePoint Site.* Only Department of Interior employees will be able to access the link. Use the information on your previously-completed worksheet (Step 2) to complete the web form. We recommend that you complete the entire web form in one sitting and submit, as we cannot guarantee that the form will save your content.

You will be asked up upload the following files:
1. SOI Template (Narrative and Budget), in .docx format
2. Lightning Presentation Image: Select a simple image (.png or .jpg work great) with **minimal** text that is close to 1:1 aspect ratio (square). We will insert this image onto a slide that has your Title and Lead PI name on it. Our reason for these requirements is that we want you to focus on your message and timing, not the slide!

3. OPTIONAL Lightning Presentation audio file, if not presenting live. You may send a pre-recorded audio file (.mp3 or .m4a), up to 90 seconds long.

When: Before the submission deadline of October 14, Friday, at 5pm Eastern. Ideally, several days before the deadline, in case you have questions for the CDI team at gs_cdi@usgs.gov.

Step 5. Prepare for the lightning presentations by practicing a 90-second pitch.

How: The purpose of the lightning talk session is to help familiarize CDI members with all SOIs before voting. Craft a pitch that is up to 90 seconds long, avoiding jargon and using plain language to persuade people to support your idea. Emphasize the value and benefits of your idea, and the intended users or audience.

When: Before the Lightning presentation session on October 19, 2022, 1-2:30 pm ET.

Step 6. Present your 90-second talk at the Lightning Presentation Session.

How: Join the Microsoft Teams meeting link on the calendar event that will be distributed to submitters and all CDI members. The CDI team will be in touch with all SOI submitters before the event to make sure everyone has what they need.

When: Wednesday, October 19, 2022, 1-2:30 pm ET

Appendix B – Invited Full Proposal Guidance

The 5 steps for Phase 2 Full Proposal Submission

Step 1.   Review the **Guidance Document** (this file).

Step 2.   Collect and update your **Cover Sheet** from Phase 1, to be provided by CDI staff.

Step 3.   Complete the **Full Proposal package**, using the template file and observing maximum page lengths. This includes your narrative, data management plan, CVs, any letters of support, and detailed budget.

Step 4.   Ensure the name of a budget analyst or AO from your Center that has **reviewed your budget** is documented in the space provided on the budget sheet.

Step 5.   Submit your information and upload your full proposal file and budget file at the **submission link** that will be on the *2023 Proposals SharePoint Site*.

More detail about the 5 steps of Phase 2: How and When

Step 1. Review the Guidance Document (this file).

How: Thoroughly.

When: As soon as possible.

Step 2. Collect and update your Cover Sheet from Phase 1, to be provided by CDI staff.

How: A cover sheet will be provided to invited Lead PIs with Phase 1 information, to be updated as necessary.

When: The cover sheet will be made available at the time of invitation to full proposals.

Step 3. Complete the Full Proposal package, using the template file and observing maximum page lengths. This includes your narrative, data management plan, CVs, any letters of support, and detailed budget.

How: Proposals must be prepared using the Full Proposal template that will be available on the *2023 Proposals SharePoint site. (Request access* if needed.)

Proposal Narrative

The main body of the proposal should consist of six sections. Prepare the sections according to the Evaluation Criteria for the Statement of Interest and Full Proposal described in this Guidance Document.

- Scope
- Technical Approach
- Project Experience and Collaboration
- Sustainability, Outreach, and Communication
- Budget Justification (see additional information below)
- Timeline

Full Proposals include a Budget and Budget Justification statement to explain project costs in the following categories:

- *Personnel (Salaries including benefits):* Include estimates (by hours) and rate of compensation proposed for each named individual or category (e.g., graduate student). Ensure that the identified personnel and their affiliations are clearly listed. Projects with contractor support must describe how the contract work will be managed and documented to ensure that products are USGS property. Proposals utilizing USGS contracting staff must also include in the Budget Justification statement a confirmation from the Contracting Officer's Representative (COR) that there is an available contract to complete the project.
- *Travel Expenses:* Specify travel requirements for project meetings, and/or conference attendance. Itemize estimated travel costs to show the number of trips required, destinations, the number of travelers and per diem rates, cost of transportation (e.g., vehicle rental), and miscellaneous expenses for each trip. Travel funds <u>must</u> be included for at least one representative to attend the May 2-5 CDI Workshop in Shepherdstown, WV. Travel <u>cannot</u> include field data collection.
- *Other Direct Costs:* Itemize any proposed permanent equipment acquisitions ($5,000 or more) and show each estimated cost. Explain costs including publication costs, office supplies, training, etc.
- *Indirect Costs (Overhead):* Provide indirect cost rate and amount approved for each institution.

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Appendices

- Required: CV(s) of Principal Investigator(s) that highlights relevance to the proposed work **(max. 2 pages each)**
- Optional: CV(s) of other collaborator(s) that highlights relevance to the proposed work **(max. 2 pages each)**
- Optional: Letters of support from USGS or outside partners indicating a clear need for this effort. Submissions may also include Memoranda of Understanding (MOU) and/or letters of support indicating commitment to the longevity of the project. **(max. 1 page each)**

Data Management Planning Form

The data management planning form is included in the full proposal template. Do not change the template format. The information requested on the Data Management Planning Form helps project teams plan for data management and product communication needs. For more guidance on data management plans, see the *USGS Data Management Website*, specifically the Data Management Plan checklist. All products resulting from CDI projects must comply with the *U.S. Geological Survey Manual Chapters* on data management (502.6-502.9).

Budget Table

The budget table template is provided as a separate Microsoft Excel file. Include Personnel, Travel Expenses, and Other Direct Costs, <u>separating</u> the requested CDI funds (maximum $55,000) from the in-kind match (at least 30% of the request – i.e., a $55,000 request would need at least $16,500 in-kind match) as indicated in the template. Relevant overhead rates should be indicated in the first column and included in the request. If there are multiple overhead rates involved, you may need to add additional columns to the table, contact *gs_cdi@usgs.gov* with any questions.

Do not change the page set-up or fonts in the template. All pages (including appendices) must be numbered.

All graphics, photos, illustrations, tables, graphs, and charts must be specifically referenced at least once in the narrative (body) of the proposal and accompanied by a caption that describes the graphic. These count towards the total number of pages allotted. References do not count toward the page count. Failure to follow the stated guidelines will reflect negatively on the proposal.

When: Ideally, several days before the submission deadline of January 26, 2023, in case you have questions for the CDI team at gs_cdi@usgs.gov.

Step 4. Ensure the name of a budget analyst or AO from your Center that has reviewed your budget is documented in the space on the budget sheet.

How: Ask a member of your Center's administrative staff to review your budget and enter their name on the space provided in the budget sheet if approved. This step ensures that salary, overhead, and other details have been properly entered. If the funds are going to multiple centers or organizations, all funds go to the Lead PI's center, which is then responsible for further distribution of funds. It is important that your center's staff and your partners are aware of the procedures and anticipated timeline of that distribution.
The lead PI must work with their Administrative Officer (AO) or Budget Analyst to ensure an accurate budget and funding management responsibilities before submission. A space is provided in the Budget Table .xlsx to enter the budget reviewer's name.

Should the project be selected for award, all CDI funds will be transferred to the lead USGS cost center through a change of allocation. The lead USGS cost center may then provide sub-awards to other collaborating organizations/cost centers. If you are not familiar the process of distributing funds beyond your Center, please speak with an appropriate budget specialist from your Center and the CDI facilitator at gs_cdi@usgs.gov.

When: Ideally, several days before the submission deadline of January 26, 2023, in case you have questions for the CDI team at gs_cdi@usgs.gov.

Step 5. Submit your information and upload your full proposal file and budget file at the submission link that will be provided on the 2023 Proposals SharePoint site.

How: The submission link for your files will be available on the *2023 Proposals SharePoint site*.

When: Before the submission deadline of January 26, 2023, in case you have questions for the CDI team at gs_cdi@usgs.gov.

Issue Date: September 6, 2022

Appendix C – CDI Science Support Framework (SSF)

The Community for Data Integration (CDI) represents a dynamic aggregation of multiple communities of practice, focused on the advancement of scientific data and information management and integration capabilities across the USGS and external organizations.

Since 2009, CDI has funded a variety of projects that support the overarching goal of data integration. USGS and other researchers conduct monitoring, assessment, and research activities that generate data assets. Through the application of business, computational, and analytic processes and technologies, these data assets are converted into information that contributes to our understanding of the Earth's physical and biological systems. This is the context within which data management and integration occur and where the CDI operates (Fig. 1).
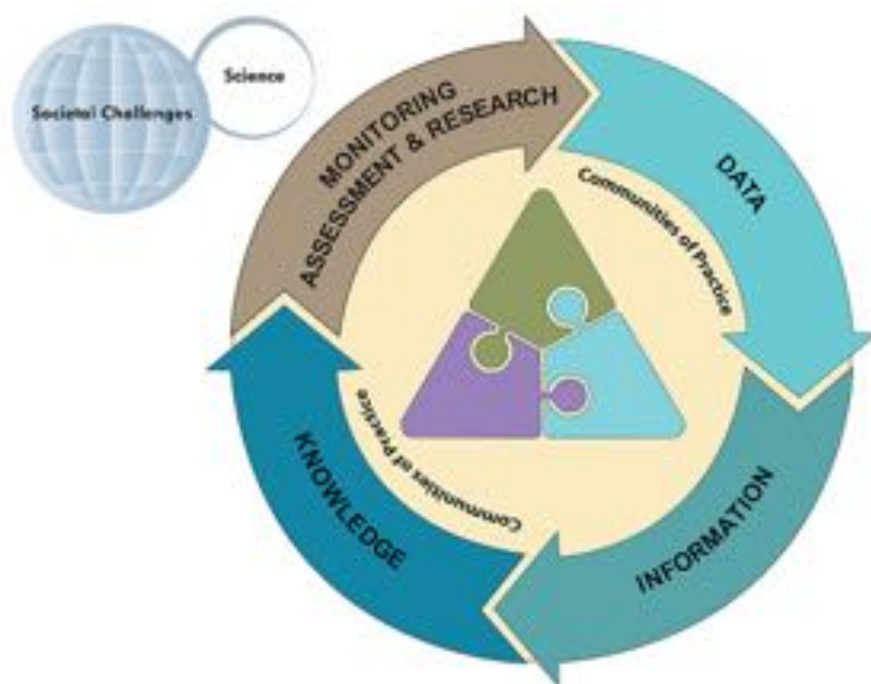

Figure 1: Overview of CDI Operational Context

Communities of Practice	Communities of practice include scientists, the CDI as a whole, CDI collaboration areas, external partners, and the human network of scientific domain collaborators.
Computational Tools & Services	Computational tools and services include applications, Web services, data discovery tools, models, semantic services and tools, infrastructure, data brokers, and visualization tools.
Management, Policy & Standards	Management, policy, and standards include data stewardship, the implementation of the Science Data Lifecycle, knowledge management, data standards, governance, and policy.
Data & Information Assets	Data and information assets include persistent archives, data registries, catalogs, data, metadata, derived information products, knowledge bases, and vocabularies/ontologies.

The CDI SSF (Fig. 2) provides a conceptual architecture that illustrates how the CDI contributes to Bureau-level data integration efforts; and defines how current and future CDI projects fit within the framework.
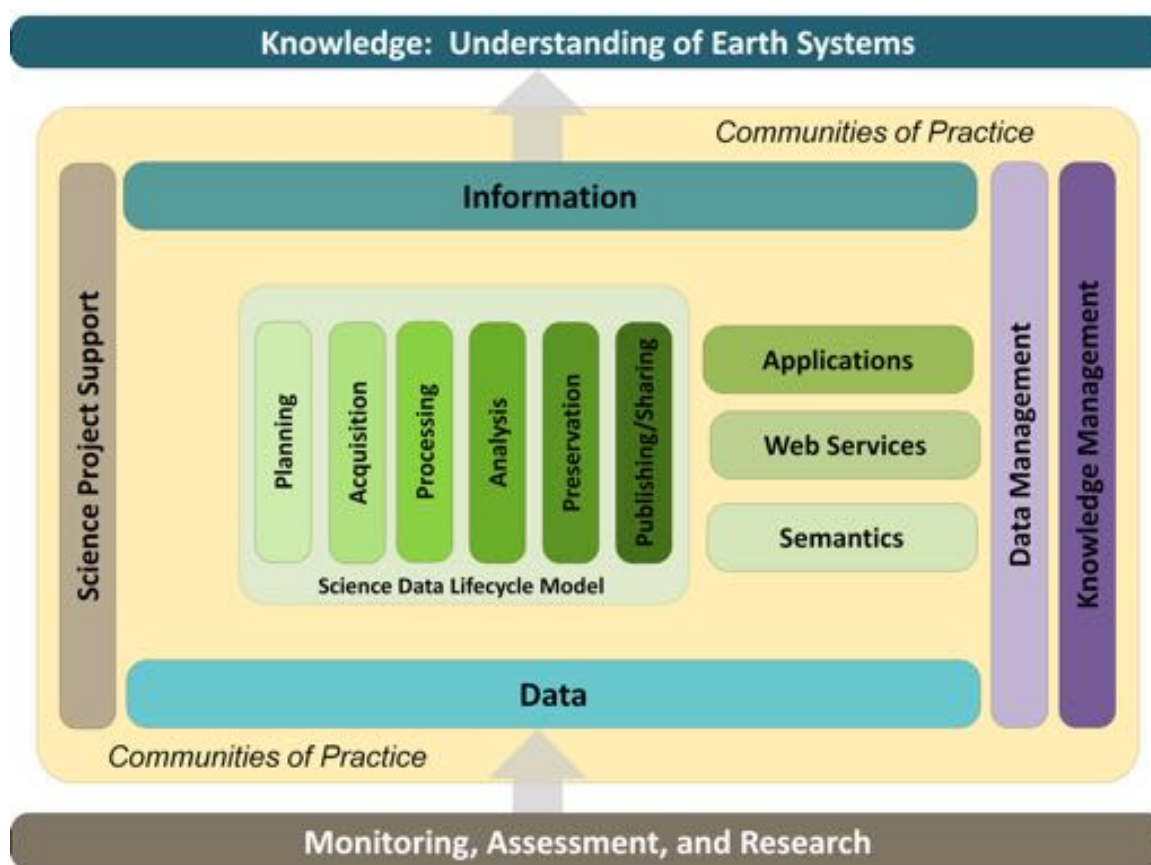

Figure 2: CDI Science Support Framework

USGS Data Assets Flow through the CDI Science Support Framework.
USGS data assets flow vertically through the SSF from a base of monitoring, assessment, and research through the Science Data Lifecycle, applications, Web services, and semantics. The assets are transformed into information products that benefit from data and knowledge management and also increase knowledge and understanding of the Earth's physical and biological systems. Data assets flow horizontally through the SSF from science project support to data and knowledge management.

The horizontal elements in the SSF represent the "what" of the CDI: products and tools that contribute to the advancement of scientific data and lead to the development of knowledge and understanding of the Earth's systems.

The vertical elements in the SSF represent the "how" of the CDI: the processes, the implementation of standards and best practices, and the interactions among people, data, and technology used to achieve data integration.

Individual Framework element descriptions:

Science Inputs (brown elements)

Monitoring, Assessment, & Research: USGS scientists conduct monitoring, assessment, and research that generate data assets. Through the application of business, computational, and analytical processes and technologies, these assets are converted into information products that can be shared with other researchers, stakeholders, and citizens to increase our knowledge and understanding of

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the Earth's physical and biological systems.

Science Project Support: Successful science projects encompass a range of activities represented in the Data Lifecycle. At each step in the cycle, researchers and data stewards rely on an array of sophisticated tools and services for data, information and knowledge discovery, acquisition, integration, management, and sharing.

Communities of Practice (tan element)

Communities of practice are the foundation for CDI and all its products – the communities of people working towards the goal of advancing scientific data and information management and data integration across the USGS.

Data & Information Assets (blue elements)

USGS assets include **Data** (e.g., raw data, databases, and linked open data (RDF[1])); **Information** or derived/interpreted information products (e.g., published or shared maps, reports, datasets); and **Knowledge** of all types and in all forms — recorded, organized, and preserved in the form of artifacts. Knowledge can be improved, shared across groups, organizations, and domains, and reused to support learning and research.

Computational Tools & Services (green elements)

Science Data Lifecycle include tools and services that move data through the lifecycle, human and machine interactions, and interactions with data through technology.

Detailed descriptions of the Science Data Lifecycle:

- **Planning** – A documented sequence of intended actions to identify and secure resources and gather, maintain, secure, and utilize data assets.

- **Acquisition** – The series of actions for collecting or adding to data assets.

- **Processing** – A series of actions or steps performed on data to verify, organize, transform, integrate, and extract data in an appropriate output form for subsequent use.

- **Analysis** – A series of actions and methods performed on data that help describe facts, detect patterns, develop explanations, and test hypotheses.

- **Preservation** – Actions and procedures to keep data for some period of time; to set data aside for future use.

- **Publishing/Sharing** – To prepare and issue, or to disseminate data or information products.

Semantics convert raw data into data that can be interpreted by machines: Machine Readable Metadata, Semantic Mediation for Data Integration & Discovery, Ontologies/Vocabularies, and World Wide Web Consortium Standards.

Web Services include machine to machine data exchange, SOAP,[2] REST,[3] SPARQL[4] EndPoints, and other protocols and services.

Applications include human readable data services and user interfaces to data driven applications.

Management, Policy, & Standards (purple elements)

Data Management includes data and metadata standards and policies and occurs in all phases of the Data Lifecycle from scientific research to finished information products.

Knowledge Management involves the creation, standardized documentation, and organization of knowledge using tools such as SKOS[5] Vocabularies and information modeling, resulting in the formation of knowledge bases.

[1] Resource Description Framework
[2] Simple Object Access Protocol
[3] Representational State Transfer
[4] SPARQL Protocol and RDF Query Language
[5] Simple Knowledge Organization System

Appendix D – CDI Sponsors and Staff

CDI Executive Sponsors
Kevin T. Gallagher, Associate Director, USGS Core Science Systems
Tim Quinn, Associate Chief Information Officer, USGS
Cheryl Morris, Science Synthesis, Analysis and Research Program Coordinator | USGS
Associate Chief Data Officer | Science Analytics and Synthesis Director

We encourage proposers to get in touch with relevant CDI contacts to discuss their proposals:

CDI Facilitators
Leslie Hsu (lhsu@usgs.gov)
Grace Donovan (gdonovan@usgs.gov)
Amanda Liford (aliford@usgs.gov)

CDI Collaboration Area leads may have specific suggestions or contacts for their focus topic (for example, data management, software development, data visualization, imagery data). All CDI Collaboration Areas and contacts can be accessed at
https://www.usgs.gov/centers/cdi/about/collaboration-areas.

Appendix E - Additional Instructions for Project Products

Use the specific wording below to acknowledge funding in CDI publications and products:

This work was supported by funding from the USGS Community for Data Integration (CDI).