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NASA'S EARTH OBSERVING SYSTEM
DATA AND INFORMATION SYSTEM

Evolving UMM-S To Better Accommodate NASA EOSDIS Web User Interfaces and Downloadable Tools For Data Use

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Outline

I. Current User Experience

II. Proposed Solution

III. Use Cases and User Experience

IV. Conclusion, Next Steps, and Discussion

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I. Current User Experience

Statements on User Experience

- The "Search, Order, and Download" Paradigm is Changing

- Users Want to Start Working With Data More Quickly and Easily

- There is a Gap Between the Data and a Tool/Service To Work With That Data

- The UMM-S Is Evolving to Bridge The Gap Between Discovery and Use

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Current User Experience in Earthdata Search

- **End-to-End Services (E2E)**
  - Enables data transformations to be applied to data sets at the variable level.
  - In Earthdata Search, the service options show up, for each of the variables within a collection.
  - Supported using the Unified Metadata Model – Services (UMM-S)

- **Smart Handoffs**
  - Enables a spring board from Earthdata Search to a web user interface (with backend API), e.g. Giovanni.
  - The data sets, variables selected, and search constraints entered into Earthdata search can be carried over to that service.

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Current Dilemma

- Is it a Service or a Tool?
  - Many different types of tools/services
  - Much confusion and disagreement over what constitutes a tool or a service

- How Can the Service or Tool be Used?
  - Many different ways to utilize and interface with various tools and services

- How should Metadata Representations be Structured?
  - EOSDIS had a single services metadata model that was growing too complex
    - Needed to be restructured, but how?

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II. Proposed Solution

Have Two Distinct Models
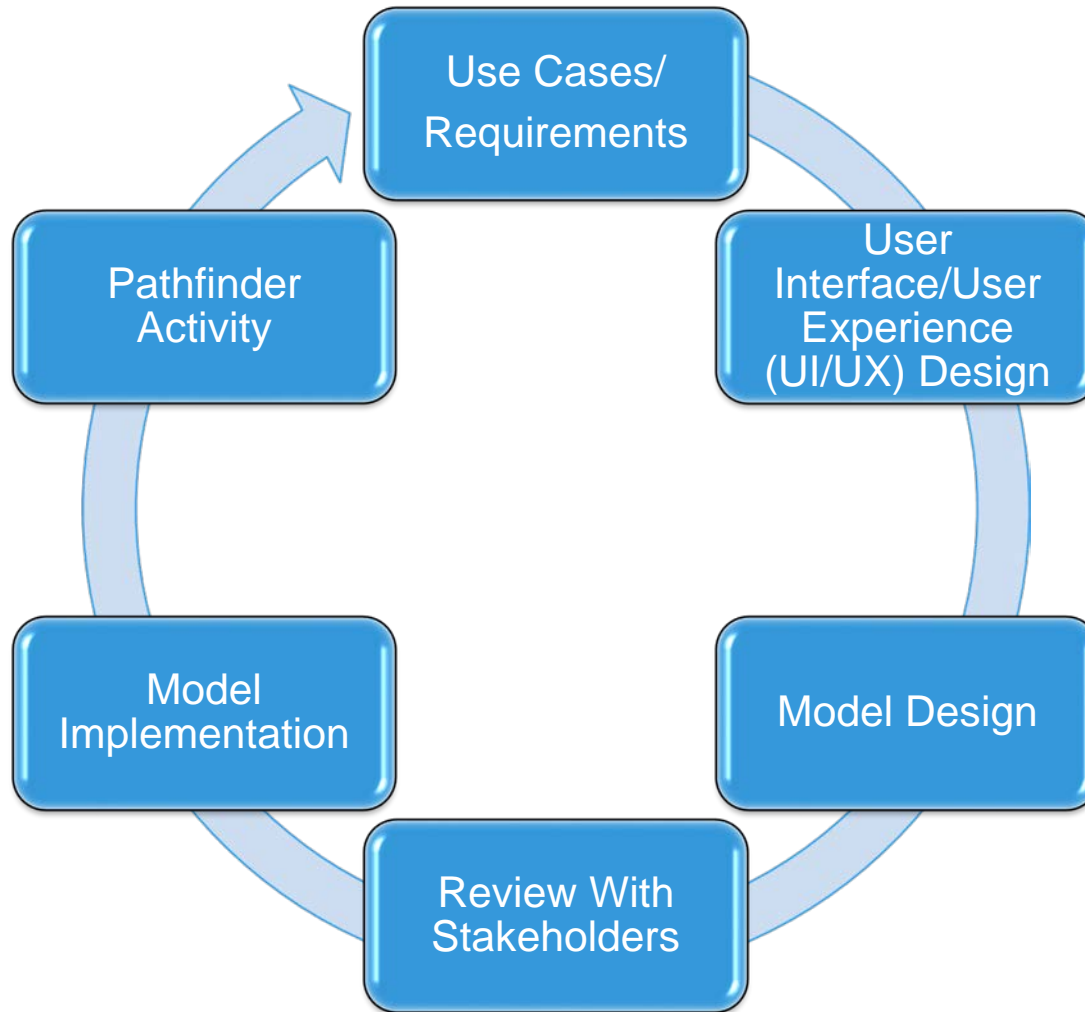## (UMM-S Refactoring)

- Break out the Model for "Back-End" and "Front-End" *(Names TBD)*
  - **(Existing)** Front-End Unified Metadata Model – Services (UMM-S)
    - Accommodates E2E services and other services (e.g. APIs, OGC Web Services, OPeNDAP, THREEDS, etc.)
  - **(New)** Front-End Model
    - Accommodates Web User Interfaces, Downloadable Tools, and Smart Handoffs

Create Metadata Associations

- Associate datasets to applicable web user interfaces (WUI) and downloadable tools (DT).

- These associations note what datasets are known to work with specific WUI and DT.

- Users want to see all WUI and DT for a given dataset once they search and discover that dataset.

- These associations can be done in the Metadata Management Tool (MMT) or the Common Metadata Repository (CMR) API.

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III. Use Cases and User Experience

Overview of the Modeling Approach For Improving the User Experience

Cycle diagram (clockwise): Use Cases/Requirements → User Interface/User Experience (UI/UX) Design → Model Design → Review With Stakeholders → Model Implementation → Pathfinder Activity → (back to Use Cases/Requirements)

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What People Are Looking For To Help Them "Use" The Data

- **Web User Interfaces**
  - Web based platforms providing interaction with the data.
  - Examples:
    - State of the Ocean
    - CEOS Visualization Environment (COVE) Tool
    - SEDAC Hazards Mapper
    - Metadata Compliance Checker
    - Hazards Data Distribution System

- **Downloadable Tools**
  - Tools which must be downloaded to the user's processing platform in order to use them. This includes local GUI tools, command line tools, and libraries (e.g., Python, R libraries)
  - Examples:
    - Panoply
    - Weather and Climate Toolkit
    - Quantum GIS
    - HDFView
    - netCDF Operator

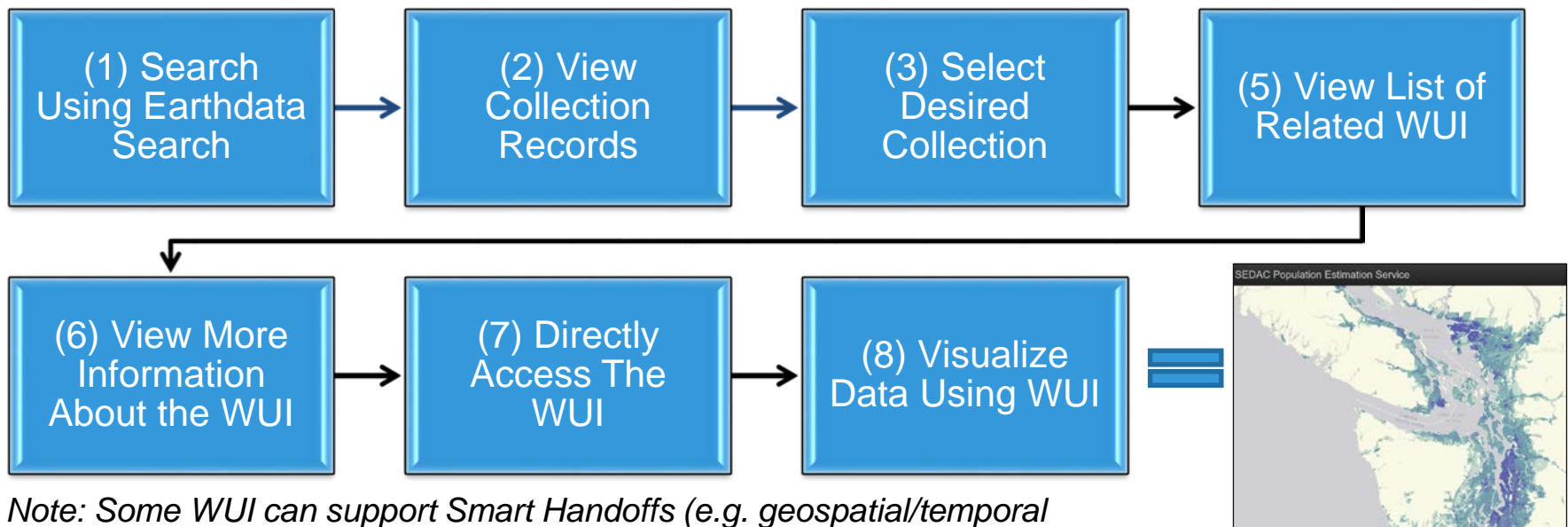**EOSDIS**

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Use Cases – Web User Interfaces

- As a User of Earthdata Search, I Want To Do a Search…..
    - For population data and see what web user interfaces I can use to visualize the population data.
    - For GIS data and see what web user interfaces I can use to preview the GIS data.
    - And subset my results by air pressure data and pass the results into Giovanni without loosing my context so I can continue to plot and visualize my air pressure data.

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Use Cases – Downloadable Tools

- As a User of Earthdata Search I Want To Do a Search….
  - For model data and want to see what downloadable tools I can use to analyze the model data.
  - For satellite imagery and want to see what downloadable tools I can use to reformat and process the satellite data.
  - For landslide data and want to see what python scripts I can use to programmatically retrieve the active landslide data at regular intervals.
  - For polarimetric radar data and want to download a Jupyeter notebook that I can use to perform all-in-one QC and radar data retrieval.

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User Experience Scenario – Discover Web User Interfaces (WUI)

In this scenario, I want to visualize SEDAC population data using the SEDAC Map Viewer.
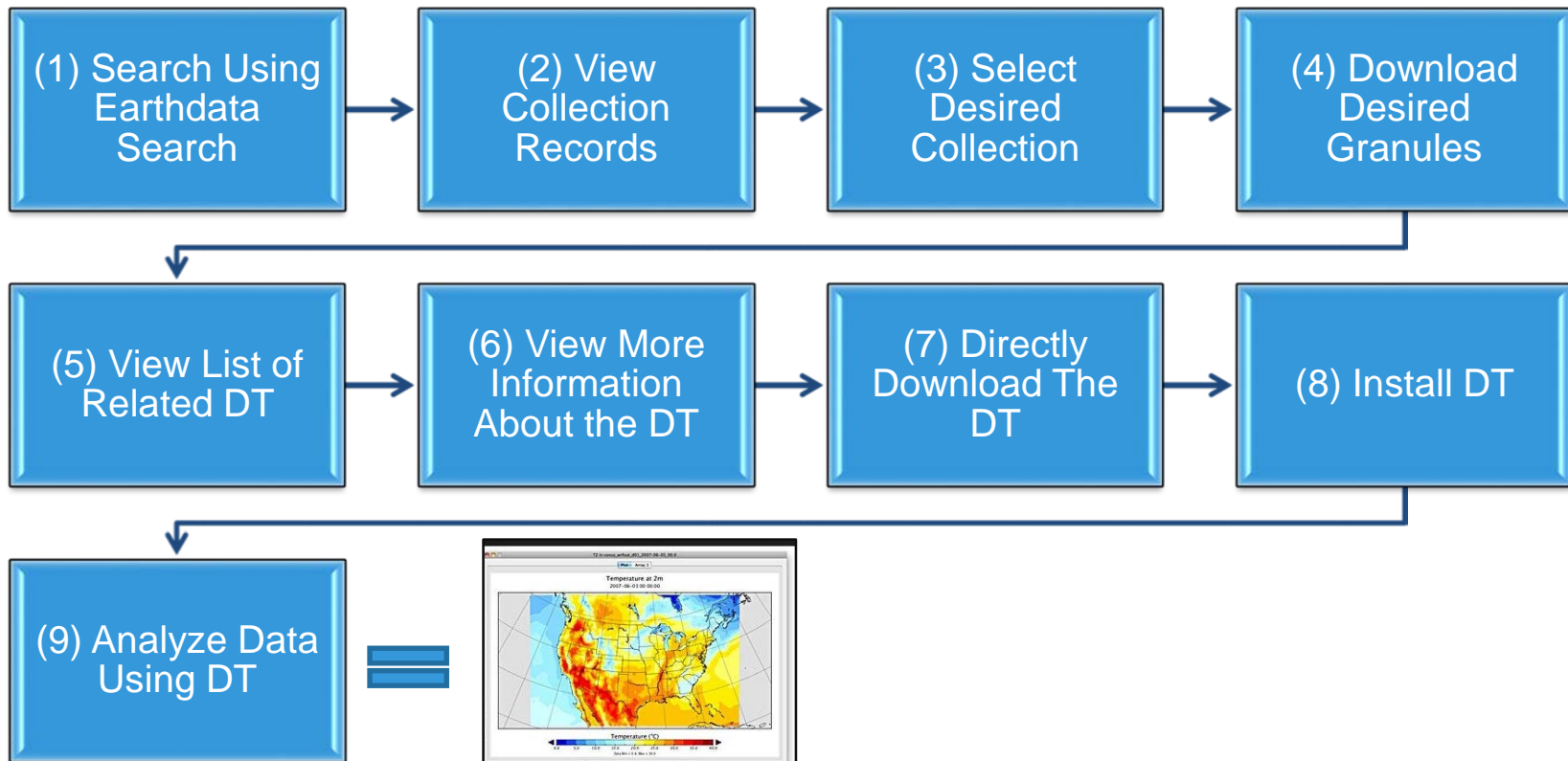
(1) Search Using Earthdata Search	(2) View Collection Records	(3) Select Desired Collection	(5) View List of Related WUI
(6) View More Information About the WUI	(7) Directly Access The WUI	(8) Visualize Data Using WUI	

Note: Some WUI can support Smart Handoffs (e.g. geospatial/temporal bounds passed from Earthdata Search to the WUI)

NASA SEDAC Map Viewer

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User Experience Scenario – Discover Downloadable Tools (DT)

In this scenario, I want to view/analyze GES DISC temperature data using Panoply.

(1) Search Using Earthdata Search → (2) View Collection Records → (3) Select Desired Collection → (4) Download Desired Granules

(5) View List of Related DT → (6) View More Information About the DT → (7) Directly Download The DT → (8) Install DT

(9) Analyze Data Using DT =

Panoply Tool

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Information Page – UI/UX Concept

Information from the UMM fields can be surfaced and displayed on the information page to provide details about the Web User Interface or Downloadable Tool.
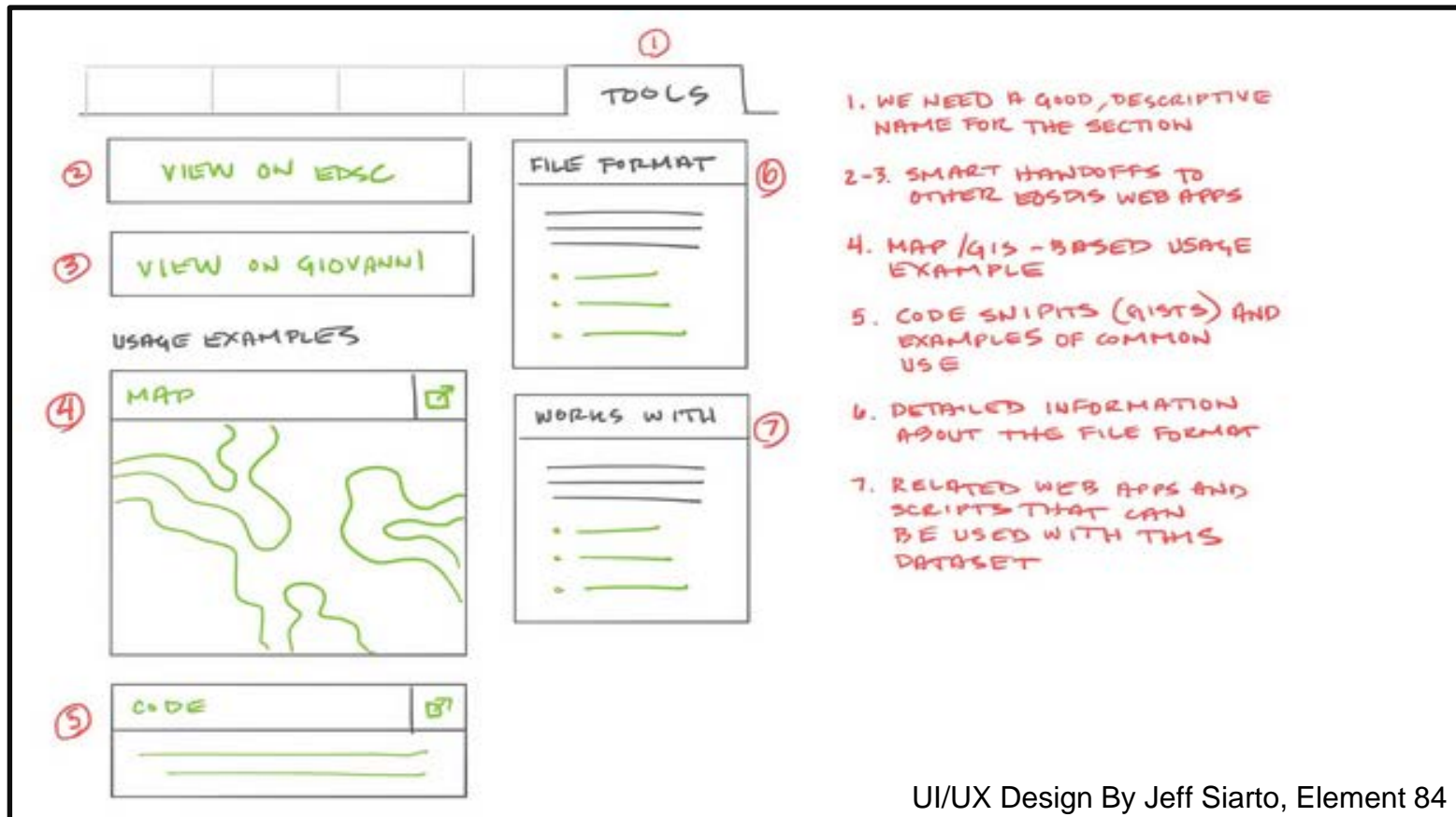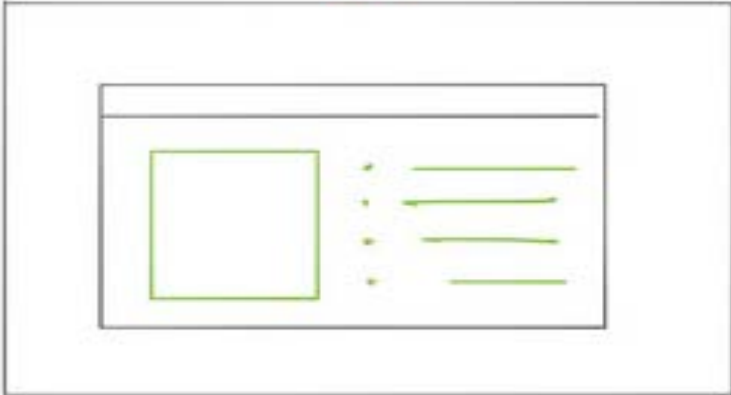

UI/UX Design By Jeff Siarto, Element 84

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Earthdata Search Page – UI/UX Concept

A list of Web User Interfaces and Downloadable Tools can be presented to the user once they complete a dataset search.

UI/UX Design By Jeff Siarto, Element 84

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User Experience for Metadata Curation

- The Metadata Management Tool (MMT) allows users to curate their collections, variables, and services metadata.
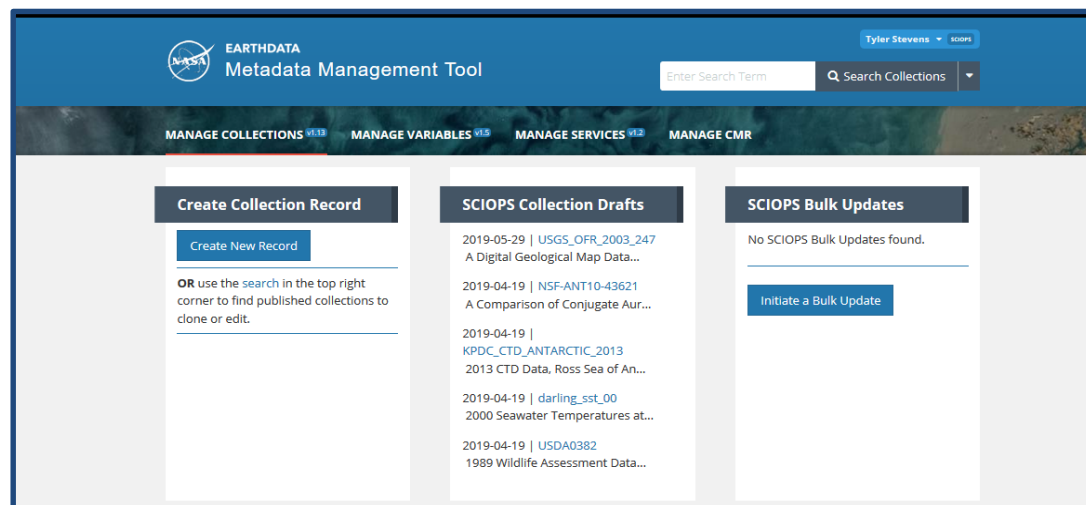
- Coming Soon
    - Updated to make the dual services model (back-end and front-end) approach clearer.
    - Draft Metadata Management Tool (dMMT) will allow users without an Earthdata Login credential to propose new or modifications to existing records.

IV. Conclusion, Next Steps and Discussion

Statements on User Experience Revisited

- The "Search, Order, and Download" Paradigm is Changing
  - *New concept for Earthdata Search pages*
  - *User experience scenarios*

- Users Want to Start Working With the Data More Quickly and Easily
  - Associations between data and tools
  - *User experience scenarios*

- There is a Gap Between the Data and a Tool/Service To Work With That Data
  - Associations between data and tools
  - New model for web user interfaces and downloadable tools

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Next Steps For Improving The User Experience

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┌─────────────────────┐     ┌─────────────────────┐     ┌─────────────────────┐
│ (1) UMM-S           │     │                     │     │                     │
│ Refactoring Proposal│ ──▶ │ (2) Revise Model    │ ──▶ │ (3) Implement Model │
│ In Review By NASA   │     │ Based on Feedback   │     │ in CMR              │
│ ESDIS Standards     │     │                     │     │                     │
│ Office (ESO)        │     │                     │     │                     │
└─────────────────────┘     └─────────────────────┘     └─────────────────────┘

┌─────────────────────┐     ┌─────────────────────┐     ┌─────────────────────┐
│ (3) Implement Model │ ──▶ │ (4) Implement Model │ ──▶ │ Conduct Pathfinder  │
│ in MMT              │     │ in Earthdata Search │     │ With DAACs          │
└─────────────────────┘     └─────────────────────┘     └─────────────────────┘

┌─────────────────────┐
│ Revise Model and    │
│ Workflow As Needed  │
│ Based on Pathfinder │
│ Input               │
└─────────────────────┘
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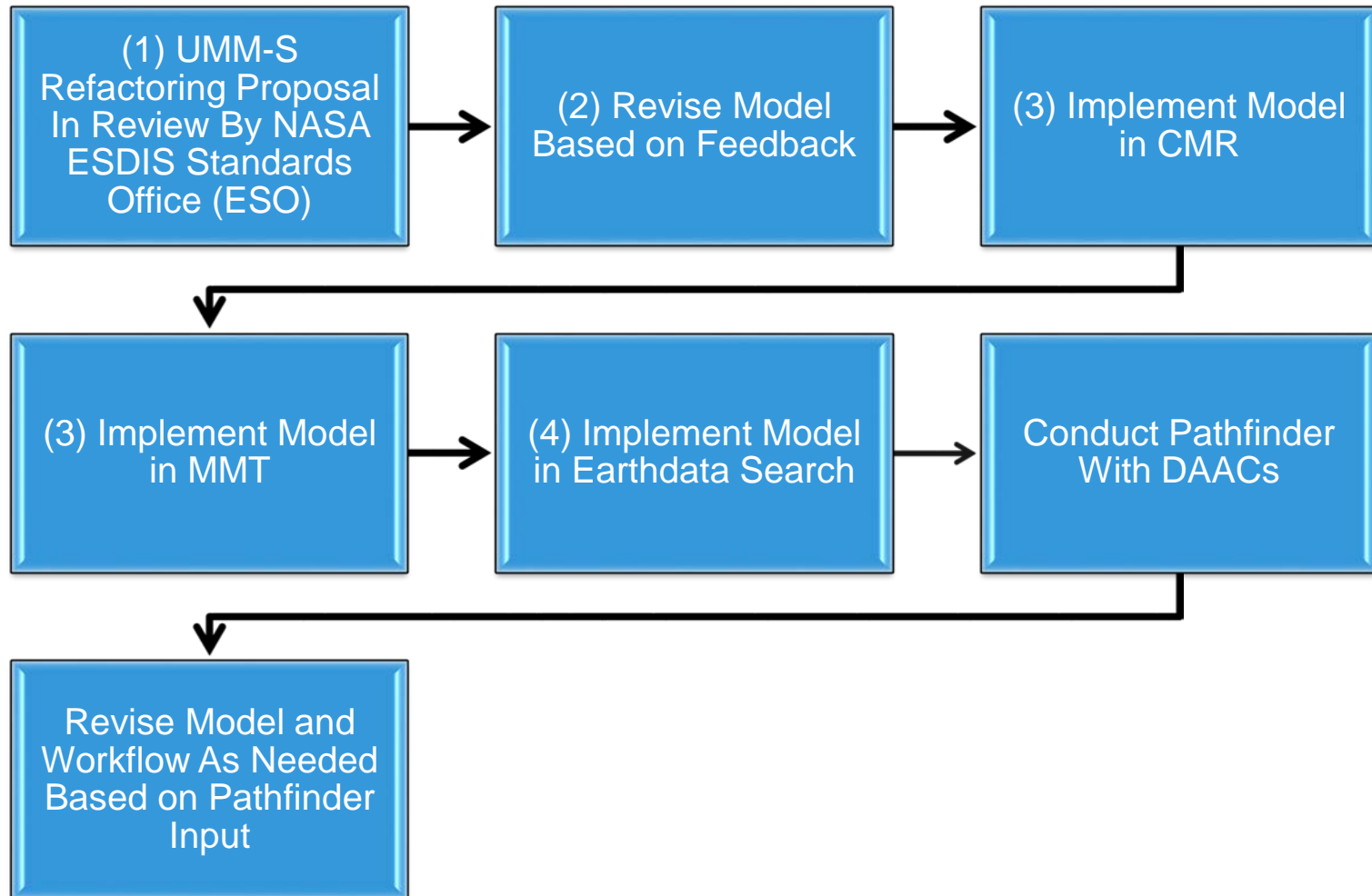
Discussion

- Do you have additional use cases or best practices for connecting data to tools/services?

- Do you have additional suggestions for the UI/UX and user experience?

- What can we do to make life easier for end-users?

- What can we do to make life easier for metadata curators?

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Thank You

If you have any questions, please reach out to me (Tyler.B.Stevens@nasa.gov) or Valerie Dixon ([Valerie.dixon@nasa.gov)](mailto:Valerie.dixon@nasa.gov)

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Backup Slides

Proposed Fields For New Front-End Model

New Fields To Accommodate Web User Interface and Downloadable Tool Use Cases

- T Name [R]
- T LongName [R]
- T Version [R]
- T Description [R]
- T ServiceKeywords [R]
- T ToolOrganizations [R]
- T ToolURL [R]
- T DOI
- T SupportedOutputFormats
- T SupportedInputFormats
- T SupportedOperatingSystem
- T SupportedBrowsers
- T Quality
- T AccessConstraints
- T UseConstraints
- T AncillaryKeywords
- T ContractPersons
- T ContactGroups
- T RelatedURLs
- T SearchActions

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Current UMM-S Model (V 1.2)

- T Name [R]
- T LongName [R]
- T Type [R]
- T Version [R]
- T Description [R]
- T RelatedURLs [R]
- + T ServiceOptions
- + T OperationMetadata
- T ScienceKeywords
- T ServiceKeywords [R]
- T ServiceOrganizations [R]
- T ContactPersons
- T ContactGroups
- + T Platforms
- T ServiceQuality
- T AccessConstraints
- T UseConstraints
- T AncillaryKeywords

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