Unidata 2020: Geoscience at the Speed of Thought

Draft Action Plan

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Introduction

This document defines specific actions envisioned by Unidata's development, community services, administration, and information technology groups to work toward the goals outlined in the 2012 strategic plan.

Goal:
Enable widespread, efficient access to geoscience data

Seamless access to data is essential for advancing education and research. To ensure that the geoscience research and education community gains access to the data it needs, we will:

- Distribute atmospheric and other geoscience data in real time
- Develop innovative cyberinfrastructure solutions to facilitate dissemination of scientific data
- Work with data providers to make geoscience data freely available for advancing research and education
- Develop and maintain the computing and networking infrastructure necessary to keep the growing volume of data flowing reliably and in a timely manner

Development group actions supporting these goals

1. Maintain, coordinate, and support LDM/IDD infrastructure and community.

Timetable	
Staff	
Resources	
Progress Indicators	

2. Maintain, coordinate, and support data ingest (NOAAPort, McIDAS GOES, etc.)

Timetable	
Staff	
Resources	
Progress Indicators	

3. Improve documentation of datasets available over IDD and how to access the data.

Timetable	
Staff	
Resources	
Progress Indicators	

4. Investigate motherlode server redundancy. For instance:
   - Cloud-like capabilities and how they might impact the IDD, TDS, RAMADDA.
   - Unique, resolvable IDs (e.g., the Handle System and DOI) that support resolution to multiple resolution points.

Timetable	
Staff	
Resources	
Progress Indicators	

5. Improve usability of the LDM:

Timetable	
Staff	
Resources	
Progress Indicators	- Add an LDM Config GUI - Convert LDM queue to use virtual buffer

6. Unidata-in-a-Box: VMware app with LDM, TDS, RAMADDA, already installed

Timetable	
Staff	
Resources	
Progress Indicators	

7. Investigate closer ties between IDD/LDM and TDS

Timetable	
Staff	
Resources	
Progress Indicators	

8. Investigate PubSub, P2P, Messaging (AMQP/ZeroQP), etc. Work with other groups, e.g., OGC PubSub SWG, iRODS.

Timetable	
Staff	
Resources	
Progress Indicators	

9. Standing query/filter on data streams (PubSub with query/filter)

Timetable	
Staff	
Resources	
Progress Indicators	

Community Services group actions supporting these goals

1. Work with governing committees and data providers to negotiate for data, model output and observational data deemed important for teaching and research.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

2. Foster collaborations with providers of data, i.e., MADIS, NCEP, NCDC, NOAA/NWS, Lightning, Radar, and follow new developments leading to future opportunities.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

3. Coordinate with Unidata technical staff to ensure Unidata technologies are compatible with each other.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

4. Augment the Unidata web site data pages with clear, easy to follow instructions describing how to retrieve each type of data.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	Answer these questions, as a start: - what software do I need? - How do I get the data? - Should I access the data remotely or copy it to a local server?

5. Regularize Unidata web site software pages so community members can easily find information relevant to each piece of technology, so as to be able to understand how it fits in Unidata's overall offerings, how it compares to other solutions, and how to install or implement it.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

6. Use Unidata's various media streams (web site, e-mail lists, blogs, social media, etc.) to communicate data offerings to community members.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

Administrative group actions supporting these goals

1. Work with Unidata staff to ensure that each staff member has the administrative support necessary to facilitate their work such as travel support, contract and purchasing support, proposal development support and human resource support

Timetable	
Staff	
Resources	
Progress Indicators	

2. Collaborate on the Unidata website pages providing maintenance and upkeep on relevant administrative areas such as proposal tracker, personnel information and links to various funding opportunities.

Timetable	
Staff	
Resources	
Progress Indicators	

3. Provide administrative support to Unidata's governing committees through travel support and meeting facilitation

Timetable	
Staff	
Resources	
Progress Indicators	

4. Provide budget and financial updates to the Director and program managers to help form strategic plans supporting the goals set forth here

Timetable	
Staff	
Resources	
Progress Indicators	

Information Technology group actions supporting these goals

1. To be added...

Timetable	
Staff	
Resources	
Progress Indicators	

2. To be added...

Timetable	
Staff	
Resources	
Progress Indicators	

Goal:
Develop and provide open-source tools for effective use of geoscience data

Faced with an abundance of scientific data, researchers and educators need well-integrated, state-of-the-art tools to access, analyze, manage, and visualize the data. Because our experience shows us that robust solutions arise from community and collaborative efforts, we will foster an open-source environment that encourages collaborative software development. In this context, and in cooperation with community members and other partners, we will develop and support open-source development approaches and software solutions to:

- Analyze, integrate, and visualize heterogeneous geoscience data in two, three, and four dimensions
- Enable visualization and effective use of very large data sets
- Access, manage, and share collections of data from diverse sources

Development group actions supporting these goals

1. Improve documentation, standardize across software packages

Timetable	
Staff	
Resources	
Progress Indicators	

Advance the communities capabilities to analyze and visualize scientific data.

2. Add and improve AWIPS2 documentation and training materials.

Timetable	
Staff	
Resources	
Progress Indicators	

3. Assist NCEP in the development and testing of AWIPS II database access by GEMPAK programs

Timetable	
Staff	
Resources	
Progress Indicators	

4. Add IDV scientific feature type capabilities as CDM/netCDF-Java and TDS add new feature types.

Timetable	
Staff	
Resources	

Progress Indicators	

5. Improve IDVs data access and export capabilities

Timetable	
Staff	
Resources	
Progress Indicators	- Support ability to select and subset a region from global datasets that crosses the seam in the underlying dataset. (See netCDF item below, also JIRA issue TDS-143.) - Automatic subsetting of data based on current projection (and screen size/resolution?) - Support progressive resolution - Improve and extend data export capabilities

6. Ensure AWIPS2 evolves to include any currently missing GEMPAK functionality

Timetable	
Staff	
Resources	
Progress Indicators	

7. Work on (with collaborators) the development of AWIPS2 plug-ins to enable AWIPS2 access to CDM data.

Timetable	
Staff	
Resources	
Progress Indicators	

8. Improve the IDV's extensability and non-GUI utility

Timetable	
Staff	
Resources	
Progress Indicators	- Solidify, publish, and support an IDV API. - Improve server side functionality (with IDV web API?).

9. IDV/THREDDS collaboration on server-side processing capabilities.

Timetable	
Staff	
Resources	
Progress Indicators	

10. Work with GEMPAK community to transition support to the community.

Timetable	
Staff	

Resources	
Progress Indicators	

Advance the netCDF ecosystem

Advance the netCDF ecosystem by advancing the capabilities of the netCDF file formats and netCDF-based tools and utilities. As well as by advancing and developing CDM-like APIs (coordinate-space, scientific feature types) and related services (e.g., Web APIs).

11. Improve the portability of the netCDF-C library

Timetable	
Staff	
Resources	
Progress Indicators	- Support Fortran 2003, 2008 (C interoperability) - Fully support Windows (for Visual Studio, 32- and 64-bit, DAP,Fortrans) - Perform on HPC platforms as well as HDF5

12. Improve remote access (DAP4, server-side processing, streaming)

Timetable	
Staff	
Resources	
Progress Indicators	

13. Provide compression as good as GRIB2 (working with NCAR/RAL and The HDF Group)

Timetable	
Staff	
Resources	
Progress Indicators	

14. Support NetCDF as exchange format (netCDF-4 file examples, CF conventions, etc.)

Timetable	
Staff	
Resources	
Progress Indicators	

15. Develop ASCII to netCDF-CF converter for data logger data.

Timetable	
Staff	
Resources	
Progress Indicators	

16. Focus Unidata's decoder efforts on CDM/netCDF-Java

Timetable	
Staff	
Resources	
Progress Indicators	

17. Make developing generic netCDF tools easier (higher-level APIs, test data, single-purpose utilities)

Timetable	
Staff	
Resources	
Progress Indicators	

18. Increase the number of scientific data formats and conventions from which georeferencing and feature information can be extracted.

Timetable	
Staff	
Resources	

Progress Indicators	- File formats:
	  - netCDF-C: GRIB, radar, etc.
	  - netCDF-Java: GeoTIFF, Shapefiles, FITS, etc.
	- Conventions and feature types:
	  - netCDF-C: Developer higher-level (CDM-like) APIs
	  - netCDF-Java: UGRID, NPP, JPSS, swaths, satellite, polygonal regions

19. Support netCDF access and CDM capabilities in other lanuage APIs (Python, C#/.NET, Javascript/DART)

Timetable	
Staff	
Resources	
Progress Indicators	- CDM Remote server (TDS-lite) - Python support: investigate py4j

20. Implement additional netCDF format variants, e.g., CDF5 (aka "Big netCDF"), append-only format for fast writes, streaming; native, for independence from HDF5

Timetable	
Staff	
Resources	
Progress Indicators	

Advance server-side data services (discovery, access, processing)

21. Expand the variety of data sources that can be supported

Timetable	
Staff	
Resources	
Progress Indicators	- Develop new ADDE servers as new data sources (typically satellite) become available. - Use TDS as driver on netCDF-Java support of new file formats and conventions. - Support UGRID datasets via OPeNDAP and other data access methods

22. Continue improving TDS support for very large collections of files (e.g., NCDC's large data collections).

Timetable	
Staff	
Resources	
Progress Indicators	

23. Support subsetting of global datasets across seam (see IDV)

Timetable	
Staff	
Resources	
Progress Indicators	

24. Expand and improve web services for point data collections.

Timetable	
Staff	
Resources	
Progress Indicators	

25. Refactor TDS for performance and extensibility

Timetable	
Staff	
Resources	
Progress Indicators	- Simplify and expand user extensibility (plug-in capabilities) - Refactor THREDDS catalog API - Refactor configuration state, including dynamic config. - Develop Web UI for TDS configuration

26. Conduct regular security audits of all web applications (TDS, RAMADDA):

Timetable	
Staff	

Resources	
Progress Indicators	- Work with RAMADDA developers - Look for ways to automate this in regular build cycle.

Community Services group actions supporting these goals

1. Coordinate with Unidata technical staff on open source tools, communicate with the community and provide desired documentation and information for smooth transitions as changes evolve.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

2. Develop documentation, descriptions, information, and conduct community surveys via email, blog, web articles.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

3. Provide presentations as general outreach opportunities arise.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

4. Provide a single, Unidata-branded Open Source community experience, common to all Unidata software efforts. A community "hub" of this sort would provide a common interface for community use of and participation in all of Unidata's software products. We feel that this is a very high priority project for Unidata as a whole, and will require buy-in and actions by individuals across the organization.
   At least one branded, functioning Open Source community effort should be running by the end of 2012, with others to follow as quickly as is feasible.

Timetable	
Staff	
Resources	
Progress Indicators	

5. Move towards a standardized, web-based system for providing effective and up-to-date user documentation for each software package. This project may be influenced by decisions made in setting up Open Source communities.

Timetable	This project can be completed by ????

Staff	
Resources	
Progress Indicators	

6. Create a series of product- and service-focused webcasts, demonstrating new, interesting, or difficult to explain features of Unidata products. Webcasts would be short (1-3 minutes) and would be created on an ongoing basis by developers and the Community Services group.

Timetable	Web infrastructure and an initial three to six webcasts can be finished by Fall 2012.
Staff	
Resources	
Progress Indicators	

Administrative group actions supporting these goals

See previous goal section. No specific actions are related to development of Open Source tools.

Information Technology group actions supporting these goals

1. To be added...

Timetable	
Staff	
Resources	
Progress Indicators	

2. To be added...

Timetable	
Staff	
Resources	
Progress Indicators	

Goal:
Provide cyberinfrastructure leadership in data discovery, access, and use

The tools and techniques of distributed scientific computing are continually evolving. Unidata provides information and leadership that allow community members to better anticipate, react to, or influence new developments. In order for the Unidata community to benefit from changes in the scientific cyberinfrastructure landscape, we will:

- Develop useful data models, frameworks, and protocols for geoscience data
- Advance geoscience data and metadata standards and conventions
- Facilitate data discovery mechanisms for quickly finding and accessing geoscience data
- Evaluate emerging cyberinfrastructure trends and technologies, providing information and guidance to community members

Development group actions supporting these goals

1. Evaluate emerging cyberinfrastructure trends and technologies, provide information and guidance to community members (use blogs, whitepapers, workshops, etc.)

Timetable	
Staff	
Resources	
Progress Indicators	

2. Work with the OPeNDAP group to develop the DAP4 specification, implement it in the netCDF-C and -Java libraries as well as in the TDS, and to develop DAP4 conformance test suites for client and server.

Timetable	
Staff	
Resources	
Progress Indicators	

3. Work with standards groups and various communities (e.g, CF, OGC, and NASA) on the development of standards related to the earth sciences, including metadata, data models, data access protocols, and real-time data distribution (e.g., OGC PubSub) standards.

Timetable	
Staff	
Resources	
Progress Indicators	

4. Work with various groups to expand Unidata's server-side data access and processing capabilities. For instance, by adding OGC WFS, SOS, and WPS implementations and by working on asynchronous remote data access.

Timetable	
Staff	
Resources	
Progress Indicators	

5. Work with operational weather services (WMO, NCEP, ECMWF e.g.) to develop and standardize a registration service for GRIB and BUFR tables.

Timetable	
Staff	
Resources	
Progress Indicators	

Community Services group actions supporting these goals

1. Networking and learning what the community needs are.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

2. Providing information about Unidata offerings and trends in our field.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

3. Facilitate collaboration among groups that could be mutually beneficial

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

4. Use Unidata's various media streams (web site, e-mail lists, blogs, social media, etc.) to provide information about Unidata's data technology solutions to community members.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

Administrative group actions supporting these goals

See previous goal section. No specific actions are related to cyberinfrastructure leadership.

Information Technology group actions supporting these goals

1. To be added...

Timetable	
Staff	
Resources	
Progress Indicators	

2. To be added...

Timetable	
Staff	
Resources	
Progress Indicators	

Goal:
Build, support, and advocate for the diverse geoscience community

Unidata works to help community members learn from each other by providing opportunities for collaboration, discussion, and knowledge sharing. To monitor the pulse of the community, track user needs, and build community relationships, we will:

- Provide expertise and resources to researchers in designing and implementing effective data management plans
- Represent the academic community in partnerships with agencies and other stakeholders
- Conduct workshops related to current community interests and needs.
- Offer training and support for Unidata products and services
- Provide reference implementations and demonstration systems to allow evaluation of Unidata tools and technologies, and assist with deployment of those tools and technologies in the field
- Foster interactions between community members through meetings and other opportunities for collaboration and communication
- Present Unidata community perspectives and experiences at scientific meetings, conferences, and other venues
- Use our community-based governance mechanisms to ensure that Unidata program efforts continue to align with the needs of community members

Development group actions supporting these goals

1. Support, training, and maintenance for all software products.

Timetable	
Staff	
Resources	
Progress Indicators	

2. Look for opportunities to use user communications to build connections between community members.

Timetable	
Staff	
Resources	
Progress Indicators	

3. Improve consistency and cohesiveness of documentation for software and systems.

Timetable	
Staff	
Resources	
Progress Indicators	

4. Improve OSS collaborative environment:

Timetable	
Staff	
Resources	
Progress Indicators	Make it easier for collaborators to contribute: - Source code repositories: git/gitHub (CDM/TDS, LDM, IDV) - Build and dependency management: Maven (CDM/TDS, IDV?) - Continuous Integration: Jenkins (CDM/TDS, netCDF-C) - Issue tracking: JIRA (netCDF-C, CDM/TDS); Redmine (IDV) - netCDF, CDM, TDS, IDV, AWIPS2

5. Work with the community on various software development collaborations:

Timetable	
Staff	
Resources	
Progress Indicators	Some current collaborations include: - CDM/TDS: NOAA (NCDC, NGDC, PMEL, etc.), USGS CIDA, etc. - IDV: SSEC McIDAS-V, NOAA (GSD, etc.), CMA, etc. - AWIPS2: NCEP, Raytheon, NOAA/ESRL/GSD, etc.

6. Continue developing close ties with the WRF community (IDV, netCDF, and CDM/TDS).

Timetable	
Staff	
Resources	
Progress Indicators	

7. Actively participate in standards development: CF, OGC, OData , etc.

Timetable	
Staff	
Resources	
Progress Indicators	

8. Build community around netCDF-4/CDM as data exchange format. Use this goal to drive development. Communicate this message in support, training, and other communications with the community.

Timetable	
Staff	
Resources	
Progress Indicators	

9. Annual and regional training workshops

Timetable	
Staff	
Resources	
Progress Indicators	

10. Presentations and demonstrations at conference

Timetable	
Staff	
Resources	
Progress Indicators	

11. Work with collaborators

Timetable	
Staff	
Resources	
Progress Indicators	

Community Services group actions supporting these goals

1. Work with technical staff regarding data set compatibility with visualization and analysis tools.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

2. Communicate with the community to ensure we are meeting their needs to reach their education and research goals related to data access/distribution, visualization and analysis and other tools.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

3. Educate the community on new data and tools available from Unidata.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

4. Work with governing committees to organize workshops, community surveys and other perceived community needs.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

5. Coordinate and provide demonstrations and early testers to allow evaluation of technologies in the field, i.e. AWIPS II.

Timetable	This is an ongoing project, although AWIPS II activities will be especially heavy 2012-2014.
Staff	
Resources	
Progress Indicators	

6. Coordinate with staff for provision of training and support for Unidata products and services.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

7. Collaborate with Director, technical staff and governing committees on metrics and assessments collection.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

8. Foster collaboration between Unidata community members, government agencies, and private industry through participation at scientific meetings, conferences, and other venues.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

9. Spread the word about Unidata and what it can do to advance education and research.

Timetable	This is an ongoing project
Staff	
Resources	
Progress	

Indicators	

10. Continue to rely and enhance Unidata's governance mechanism to ensure the diverse representation from the Unidata community.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

11. Create a template data management plan that shows researchers what they must submit, providing a clear explanation of how various Unidata tools and technologies could be used as part of the plan. Provide guidance on how to choose appropriate solutions for several classes of research project, along with information on third-party providers of tools and services that may be useful (e.g. data archives, hosting, etc.).

Timetable	This is a high-value project that should be completed, in its initial form, in 2012.
Staff	
Resources	
Progress Indicators	

12. Ensure that training and support materials are clear and effective learning tools.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

13. Ensure that demonstration systems are well-explained and easy for users to evaluate.

Timetable	This is an ongoing project
Staff	
Resources	
Progress Indicators	

Administrative group actions supporting these goals

1. Work with technical staff in preparing, developing and coordinating proposals defined by the goals set forth and approved by the governing committees

Timetable	
Staff	
Resources	
Progress Indicators	

2. Educate and communicate with the community in developing and managing the Unidata Equipment Awards

Timetable	
Staff	
Resources	
Progress Indicators	

3. Work with governing committees and staff to organize and coordinate users and training workshops

Timetable	
Staff	
Resources	
Progress Indicators	

4. Provide e-support to the community for workshops and Equipment Awards processes and functions

Timetable	
Staff	
Resources	
Progress Indicators	

5. Provide input to the Director, technical staff and governing committees on various UCAR processes, policies and projects

Timetable	
Staff	
Resources	
Progress Indicators	

6. Foster collaboration between Unidata community members, government agencies, and private industry through booth participation at the AMS conference

Timetable	
Staff	
Resources	
Progress Indicators	

7. Spread the word about Unidata and what it can do to advance education and research through conference participation, and UCAR and UCP involvement

Timetable	
Staff	
Resources	
Progress Indicators	

8. Continue to enhance Unidata's governance mechanism by providing financial updates to the Policy Committee and to the Users Committee as appropriate

Timetable	
Staff	
Resources	
Progress Indicators	

Information Technology group actions supporting these goals

1. To be added...

Timetable	
Staff	
Resources	
Progress Indicators	

2. To be added...

Timetable	
Staff	
Resources	
Progress Indicators	

SAVE THIS ONE

Timetable	
Staff	
Resources	
Progress Indicators	