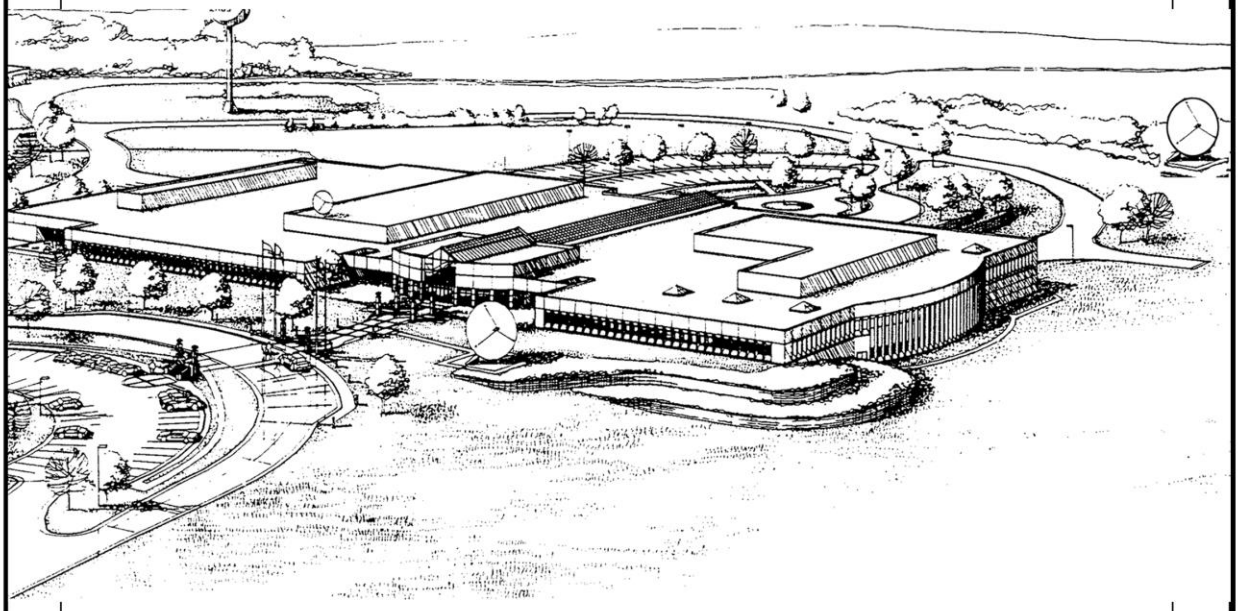
Strategic Direction for the USGS EROS Data Center



U.S. Geological Survey
National Mapping Division
EROS Data Center
Sioux Falls, South Dakota 57198

1998 to 2008

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PREFACE

The U.S. Geological Survey=s EROS Data Center is a very different place today compared to 10 years ago. Back then, the Internet was mostly an idea; the CD technology was only in music stores; we had just begun the design of the Global Land Information System (GLIS); the Landsat program was in trouble; the Earth Observing System (EOS) was a hope; our international activities were just getting started; and a seamless global data set was a gleam in someone=s eye. Over the last decade, we have witnessed unprecedented change at the Center and everything just mentioned has become part of our daily work.

It is difficult to predict what the Data Center will be like 10 years from now--other than, we know, it will be very different. It is clearly evident that we are entering into what I have been calling the "decade of imagery" and a period of many challenges but extraordinary opportunities too. In order to capture these opportunities and overcome the challenges, we must have sound strategic programmatic direction that will guide our planning and management activities.

At the beginning of this year, we formed the Strategic Direction Team. The team was asked to review our past strategic goals and actions, define future programmatic scenarios, respond to the U.S. Geological Survey and National Mapping Division strategic plans, develop new goals and actions, and document and communicate recommendations. This report is the result of the team=s effort.

Special thanks are due to the members of the team, who were:

Mark Barber	Sue Greenlee	Wayne Rohde - Chair
Doug Binnie	Dave Meyer	Tim Smith
Jon Christopherson	Lyn Oleson	Jim Storey
Dave Hair	Deanna Reynolds - Facilitator	Jim Sturdevant - Ex Officio
Cheryl Greenhagen		Karen Zanter

Also, a sincere thank you to K.C. Wehde for her extensive review and editorial comments.

The strategic direction charted here will be a living, dynamic road map into the future. Each year we will debate our direction based on rapidly changing technologies and customer needs. I am confident, however, that with this set of recommendations, we will successfully meet our many challenges, seize the right opportunities and achieve our vision and mission.

Donald T. Lauer

Chief, EROS Data Center

VISION

The U.S. Geological Survey=s Earth Resources Observation Systems (EROS) Data Center=s vision is to be the world=s leading source of land information for exploring our changing planet.

MISSION

The mission of the U.S. Geological Survey's Earth Resources Observation Systems (EROS) Data Center is:

To promote new uses, new users, and new understanding of land information, so that others can better understand our planet.

To ensure that scientists, researchers, businesses, decision makers and the public have ready access to the land information they need.

To safeguard and expand the world's largest archive of remotely sensed land data.

INTRODUCTION

The U.S. Department of the Interior created the Earth Resources Observation Systems (EROS) Program within the U.S. Geological Survey (USGS) in 1966. The principal objective of the Program was, and still is, gathering facts about the natural resources of the Earth using Earth-orbiting satellites. The USGS EROS Data Center (EDC) holds one of the largest collections of remotely sensed images of the Earth=s land surface. For over 25 years, the EROS staff have acquired and archived these data, managed their preservation, ensured their access and distribution to users worldwide, conducted research and product development to demonstrate and foster new applications of these data, and have continued engineering and development of new systems and technologies to ensure that these data and new data are readily available to support all users and continually emerging applications.

The EDC was organizationally aligned with the USGS National Mapping Division (NMD) in 1982. Since that time, the Center has become an integral component of the Division=s National Mapping Program and its original mission has been sustained, but with increased mission responsibilities that have evolved to include archiving, managing, and distributing cartographic data and other related land information.

As we end one millennium and begin another, we are clearly in what can be described as the decade of imagery. This decade affords the EDC an era of unprecedented opportunities. Thus, this document was developed to ensure that we can sustain and enhance our fundamental mission through sound strategic programmatic direction that will guide our planning and management activities over the next several years. The goals and actions described herein complement the strategic plans of the USGS and the NMD.

This document is the result of a planning process conducted by our Strategic Direction Team. The Team consisted of both government and contractor staff and represented a good cross section of scientists, managers, and administrators. The process consisted of extensive brainstorming by the team members, a large number of interviews with external constituents, and considerable dialog with numerous staff to (a) identify EDC strengths, weaknesses, opportunities, and threats (SWOT); (b) define future scenarios related to EDC=s functional activities; and (c) develop strategic goals that will influence the development of EDC=s annual operating plans. Several working seminars with the EDC senior management staff were used to discuss the SWOT analysis, the accuracy and relevance of the perceived future scenarios, and to clarify and define the specific goals and recommended actions.

CORE VALUES/PRINCIPLES

The EDC has a cadre of highly qualified professional personnel with a diverse set of skills that enable the EDC to carry out its broad mission responsibilities with a high degree of credibility, flexibility, and responsiveness. The organizational culture and performance of the EDC is strongly influenced by a set of core values and guiding principles. These include:

1. High regard for employees

We believe employees and teamwork are the keys to our success. The concept of a team, where an individual is viewed as a critical part of the whole, serves as a model for the EDC=s operation. We work together unselfishly for our common goals. Each employee=s function significantly helps the EDC fulfill its overall mission. We view employee growth through training and education opportunities as essential. We strive to demonstrate mutual trust and respect toward all.

2. Commitment to quality

We provide the highest quality, scientifically defensible, and cost-effective products and services. We endeavor to maintain standards through quality assurance, scientific review, and validation.

3. Pursuit of excellence

We are committed to the pursuit of excellence in all that we do. We sustain our reputation of leadership through outstanding accomplishments and professional, skilled staff. We are a highly valued, world-class resource for the people, industry, and the Government of the United States.

4. Responsibility to our customers

We understand that the value of the data we provide is in the data=s usefulness to our customers. We dedicate ourselves to customer satisfaction. We actively remain cognizant of our customers= evolving information requirements. We fulfill their needs in a meaningful, timely, and helpful manner. With our customers, we look to the future as we develop capabilities and products that will enhance our ability to serve them.

5. Dedication to action

We are a goal-oriented, motivated, and efficient work force. We are committed to the philosophy that customer needs represent opportunities and challenges that are to be aggressively and energetically pursued and carried to completion.

6. Foundation in partnerships

We are a synergistic partner with other U.S. agencies and international organizations. We actively participate in collaborative efforts, ensuring that our products and services meet and exceed our partners= requirements.

7. Innovation

We creatively and imaginatively look to the future by designing, developing, and using innovative approaches and technologies to address our customers= rapidly evolving needs. We keep abreast of technology advances in industry, at universities, and elsewhere. We test and evaluate innovative, leading-edge techniques to find more efficient and cost-effective solutions to tomorrow=s problems.

The core values and principles that the EDC adheres to contribute significantly to the EDC=s culture and work environment. These must be developed and maintained in order to excel in current and future business activities. Thus, it is recommended that the EDC adopt a goal and series of actions that will ensure continuance of these core values and principles.

Goal 1: The EDC remains committed to its core values and guiding principles.

Actions:

1. Maintain a cadre of multi-disciplinary personnel with requisite training and expertise in remote sensing data acquisition, systems engineering and development, image processing, other geospatial information technologies, applications research, technology transfer, and outreach.

2. Create a work force rich in cultural diversity.

3. Provide increased training opportunities so that staff remain current with changing technology and are able to utilize and build upon that new technology.

4. Implement process engineering business practices.

5. Create a management style in which leaders provide visionary guidance and function as strong advocates in national and international forums.

6. Create an environment in which all employees are actively engaged in creative aspects of the EDC=s work and are encouraged to develop new ideas and innovations.

7. Enhance support for collaborative partnerships by providing an infrastructure to develop grants, proposals, and other collaborative agreements, including proposal development experts, technical writers, and graphics support.

FUTURE SCENARIOS

The availability of improved data and tools to manipulate and analyze data has resulted in an explosion in the types of applications and the demands for data at global, national, regional, and local levels. Concurrently, the Nation is undergoing an unprecedented era of rapidly changing computer technology and significantly enhanced communications infrastructure for a growing and diverse population of scientists, engineers, and managers, all of whom have ever-changing data and information requirements and high expectations for access to land information. Simultaneously, there is a proliferation of improved geo-spatial data acquisition, collection, and production systems, and an emerging industry of diversified, value-added data providers. Consistent with the strategic plans of the USGS and NMD, the EDC will develop strategies that will ensure the proper preservation of the Nation=s geo-spatial land data and information, enable efficient access for all users, support continued development and demonstration of new methods for applying and interpreting these data, improve data formats and pre-processing towards development of real-time access of data products, and pursue outreach opportunities for expanding the population of users. (Geo-spatial data includes remotely sensed, cartographic, and other geographically referenced land information).

I. Future Scenario for Archive Management

There will be an exponential increase in data sources from U.S. Government programs, commercial systems, and foreign systems. Data content will vary considerably and be more complex, for example, radar and hyper-spectral systems as well as cartographic and other Earth science information such as National Hydrographic Data, National Elevation Data, and land characterization data. Long-term, continuous, repetitive, global data acquisition strategies will not necessarily be the norm. Research into new applications will suggest that new derivative products should be added to the archive.

Goal 2: EDC is the preferred long-term archive for land remote sensing data from U.S. Government programs, commercial systems, and selected foreign systems.

Actions:

1. Engineer and document a process to determine which remotely sensed land data holdings should be represented in the EDC=s archives and which should remain in collateral facilities, linking to our information systems.

2. Conduct and maintain an assessment of end-user data requirements to include data source characteristics, spatial and temporal coverage, and higher-level product requirements.

3. Regularly survey the availability of various data sources and determine where the needs of the end-user community are not being addressed by other data providers.

4. Actively pursue partnerships with Federal and commercial data sources that address end-user data access needs.

5. Develop and implement a process for evaluating, estimating, and determining the relative priority, suitability, and costs associated with the acquisition of remote sensing data sets for inclusion in the National Satellite Land Remote Sensing Data Archive.

6. Investigate the suitability and feasibility of new data acquisition opportunities and facilitate their initiation and implementation.

7. Provide scientific input on the desired characteristics of future sensors so that the data collected will complement and enhance the land resource data contained in the archive.

Goal 3: EDC is the principal archive and distribution facility for USGS geo-spatial data.

Actions:

1. Develop a process, including criteria, to decide which USGS data holdings should be represented in the EDC=s archives.

2. Build stronger relationships with other USGS Divisions to incorporate other USGS geo-spatial data holdings into the EDC archive.

3. Explore potential areas of collaboration with other U.S. geo-spatial data archives as well as foreign and private data sources.

4. Maintain and preserve the archive for our customers, business partners, academia, and other Government organizations as a national asset.

5. Provide increased visibility and accessibility of the archives for all potential users through such mechanisms as increased research and applications and more creative and innovative uses of Internet technology.

Goal 4: The EDC strengthens its standing as a world leader in data archiving and data management through continued improvements in information technology and effective use of advisory bodies.

Actions:

1. Create a flexible environment for meeting the diverse and evolving needs of the EDC=s data archives.

2. Initiate and maintain long-term relationships with the National Archives and Records Administration and other national and international organizations that work with long-range data management issues and leading edge data management systems to ensure that the best practices are implemented at EDC.

3. Work with external advisory groups, for example, Archive Advisory Committee, to (a) obtain information from other agencies and the private sector to define the Government=s role in archiving data and in developing and distributing products, and (b) define the roles and responsibilities of the EDC as a National Center for archiving, managing, and distributing geo-spatial data.

4. Develop a plan for an off-site, back-up archive of EDC holdings.

5. Seek outside consultation on the design of a future information management system based on Federal and international standards, framework clearinghouse concepts, and customer input.

6. Invest in leading-edge archive management tools.

7. Seek outside consultation on the design of future seamless data archives, emerging data standards, framework concepts, and emerging archive technologies.

8. Implement standardized multi-site collaboration technologies which allows remote archives to link into EDC data holdings and vice versa, for example, EPA-Open Access.

9. Initiate and maintain long-term relationships with organizations in higher education, government, and private industry (for example, the University of Maryland-College Park, Defense Advanced Research Program Agency, the Massachusetts Institute of Technology) to receive training and to participate in research to develop leading-edge information management systems.

II. Future Scenario for Data Access and Distribution

Users of EDC geo-spatial data will vary widely in both their technical capabilities and their understanding of our data holdings. This will necessitate varying data access scenarios and a flexible, standards-based information system architecture. In addition, mass storage, computing, and networking technologies will continue to evolve and deliver increased capabilities. Finally, development of new interpretive methods and derivative products that have the potential to shift user-access needs can serve as early notice for acquiring new technologies to address those needs.

Goal 5: The EDC=s Customer Services provides scientific and technical support to customers.

Actions:

1. Develop a profile of the evolving customer base from traditional remote sensing scientists to current and future users of all archived geo-spatial data.

2. Develop profiles of the EDC user community that would benefit from a 3-dimensional browse capability.

3. Develop tools and mechanisms that allow customers to document how they are using the data acquired from the EDC (for example, how customers transform data into information).

4. Develop a plan for the evolution of Customer Services to respond to a changing customer base, including the identification of future functions to be performed by Customer Services staff and the definition of the level of support required for science applications.

Goal 6: The EDC leverages new technology to improve geo-spatial data access.

Actions:

1. Pursue appropriate use of advanced visualization and display capabilities to (a) enhance the public visibility of selected data sets, (b) provide additional functionality in the information system, such as setting up complex queries, and (c) provide additional browse functionality using applicable industry and Federal standards.

2. Implement, where appropriate, standard/commercial technologies to provide improved access to geo-spatial data and services. (For example, three-dimensional visualization and display standards such as the Virtual Reality Markup Language for enhancing browse capabilities, distributed processing technology standards such as the Common Object Request Broker Architecture to support standard geo-spatial catalog and data access services, and distributed/Web document presentation and management standards such as the eXtensible

Markup Language and the Document Object Model for providing information to users via the Internet).

3. Maintain leading-edge data access capabilities by incorporating advanced knowledge of new data products and feedback from targeted users into strategic planning for data access and management.

4. Actively plan to facilitate Internet use for browse and distribution of geo-spatial data.

5. Continue to participate in the OpenGIS Consortium. Promote the use of interfaces as they are adopted and deployed. Use the interfaces, either by developing implementations of our own or by using commercial off-the-shelf (COTS) software products that implement the interfaces.

Goal 7: The EDC has viable partnerships with private sector entities to develop wholesale/retail relationships for the distribution of USGS data.

Actions:

1. Partner with private industry and academia to expand and modernize information management systems.

2. Develop and maintain business partner agreements with private industry, where appropriate, for geo-spatial data access and distribution.

3. Pursue brokerage agreements with private companies that will benefit USGS and EDC customers.

4. Serve business partners, academia, and other Government cooperators worldwide with timely and easily accessible geo-spatial data.

III. Future Scenario for Product Development

The EDC currently does most of its development of new and ongoing products in-house. Research, technique development, and prototyping are done to provide new products, to demonstrate new uses of products, or to provide more efficient mechanisms for generating products. The EDC will continue to strongly support these activities in-house, but will shift toward increased use of outsourcing for generating ongoing or repetitive products. In these cases, our role will become increasingly more than that of a facilitator, assuring the product generation activities are accomplished to existing Federal or other customer requirements according to existing Federal Geographic Data Committee and National Spatial Data Infrastructure product specifications. The Government may assume much of the risk associated with product development activities through in-house product development, cooperative activities with other Federal agencies, grants to universities, or contracts with the private sector.

However, once product specifications and production methodologies have been determined, the most efficient mechanisms for product generation should be investigated and should include significant outsourcing.

Goal 8: The EDC has a leading role in product development for USGS and NMD.

Actions:

1. Work with the NMD=s Data, Information, and Delivery staff to implement a process to identify the needs of USGS/NMD and other collaborators with respect to product development.

2. Define the relationships between various product development needs to determine which needs could be combined and concentrate on those product development activities that are of highest priority.

3. Utilize an internal product development review board and the NMD Product Proposal Review Board to assure proper approval, coordination, and progress is made on high priority product development and generation activities.

4. Foster commonality across product lines by promoting the development and use of standards in product development.

5. Collaborate with other NMD organizations to identify data production process and product specification improvements that would enable USGS to distribute seamless data, where appropriate.

6. Promote the production of seamless data products, leveraging partnerships with the private sector, where appropriate.

7. Initiate a prototype development effort to implement a seamless raster data set using existing data such as the National Elevation Data and the Multi-Resolution Land Cover data.

Goal 9: The EDC fosters a robust and vigorous value-added product generation industry by promoting the development of new geo-spatial products and services in the private sector.

Actions:

1. Produce prototype products that demonstrate new and varied uses for data.

2. Pursue image scanning technology to provide digitized film products. (This may be an activity that could be outsourced.)

3. Establish working relationships with the private sector, where appropriate, to outsource product development and generation activities.

4. Pursue utilization of grants, Cooperative Research and Development Agreement (CRADA) opportunities, Innovative Partnerships, and contracting to encourage creativity and competition in product development from a variety of sources.

IV. Future Scenario for Applications Research and Development

The demand for remotely sensed and other related geographic information increases significantly, driven by the need to monitor the Earth's increasingly precious resources over a wide range of spatial and temporal scales. The EDC, widely respected for its ability to provide a bridge between basic remote sensing research and pragmatic resource management, has an active research program designed to develop new methods for mapping the distribution of our planet's resources, monitoring them vigilantly over time, modeling the processes that are observed to infer processes that are less directly observable, and providing the training and transfer of technology necessary to manage resources. Because EDC understands that the existence of the archive and all supporting technologies are justified entirely by the applicability of remotely sensed and related geo-spatial information, reliable and consistent funding mechanisms are necessary to insure the continued vigor and relevance of a credible applications research effort.

Goal 10: The EDC leads NMD=s research program in the applications of USGS geo-spatial data to critical bureau Earth science issues.

Actions:

1. Develop a research agenda that addresses the most important Earth sciences issues: global climate change, population dynamics, physical process monitoring, Earth-atmosphere interactions.

2. Define the requirements for products within this broad constituency.

3. Develop applications of archived data for resource management, environmental assessment, hazards analysis, and Earth science investigations.

4. Facilitate the use of archive-derived data products in relevant applications scenario, including mapping, monitoring, managing and modeling with a focus towards helping to meet the land information needs of Department of the Interior bureaus.

5. Develop collaborative programs with appropriate Federal agencies for forecasting, monitoring and mitigating hazards. Identify remote sensing and information management technologies that are most appropriate for addressing a wide range of hazards scenarios.

6. Conduct field-based studies that improve the understanding of archive data products and their relationship to the Earth processes they represent.

7. Form an academic research consortium to collaborate on information access and delivery technologies.

8. Explore opportunities for research partnerships in the private sector.

9. Invest in state-of-the-art information science research in such areas as human-computer interface design, data base design, clearinghouse technologies, and data warehousing.

10. Develop appropriate access to relevant data archives (for example, other Government agencies, academia, and the private sector, to support applications research.

11. Develop and apply validation strategies that provide evidence of archive data product quality.

12. Explore the use of EDC=s resources for addressing public health and urban dynamics.

13. Develop mechanisms for moving basic applications research to operational resource monitoring and management applications. Pursue collaborative activities with NASA to implement technology transfer activities.

14. Promote external research, through academic, Government, and private research entities to address those issues that are beyond the capabilities of EDC=s internal research staff.

Goal 11: The EDC leverages new archive, communication, and visualization technologies to pursue innovative research and analysis directions.

Action:

1. Develop near-real time, multi-scale monitoring and change analysis strategies. Identify key programs and their requirements for monitoring change. Develop and test land-transformation detection, targeting, and assessment strategies. Facilitate the use of monitoring and change strategies in near-real time applications.

2. Develop improved visualization, analysis, and data mining technologies. Explore, test, and apply data-mining strategies appropriate for resource management and scientific users.

3. Identify methods, strategies, and standards for geo-spatial data base development. Develop seamless, multi-layered, geo-spatial data bases for resource management applications. Apply industry-standard quality assurance and validation practices.

4. Apply new and emerging technologies to explore: alternative land cover mapping, alternative topographic and land surface deformation mapping, alternative soil-moisture/evapotranspiration/surface hydrology mapping and monitoring, monitoring land-atmosphere changes of energy and matter for the purpose of improved meteorological, climatological, ecological, and public health models and assessments.

5. Stay abreast of new and emerging technologies with increased participation in forums demonstrating new technologies for Earth science and resource management applications and increased use of EDC=s facilities to host conferences on emerging technologies such as the LightSAR conference.

6. Pursue a CRADA or internally funded prototype development effort to demonstrate the feasibility of using COTS technology such as the Spatial Database Engine to provide seamless access to vector and raster data.

V. Future Scenario for Technology Research and Development

Widely available high-speed Internet connections, powerful desktop processors, and commercial Web-based data providers will lead EDC=s customers to demand real-time access to application-ready data products and services. These increased customer expectations, combined with the proliferation of new sensor types and technologies and new examples of resource management and research applications, will require the EDC to implement a more flexible, modular system architecture. The costs associated with implementing the necessary upgrades to EDC=s network, processing, archive, and software infrastructures will require greater reliance on COTS hardware and software, as well as establishing partnerships (for example, Gateway to the Earth) to spread the data dissemination load.

Goal 12: The EDC is an active participant in the development and implementation of new technology of central importance to the EDC=s mission.

Actions:

1. Prepare for the profound impact the Web/Internet will have on how we do business. Minimize the restrictions placed on employees for using the Web. Obtain and use a digital certificate.
2. Seek opportunities to actively participate on the World Wide Web consortium and prototype geo-spatial applications using the consortium=s standards.

3. Prototype small applications that utilize the infrastructure provided by the Web. Move quickly to more complex systems. Web-enable everything.

4. Work closely with technology vendors (for example, ESRI, Lizard Tec) to convey future requirements and to determine technology trends.

5. Implement focused and systematic efforts to support the characterization and evaluation of new sensor types and technologies. Establish closer contact with colleagues working in sensor system development at places such as the NASA Goddard Space Flight Center, the Jet Propulsion Laboratory, and Raytheon Santa Barbara Remote Sensing.

6. Pursue CRADA opportunities with commercial remote sensing system developers, leveraging the Landsat 7 Image Assessment System ETM+ characterization and calibration experience, to develop sensor characterization and calibration tools for other Earth remote sensing missions.

Goal 13: The EDC continuously modernizes its technology infrastructure.

Actions:

1. Establish an annual information technology planning process and implement aligned efforts with appropriate vendors 1 to 3 years in advance of when functionality is required.

2. Establish common systems development terminology and definitions for those terms. Utilize process engineering techniques, where possible. Clarify roles and responsibilities tied to specific steps of systems development processes.

3. Establish technology standards and a review/approval process at the EDC. Consider establishing new software standards based on component technology utilizing COTS tools, where appropriate, to enable greater flexibility and efficiency.

4. Move toward EDC-wide software system standardization and participate in ongoing spatial

data software service standardization efforts. Examples include work done by the OpenGIS Consortium, the Common Imagery Interoperability Working Group, and the National Imagery and Mapping Agency (NIMA) Architecture Integration Group. Develop a prototype catalog server implementation, using selected EDC catalog holdings, including basic access services and one or two client implementations, in order to gain experience with the emerging standards and to demonstrate the relevant technology and concepts.

5. Develop one or more prototype application servers to demonstrate the feasibility of exploiting standard catalog and data servers to rapidly deploy higher-level data services.

6. Develop advanced computing resources and an information infrastructure to support applications research and development.

7. Establish an information technology architecture with an ongoing effort to keep it current and ensure that projects utilize and contribute to that architecture.

8. Conduct detailed investigations of computer industry developments and EDC's needs in the areas of computer hardware and networking.

9. Perform ongoing, detailed investigations of industry developments and EDC needs for long-term archives (100+ years), including recording and media technology, media and technology life cycle, environmental controls, condition of current archive holdings, appropriate data formats, and off-site storage.

10. Develop and document a facility development plan for the next 5 years, based on anticipated staff growth and requirements for conditioned space (computer rooms). Include a facility impact assessment when new projects are being evaluated.

VI. Future Scenario for Communication and Outreach

In this age of technological advances, there will be an abundance of new media to service a growing telecommuter job market. For instance, digital video technology promises to multiply services and dwarf previous efforts to make video as big and real and interactive as life. Imagine the EDC reaching out to people through the use of three-dimensional mapping technology to view USGS data. Viewers would be able to choose their own camera angles. Children would be able to co-program a "virtual world" channel with peers halfway around the globe. A pair of headset projectors might beam 4,000-line, three-dimensional data from the EDC directly onto the retina of a customer's eye. Consider the possibility of devices that create tactile sensations of land data.

Outreach at the USGS and EDC will change significantly in the next decade, both because of increased demand for specialized media among telecommuters, and because of the concomitant evolution of new technologies for analyzing and interpreting data. Long-range planning for

outreach can be guided by informal or formal, systematic polling of the views held by EDC customers. Finally, advances in fiber distribution and global interconnection will enable EDC staff to reach out to students and teachers worldwide to provide online training about the availability, processing, and applications of land resource data.

Goal 14: Robust communication channels exist within the Earth science community to facilitate information exchange and scientific collaboration.

Actions:

1. Support and improve the Library, one of the EDC=s most credible symbols of a viable research capacity in applications and other areas of research. Implement Web-based information exchange and remote collaboration technologies to improve EDC=s research capabilities away from major think tanks. Promote peer-to-peer exchanges (colloquia, conferences, and special topics meetings).

2. Develop a Science Advisory Panel for EDC applications research and product development.

3. Create a Science Museum for Remote Sensing at the EDC or in the Sioux Falls Area. This museum should portray the history of remote sensing, provide hands-on exercises, and highlight current and future activities in remote sensing.

4. Re-establish the Outreach Advisory Team (not restricted to EDC staff) to offer advice on outreach activities, help support major events, and develop new outreach proposals and initiatives.

5. Establish mechanisms for the Outreach Advisory Team to collaborate with the EDC=s Senior Staff to target audiences for EDC's outreach efforts.

6. Develop university consortia focused on EDC=s needs and roles in the Earth science and resource management community. Explore existing consortia as a starting point. Devise mechanisms for using consortia both to gain important research expertise and to recruit new talent to the EDC.

7. Develop strategies for providing training, technical assistance, and technology transfer to EDC constituents through appropriate collaborative efforts with both public and private organizations.

CONCLUSION

The EDC has a very dynamic and evolving program with many new opportunities for changing or expanding the mission relevant activities at the EDC. This report is intended to provide a series of goals for the EDC to aspire towards over the next 5 to 10 years. The recommended actions are intended to assist the EDC senior staff in developing annual operating plans that will ensure that the goals are achieved.

The EDC will continually review these goals and recommended actions to ensure that the EDC is responsive to changes in program direction over time and that the EDC actions are consistent with the evolving USGS and NMD strategic plans.