CSR IMPLEMENTATION PLAN FOR THE SELF-SUSTAINABILITY
OF THE TEXAS INFOMART

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December 14, 2001
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<tr>
<td>ASTER</td>
<td>Advanced Spaceborne Thermal Emission and Reflection Radiometer</td>
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<tr>
<td>AVHRR</td>
<td>Advanced Very High Resolution Radiometer</td>
</tr>
<tr>
<td>BIC</td>
<td>Borderlands Information Center</td>
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<td>CPP</td>
<td>Continuing Planning Process</td>
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<tr>
<td>CSR</td>
<td>Center for Space Research</td>
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<td>CWA</td>
<td>Clean Water Act</td>
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<tr>
<td>DB</td>
<td>Direct broadcast</td>
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<tr>
<td>DEM</td>
<td>Digital Elevation Models</td>
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<td>DOQ</td>
<td>Digital Orthophoto Quadrangles</td>
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<tr>
<td>DRG</td>
<td>Digital Raster Graphics</td>
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<tr>
<td>ECS</td>
<td>EOS Core System</td>
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<td>EOS</td>
<td>Earth Observing System</td>
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<td>EOSDIS</td>
<td>Earth Observing System Data Information System</td>
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<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
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<tr>
<td>EROS</td>
<td>Earth Resources Observation System</td>
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<tr>
<td>ETM+</td>
<td>Enhanced Thematic Mapper Plus (Landsat)</td>
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<tr>
<td>FEMA</td>
<td>Federal Emergency Management Association</td>
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<td>FTP</td>
<td>File Transfer Program</td>
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<tr>
<td>GeoTIFF</td>
<td>Georegistered Tagged Image File Format</td>
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<tr>
<td>GIS</td>
<td>Geographic Information System</td>
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<tr>
<td>HiPPI</td>
<td>High Performance Parallel Interface</td>
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<tr>
<td>IKONOS</td>
<td>Space Imaging High Resolution (1M) Earth Resources Satellite</td>
</tr>
<tr>
<td>Internet2</td>
<td>UT Connection to High Speed (1 gigabit/sec) Internet Service</td>
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<tr>
<td>MODIS</td>
<td>Moderate-Resolution Imaging Spectroradiometer</td>
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<td>MOU</td>
<td>Memorandum of Understanding</td>
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<td>NASA</td>
<td>National Aeronautic and Space Administration</td>
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<td>NEXRAD</td>
<td>(National Weather Service's) Next Generation Weather Radar</td>
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<td>NPOESS</td>
<td>National Polar-orbiting Operational Environmental Satellite System</td>
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<td>SIP</td>
<td>State Implementation Plan</td>
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<td>SPOT</td>
<td>French High Resolution (10m) Earth Resources Satellite</td>
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<td>StratMap</td>
<td>Texas Strategic Mapping Program</td>
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<td>TACC</td>
<td>Texas Advanced Computing Center</td>
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<td>TBD</td>
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<td>TGIC</td>
<td>Texas Geographic Information Council</td>
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<td>TIROS</td>
<td>Television Infrared Observational Satellite</td>
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<tr>
<td>TNRCC</td>
<td>Texas Natural Resource Conservation Commission</td>
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<tr>
<td>TNRIS</td>
<td>Texas Natural Resources Information System</td>
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<tr>
<td>TPWD</td>
<td>Texas Parks and Wildlife Department</td>
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<tr>
<td>TWDB</td>
<td>Texas Water Development Board</td>
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<td>USFWS</td>
<td>United States Fish and Wildlife Service</td>
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<td>United States Geographical Service</td>
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<tr>
<td>UT</td>
<td>The University of Texas at Austin</td>
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<td>UTM NAD</td>
<td>Universal Transverse Mercator North American Datum of 1983</td>
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EXECUTIVE SUMMARY

The Texas InfoMart is a web-based data distribution system designed to serve remotely-sensed satellite data and data products, primarily from the Earth Observing System (EOS) Core System (ECS), to the large State of Texas user community. Once operational, data products from CSR are routinely sent via a High Performance Parallel Interface (HiPPI) Connection, i.e. fiber optics cable, to the Texas Advanced Computing Center (TACC). From the TACC, InfoMart users may access data in near real-time through The University of Texas at Austin (UT) 1 gigabit/sec Internet2 land line, download large data sets via File Transfer Program (FTP) over T1 or higher systems, and view standard products routinely generated for dissemination through any web browser. Much of the Texas InfoMart infrastructure was created under the Synergy Program using National Aeronautic and Space Administration (NASA) funds provided to CSR through a contract with the Raytheon Systems Company, including acquisition of the SGI 3400 data server and a 60 terabyte data archival system hosted at the TACC. Both were purchased in part using NASA funds in a cost-sharing arrangement with UT. Salaries for CSR staff developing the InfoMart were funded almost exclusively by the Synergy Program. Slightly more than $2 million in total were expended by CSR during the first two years (2000-2001) of the Synergy Program. These funds were used to develop and implement the InfoMart Developmental Prototype at CSR and the Advanced Prototype at the TACC, acquire additional remotely-sensed data and products, educate users of the system on the capabilities of the Texas InfoMart, and work with the State of Texas user community to define their product requirements. During Synergy II, the second year of the Synergy Program, it became evident that a formal model was needed to ensure the long-term viability of the Texas InfoMart. Therefore, CSR began examining resource requirements and potential funding sources for operating the Texas InfoMart in the University environment. It was concluded that the Texas InfoMart would rely upon a stable base of funds acquired by UT through the Texas Legislature. To obtain these funds, CSR needs the strong advocacy of two major Texas user communities, the Texas Natural Resources Information System (TNRIS), representing the GIS user community, and the Texas Natural Resource Conservation Commission (TNRCC), the agency responsible for air and water quality across the State of Texas. To solidify the advocacy of these agencies, CSR established a requirement for an initial operational capability (IOC) of September 1, 2003 which conforms to the beginning of the 2004-05 Texas Biennium budget cycle. Meeting this schedule requires CSR, in 2002, to fully implement and test the Advanced InfoMart Prototype at the TACC, extend InfoMart services to a broader user community, and formalize the advocacy needed to make a petition to the Texas Legislature for a line-item in the budget. The plan also calls for CSR to begin the final migration of key InfoMart data and data products to the TACC in January, 2003 at the beginning of the next Texas legislative session and conclude by May, 2003 when the Legislature adjourns. CSR has also identified additional funding sources including sales of educational literature on the Texas InfoMart and grants that will be awarded to CSR in response to requests for proposal and research announcements. There exists the potential for data sales through the commercialization of the Texas InfoMart and CSR acquired the services of SeaSpace Corporation and Boeing-Autometric Inc. to assist with a market analysis of potential business opportunities. However, commercialization of the InfoMart is not considered a viable source of funding at this time. This document provides detailed information on the CSR Implementation Plan for the Self-Sustainability of the Texas InfoMart and outlines activities which must be successfully completed to meet an IOC of September 1, 2003.
1.0 INTRODUCTION

Background information is provided on the primary customers of the Texas InfoMart, i.e. the State of Texas user community. There are two key State organizations that comprise this customer base: the Texas Natural Resources Information System (TNRIS) and the Texas Natural Resource Conservation Commission (TNRCC). TNRIS bears responsibility for the dissemination of public domain geospatial data related to the human and natural resources of the State of Texas while TNRCC is a regulatory agency responsible for policy and monitoring these resources. TNRIS represents the vast Texas GIS user community while TNRCC is responsible for Texas air and water quality, including air pollution monitoring and prediction. Applications for ECS data developed for either of these key customers could extend the InfoMart to users outside Texas and possibly to other nations.

1.1 TNRIS - GIS DATA REQUIREMENTS FOR THE STATE OF TEXAS

TNRIS is often referred to as the geospatial data clearinghouse for the State of Texas. It serves as a repository and distribution hub for data created by many different governmental agencies. The following background information is available on the TNRIS web site:

TNRIS was established by the Legislature in 1968 as the Texas Water-Oriented Data Bank. In 1972, after four years of growth and diversification, it was renamed the Texas Natural Resources Information System. The mission of TNRIS is to provide a "centralized information system incorporating all Texas natural resource data, socioeconomic data related to natural resources, and indexes related to that data that are collected by state agencies or other entities" (Texas Water Code, 16.021).

TNRIS also fills a number of other roles, and serves as:
- Geographic Names Coordinator for Texas,
- A State Data Center affiliate,
- An Earth Science Information Center affiliate,
- Co-sponsor of the annual Texas GIS Forum and Training Conference,
- Sponsor for technical workshops.

TNRIS is an operational Division of the Texas Water Development Board (TWDB), and for administrative and managerial purposes, it is part of that agency. However, the TWDB receives advice on the operation of TNRIS from the Texas Geographic Information Council (TGIC), a geographic data planning and coordination group serving state and regional government agencies in the State of Texas. TGIC also advises the Executive Director of the Department of Information Resources on statewide rules and guidelines for agency use of geographic information technologies.

TNRIS maintains a library of digital and paper data and provides information about data available from other sources. TNRIS is organized into four sections: Information Services, the Research and Data Center, the Texas/Mexico Borderlands Information Center (BIC), and the Texas Strategic Mapping Program (StratMap).

- **Information Services Section**: is responsible for the acquisition, warehousing, and distribution of digital geospatial information. TNRIS distributes a variety of digital geospatial data to users via the Internet and CD-ROM, including Digital Orthophoto
Quadrangles (DOQs), Digital Raster Graphics (DRGs) and Digital Elevation Models (DEMs). Recently, TNRIS has been a leader in ArcIMS map service development and has devoted staff and other resources to the creation of the Texas Geography Network.

- **Research and Distribution Center**: distributes current maps and data, and provides access to historical information. Data distributed includes United States Geographical Service (USGS) topographic maps, United States Fish and Wildlife Service (USFWS) wetlands maps, Federal Emergency Management Association (FEMA) flood hazard maps, analog aerial and satellite imagery, groundwater and surface water data, and census data and maps.

- **Texas/Mexico Borderlands Data and Information Center**: is a clearinghouse and referral center for information regarding both sides of the Texas/Mexico border (100 Km either side of the border). The BIC goals are to make data and information related to the natural resources and demographics of the border available in a timely and efficient manner to researchers, planners, and others with responsibilities for protecting the environment, public health and well being of the borderlands region and to promote closer ties, communication, and data sharing among entities with borderlands responsibilities and thereby reduce redundancy in data collection and project activities.

- **Texas Strategic Mapping Program (StratMap)**: is a Texas-based cost-sharing program to develop digital geographic data layers in partnership with public and private sector entities. The goal of StratMap is to produce consistent, standardized, compatible, statewide digital data for use by all individuals and groups needing spatial data in Texas. The seven data layers being produced by StratMap are digital orthoimages, DEMs, hypsography contours, soil surveys, hydrography, transportation and political boundaries. The funding profile for StratMap is shown in Figure 1.

![Figure 1. Funding profile for the Texas Strategic Mapping Program.](image)

The federal government and the State contributed up to 75% of the development costs of Stratmap data layers. Local funding sources included local agencies, non-profit organizations and, in some cases, private sources. These private funds are eligible for tax deductible charitable contributions. One fundamental requirement for participation by
The collection and maintenance of current data and data products for the StratMap Program are very expensive. In 1997, the 75th Texas Legislature awarded StratMap $5 million in funding for fiscal years 1998-99 as part of the water resources planning bill. In 1999, the 76th Texas Legislature funded StratMap with an additional $5 million for the fiscal years 1999-2000, to help complete the statewide strategic mapping program. In 2001, the 77th Texas Legislature provided additional funds for maintenance and enhancement of several data layers. These funds are not sufficient to cover all StratMap costs. The success of the program has required outreach, coordination, and consensus building at all levels of government.

The State has a program to continuously update the DOQs by obtaining completely new data every four to eight years. In addition, the State desires to obtain two-cycles of Landsat coverage per year and uses cost sharing with multiple programs to purchase these data, such as has been done under Synergy I and Synergy II programs. TNRIS has a Memo of Understanding (MOU) with the USGS to provide terrain corrected Landsat data for emergency responses.

1.2 TNRCC – AIR AND WATER QUALITY IN THE STATE OF TEXAS

The history of natural resource protection by the State of Texas is one of gradual evolution from protecting the right of access to natural resources (principally surface water) to a broader role in protecting public health and conserving natural resources for future generations of Texans. Natural resource programs were established in Texas at the turn of the 20th century, motivated initially by concerns over the management of water resources and water rights. In parallel with developments in the rest of the nation, and at the federal level, state natural resource efforts broadened at mid-century to include the protection of air and water resources, and later to the regulation of hazardous and non-hazardous waste generation. During the 1990s, the Texas Legislature moved to make natural resource protection more efficient by consolidating programs. This trend culminated in the creation of the TNRCC in the fall of 1993 as a comprehensive environmental protection agency. Today, the TNRCC has approximately 3,000 employees, 16 regional offices, and a $410.9 million annual appropriated budget for the 2000 fiscal year. As shown in Figure 2, the TNRCC budget is funded by regulatory program fees ($323.8 million), Federal funds ($53.4 million), State general revenue ($27.5 million) and other sources ($6.2 million).
Three full-time commissioners are appointed for six-year terms by the governor to establish overall agency direction and policy, and to make final determinations on contested permitting and enforcement matters. The executive director, who is hired by the commissioners, is responsible for managing the agency's day-to-day operations. Major responsibilities include implementation of commission policies, making recommendations to the commissioners about contested permitting and enforcement matters, and approving uncontested permit applications and registrations. Major responsibilities of TNRCC include:

- **Air Quality**: TNRCC is responsible for developing the State Implementation Plan (SIP) which details the efforts and commitments made by a state in fulfilling its Clean Air Act obligations. The official SIP document is housed at the U.S. Environmental Protection Agency (EPA). There is only one SIP; all later submittals to EPA are SIP revisions to that single comprehensive plan. The rules adopted and submitted to EPA to enforce SIP requirements are part of the SIP—just like the narrative portion that describes the state's plan. The two together--rules and narrative--comprise the SIP revision. A SIP revision that has been adopted by the TNRCC becomes state law immediately, but does not become part of the SIP officially until it has been approved by EPA.

- **Water Quality**: The Continuing Planning Process (CPP) document provides the current management and technical procedures developed and implemented by the TNRCC to control, manage, and abate water pollution in Texas. The Clean Water Act (CWA) requires the state to prepare and publish a CPP which describes the procedures by which the TNRCC will operate. These operating procedures are developed by the various divisions responsible for the implementation of the TNRCC's water quality management program.

- **Drought**: TNRCC is responsible for monitoring drought conditions, permitting weather modification projects, assisting public drinking water systems in the preparation of drought contingency plans, administering water rights, and providing technical assistance to public drinking water systems.
**Border Issues**: The U.S.-Mexico border region, as defined under the La Paz Agreement, is the area 100 kilometers (62.5 miles) on either side of the 3,200 km (2,000 mile) boundary between the two countries. In Texas, the border region is a unique area ranging from the sister cities of El Paso and Ciudad Juarez, to the Gulf of Mexico, near the sister cities of Brownsville and Matamoros. In this part of the US-Mexico border region, where four Mexican states border Texas, a number of issues characterize the area: incredible natural beauty, scarce hydrological resources, and burgeoning metropolitan areas. It is a land of opportunity and promise, trying to accommodate the increasing demands made by humans and wildlife.

One office within TNRCC is highlighted since it is the primary customer of the Texas InfoMart. The Office of Environmental Policy, Analysis and Assessment has four major functions: strategic environmental analysis and assessment; the coordination of all agency policy development and rulemaking; the coordination of border affairs; and the technical analysis of data to support these functions. Divisions within this office include:

- **Strategic Assessment Division**: researches regional and statewide environmental issues for the purpose of setting priorities and developing informed strategies to protect and improve the state's environment. The division conducts diverse projects such as: the analysis of environmental indicators, development of performance metrics, trends analysis, and comparative risks. The Strategic Environmental Analysis Group produces the agency's State of the Environment Report, which serves as Volume II of the agency's Strategic Plan. It also conducts evaluations of agency strategies and their impacts on environmental conditions. The division serves as the lead for the development of air quality state implementation plans, solid waste planning, and the Total Maximum Daily Load Program to address impaired surface water bodies.

- **Policy and Regulations Division**: performs a variety of activities including the coordination of Regulatory Forums, Commissioners' Work Sessions, and statewide public hearings; the publication of agency rules in the Texas Register; the development of memoranda of understanding with other state agencies; maintenance of the online Rules Tracking Log; processing of rule petitions; and coordination with an internal rule liaison/management group to facilitate the regulation development process. The division oversees implementation of changes in operations or rules that result from bills passed by the Texas Legislature.

- **Technical Analysis Division**: develops and updates the emissions inventory for all stationary, mobile, and area sources of air contaminants. Staff also provide information about the Toxic Release Inventory Program. The division provides computer modeling and data analysis in support of pollution control strategies, and designs and implements mobile source pollution reduction programs. In particular, the division designs, administers, monitors, and evaluates the vehicle inspection and maintenance programs, the Texas Clean Fleet and Texas Clean Fuels programs, and provides information and advice on voluntary mobile source emission reduction strategies. In addition, the group performs surface water quality planning and assessments under the Texas Clean Rivers Program, and the Non-point Source Pollution Management Program, performs groundwater quality planning and assessments, and provides support for the Texas Groundwater Protection Committee.
1.3 THE TEXAS SYNERGY PROGRAM

During Fiscal Year 2000, NASA initiated the “Synergy Program” as a new segment of the Earth Observing System (EOS) Data Information System (EOSDIS) Core System (ECS) with the specific objective of demonstrating applications for EOS data to users outside the climate change (research) community. During Phase I of the Synergy Program, nine universities were identified by Raytheon Systems Company, who developed the EOSDIS and manages the Synergy Program, to participate in the project, including the Center for Space Research (CSR) at The University of Texas at Austin. The project name given the program by CSR was the EOSDIS and Texas Data Products Synergy Program, but soon it became known as Synergy I.

The primary goal for CSR during Synergy I was to assess the value of ECS and CSR data and data products for meeting the remotely-sensed data requirements of the Texas Geographic Information System (GIS) community. The approach taken was to show that data and products, derived from sensors, such as the Moderate-Resolution Imaging Spectroradiometer (MODIS) and the Landsat 7 Enhanced Thematic Mapper Plus (ETM+), that have relatively coarse spatial resolution but are routinely available can be vertically integrated with higher spatial resolution but less frequently acquired data and data products, such as DOQs, to create synergistic products that are useful for the large and diverse Texas GIS user community. The premise of Phase I was that the seamless integration of ECS and CSR data and data products with State of Texas GIS data and data products would support the remote sensing requirements for a number of regional applications, including hazard monitoring, drought management, land use planning, estuary management, agricultural productivity, and forestry. The system that offers integrated ECS, CSR, and State of Texas data and data products by means of an Internet web site became known as the “Texas InfoMart.”

Through the course of Synergy I, CSR Staff demonstrated the importance of developing close working relationships with State of Texas user partners. These relationships are essential to identify the unique requirements of each user group and catalyze the development of new, advanced data products. During the latter stage of the program, products initially created for user evaluation were provided on a near-operational basis, successfully addressing the real-time emergency response needs of some State users. By the end of Synergy I, it had been demonstrated that the EOSDIS and Texas Data Products Synergy Program will effectively address the requirements for remotely-sensed data needed by the State of Texas GIS user-community and holds great potential for the larger EOS community. The success of the Synergy I program, assessed by the Texas user-community using criteria established by the State at the outset of this program, provided a solid basis to expand interactions with additional State of Texas user-partners and continue the development of the Texas InfoMart during Synergy II. Phase I concluded with a concept of hosting the Texas InfoMart at the University of Texas Advanced Computing Center (TACC) to facilitate data to be served to the GIS user community via the high speed Internet2.

The goals of Synergy II, were to continue the development of applications that make Synergy products accessible to the GIS user community and to implement a unified access data server for local, State, and Federal agencies. In addition, the Synergy II program required each participating University to develop a business plan to assist it in becoming a self-sustaining entity. This document is the contract deliverable for that task.
During the course of Synergy II, TNRCC contacted CSR and requested support from the Texas InfoMart. Thus, TNRCC became a key new InfoMart customer representing a MAJOR enhancement to the InfoMart system based upon their mission and their stature within the State Government. The support requested by TNRCC expands the Texas InfoMart to products for monitoring air and water quality. Thus, TNRCC provide the InfoMart with the opportunity to significantly extend ECS data and products to a much larger set of applications.

1.4 THE IMPLEMENTATION PLAN TO ACHIEVE SELF-SUSTAINABILITY

The CSR Implementation Plan for the Self-Sustainability of the Texas InfoMart complies with the following restrictions:

- CSR is a research entity of The University of Texas (UT) at Austin and is prohibited from becoming a profit center.
- CSR receives the majority of its support in the form of grants issued to academic institutions.
- CSR, as all UT facilities, is self-insured and is prohibited from any arrangement that could result in liability suits against CSR or UT.
- CSR and UT are tax exempt organizations.
- CSR and the Texas InfoMart receive support from the University and do not need venture capital.
- CSR is provided access to the high-speed Internet2 for delivery of data products over the web. The University annually expends approximately $250,000 for this system.
- CSR receives at no cost its office space, fiber optical networks, and other valuable facility resources from the University.
- CSR does not reimburse the University for salaries of key TACC staff that support the main computer systems of the Texas InfoMart.
- Key CSR Staff will receive compensation from UT for teaching duties, lowering the operating expenses of the Texas InfoMart.

Therefore, the main thrust of this plan is to define the roles and responsibilities of CSR and The University of Texas at Austin pursuant to satisfying the remotely-sensed data and products requirements of key State agencies. The acknowledgement of these roles and responsibilities is critical since:

- The University of Texas at Austin is funded by the State legislature to meet the educational and research requirements of the State of Texas. Thus, the charter for addressing the technology requirements for local, State, and federal organizations lies within The University of Texas System.
- CSR is the center of excellence within The University of Texas system for the collection and analysis of remotely-sensed satellite data.
- CSR has developed the technical expertise to work with local, State, and federal organizations, headquartered in Austin, and help each fully exploit remotely-sensed data to better support existing mission requirements.

While the primary customer base for the Texas InfoMart is expected to be State agencies, the possibility exists that CSR will engage in contractual agreements with commercial customers. In this plan, we consider the potential for educational sales, the commercial market for Texas InfoMart data products, and the possibility that CSR staff will provide technical services to clients that desire to establish similar information distribution systems, or InfoMarts. For example, in the past, CSR has been licensed as a Technical Services Center of the University to recover some operating costs through the sale of satellite data products collected in our direct broadcast (DB) meteorological satellite ground station. A “Cost Center Application” must be filed with The University of Texas at...
Austin before CSR will be allowed to provide products to commercial clients. It is possible that an application will be made to “sell” CSR data provided to the Texas InfoMart, although a decision has yet to be made on the issue. Experience to date suggests this activity will not produce a significant revenue stream.

It is emphasized that the concepts proposed in this plan cannot be fully implemented until approved by The University of Texas at Austin Business Office.

2.0 THE SYNERGY SERVICE

The business strategy of the Texas InfoMart is to routinely acquire ECS data and data products and make them more accessible to the user community across the State of Texas, as shown in Figure 3. Key imagery data sources include Landsat ETM+, MODIS, and Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), and Advanced Very High Resolution Radiometer (AVHRR). In addition, MODIS data will be augmented by VIIRS imagery with the scheduled launch of the National Polar-orbiting Operational Satellite System (NPOESS) in 2009 and possibly as early as 2005 when the first VIIRS sensor is carried on The NPOESS Preparatory Program. Additional data sets of value include SPOT (French High Resolution (10M) Earth Resources Satellite) and IKONOS (Space Imaging High Resolution (1M) Earth Resources Satellite) imagery, which could serve to update the DOQ archive.

Figure 3. Data Collection by the Texas InfoMart and Dissemination to the GIS Community.

Initially, MODIS data and derived products are obtained over the EOSDIS; however, CSR plans to acquire MODIS in real-time using either a DB ground station or the EOSDIS Data
Pool, which is currently being developed by Raytheon. Currently, global MODIS data can be acquired by submitting requests to the EOSDIS. Once received, data are placed on the FTP file server at NASA Goddard and a message is sent notifying the requester that the data are available for file transfer. Unfortunately, it may take several days to receive MODIS Level-1B data using this process and delays of up to 90 days and more have been noted when attempting to obtain Level 2 data products. Therefore, Raytheon is developing a “data pool concept” to speed the delivery of data by routinely distributing data products to each InfoMart as defined by their user communities. CSR suggested this type of capability be implemented in the Synergy I Final Report and has agreed to help test the Data Pool as a participant of the Synergy program. CSR may also wish to disseminate data from the Texas InfoMart to key customers using the Data Pool concept. CSR is convinced that once users of the Texas InfoMart become dependent upon MODIS and other ECS data, the InfoMart data archive must remain current. Failure to provide data upon demand could impact the mission of the Texas InfoMart and result in loss of lives and property. Therefore, CSR will implement the capability that best supports the real-time ECS data requirements of the Texas InfoMart. This capability may include a DB MODIS ground station, the Data Pool, or the use of both for different data products. For example, ASTER data might best be acquired via the Data Pool while India Remote Sensing (IRS) data are available via the TeraScan MODIS ground station.

2.1 DESCRIPTION OF SERVICE

CSR has agreed to provide users of the Texas InfoMart with routine access to Level-1B ECS data and (TBD) Level-2 data products derived from these imagery. EOS data will be obtained from the EOSDIS or via a DB ground station at CSR. In addition, CSR will also assist the State GIS User Community and other customers of the Texas InfoMart in exploiting these data to meet mission requirements. CSR will also help support the Landsat, Spot, and IKONOS data needs of the State GIS User Community by considering unsatisfied TNRIS data requirements in research proposals and by budgeting a (TBD) percentage of funds obtained through joint ventures or proposals between CSR and various State GIS user groups. Details of this agreement are contained in the MOA between CSR and TWDB/TNRIS contained in Appendix A.

CSR also plans to generate and distribute educational literature on the wide variety of topics related to the Texas InfoMart through the Texas Space Grant Consortium. Subscriptions to these materials will be available to school districts across Texas at a modest price to supplement existing curriculum in geography, science, and mathematics.

CSR will offer local, State, and Federal users (TBD) value-added InfoMart products derived from remotely-sensed satellite data and assist each user with the integration of these data into their program. For example, during Synergy I, CSR found it valuable not only to provide Red Tide analyses of the Texas Gulf Coast to personnel at the Texas Parks and Wildlife Department (TPWD) but also found it valuable to help interpret the results to assist in planning TPWD daily operations. Therefore, assisting the GIS User Community with the exploitation of remotely-sensed data products is essential for continued development and the sustainability of the Texas InfoMart.

If a decision is made to sell commercial data products, it may become necessary for CSR to establish policies that protect the proprietary rights of the Texas InfoMart user community while limiting 3rd party access to certain products. Thus, user IDs and passwords may be needed to access specific areas of the InfoMart data archive. Also, cost recovery formulas may be applied for the distribution of data in certain cases, such as those provided on CDROM or DVD.
Since the primary focus of the Texas InfoMart is to serve the GIS user community, Landsat 7 ETM+ imagery will be georeferenced to the UTM NAD 83 coordinate system, which has been designated as the Texas Reference Frame for StratMap, MODIS and other more coarse imagery. Users possessing in-house remote sensing capabilities can acquire data suitable for analysis while GIS users have access to grayscale and color composite Georegistered Tagged Image File Format (GeoTIFF) files, a standard file format for image viewing and visualization. Figure 4 shows the 44 Landsat data “tiles” that cover all counties in the State of Texas. Multiple time sequences of ETM+ and MODIS imagery will be available for each tile through the Texas InfoMart web server.

Figure 4. Landsat ETM+ Tiles for State of Texas.

Figure 5. Communications between CSR and TACC within the Texas InfoMart.
The data collection, product generation, and product distribution system established by CSR to support the requirements of the InfoMart user community are shown in Figure 5.

Remotely-sensed satellite data and products are received from three sources: AVHRR data from the CSR Television Infrared Observational Satellite (TIROS) BD ground stations, MODIS and other EOS data initially from the EOSDIS, and Landsat data from the Earth Resources Observation System (EROS) Data Center. The planned addition of a MODIS DB ground station at CSR will reduce dependence upon the EOSDIS and speed data delivery to the Texas InfoMart user community. Data collected at CSR will be processed into value-added products such as red tide analyses, vegetation cover, sea surface temperature analyses, air quality analyses, etc. Data products generated at CSR are transmitted to the TACC via a high speed HiPPI connection. Dissemination of products is via the Internet2 or over the commodity Internet.

2.2 ANALYSIS OF CUSTOMER REQUIREMENTS

As noted previously, the primary market for the Texas InfoMart is the State user community. Secondary markets include educational facilities, potentially commercial customers, and consulting agreements for those interested in building similar data distribution systems, both inside and outside the US. To be successful with the primary customers of the InfoMart, CSR will work with UT to establish a funding line in the Texas Legislature budget. Thus, it becomes critical that key State agencies, e.g. TNRIS and TNRCC, become advocates of the InfoMart since strong justification will be required to demonstrate the value of data and products served via the InfoMart to these key organizations. CSR staff is working closely with senior staff in these organizations to develop this justification. This plan identifies the customers within the Texas Geographical Information Council that have been nurtured during the first two years of the Synergy program and the products they require as key successes of the Texas InfoMart. In addition, it identifies potential products identified in recent staff work with TNRCC for which advocacy is expected within the near future. An overview of other segments of the marketplace is provided based upon ongoing activities with the SeaSpace Corporation and Boeing-Autometric. While potentially important to the InfoMart, additional staff work is needed to accurately assess the potential value of these markets.

2.2.1 The Government User Communities

The primary users of the Texas InfoMart are the local, State, and Federal agencies that are based in Texas. As CSR staff continues to work with Texas agencies to identify their specific data and application requirements, the list of overlapping interests and desired products continues to grow. To date, the following important applications have been identified:

- Monitoring and forecasting of air quality,
- Monitoring of surface water availability and water quality,
- Planning for water quantity,
- Monitoring of drought and flood conditions,
- Change detection for urban, suburban and rural planning,
- Maintenance of natural resource and other mapping inventory,
- Project specific data products or services.

To date, CSR has received requests for data and services from local (city & county), regional (Councils of Government, aquifer authority), State (multiple agencies), Federal (multiple agencies), and education institutions (multiple State universities). Services have
been as elementary as providing base map data in a format suitable for use by an agency GIS and as sophisticated as developing three-dimensional visualizations from multiple data sources. Although many public agencies have invested in GIS technology and staff, few have resources dedicated to the preparation or analysis of remote sensing data. There is, however, a growing realization of the benefits associated with such data and data products, and a pent-up demand for GIS-ready products and training for existing and new personnel.

Entities that have either received services or requested data or information since the inception of the Synergy project include:

- Texas Water Development Board (state),
- Texas Natural Resources Information System (state),
- Governor’s Division of Emergency Management (state),
- Texas Parks and Wildlife Department (state),
- Texas Department of Agriculture (state),
- Texas Department of Health (state),
- Texas Soil and Water Conservation Board (state),
- Texas Natural Resource Conservation Commission (state),
- Texas Department of Criminal Justice (state),
- Texas Forest Service (state),
- U.S. Geological Survey (federal),
- USDA Natural Resources Conservation Service (federal),
- Bureau of Land Management (federal),
- Texas Army National Guard (federal),
- City of Austin, Texas (local),
- City of Bryan, Texas (local),
- North Central Texas Council of Government (regional),
- Capital Area Planning Council (regional),
- Brazos Valley Council of Government (regional),
- Edwards Aquifer Authority (regional),
- University of Texas at Austin (educational),
- Southwest Texas State University (educational),
- Blacklands Research Center, Texas A&M University-Temple (educational),
- Texas A&M University (educational),
- Texas A&M University-Corpus Christi (educational),
- Texas A&M University-Kingsville (educational),
- Texas Tech University-Lubbock (educational),
- Forest Resources Institute, Stephen F. Austin State University (educational),
- Center for the Study of Earth from Space, University of Colorado (educational).

For most of the above-mentioned governmental user community, the core groups requesting information and services come from within the existing GIS user community. Thus, we turn our discussion of the Texas InfoMart to the formal structure that supports this GIS community in Texas.

### 2.2.2 The GIS User Community

The case could be made that construction of the Texas InfoMart is justified solely by the support requirements established by the TNRIS as the state’s natural resource and spatial data clearinghouse and referral center. TNRIS serves as the data hub for many public and private entities. This division of the Texas Water Development Board (TWDB) distributes public domain digital and non-digital data, coordinates the Texas Strategic
Mapping Program, and provides an administrative co-chair to the Texas Geographic Information Council (TGIC) Technical Advisory Committee.

The following is excerpted from the TGIC web site (www.tgic.state.tx.us):

TGIC was formed on September 1, 1997, through legislation passed by the 75th Texas Legislature. Section 7.03 of Senate Bill 1 of the 75th Texas Legislature merged two pre-existing oversight and planning entities with related responsibilities, the TNRIS Task Force. The TNRIS Task Force was formed to provide guidance in managing TNRIS. The TNRIS Task Force had members from 17 agencies and provided advice to the Texas Water Development Board on TNRIS management and operations. The Texas Geographic Information Systems Planning Council was a statewide geographic information planning and coordination group with members from 36 agencies. It was responsible for GIS standards, data development, and policy. The Planning Council was formed in 1990.

TGIC is a geographic data coordination and planning group serving the State of Texas. TGIC addresses issues concerning geographic data development, data exchange, geographic information system (GIS) implementation, standards, statewide planning, and policies. Over forty state agencies, universities, and local or regional government associations are represented on the council. TGIC has a statewide focus and serves the Texas Legislature and the public. Because of this, only governmental entities with statewide responsibilities may join. Voting membership is limited to state agencies and governmental associations (associations of counties, councils of government, river authorities, etc.) with statewide focus, although all meetings are open to any interested party. TGIC meetings are held quarterly in Austin. TAC meetings occur more frequently, and offer the opportunity for State GIS managers and technical staff to work together on data coordination and technical issues that extend beyond individual agency concerns. The TGIC charter is included in the appendix of this document.

The 77th Texas Legislature once again passed legislation impacting TGIC and all member agencies. Senate Bill 312 amended the portion of the Texas Water Code that creates TGIC, adding language instructing TGIC, by September 1 of each even-numbered year, to prepare and provide to TWDB, DIR, the governor, and the legislature a plan that inventories known state agency GIS projects and recommends initiatives to improve the state’s GIS programs. This new duty gives TGIC direct input to the state’s planning and legislative processes.

Current circumstances are leading to an opportunity to increase the reliance of Texas state agencies and the larger community of GIS users in the state upon remotely-sensed imagery derived from satellites. The first generation of 1-meter aerial orthoimagery will be replaced by new 1-meter satellite imagery over the next four-five years using funds authorized by the 77th Texas Legislature. The rate of replacement is contingent upon federal contributions to both the acquisition of new source imagery through the National Aerial Photography Program and production of new DOQs through the National Digital Orthophotography Program. Both federal programs are under funded in FY2002, thus there will likely be a shortfall in federal matching funds for DOQ production in Texas at a time when the orthoimagery covering the eastern half of the state reflects surface conditions of six to seven years ago. Demand for updated DOQ coverage is rising within state agencies at a time when the supply of conventional orthoimagery is restricted.

The successful launch of new high resolution commercial remote sensing satellites will lead to new sources of orthoimagery that meet many of the requirements of state
agencies. Whereas 1-meter imagery from Space Imaging’s IKONOS 2 satellite may remain too costly and sporadic in coverage to address the need for statewide orthoimagery, future 2.5-meter imagery from SPOT 5 can meet the requirements for many applications of aerial DOQs, potentially at a small fraction of the cost. Efficient large-area coverage by the SPOT 5 and other satellites may dramatically reduce the cost of orbital high-resolution data. If statewide coverage cycles can be obtained every 12-18 months, then it will be practical to substitute low-cost 2.5-meter orthoimagery for 1-meter aerial DOQs in rural regions of the state that would otherwise remain without new orthoimagery for several years in the future. Price reductions created by increased market competition from multiple providers could make 1-meter and sub-meter satellite orthoimagery more competitive in urban and suburban areas. State agencies and federal agencies in the region are beginning to recognize the benefits of access to recent, high-quality imagery from commercial high-resolution satellites.

The recent release of large quantities of Terra ASTER Level 1A and Level 1B data opens additional possibilities for the development of improved applications for state agencies beyond those developed using Landsat ETM+ data. Most of the state is covered by cloud-free ASTER scenes collected since the late winter of 2000, with several regions covered by multiple scenes. The ASTER instruments offer both improved spatial resolution over the Landsat ETM+ sensor in the 15-meter Visible/Near-IR bands and better spectral resolution in the six Short Wave-IR and five Thermal IR bands. Initial analyses of ASTER imagery indicate that vegetation classification, irrigated cropland detection and lithological characterization can be more effectively accomplished using ASTER data than ETM+ imagery. CSR is currently working with TNRIS and other users to assess the value of these data for the Texas GIS community.

2.2.3 Demonstrated Success Stories

During Synergy II, CSR and TNRIS initiated a Memorandum of Agreement (MOA) to facilitate the sharing of personnel and resources in support of the Texas InfoMart. A copy of the MOA is in Appendix A. This agreement represents a major success for the Texas InfoMart since it demonstrates a long-term commitment by TNRIS to the InfoMart.

CSR also made major progress with other InfoMart users during Synergy II. CSR continued to expand our support to the State GIS user community and our work was cited by the Executive Director of Texas Park and Wildlife Department (TPWD) and the Commissioner of the Texas Department of Agriculture. This is the second consecutive year that TPWD has documented its appreciation to CSR. A similar letter of appreciation was received by CSR from the Commissioner of the Texas Department of Agriculture for work done through the InfoMart, as detailed below. The letters of appreciation from TPWD and TDA demonstrate satisfied InfoMart customers and suggest long-term commits are probable.

2.2.3.1 Texas Parks and Wildlife Department

User requirements vary with user sophistication and technological resources. One of the primary users of Synergy products, the Texas Parks and Wildlife Department is most interested in acquiring primary datasets for use by in-house analysts. Several offices within TPWD have invested both in personnel and technology. However, with limited budget resources, data acquisition is often problematic. Texas Synergy has afforded TPWD the opportunity to obtain multispectral Landsat ETM+ imagery and other data that
the agency would not have otherwise acquired. The main requirement for an agency
with a high level of remote sensing expertise, such as that housed within the GIS
Laboratory of the TPWD, is for rapid access to the best possible data resources. TPWD
staff use remote sensing data and data products for a wide range of activities, including
map production, wildlife studies, park management and biological research.

TPWD has expressed its appreciation to CSR for facilitating access to satellite remote
sensing resources that have proved invaluable in helping the Agency fulfill its mission to
“manage and conserve the natural and cultural resources of Texas”. The overview
provided by satellite remote sensing is ideal for projects concerned with potential
endangered species and for land management practices in the big ranches and open
spaces of West Texas. In fact, letters of support have been given to CSR during both
Synergy I and II expressing TPWD support of the Texas InfoMart project. The following
illustrations demonstrate how InfoMart data have benefited TPWD.

• Multiple datasets are being employed in a black-tailed prairie dog habitat study of
the Texas Panhandle to aid this threatened species. Landsat 7 ETM+ imagery
obtained from the InfoMart is being used for land use/land cover mapping. This
vegetation classification specifically targets fragile remnants of the Blue Gramma-
buffalo grass prairie habitat and Harvard Shin oak-tall grass communities. Terra
ASTER data, also from the InfoMart, are being compared with the ETM+ data as a
new source for land use/land cover mapping. Visual interpretation comparing
evidence of prairie dog town occupation is underway, with automated
classification of vegetation cover is planned for the coming spring. In addition, 10-
meter panchromatic SPOT USA Select for Texas imagery is being used for
verification in conjunction with ground truth data to determine the
presence/absence of medium to large prairie dog towns (>20 acres).

• TPWD game wardens employ Landsat 7 ETM+ imagery of the coastal zone
provided by the InfoMart to plan coastal law enforcement activities. TPWD GIS
staff have prepared large format annotated paper field maps using ETM+ imagery
to provide a synoptic view of jurisdictional areas. Game wardens plan missions to
monitor fishing and shrimping law compliance, and to note the locations of
permitted houseboats based on these maps.

• Classified Landsat 7 ETM+ imagery are being used to develop a habitat suitability
model for Eastern wild turkey reintroduction.

• Landsat 7 ETM+ imagery are currently being used to map land cover for a stream
quality analysis project on the Texas coast. Water quality is a vital issue for
TPWD, closely tied to its mission in the coastal bays and estuaries of the state.

• Landsat 7 ETM+ data products are used to provide a landscape view to assist
with resource management and planning and for assessment of lands for
acquisition. TPWD staff have adopted a multi-tiered approach using ETM+ imagery
to supplement ongoing TPWD work with high resolution DOQs.

Decisions impacting natural resource management and conservation are made at the
Texas Water Development Board (TWDB). Texas Synergy data have helped formulate
decisions taken to protect black-tailed prairie dogs and other potentially endangered
species. Land management practices respond to evidence of improvement or
deterioration in imagery studied by TPWD analysts. Coastal game wardens have decided
how best to traverse their areas of jurisdiction based on satellite remote sensing data.

The cost benefit to TPWD manifests itself in several ways. On its own, TPWD could not
have leveraged the funds for source image data acquisition. The diffusion of data
products and analyses derived from resources provided by CSR makes the benefit of
these resources tangible to administrators in Austin and field personnel throughout the
state. Administrators tell TPWD GIS staff that “you make us look good” when superb
graphic materials convey information about issues of importance to the agency. In addition, game warden safety has been enhanced through the use of current imagery. Many USGS topographic quadrangle maps date back a quarter century while most one-meter DOQs are over five years old. Wardens traversing rivers, bays and estuaries in the coastal have noted channel changes impacting mission plans. Administrative staff is now better informed about the planned activities of field personnel. Current imagery enhances mission planning for biologists' fieldwork as well.

A letter of appreciation from the Executive Director of TPWD to CSR is contained in Appendix A of the Final Report on the Texas Phase II of the EOSDIS and Texas Data Products Synergy Program. A similar letter of appreciation from TPWD for work done to support a serious red-tide event in the Gulf of Mexico is found in the Final Report on the Texas Synergy I Program. Work done under Synergy I and II have clearly resulted in the strong advocacy of the TPWD Executive Director for the Texas InfoMart.

### 2.2.3.2 Texas Department of Agriculture

The case of the Texas Department of Agriculture (TDA) contrasts with that of the sophisticated TPWD user. TDA represents the type of agency that is resource-rich, particularly for selected projects, but expertise-poor. TDA approached CSR in the spring of 2001, during the hectic months of the 77th Texas Legislature, with a specific request to help quantify the presence of an invasive species along a riparian corridor to use as justification for a funding request. Determining the extent and distribution of infestation is crucial because of the high cost of pesticide treatment. In the past, TDA determined projected pesticide costs by multiplying river miles by a factor representing pesticide cost. The agency preferred to test a classification application that would potentially yield a more accurate estimate and would help legislators visualize the invasive species problem.

Over the past century, saltcedar (*Tamarix spp*) has established itself along most river channels in Texas. Salt cedar is considered a noxious pest in Texas. The species increases soil salinity and successfully competes with other vegetation for precious water resources. The invasive species has increased river siltation, reduced stream flow and reservoir storage capacity, and crowded out native species. TDA programs are underway to clear it from riparian corridors along the Pecos and Colorado rivers in West Texas.

TDA had one GIS specialist devoted to the project, but lacked the necessary expertise to bring it to fruition. CSR identified approximately 12,500 acres of potential salt cedar stands using an isodata classification routine and field ocations provided by TDA. Local knowledge and ground truth corroborated land cover classification results. Areas identified covered a stretch of river from Lake J.B. Thomas in Scurry County south to Lake Buchanan in Burnet County. TDA presented the results of the preliminary analysis to the Texas Legislature in support of their estimated funding needs to cover herbicide costs for the Salt Cedar Eradication Program during the next fiscal cycle (FY 2002-2003). TDA and CSR presented the results of the initial cooperative effort to the annual meeting of the Southwestern Division of the Association of American Geographers. A Spotlight entry on invasive species is hosted at:

[http://synergy1.csr.utexas.edu/invasive_main.html](http://synergy1.csr.utexas.edu/invasive_main.html)
The TDA concluded that the saltcedar classification application improved the estimates of acreage requiring pesticide application, and provided strong justification for its funding request. The Commissioner of TDA has encouraged the increased use of the classification procedure in other areas targeted for saltcedar removal. TDA wishes to support this project in the future by supplying funds for data acquisition and for graduate student support. Currently, TDA staff is processing ground truth data collected at critical locations along the Colorado and other Texas rivers. The agency will target seed source areas in an attempt to reduce saltcedar encroachment.

The Commissioner of the Texas Department of Agriculture has been outspoken in her support for continuing cooperation with CSR and documented it in the letter of appreciation, shown in Appendix B of the Final Report on the Texas Phase II of the EOSDIS and Texas Data Products Synergy Program. This is the first year CSR staff have had the resources to integrate TDA into the Texas InfoMart program. Clearly, the work done under Synergy II provides a solid basis for continued work with TDA and has secured the advocacy of the Commissioner for the Texas InfoMart.

2.2.4 Expectations for Continued Future Successes

In March 2001, representatives from TNRCC requested CSR assistance in developing advanced data products to help monitor and improve air quality and water quality across the State of Texas. Unfortunately, CSR had extremely limited resources under Synergy II to support the request by TNRCC so little has been accomplished. CSR did offer to assist TNRCC in the near future in defining its remotely-sensed data requirements and to identify data products for dissemination over the InfoMart for their applications. Subsequently, CSR identified TNRCC to Raytheon as a key new InfoMart customer representing a MAJOR enhancement to the InfoMart system based upon their mission and their stature within the State Government. The support requested by TNRCC expands the Texas InfoMart to products for monitoring air and water quality. Thus, TNRCC provides CSR with the opportunity to significantly extend the value of ECS data and products to a much larger set of applications. CSR now believes that the joint advocacy of the Texas InfoMart by both TNRIS and TNRCC, if secured, will ensure a funding line in the State budget to sustain the operations of the Texas InfoMart.

CSR has developed a “strawman” technical plan to create a new operational products to meet the state requirements of TNRCC and to ensure that the Texas InfoMart makes these products routinely available. The plan calls for CSR to lead the process of: (1) articulating data requirements for remotely-sensed and other environmental data products essential to the air and water quality communities, (2) identifying and participating in the development of data products needed to meet TNRCC requirements, and (3) ensuring these products are routinely created and disseminated over the InfoMart to satisfy the requirements of the air and water quality community. A breakdown of the plan includes the following tasks:

- CSR will assist TNRCC and support staff in defining their requirements for remotely-sensed data and products that might be candidates for dissemination over the Texas InfoMart:
  - CSR will provide TNRCC staff with current information on the Texas InfoMart and Synergy program,
  - CSR will assist TNRCC will the definition of operational requirements for Texas InfoMart data and products,
• CSR will document agreements in a memorandum of understanding between UT, CSR, and TNRCC that clearly defines TNRCC requirements for the Texas InfoMart products.

• CSR will assist in evaluating the capabilities across the UT System of satisfying TNRCC requirements for data and products, using existing technology. If necessary, CSR will evaluate the potential of new technology for addressing unsatisfied requirements within resource constraints. In particular, CSR will work with staff at the following UT centers:
  - The Center for Energy and Environmental Research (CEER) http://www.utexas.edu/research/ceer/main.htm,
  - The Center for Research in Water Resources (CRWR) http://uts.cc.utexas.edu/~iml/Projects/crwr/new_site.

• CSR will help define the resource requirements necessary to provide data and products to TNRCC and work with the UT Office of the Vice President for Research to satisfy these resource requirements:
  - CSR will develop a concept of operations that supports the continued access of essential data and products to TNRCC.
  - CSR will advocate a multi-disciplinary remote sensing program for UT Austin capable of providing sufficient student resources needed for a sustainable operational Texas InfoMart.

The Texas Legislature operates under a biennial budget cycle and is next in session from January – May, 2003 to approve the State budget for the funding cycle beginning in September, 1 2003 and ending in August 31, 2005. Advocacy of the InfoMart by key state agencies, most notably TNRIS and TNRCC, is essential to obtain Legislative support. Therefore, it is essential that tasks described above be completed and the advocacy of TNRCC for the Texas InfoMart be obtained during calendar year 2002.

2.2.5 The Educational Community

As a component of The University of Texas at Austin, a primary focus of all CSR activities is the education of students across the State of Texas. Accordingly, we plan to create and disseminate educational literature to enhance the curriculum in all Texas districts, with emphasis upon primary and secondary schools. While the entire program is not yet defined, discussions have been held with the Texas Space Grant Consortium (TSGC) and concepts have been develop that will enrich educational opportunities for all Texas students. More details plans will be made during the Spring Semester, 2002 with the assistance of certified teachers that consult with TSGC to suggest enhancements to the curriculum of Texas secondary schools.

Central to this concept is the routine publication of a periodical, similar to the “Weekly Reader” except emphasis will be upon topics that include geography, environmental sciences, physics, and mathematics. These publications will include discussions on satellites, remote sensing, and data products available in the Texas InfoMart that are relevant to current events. The publication may be disseminated electronically to minimize cost and maximize return on investment, which will allow CSR to charge only a nominal price for each subscription. Names for these publications have been identified and are currently being registered through The University of Texas at Austin, Intellectual Property Office. Initial estimates by the TSGC staff suggest that CSR may ultimately expect a continuous gross annual revenue of $400,000 – 500,000 from the educational literature based upon the number of school systems in the State and a nominal charge for the reader. These funds will be used to help sustain the Texas InfoMart and support educational enrichment for student at schools that participate in the program.
2.2.6 Potential Commercial Customers

Commercial users might include non-government agencies that desire to purchase products directly from the Texas InfoMart to support their businesses or existing users of Autometric's and SeaSpace systems. In our initial market analysis, CSR identified three potential commercial customers that might purchase data from the InfoMart, including insurance, telecommunications, and commodities. Others are undoubtedly possible. Unfortunately CSR also identified vendors that have established businesses to support this customer base, e.g. Houston Advanced Research Center (http://www.harc.edu). Thus, CSR has elected to move cautiously into this business segment since any conflict with an existing Texas business might impact the opportunity of obtaining funds through the Texas Legislature.

CSR is also exploring the possibility that current users of either Autometric's EDGE software or SeaSpace TeraScan systems may wish to acquire the capability to distribute data products to their customers via an Internet distribution system. SeaSpace in particular could be most valuable as a partner, if there is significant benefit for CSR to pursue such a market, since SeaSpace has a large national and international customers base for their direct broadcast ground stations. CSR is developing MOA's with both Autometric and Seaspace to pursue potential opportunities in this arena.

2.3 FUNCTIONAL MANAGEMENT OF THE INFOMART

Key staffing requirements for the Texas InfoMart are shown in Table 1. Program oversight of the Texas InfoMart is provided by P/I Byron D. Tapley. In addition to providing top-level management of the system, he has successfully obtained matching UT funds to enhance the InfoMart during the Synergy program. He also coordinates CSR activities with key personnel within UT and the State Legislature. Dr. Tapley exercises his direction for the InfoMart through his Co-P/I and Program Manager, Dr. Keith Hutchison. Dr. Hutchison manages all programmatic activities of the Texas InfoMart, including day-to-day actions required to keep development of the InfoMart on schedule. Technical leadership of the Texas InfoMart and oversight of support to TNRIS and Texas GIS customer community is provided by Dr. Gordon Wells. In the future, a similar role to the TNRCC and air quality customer community will become the responsibility of Dr. Hutchison. Oversight of new product development for the Texas InfoMart is vested in Dr. Melba Crawford with assistance from Tapley, Wells, and Hutchison. All are considered key personnel in the management of the program.

Functions of the Texas InfoMart Managerial Staff are essential for an operational system and include: establishing program goals, objectives, guidelines, policies and success criteria for the system; management of key personnel; approval of computer and networking systems; acquisition and operational requirements of CSR ground stations; and resource allocation including approval of budgets.

2.4 ADDITIONAL FUNCTIONS REQUIRED FOR SUSTAINED OPERATIONS

In addition to key management, other functions are required to sustain the operations of the Texas InfoMart, as shown in Table 1. Customer liaison to the GIS community is exercised by Ms. Teresa Howard. She is the focal point for GIS users at TNRIS, the TAC, and the TGIC. Additional staff members are needed as liaison to the GIS users community based upon current workloads. The InfoMart System Architect, Mr. Solar Smith, designed
the InfoMart. He manages all components of the system and maintains its performance to ensure InfoMart customers receive data in a timely manner. The InfoMart Systems Analyst, Ms. Ortiz, is responsible for developing all web interfaces to the InfoMart, including the ArcIMS data server that supports access to the InfoMart by GIS customers using ArcIMS software. The InfoMart Program Administrator manages financial reports, performs purchases, controls inventories, and assists in creating all technical reports required of the InfoMart.

During Synergy II, the Texas InfoMart carried three unsatisfied staffing requirements: database programmer and customer liaison to TNRIS and TNRC. The database programmer requirement was filled temporarily with a summer-hire student and a graduate student. Neither are currently available to the project. The TNRC and additional TNRIS liaison positions were not filled due to a lack of program funds.

Table 1. Texas InfoMart Key Staffing Requirements.

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<thead>
<tr>
<th>Function</th>
<th>Team Member</th>
<th>Title</th>
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<tbody>
<tr>
<td>Principal Investigator</td>
<td>Dr. Byron D. Tapley</td>
<td>Director</td>
</tr>
<tr>
<td>Co-P/I &amp; Program Manager</td>
<td>Dr. Keith D. Hutchison</td>
<td>Senior Research Scientist</td>
</tr>
<tr>
<td>Product Development</td>
<td>Dr. Melba M. Crawford</td>
<td>UT Faculty &amp; CSR Staff</td>
</tr>
<tr>
<td>Technical Leadership</td>
<td>Dr. Gordon Wells</td>
<td>Research Scientist</td>
</tr>
<tr>
<td>GIS User Community Liaison</td>
<td>Ms. Teresa Howard</td>
<td>Research Scientist</td>
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<tr>
<td>Program Architect</td>
<td>Mr. Solar Smith</td>
<td>Research Scientist</td>
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<tr>
<td>Systems Analyst</td>
<td>Ms. Dawn Ortiz</td>
<td>Research Scientist</td>
</tr>
<tr>
<td>Program Administrator</td>
<td>Ms. Nikki Goodfellow</td>
<td>Administrative Associate</td>
</tr>
<tr>
<td>TNRC Liaison</td>
<td>Unfilled</td>
<td>Computer Analyst</td>
</tr>
<tr>
<td>Database Programmer</td>
<td>Unfilled</td>
<td>Research Scientist</td>
</tr>
<tr>
<td>GIS User Community Liaison</td>
<td>Unfilled</td>
<td>Research Scientist</td>
</tr>
</tbody>
</table>

Under Synergy I and II, CSR obtained assistance from a number of graduate and undergraduate students from several departments including Computer Science, Operations Research, and Aerospace Engineering. A total of 14 students, including four graduate students, received at least half-time support from the Synergy program during the first two years of the project.

2.5 PLANNED TEMPORARY ADDITIONS TO INFOMART TECHNICAL STAFF

As CSR looks toward future support of the Texas InfoMart to TNRC, major tasks must be completed to address their requirements. Staff from TNRC have requested a variety of data products be created from remotely-sensed satellite data to support their air and water quality missions. Some of the key products requested include: detect sources and concentrations of atmospheric pollution in satellite imagery, provide 2-dimensional and 3-dimensional cloud analyses for improved actinic flux calculations and vegetation classifications for use in chemistry models, and improve forecast accuracy of mesoscale models used in air quality prediction. While CSR has the expertise to address these requirements, there was a lack of resources to staff them under Synergy II. Thus, CSR advised TNRC of our intent to support them during Synergy III. CSR has contacted key research centers at UT with expertise in air and water quality modeling including the Director of the Center for Energy and Environmental Research and the Director of the Center for Research in Water Resources. The number and priority of TNRC requirements, that can be satisfied by the Texas InfoMart, must be evaluated by CSR, CEER, and CRWR. It is critical that CSR address these requirements during CY 2002 in order to obtain the advocacy of TNRC for the Texas InfoMart. Table 2 lists the staff needed to address the air and water quality requirements of TNRC.
Table 2. Additional CSR Staffing Needed to Identify and Satisfy InfoMart Requirement for the Air and Water Quality Mission of TNRCC.

<table>
<thead>
<tr>
<th>Function</th>
<th>Team Member</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry Modeling Oversight</td>
<td>Dr. David Allen</td>
<td>Director, Center for Energy and Environmental Research (CEER)</td>
</tr>
<tr>
<td>Hydrological Modeling Oversight</td>
<td>Dr. David Maidment</td>
<td>Director, Center for Research in Water Resources (CRWR)</td>
</tr>
<tr>
<td>Atmospheric Remote Sensing</td>
<td>CSR Staff – unfilled</td>
<td>Research Scientist, Post-Doc, Graduate Student</td>
</tr>
<tr>
<td>Product Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry Modeling</td>
<td>CEER Staff – unfilled</td>
<td>Research Scientist, Post-Doc, Graduate Student</td>
</tr>
<tr>
<td>Mesoscale Modeling</td>
<td>CSR Staff – unfilled</td>
<td>Research Scientist, Post-Doc, Graduate Student</td>
</tr>
<tr>
<td>Hydrological Modeling</td>
<td>CRWR Staff – unfilled</td>
<td>Research Scientist, Post-Doc, Graduate Student</td>
</tr>
</tbody>
</table>

### 2.6 SUMMARY OF IMPLEMENTATION PLAN

Significant progress has been made under the Synergy Program in developing the Advanced Prototype InfoMart at the TACC. CSR has also successfully demonstrated the value of ECS data and applications to key members of the InfoMart GIS user community. Once requirements of TNRCC have been satisfied, CSR believes that a stable base of funds can be obtained through the Texas Legislature by the joint advocacy of TNRIS, TNRCC, and the UT system. The goal for the Texas InfoMart is to complete the Advanced Prototype in 2002 and establish an IOC of September 1, 2003 in time to establish a funding line-item in the next Texas biennial budget. Current shortfalls in this plan include staffing an additional person to assist in the GIS liaison function at TNRIS and across the TGIC, a dedicated data base programmer for the InfoMart, and resources to develop and validate the data products requested for distribution over the InfoMart by TNRCC. CSR is seeking the funds needed to resolve these shortfalls.

### 3.0 FINANCIAL ANALYSIS

In this section, CSR outlines the funds needed to transition to the Advanced Prototype at the TACC, meet an IOC of September 1, 2003, and secure the joint advocacy of TNRIS and TNRCC in order to secure a funding line in the State budget, during the next legislative session, to sustain the Texas InfoMart.

### 3.1 ASSUMPTIONS

The following assumptions were made in formulating the financial analyses for the Texas InfoMart:

- Ramifications of the September 11, 2001 disaster in New York and subsequent events will not significantly impact funding for Synergy III and beyond,
- CSR staff will successfully host the advanced prototype of the Texas InfoMart and acquire the advocacy of TNRIS, TNRCC, UT, and State Legislatures for the delivery of ECS data and products over the system,
  - The capability to provide a reliable Internet-based distribution of ECS data product will stimulate user demand and increase the value of the Texas InfoMart,
• All will support the CSR position that State funds should be dedicated to sustain the Texas InfoMart starting with the next biennial budget cycle of 2004-2005,
• CSR in collaboration with the Texas Space Grant Consortium will leverage InfoMart data and products to new opportunities in education of K-12 students within Texas,
• No pro-rata charges will be levied by UT upon CSR for resources currently available at no expense to the InfoMart, e.g. Internet2, TACC support personnel, etc.,
• By 2004, UT will approve the proposed Interdisciplinary Degree Program in Earth System Sciences and salaries of key CSR staff will be partially subsidized through classroom activities,
• Collaboration with Autometric and SeaSpace will produce new opportunities for the Texas InfoMart with a modest growth rate of 3% per year over the next decade,
• CSR will successfully leverage capabilities of the Texas InfoMart to increasingly acquire grants through competitive proposals to research announcements.

CSR has begun validating these assumptions through interactions with key UT personnel. Formal meetings have been held with senior UT management including the Dean for the College of Engineering and the Vice President for Research. Initial exchanges have been extremely positive. Additional meetings have been held with Dr. David Allen, Director UT CEER, and Dr. David Maidment, Director of CRWR. CSR will continue meetings with these key UT participants during the Spring Semester, 2002 and request representatives from TNRCC and TNRIS to join these discussions.

3.2 INFOMART FUNDING REQUIREMENTS

The total budget (salaries and fringe benefits) for the InfoMart core staff shown in Table 1 under Synergy I and Synergy II has been approximately $400,000 per year. Some of these funds went to sub-contractors under Synergy I to facilitate the spin-up of the system; however, under Synergy II nearly all funds were dedicated to CSR staff. Thus, a minimum funding line of $400,000 per year is considered essential to ensure a sustained operation of the InfoMart system. Any additional attempt to extend the product base of the InfoMart, e.g. to address totally new user requirements, would require at least a temporary increase in funds. If the functionality of the InfoMart is expected to significantly grow into a more robust system that supports additional users, added funds will be needed to sustain operations.

CSR has projected a temporary increase in staff necessary to meet unsatisfied requirements listed in Tables 1 and 2. Filling these positions will double the costs in annual salaries and wages for the InfoMart. Unfortunately, these temporary staff additions during Synergy III are critical to the CSR strategy of gaining strong advocacy from TNRCC.

4.0 SUPPORTING DOCUMENTS: MOU’S, LETTERS OF INTENT, CONTRACTS, ETC.

Appendix A: Agreement between the University of Texas at Austin Center for Space Research and the Texas Water Development Board

Appendix B: Charter of the Texas Geographic Information Council
Appendix A

AGREEMENT BETWEEN THE UNIVERSITY OF TEXAS AT AUSTIN CENTER FOR SPACE RESEARCH AND THE TEXAS WATER DEVELOPMENT BOARD
AGREEMENT

between the

University of Texas at Austin
Center for Space Research

and the

Texas Water Development Board

Purpose

The intent of this Agreement between the University of Texas at Austin Center for Space Research (UT-CSR) and the Texas Water Development Board (TWDB) is to promote collaboration between the Texas Natural Resources Information System (TNRIS), a division of TWDB, and UT-CSR, a research unit of the University of Texas at Austin. This Agreement outlines the major goals and responsibilities of the two parties as they relate to the acquisition, processing and distribution of geospatial data.

Objectives

The mission of UT-CSR is to conduct coordinated research efforts associated with orbit determination, space geodesy, the Earth and its environment, exploration of the solar system, as well as expanding the scientific applications of space systems data. Among its activities, UT-CSR receives processes and makes available in the public domain remotely sensed data and data products collected by satellite and airborne sensor systems. In addition, UT-CSR serves as the base for the Texas Space Grant Consortium, which includes 34 organizations performing educational outreach to universities and public schools throughout Texas.

The mission of TNRIS is to serve as the state’s primary public domain repository and distribution center of Texas natural resource, climate and demographic data. TNRIS maintains a library of digital and paper data products and provides information about data available from other sources including state and federal agencies. As the gateway to geospatial data for the State of Texas, TNRIS is charged with making accurate data available to users quickly, or referring customers to the appropriate data holders.

The collaboration between UT-CSR and TNRIS enabled by this Agreement is intended to bring to the public the benefits of remote sensing technology and geospatial data development through direct access to data products and through useful applications of these data products in Texas and the surrounding regions.
Statement of Responsibilities

A. To the extent able to do so and not in conflict with any third party rights or obligations, and subject to the policies and procedures of The University of Texas System Board of Regents and The University of Texas at Austin Center for Space Research will use reasonable efforts to:

• Expedite access by TNRIS to satellite and airborne remote sensing data and data products collected or created by UT-CSR for delivery in the public domain subject to UT System Intellectual Property Policies and Guidelines.

• Contribute to the development of technical specifications for future geospatial data products for use by the State of Texas and the testing of experimental products intended to meet these standards.

• Collaborate with TNRIS in technical and research activities regarding data distribution, new sensor system development, calibration and georectification techniques, digital image processing and enhancement techniques and algorithm development.

• Provide staff support to TNRIS to accomplish objectives of mutual interest to UT-CSR subject to the availability of personnel and funds appropriated for the purpose.

• Provide funding to TNRIS for specific data, data products and support services so designated, when specifically authorized through an Interagency Service Agreement.

• Assist TNRIS in the acquisition of high-speed computer network connections for rapid data reception and data delivery via Internet2, microwave relay and/or satellite transmission.

• Coordinate the support activities provided to TNRIS by the Advanced Computing Center for Engineering and Science (ACCES) and other relevant laboratories of the University of Texas at Austin.

• Facilitate support by appropriate centers of the University of Texas at Austin to assist TNRIS in advanced database architecture design for efficient data storage, querying, retrieval and distribution.

• Coordinate emergency response activities with TNRIS in support of the Governor’s Division of Emergency Management, Federal Emergency Management Agency and other organizations engaged in emergency response.
• Cooperate with TNRIS in the preparation of joint initiatives, proposals, documents and reports for projects regarded as mutually beneficial to the goals of both organizations.

• Consider, when proposing projects for funding, the direct participation of TNRIS for the production of non-remotely sensed geospatial data products that complement the remote sensing research and product development conducted by UT-CSR.

• Participate with TNRIS in appropriate training programs and workshops, meetings and seminars.

• Cite the TNRIS URL home page as the central state archive for geospatial data on the home page level of the Synergy, Planet Texas and other UT-CSR web sites describing remote sensing activities in Texas as provided by the laws of Texas.

B. Texas Natural Resources Information System will:

• Support the use of TNRIS and TWDB facilities by UT-CSR staff and the location of UT-CSR staff within TNRIS offices to implement the terms of this agreement.

• Provide access by UT-CSR to geospatial data and information developed for the State of Texas and archived at TNRIS.

• Reimburse UT-CSR by direct funding for specific data, data products and support services to be designated under work authorizations made under this Agreement.

• Share expertise with UT-CSR on the development of geospatial data delivery systems and technologies.

• Advise UT-CSR regarding GIS software technology related to collaborative TNRIS—UT-CSR projects.

• Expedite UT-CSR access to the Texas Geography Network and the system of regional nodes.

• Cooperate with UT-CSR in the preparation of joint initiatives, proposals, documents and reports for projects regarded as mutually beneficial to the goals of both organizations.

• Participate with UT-CSR in appropriate training programs and workshops, meetings and seminars.
• Cite the UT-CSR URL home page as the primary state center for the reception of NASA remote sensing data and development of associated satellite imagery products.

**Interagency Service Agreement**

The Texas Water Development Board and the Center for Space Research will enter into Interagency Service Agreements on joint funding and purchases programs related to the America View grant. Such Interagency Service Agreements include funding for education programs, web specialists, database specialists hardware and software. Additionally, Interagency Service Agreements will be utilized to implement access and membership in the ICAID 12” or Internet 2 consortium. All transactions under this Agreement will be detailed under separate Interagency Service Agreements.

**Period of Agreement, Renewal, and Termination**

This Agreement will commence upon the date of the last signature of approval specified below, and it will be in effect for a period of three years from that date. This Agreement may be reviewed periodically for currency, and amended as necessary with the mutual consent of both parties. Similarly, the Agreement may be renewed by written agreement of both parties. All modifications to this Agreement will be incorporated as written amendments. The Agreement may be terminated by either party upon 90 days’ written notice to the other party.
Points of Contact

The following individuals will be the points of contact for this Agreement:

Center for Space Research

For technical matters:
Gordon L. Wells
Center for Space Research
The University of Texas at Austin
3925 W. Braker Lane, Suite 200
Austin, Texas 78759
Tel: (512) 232-7515
FAX: (512) 471-3570
GWells@csr.utexas.edu

Hugh Bender
Texas Natural Resources Information System
1700 N. Congress Avenue
P.O. Box 13231
Austin, Texas 78711-3231
Tel: (512) 463-8051
FAX: (512) 463-7274
hbender@tnris.state.tx.us

For contractual matters:
Byron D. Tapley
Director,
Center for Space Research
The University of Texas at Austin
3925 W. Braker Lane, Suite 200
Austin, Texas 78759
Tel: (512) 471-5573
FAX: (512) 232-2443

Ron Pigott
Texas Water Development Board
1700 N. Congress Avenue
P.O. Box 13231
Austin, Texas 78711-3231
Tel: (512) 936-2414
FAX: (512) 463-5580

Approvals

Original Signature on File at CSR
________________________________________
Date
Byron D. Tapley
Director, Center for Space Research
The University of Texas at Austin

Original Signature on File at CSR
________________________________________
Date
Craig Pedersen
Executive Administrator
Texas Water Development Board
Appendix B

CHARTER OF THE TEXAS GEOGRAPHIC INFORMATION COUNCIL
CHARTER OF THE TEXAS GEOGRAPHIC INFORMATION COUNCIL

ADOPTED JANUARY 27, 2000

I. POLICY FINDINGS

Whereas geospatial\(^1\) information and geographic technology resources residing in the various agencies of state government are strategic assets belonging to the people of Texas that must be managed as valuable state resources; and

Whereas it is mutually advantageous that this information be organized and shared through the public domain to all groups and citizens for maximum cost-effectiveness and use; and

Whereas technological and theoretical advances in geospatial information use are recent in origin, immense in scope and complexity, and rapidly changing; and

Whereas it is mutually advantageous that geospatial data be managed using accepted standards, uniform policies, and transferable methodologies; and

Whereas Texas agencies collecting geospatial data have a responsibility to coordinate their efforts to avoid acquiring uncoordinated and duplicate data; and

Whereas a coordinated system to optimize effectiveness in the use, acquisition, and dissemination of geospatial information resources is needed,

Therefore, the Texas Geographic Information Council (Council) is created to provide cost-effective and useful exchange and retrieval of geospatial information both within and among the various agencies and branches of government, and from the agencies and branches of state government to the people of Texas and their elected representatives.

\(^1\) Geospatial - broadly refers to all data with a spatial component including demographic information and non-digital sources such as maps and aerial photographs; and specifically the current and historical aerial photography archives, remotely-sensed data, maps, and associated data maintained at TNRIS.

II. PURPOSE

A. To provide state agencies, universities, regional, and local governments a means through which they can plan together for geospatial data development, locate partners for joint development projects, and seek support for their funding requests.

B. To identify the most cost-effective and efficient means to develop geospatial data layers and applications in state government.

C. To increase the utility of geographic information system (GIS) technology as a tool of government to meet the needs of the citizens of Texas.
D. To provide integrated, spatially referenced information from a variety of expert, custodial agencies to the leadership and Legislature of Texas.

E. To promote the sharing of data for the common good of the people of Texas.

F. To provide educational opportunities to promote the use of modern geographic information technologies.

III. COUNCIL PARTICIPATION

A. AGENCY PARTICIPATION -- Entities whose responsibility falls within the definition of Membership Qualifications are eligible to be a member of TGIC. Qualifying agencies will submit their membership request in writing to the administrative co-chair who will forward the request to the Executive Director of DIR and Executive Administrator of TWDB for consideration. Entities whose membership qualifications are not defined or are ambiguous in Membership Qualifications will submit their membership request to the administrative co-chair for consideration by TGIC who will forward a recommendation to the Executive Director of DIR and Executive Administrator of TWDB for consideration.

B. MEMBERSHIP QUALIFICATIONS -- Qualified council members are state agencies, state-wide associations, federal agencies, state universities, and state university affiliated research laboratories and extension offices that provide state-wide services.

C. VOTING -- Each agency will have one vote by their representative or their designated alternate. The exception is the Texas Water Development Board, which is granted an additional representative through the Texas Natural Resources Information System. To maintain voting status, an agency must have attended at least one of the previous four quarterly meetings.

D. NON-VOTING MEMBERSHIP -- Entities that are not qualified under (III. B) may apply for non-voting membership status to the Steering Committee.

IV. STRUCTURE AND OPERATION

A. TEXAS GEOGRAPHIC INFORMATION COUNCIL

1. PURPOSE -- The purpose of the Council is to direct interagency coordination. The Council will establish goals and objectives for developing a mutually supportive environment for the use of geospatial systems at the State of Texas, and to direct the efforts. The Council will be assisted by the Technical Advisory Committee, which is composed of members from the same agencies represented on the Council.

2. MEMBERSHIP -- Council members must be executive level personnel authorized to make executive level commitments for their agencies. Appointments shall be made by executive directors of the agencies (or statewide elected official, commission, or board chair should there be no executive director). Members will select an alternate for their agency from the Technical Advisory Committee. The term of appointment shall be two
years (to coincide with the biennium). DIR will request a reappointment of membership at the end of each biennium.

3. LEADERSHIP -- The Council will be served by two elected positions: a Council Chair and a Vice-Chair. The Council Chair and Vice-Chair will be elected by a simple majority of the Council, using a blind ballot in the event of multiple nominations, at the first meeting of the biennium. The Chair and Vice-Chair will serve for a period of two years with the option, if elected, to serve a maximum of two terms. The Administrative Co-chair, described in IV.A.4.a., will work to support the Council.

The Chair will be responsible for managing council meetings, signing correspondence, resolutions, and proclamations, presiding over meetings of the Steering Committee, and representing the council in public meetings.

The Vice-chair will work in partnership with the chair and will be responsible, when the chair is unavailable, for managing council meetings, signing correspondence, resolutions, and proclamations and representing the council in public meetings.

A Council Steering Committee will guide the development of the agenda for both the Council and the TAC. In addition, the Steering Committee will be empowered to make administrative decisions on behalf of the Council in circumstances when it is not feasible to call a vote in a timely manner. The Steering Committee will meet once a month.

The Steering Committee will be composed of the following members based on five elected positions and four permanent working positions:

- TGIC Chair (elected position)
- TGIC Vice-Chair (elected position)
- TGIC Administrative Co-Chair (permanent position)
- TAC Chair (elected position)
- TAC Vice-Chair (elected position)
- TAC Administrative Co-Chair (permanent position)
- TNRIS Director (permanent position)
- DIR State GIS Coordinator (permanent position)
- At-large Position (elected position)

The At-large position will be nominated and elected by the Steering Committee. The At-large position may serve for a period of two years with the option, if elected, to serve a maximum of two terms. The appointment of the At-large position who will based upon the need to ensure the Steering Committee represents a diversity of ideas and interests.

4. ADMINISTRATION AND SUPPORT -- The Council is sustained by its member agencies through administrative support, attendance, voting, study of issues, and participation in discussion. Two agencies, the
Department of Information Resources (DIR) and the Texas Water Development Board (TWDB), will provide primary administrative support.

a. DIR is responsible for providing statewide leadership in the use of information resources technologies. DIR advises agencies, sets standards, and administers guidelines for state information procedures. DIR shall be responsible for administrative tasks including maintenance of the TGIC web site, official files, and official membership lists in both hardcopy and electronic formats. DIR's representative to the Council shall also serve as Administrative Co-chair of the Council. This person shall be responsible for organizing steering committee meetings, administrative tasks (minutes, mail-outs, room scheduling, etc.) and general support to the Council. This person shall chair meetings in the event of the absence of the Chairs.

b. TNRIS, working on behalf of TWDB, is the state clearinghouse and referral center for natural resource data. It serves as a state resource center for those data. TNRIS will support the Council through implementation of Council policies directed toward data collection, storage, and dissemination. TNRIS will also support the Council through administrative assistance with meetings, training, and outreach. TNRIS' representative to the Technical Advisory Committee (Committee) shall also serve as Administrative Co-chair of the Committee. This person shall be responsible for administrative tasks (meeting agendas, meeting summaries, mail-outs, room scheduling, etc.) and support to the Committee and the Chair.

5. COUNCIL DUTIES

a. The Council will meet at least once each quarter. Any member may request that the Chair call additional meetings. Written summaries will be produced for all meetings.

b. The Council will maintain strategic plans for development of coordinated, cost efficient, and non-redundant GIS systems in the state. This plan will identify data layers of interagency interest, the custodial agency that will create and/or maintain the data layers, and assign time lines as well as other items identified by the Council.

c. The Council is responsible for providing guidance to the executive administrator of the Texas Water Development Board on the direction and long-term planning for TNRIS. The Council may create TNRIS oversight subcommittees as needed to assist in advising the executive administrator. The Council will help promote TNRIS as the state's clearinghouse and referral center for geospatial data.

d. The Council is responsible for providing recommendations to the Department of Information Resources to adopt and promote standards that facilitate sharing of digital natural resource data and
related socioeconomic data among federal, state, and local
governments and other interested parties.

e. The Council will produce implementation plans which will serve as
blueprints for the direction of the interagency GIS coordination
effort for each fiscal biennium.

f. The Council will act as a forum for member agencies seeking
coopeative development opportunities.

g. The Council will utilize the resources of the Technical Advisory
Committee to provide input and advice on technical matters.

h. The Council has primary responsibility for addressing
administrative issues. These include border issues, TNRIS
operations, and legislative issues. The Council may also create and
authorize committees to address these and other issues, as it
deems necessary to support the interagency coordination role. The
Council will determine the role, size, length of duration, and
membership for the committees.

i. The Council will inventory and track geospatial programs and
projects with a survey. A summary report will be produced at the
completion of the survey.

j. The Council will coordinate with federal agencies through the
Texas Federal Geographic Information Workgroup (TFGIW).

k. The Council will coordinate activities with the Texas Mapping
Advisory Committee (TMAC).

B. TECHNICAL ADVISORY COMMITTEE

1. PURPOSE -- The Technical Advisory Committee (Committee) shall advise
the Council in all matters related to the technical and operational issues of
statewide geospatial coordination and integration.

2. MEMBERSHIP -- Technical Advisory Committee members should be a
senior staff member with day-to-day responsibility involving geospatial
activities at the agency. Members appointed to the Technical Advisory
Committee serve at the discretion of their agency. It is the responsibility of
TAC members designated as the agency alternate to TGIC to function as a
liaison between their agency and the Technical Advisory Committee.

3. LEADERSHIP -- The Committee will be served by two elected positions: a
Chair and a Vice-Chair. The Chair and Vice-Chair will be elected by a
simple majority of the Committee, using a blind ballot for multiple
nominations, at the first meeting of the biennium. The Chair and Vice-Chair
will serve for a period of two years with the option, if elected, to serve a
maximum of two terms. The Administrative Co-chair, described in IV.B.4,
will work to support the Committee.

The Chair will be responsible for managing TAC meetings and representing the committee in public meetings. The Vice-chair will work in partnership with the chair and will be responsible, when the chair is unavailable, for managing TAC meetings and representing the committee in public meetings.

4. ADMINISTRATION AND SUPPORT -- The Committee is sustained by its member agencies through administrative support, attendance, voting, study of issues, and participation in discussion. A designated TNRIS representative to the Committee shall also serve as Administrative Co-chair of the Committee. This person shall be responsible for administrative tasks (minutes, mail-outs, room scheduling, etc.) and support to the Committee and the Chair. This person shall chair Committee meetings in the event of the absence of the Chair. Both DIR and TNRIS will supply additional primary administrative assistance as required.

5. TECHNICAL ADVISORY COMMITTEE DUTIES

a. The Technical Advisory Committee will meet at least quarterly. The Technical Advisory Committee will facilitate agency efforts and provide policy recommendations to the Council on implementation of GIS related technologies.

b. Agency GIS related activities shall be reported in the Technical Advisory Committee meetings and appropriate summary information shall be conveyed to the Council.

c. The Technical Advisory Committee will facilitate interagency communications and provide policy recommendations to the Council on Census TIGER file updates.

d. The Technical Advisory Committee has primary responsibility for working on technical issues. These include standards, geospatial data acquisition, and data exchange. The Technical Advisory Committee may form subcommittees as required to address these or other issues. Chairs for the subcommittees must be Technical Advisory Committee members or alternates. Other individuals from state agencies, local governments, and academia with technical experience in appropriate technologies may also join and vote on Technical Advisory Committee subcommittees.

e. The Technical Advisory Committee will review data development or revision plans submitted by base map or other data layer custodians in an effort to ensure their consistency with interagency strategic plans and approved standards, and report results and make recommendations to the Council.

f. The Technical Advisory Committee will advise the Council on the best and most efficient methods to ensure custodial roles of
agencies are met so that data are updated, distributed, and made available to the public.