

## TARGETED EXCELLENCE COVER SHEET

### I. **Project Title:**

Geospatial Technology Infrastructure Enhancement Program

### II. **Brief Project Description:**

Competency in geospatial technology and GIScience allows students/faculty to acquire, use, and interpret geographic information at multiple spatial and temporal scales. In addition, GIScience competency is critical in analyzing and communicating knowledge about the world around us. Applications of geospatial technologies spans multiple disciplines including agriculture, biological sciences, computer science, earth sciences, ecology, economics, geography, marketing, regional planning, sociology, transportation engineering, surveying, and veterinary medicine.

This proposal seeks to greatly expand K-State's capabilities in geospatial research, teaching, and service/outreach. Current student underexposure to GIS and other geospatial technologies is related to an insufficient number of trained educators among the ranks of faculty, a shortage of relevant classes and continuing education opportunities, and suitable high-tech lab classroom facilities. This proposal addresses these shortfalls with the goal of facilitating the diffusion of GIScience and geospatial technologies into the general university community and to promote the informed and responsible use of GIScience and geographic analysis for the benefit of society.

Specific enhancements to K-State geospatial capabilities include:

- New faculty and a GIS Education and Outreach Coordinator to expand the geospatial technology curriculum via traditional courses, web-based modules, and workshops.
- A GIS Research Coordinator to provide training, data, and applications/technical assistance to the campus community and state.
- Additional CNS and iTAC support staff to address core computing, networking, and technical support needs.
- Creation of a university geospatial technology teaching laboratory.
- Exposing a larger, and more diverse, population of students to geospatial technologies and the value of spatial analysis and reasoning.
- Increasing the spatial literacy of K-State students.
- Additional social science faculty and GIS experts that can participate in multidisciplinary teaching and research.
- Increased competitiveness for extramural research funding.

### III. **Potential Impact/Intellectual Merit**

Complementing existing research strengths, approval of the proposed GIScience Infrastructure Enhancement program will elevate Kansas State University to a

leadership position in GIS education, research applications, and service. The field of GIScience and supporting geospatial technologies fully supports the university's core missions, is an integral component of several other Targeted Excellence proposals, and will provide a springboard for the development of unique disciplinary and multidisciplinary programs.

Strengthening the human and equipment GIScience infrastructure will enhance the status of K-State in the areas of GIScience and geospatial technologies while helping students and faculty/staff to maximize the effectiveness of geospatial technologies in the curriculum, basic research, applied studies, and outreach services.

**IV. Amount Requested, Proposed Matching Funds (Estimate) and Duration:**

1. Total Amount Requested: \$2,165,233 million over 5 years (Year 1 = \$706,020; Year 2 = \$377,745; Year 3 = \$320,758; Year 4 = \$436,901; Year 5 = \$436,901).
2. Long-term Matching Funds (current grants with >1 year duration): \$1,217,512
3. Short-term Matching Funds (current grants in last year): \$1,610,000
4. Matching Faculty Positions (1 @ \$45,000 per year) – teaching and research; \$180,000 total.
5. Other Matching Positions
  - a. Post-Doctoral Research Associate (1 @ \$36,000 per year) –\$180,000.
  - b. Graduate Research Assistantships (2 @ \$26,000 per position) – \$260,000 total.
  - c. Hourly Undergraduates (\$8,000 per year) – service; \$32,000 total.
6. Mean Annual University Geospatial Extramural Funding (1995-2003): \$2,401,399.
7. Duration: 5 years

**V. Team Members (Indicate Project Director) (Name, Title, Department)**

J.M. Shawn Hutchinson, Assistant Professor and Director, Geographic Information Systems Spatial Analysis Laboratory (GISSAL), Kansas State University – Project Director

John A. Harrington, Jr., Professor and Head, Department of Geography, Kansas State University – Co-Project Director

Harvard Townsend, Director, Computing and Network Services, Kansas State University – Key Collaborator

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**VI. Submission Date: February 17, 2004**

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## PROJECT SUMMARY

Geospatial Technology Infrastructure Enhancement will assist Kansas State University in our goal of being a top-ten land grant institution. This Targeted Excellence proposal is an interdisciplinary effort to advance Kansas State University's focus on and capabilities in geospatial technologies and geographic information science (GIScience). The primary purpose of this effort is to **provide the means to facilitate the diffusion of GIScience and geospatial technologies into the general university community.**

GIScience is an emerging interdisciplinary field that aims to advance basic understanding of the use of digital geographic information to acquire and communicate knowledge about the world. GIScience bridges multiple disciplines including geography, computer science, ecology, economics, psychology, mathematics, statistics, engineering, surveying, marketing, tourism, and the earth sciences. Faculty, staff, and students who actively use geographic information systems (GIS) and related technology reside throughout the university. Geospatial technologies form a vital suite of methods and tools applicable for nearly all academic units. However, there is a strong consensus that we lag significantly behind peer institutions. This "underexposure" to GIS and other geospatial technologies is reinforced by an insufficient number of trained educators among the ranks of faculty and a shortage of relevant classes, distance education courses, extension workshops, and continuing education opportunities.

In the context of geospatial technologies, specific suggestions are made to address weaknesses and enhance strengths in each of the three core mission areas of Kansas State University. Administered by multidisciplinary GIS Advisory Council, acceptance of this proposal will dramatically increase the realization of our individual and collaborative goals. First, it strengthens our teaching mission by making available learning tools and faculty who will specialize in the application, methods, and theory of spatial data. Second, it provides for the necessary staff, centralized services, and data-sharing capabilities that will significantly strengthen our ability to compete both more frequently and more successfully for outside funding. Finally, this proposal establishes the means by which this university can more effectively serve off-campus students, professionals, and the citizens of Kansas. By providing for the critical faculty, facilities, and equipment, K-State will have the opportunity to become **a premier institution in the instruction and application of GIScience and geospatial technologies.** Building from the existing strength of multidisciplinary GIScience research in the biological and physical sciences, additional strengths can be achieved in the social sciences, business, and veterinary medicine.

Approval of this Geospatial Technology Infrastructure Enhancement Program will elevate Kansas State University to a leadership position in GIS education and service for the State of Kansas, the United States, and the world. The field of GIScience and supporting geospatial technologies fully compliments the university's core missions, is an integral component of several other Targeted Excellence proposals, and will provide a springboard for the development of unique disciplinary and multidisciplinary programs (e.g., agricultural biosecurity, plant and animal disease modeling, spatial economics, and a new Undergraduate Certificate in GIS).

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## 1 GEOSPATIAL TECHNOLOGY AT K-STATE: A CURRENT VIEW

*“GIS are simultaneously the telescope, the microscope, and the xerox machine of regional analysis and synthesis.”*

Ronald F. Abler (1988)

President, Environmental Systems Research Institute (ESRI)

Geographic Information Science (GIScience) is an emerging interdisciplinary field that aims to advance basic understanding of the use of digital geographic information to acquire and communicate knowledge about the world. GIScience bridges multiple disciplines including geography, computer science, ecology, economics, psychology, mathematics, statistics, engineering, surveying, marketing, tourism, and the earth sciences. In order to fulfill its historic educational mission in teaching, research, and public service, K-State recognizes the value of GIScience and related geospatial technologies, spatial analysis, and geographic visualization in its continuing effort to build a top-ranked land grant university. Faculty, staff, and students who actively use geographic information systems (GIS) and related technology reside throughout the university.

Administrators and faculty at K-State recognize the importance of this vital suite of technologies to nearly all academic units. Comments regarding GIS include, **“GIS is as important as composition”** in terms of basic student preparation and **“GIS represents a core of our future vision”** as we reshape courses and curricula to meet the challenge of the new millennium. However, there is a strong consensus that today’s students lack the basic understanding of what geospatial technologies are, why they are important, and how to use them in fields ranging from sociology to civil engineering.

Ramifications from this current situation are serious. K-State efforts to diversify and modernize curricula and promote professional development in GIScience haven’t gone nearly far enough. Departments and individual researchers who have contributed funds to renew expensive annual software site licenses and take time to help share information concerning software installation and other technical support issues feel they are carrying a burden that central administration should absorb. As a result, the very future of these critical contributions is at risk. More importantly, students now leave the university without having been fully exposed or, in most cases, even introduced to the key technologies and methods now commonplace in both the public and private sector.

This underexposure to GIS and other geospatial technologies is caused in part by an insufficient number of trained educators among the ranks of faculty and a shortage of relevant classes, distance education courses, extension workshops, and continuing education opportunities. For example, GEOG 508 (Geographic Information Systems I) has not been proposed as a University General Education (UGE) course due to a lack of faculty, facilities, and resources. **Local deficiencies are glaring when KSU is compared to its peer universities.**

## 2 MOVING FORWARD IN THE LAND GRANT TRADITION

Since the first remote sensing course was offered at Kansas State University in 1976, the broad field of geospatial technologies, and now GIScience, has grown tremendously (Nellis et al. 1992). In the early 1990s, the major geospatial research foci were in natural resource assessment and GIS approaches to landscape ecology analysis (e.g., Nellis and Briggs 1989; Nellis et al.



1990; Su et al. 1990; Briggs and Nellis 1991). The Geographic Information Systems Spatial Analysis Laboratory (GISSAL) was created in August 1990 as the university made its first concerted effort to develop adequate hardware and software infrastructure to support remote sensing, GIS, and computer mapping research and education. Developments at K-State were paralleled at the state level in terms of administrative coordination. The Kansas GIS Policy Board was created in 1989 by an executive directive issued by then Governor Hayden, and continues to operate today (Bannister et al. 1998).

Not since the Departments of Geography and Agronomy initiated what became an agreement with Environmental Systems Research Institute (ESRI) for a university GIS software site license in 1995 has a clearly defined and organized proposal for the campus-wide advancement of geospatial technologies been made. Expanding the geospatial technology curriculum, establishing a sound education base in geospatial technology for later application courses, providing leadership in continuing education and extension services, faculty assistance, and technical advisory support are critical to the advancement of GIScience and GIS-assisted applications at Kansas State University. Proposed enhancements are included within each of the three mission realms of a land grant university: Teaching, research, and outreach. A conceptual model for the proposal is shown in Figure 1 and proceeding sections detail the motivation for, and plan to accomplish, specific tasks.

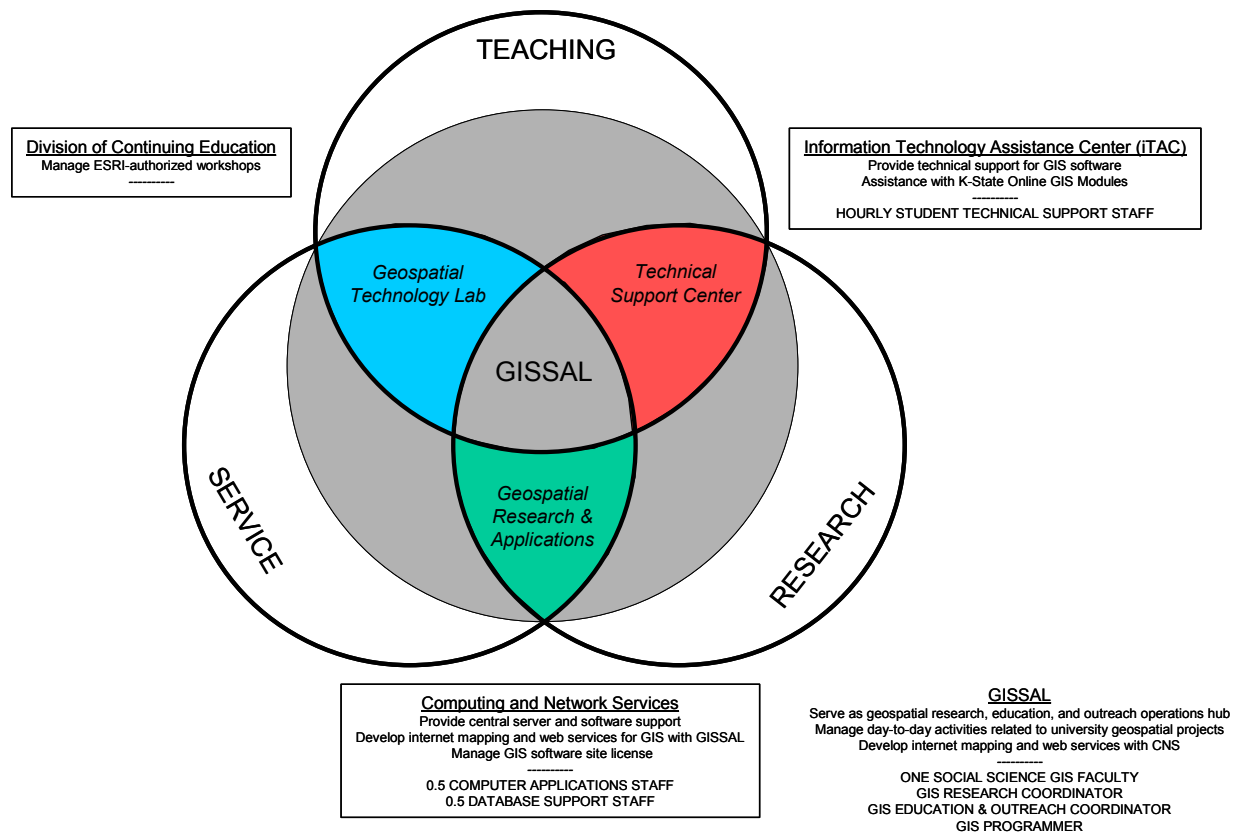


Figure 1. Conceptual design for the integration and management of proposed geospatial technology enhancements.

## 2.1 Teaching – Programmatic and Curricular Enhancements

An essential prerequisite for meeting student and faculty demand for the study and application of geospatial technology is the **availability of faculty who specialize in the applications, methods, and theory of spatial data and associated tools**. Kansas State University can move forward in GIS by making the commitment to hire capable faculty and support personnel. In terms of the number of faculty trained in various aspects of GIScience, K-State lags far behind its peer universities and other prominent land grant institutions. For example, the Pennsylvania State University recognizes approximately 100 faculty members with geospatial expertise. At K-State, that number is closer to 15 tenure-track faculty members. Further, K-State faculty currently offer geospatial technology or applications courses in the curricula of only four departments – agronomy, civil engineering, geography, and landscape architecture/regional community planning.

As measured by an informal survey of extramural funding received by academic departments and research units in 2000, researchers examining natural resource and environmental topics are clearly leading the GIS movement at K-State. To complement this existing relative research and teaching strength, it is recommended that a *tenure-track GIScience expert in the social sciences* be hired. A new social science faculty member can take advantage of many grant requests for proposal opportunities that seek or expect application of geospatial techniques in the economic, transportation, medical, and human-environment interactions fields.

A diverse curriculum, assembled by trained experts, is essential to effectively teach students about geospatial technology, its underlying theory, and how to properly apply this technology. The new social science faculty member would be responsible for developing an *introductory GIS course focusing on socio-economic applications*, one (or more) courses that take advantage of his/her research interests, and alternate with existing GIS faculty in the Department of Geography to develop and offer a *new advanced GIS course* (e.g., GEOG 808 GIS III). An additional outcome supporting the curricular development effort will be the development of an *Undergraduate Certificate in GIS* to complement the recent approval, and administration of, a *Graduate Certificate in GIScience*.

A promising and efficient method to expose a large population of K-State undergraduates to GIScience and GIS technology is through the development of *learning modules for large enrollment* classes in all colleges at KSU (e.g., AGRON 305 Soils, CE 015 Engineering Assembly, GENAG 101 Ag Orientation, GEOG 100 World Regional Geography). Such modules, delivered through K-State Online and designed by teams of subject matter experts working with a *GIS Education and Outreach Coordinator*, are an innovative and effective means to develop cognitive strategies among the general student body whereby spatial reasoning can increasingly be applied to relevant issues outside (and also inside) the geography classroom (Macaulay 1994; West 2004). The promise of integrating geospatial technologies into the engineering, social science, and biophysical science classroom is the opportunity to present “contextually rich” learning environments where instructors can develop critical thinking skills, methods of scientific inquiry, and highlight the geographies inherent in pressing societal issues (Wilder et al., 2004; Tinker 1992). The ability of faculty to successfully use the “teaching with GIS” approach is not hampered by technological diffusion, but rather the effectiveness at which the curricular value is made clear, both to students and faculty (Bednarz and Ludwig 1997). GIS learning modules for classes across campus will be a major step towards increasing spatial reasoning at K-State.

In addition to a limited number of trained faculty, another major factor limiting the integration of GIS into courses and curriculums is the high cost of establishing a functional computing environment with the computers, printers, and other peripheral devices needed to operate, let alone maximize the potential of, this technology. While individual departments have managed to operate small computer lab classrooms to serve most of their in-house student educational needs, a *University Geospatial Technology Laboratory* would provide the necessary facility and computing infrastructure to better support efforts to expand the role of geospatial tools and technology in coursework for all academic units. Such a facility could be scheduled to serve as a high-tech classroom and lab for geospatial education modules that last a day, week, or semester. In addition, the facility could host low-cost/no-cost workshops for faculty and serve as the home of a profit-based ESRI-Authorized Learning Center and/or Autodesk instructional facility for software specific education. Essential to the successful operation of this kind of facility are the human resources (faculty and staff) needed to manage and facilitate operations, as well as to maintain purchased computer hardware and software.

### 2.1.1 Objectives

Specific objectives for the teaching component to this proposal are listed in Table 1.

OBJECTIVES	DESCRIPTION
Search/Hire Social Science GIS Faculty	<ul style="list-style-type: none"> <li>▪ Tenure-track faculty position (new position #1) in the GIScience field with social science expertise.</li> <li>▪ Develop new GIS courses and obtain extramural funding in new K-State focus area.</li> </ul>
Develop New GIS Courses	<ul style="list-style-type: none"> <li>▪ GEOG 508 GIS I changed to Introduction to GIS (Natural Resource Applications).</li> <li>▪ Develop new GEOG 509 Introduction to GIS (Socio-Economic Applications) as companion course to complement GEOG 508.</li> <li>▪ Develop new GEOG 808 Advanced GIS.</li> </ul>
Recruit/Hire GIS Education and Outreach Coordinator	<ul style="list-style-type: none"> <li>▪ Graduate Research Assistant position (new position #2) and housed in the K-State GISSAL.</li> <li>▪ K-State Online module development, administrative support for GIS workshops, and assisting with new distance education initiatives.</li> </ul>
Develop K-State Online GIS Modules	<ul style="list-style-type: none"> <li>▪ Turn-key learning units designed for large-enrollment courses and other courses oriented towards underrepresented groups.</li> <li>▪ Created in partnership with course instructors and GIS Education and Outreach Coordinator.</li> </ul>
Develop GIScience and GIS Certificate Programs	<ul style="list-style-type: none"> <li>▪ Strengthen individual degree programs across colleges by offering skills and knowledge in the high-demand technical field of GIS.</li> <li>▪ Graduate Certificate in GIScience implemented in 2003.</li> <li>▪ Undergraduate Certificate in GIS – under consideration by the College of Arts and Sciences Course and Curriculum Committee.</li> </ul>
Construct University Geospatial Technology Laboratory Classroom	<ul style="list-style-type: none"> <li>▪ Modern facility to support higher enrollments in basic and application-oriented GIS courses.</li> <li>▪ Flexible scheduling.</li> <li>▪ Classroom facility for GIS workshops conducted through the Division of Continuing Education.</li> </ul>

Table 1. Proposed programmatic and curricular objectives.

### 2.1.2 Implementation Timeline

Table 2 presents a timetable for teaching milestones in support of proposed programmatic and curricular enhancements.

ACTION/DELIVERABLE	DONE	YR 1	YR 2	YR 3	YR 4	YR 5
Design/Offer Graduate Certificate in GIScience						
Design/Offer Undergraduate GIS Certificate						
Recruit/Hire GIS Education and Outreach Coordinator (GRA)						
Construct University GIS Laboratory						
Search/Hire Social Science GIS Faculty (Tenure-Track)						
Develop/Offer GIS for Natural Resources (GEOG 508)						
Develop K-State Online GIS Modules						
Offer GIS for Socio-Economics (GEOG 509)						
University GIS Lab Operational						
Offer Advanced GIS (GEOG 808)						

Table 2. Timeline of proposed teaching-related activities.

### 2.2 Research – Infrastructure, Data Sharing, and Innovation

Established in 1990, GISSAL continues to conduct spatial research and provide education/outreach activities at Kansas State University. Owing largely to the “activism” of faculty directors of GISSAL and key researchers in a handful of other departments, Kansas State University has been remarkably successful at earning extramural support (>\$16 million since 1995) for research projects with a significant GIS or geospatial component. Expert faculty in GIS-based applications and GIScience theory are able to garner considerable support for research. The ability to add new GIScience faculty would increase the ability of K-State **to compete more frequently and more successfully for outside funding** through individual or multidisciplinary collaborative projects. Interestingly, GIS and geospatial technologies play a significant supporting role in several other Targeted Excellence projects selected for full-proposals in clear recognition of the need for enhanced GIScience support across our campus.

An opportunity also exists to fundamentally alter the way K-State faculty and students interact with basic and “value-added” digital geospatial data. Progression of a typical GIS project begins with the acquisition of basic data from one or more archives maintained at the state or federal level. In many cases, it is necessary to create new data (e.g., determination of landcover types based upon a time-series of satellite imagery). While the end result of this process is often scholarly publication, the data are frequently relegated to storage. A new *University Spatial Data and Application Server* can be used to archive this data that can then be expanded or improved upon in future research. To ensure reliable operation, the system will be

comprised of redundant database and spatial database engine (SDE) servers with an additional one Terabyte of space on the SAN. Given normal replacement schedules and future space requirements, the server will need to be replaced, and an additional Terabyte of SAN space added, 3-4 years after the system goes online. Reliable and robust performance is necessary to serve GIS-based applications such as Internet mapping services (IMS), thematic packages of data via web services, and real-time data reporting systems (e.g., for the Great Plains Diagnostic Network and the Kansas Weather Data Library). A full-time *GIS Programmer*, available to assist faculty across campus, is critical to this effort to bridge the academic gap between geospatial technologies, large datasets, and the needed computer programming and networking.

In addition, community outreach and service comprise a significant portion of the Kansas State University mission. Surprisingly, use of geospatial technology within K-State Research and Extension is relatively uncommon despite the direct application of tools such as GIS, GPS, and remote sensing to the research, programs, and people served by agricultural experiment and extension specialists. Existing extension specialists within Kansas are aware of the significant need for GIS outreach. A *GIS Research Coordinator* could provide training, data, and applications/technical assistance that provide the means to help expand GIS and related technologies in the State of Kansas. An excellent example of the potential role of such a GIS specialist would be to work cooperatively with research faculty and extension staff, such as the state water quality extension specialists, to provide maps, digital data, decision-support aids, and field data collection hardware and techniques. Such assistance applies not only to agriculture and the environment, but also to the economic and social science areas of KSU Research and Extension. A GIS Research Coordinator could also cooperate in the preparation of grant proposals requiring application of geospatial technologies.

### 2.2.1 Objectives

Specific objectives for the research component to this proposal are listed in Table 3.

OBJECTIVES	DESCRIPTION
Recruit/Hire GIS Research Coordinator	<ul style="list-style-type: none"> <li>▪ Post-doctoral research associate (new position #3) and housed in the K-State GISSAL.</li> <li>▪ Provide GIS subject matter and technical support for research projects.</li> <li>▪ Assist in the preparation of grant proposals with a GIS emphasis.</li> </ul>
Recruit/Hire GIS Programmer	<ul style="list-style-type: none"> <li>▪ Position to be filled by a Graduate Research Assistant (new position #4) and housed in the GISSAL</li> <li>▪ Responsible for integrating GIS and programming skills (e.g., Avenue, AML, Visual Basic) to design and create GIS-based applications.</li> <li>▪ Assist Computing and Networking staff in the design and maintenance of the proposed University Spatial Data and Application Server.</li> </ul>
Hire Computing and Networking Services (CNS) Technical Staff	<ul style="list-style-type: none"> <li>▪ Funding to support two technical staff (new position #4)</li> <li>▪ Responsible for the daily maintenance of necessary hardware and software supporting a University Spatial Data and Application Server.</li> </ul>
Supplement Computing Hardware for CNS	<ul style="list-style-type: none"> <li>▪ Expand CNS infrastructure to provide new, and reliable, services - specifically for the University Spatial Data and Application Server.</li> </ul>
Create University Spatial Data and Application Server	<ul style="list-style-type: none"> <li>▪ State-of-the-art web-based spatial data archive and data sharing technology, including large library of satellite imagery.</li> <li>▪ Host innovative GIS-based applications and models conceived and developed by K-State researchers and extension personnel.</li> </ul>

Table 3. Proposed research infrastructure and data-sharing objectives.

### 2.2.2 Implementation Strategy

Table 4 presents a timetable for research milestones to enhance campus-wide GIS infrastructure, foster spatial data sharing, and stimulate innovative applications.

ACTION/DELIVERABLE	DONE	YR 1	YR 2	YR 3	YR 4	YR 5
Purchase CNS Equipment to Increase Spatial Data Capacity						
Recruit/Hire GIS Research Coordinator (Post-Doctoral Research Associate)						
Recruit/Hire GIS Programmer (GRA)						
Staff In-Place to Support Geospatial Proposals/Applications						
Design/Equip University Spatial Data and Application Server						
Hire CNS Technical Staff to Maintain Spatial Data Server						
University Spatial Data and Application Server Operational						

Table 4. Timeline of proposed research-related activities.

### 2.3 Outreach – Lifelong Learning and Distance Education

GISSAL and the Department of Geography have already initiated efforts to **serve off-campus students and professionals** by developing and offering introductory GIS workshops in conjunction with the K-State Division of Continuing Education and the Environmental Systems Research Institute (ESRI) Authorized Instructor Training Program. ESRI develops and markets the most widely used suite of GIS software in the United States. Future plans include establishment of an *ESRI Authorized Learning Center (ALC)* at Kansas State University that could be operated on a for-profit basis. Currently, no ESRI ALC exists in the states of Nebraska, Kansas, or Oklahoma.

Part of the effort for outreach should include expanding distance education opportunities for our on- and off-campus students. However, limited faculty numbers (even if one additional GIScience faculty can be hired), and competing demands for their time, effectively limits K-State from offering a full suite of geospatial classes online. With recent programmatic additions, such as the *Graduate Certificate in GIScience*, our ability to accommodate working professionals seeking to advance their knowledge and skills in this area is limited. Given this reality, a more practical alternative is for K-State to form a coalition of Regent’s institutions such as the University of Kansas and Emporia State University to examine the *joint development of a comprehensive geospatial distance education curriculum* to serve the people of Kansas.

#### 2.3.1 Objectives

Specific objectives for the outreach component to this proposal are listed in Table 5.

OBJECTIVES	DESCRIPTION
Recruit/Hire GIS Education and Outreach Coordinator	<ul style="list-style-type: none"> <li>▪ Graduate Research Assistant position (new position #2) and housed in the K-State GISSAL.</li> <li>▪ K-State Online module development, administrative support for GIS workshops, and assisting with new distance education initiatives.</li> </ul>
Expand Division of Continuing Education GIS Workshops	<ul style="list-style-type: none"> <li>▪ Increase number of ESRI Authorized Instructors on campus.</li> <li>▪ Offer ArcGIS II, Spatial Analyst, and ArcIMS courses.</li> <li>▪ Explore additional opportunities with other technology and software manufacturers such as Trimble, AutoDesk, and Intergraph.</li> <li>▪ Establish ESRI Authorized Learning Center and become the premier state/regional GIS learning center.</li> </ul>
Hire/Train iTAC Support Staff	<ul style="list-style-type: none"> <li>▪ Divert basic technical support issues on campus (e.g., software installation) from tenure-track faculty to trained support staff.</li> </ul>
Explore Collaborative Distance Education	<ul style="list-style-type: none"> <li>▪ Collaborate with other Regent's institutions in Kansas to develop a statewide Distance Education suite for geospatial technologies.</li> </ul>

Table 5. Proposed lifelong learning and distance education objectives.

### 2.3.2 Implementation Strategy

Table 6 presents a timetable for outreach milestones to enhance lifelong learning opportunities and distance education.

### 2.4 Other – Administrative and Professional

Four additional objectives are included in the “Other” category, which include some of most critical elements of this proposal. K-State faculty and staff realize that given the resources available at the department (and college) level today, and the interdisciplinary nature of GIScience, GIS, and geospatial technologies, that **teamwork and central services are needed to facilitate the realization of our individual and collaborative goals.**

A new *GIS Advisory Council* is proposed to provide a multidisciplinary administrative structure and “voice” for the continuation and improvement of geospatial activities at K-State. Built from the existing ad hoc council in operation since 2000, details explaining the structure and purpose of the GIS Advisory Council are presented in Section 4.1 of this proposal.

Since 1996, Kansas State University has maintained an ESRI GIS software site license. This license, managed by CNS, permits use of most ESRI GIS products, such as ArcView 3.x and ArcGIS. Currently, funding for the ESRI site license is accomplished on a fragmented basis, with individual departments, research centers, and colleges “chipping in” amounts perceived to be in concert with demand. Such a funding strategy results in instability and potentially dangerous implications for meeting the demands of a recurring annual cost. *Centralized ESRI site license funding* at KSU should be implemented. A current concern is accurate estimation of demand across units and possible perceptions of inequitable cost sharing. Another is the lack of support by entire colleges that should be active in interdisciplinary geospatial research. A major difference in how the ESRI site license is funded at K-State versus other universities is the relatively low contribution received from the central administration and/or computer and information services.

<b>ACTION/DELIVERABLE</b>	<b>DONE</b>	<b>YR 1</b>	<b>YR 2</b>	<b>YR 3</b>	<b>YR 4</b>	<b>YR 5</b>
Fund ArcView Instructor Authorization Fees						
Offer ArcView Courses through Division of Continuing Education						
Pay Annual ArcView Maintenance Fee						
Fund ArcGIS I Instructor Authorization Fees						
Offer ArcGIS I Courses through Division of Continuing Education						
Pay Annual ArcGIS I Maintenance Fee						
Establish ESRI Authorized Learning Center						
Train iTAC Support Staff in Basic Geospatial Software Tasks						
Fund ArcGIS Spatial Analyst Instructor Authorization Fees						
Offer ArcGIS Spatial Analysis Courses through Division of Continuing Education						
Pay Annual ArcGIS Spatial Analyst Maintenance Fee						
Pay Trimble GPS Instructor Authorization Fee						
Offer GPS Courses through Division of Continuing Education						
iTAC Tech Support Active and Providing Service						
Fund ArcGIS II Instructor Authorization Fees						
Offer ArcGIS II Courses through Division of Continuing Education						
Pay Annual ArcGIS II Maintenance Fee						
Fund ArcIMS Instructor Authorization Fee						
Offer ArcIMS Courses through Division of Continuing Education						
Pay Annual ArcIMS Maintenance Fees						
Develop Distance Education Courses with Regents Schools						

Table 6. Timeline of proposed outreach activities.

The University Consortium for Geographic Information Science (UCGIS) is a non-profit organization of universities (Table 7) and other research institutions dedicated to advancing our understanding of geographic processes and spatial relationships through improved theory, methods, technology, and data. The UCGIS attempts to serve as an effective, unified voice for the geographic information science research community; foster multidisciplinary research and education, and promote the informed and responsible use of GIScience and geographic analysis



for the benefit of society. *Membership in UCGIS* should be a goal of K-State. Advantages to member universities include increased competitiveness for extramural funding, better communication with political leadership, closer ties with private affiliate members (e.g., Intergraph Corporation provides members with university site licenses for GeoMedia GIS software), and recruiting advantages for promising GIScientists through UCGIS student grants program.

As suggested by many of the collaborators involved with the proposal, resources have been requested to fund, via competitive award, a *travel and professional training grant for faculty and new staff hires* seeking to improve upon their geospatial skills, participate in national or international conferences (e.g., ESRI Annual Meeting), or collaborate with other geospatial researchers at universities across the nation and world.

Arizona State University	University of Iowa	University of Oregon
University of Arizona	<b>University of Kansas</b>	Pennsylvania State Univ
Boston University	University of Kentucky	University of Pennsylvania
Brigham Young University	Louisiana State University	University of Pittsburgh
California State Univ Systems	University of Maine	University of Redlands
Univ of California, Berkeley	Univ of MD, College Park	Rutgers University
Univ of Calif, Santa Barbara	Mass Inst of Technology	Sand Diego State Univ
Clark University	Univ of Mass – Amherst	Univ of South Carolina
<b>University of Colorado</b>	Michigan State University	Univ of Southern California
University of Connecticut	University of Michigan	Southwest Texas State Univ
University of Delaware	University of Minnesota	SUNY– Buffalo
Florida International Univ	University of Mississippi	Syracuse University
Florida State University	<b>University of Nebraska</b>	Univ of Tennessee – Knoxville
George Mason University	New Mexico State Univ	Texas A&M – Corpus Christi
Georgia Inst of Technology	University of New Mexico	University of Texas at Dallas
University of Georgia	Univ of NC, Chapel Hill	University of Utah
Hunter College	Univ of NC - Charlotte	Virginia Commonwealth Univ
Idaho State University	University of New Mexico	Univ of Washington
University of Idaho	Ohio GIS Net	West Virginia University
Univ of Illinois, Chicago	Ohio State University	Univ of Wisconsin, Madison
Univ of IL, Urbana-Champaign	<b>University of Oklahoma</b>	Univ of Wisconsin, Milwaukee
Indiana University	Oregon State University	University of Wyoming

Table 7. UCGIS university members, with nearby Big 12 schools highlighted.

#### 2.4.1 Objectives

Specific objectives for the "other" component to this proposal are listed in Table 8.

#### 2.4.2 Implementation Strategy

Table 9 presents a timetable for "other" milestones that include outline administrative control structure, provide for basic geospatial software needs, establish national recognition with professional society membership, and offer faculty training opportunities.

<b>OBJECTIVES</b>	<b>DESCRIPTION</b>
Establish K-State GIS Advisory Council	<ul style="list-style-type: none"> <li>▪ Formalize existing “ad hoc” advisory committee to provide unified voice for geospatial programs and future endeavors.</li> <li>▪ Evaluate program success, formulate plans/procedures for current and long-term growth, and providing feedback/guidance to administrators.</li> </ul>
Faculty Travel and Training Grants	<ul style="list-style-type: none"> <li>▪ Competitive awards to K-State faculty to promote professional development.</li> <li>▪ Faculty recipients conduct seminars discussing experiences.</li> </ul>
UCGIS Membership	<ul style="list-style-type: none"> <li>▪ \$3,000 initial membership costs, plus subsequent \$1,000 annual renewal fees.</li> </ul>
Centralized ESRI GIS Site License Funding	<ul style="list-style-type: none"> <li>▪ University allocates \$25,000 per year for site license renewal.</li> </ul>

Table 8. Specific proposed objectives for outreach activities.

<b>ACTION/DELIVERABLE</b>	<b>DONE</b>	<b>YR 1</b>	<b>YR 2</b>	<b>YR 3</b>	<b>YR 4</b>	<b>YR 5</b>
Establish KSU GIS Advisory Council						
Offer Faculty Travel and Training Grants						
Conduct Biannual GIS Advisory Council Meetings						
Prepare Annual “State of KSU GIS” Report for Administration						
Obtain and Maintain UCGIS Membership						
Provide Central ESRI GIS Site License Funding						

Table 9. Timeline of proposed "other" activities related to proposed university-geospatial enhancement program.

### **3 INVOLVING INSTITUTIONAL AND STATE UNITS**

#### **3.1 Campus Collaboration**

Widespread support for this effort is evident in the subset of interested collaborators listed on the cover page of this proposal, as well as the appended letters of support. Much of the content of this proposal is a logical extension of findings discussed by the ad hoc GIS Advisory Committee formed by the campus GIS Coordinator (2000-01) funded by Dean Law (College of Architecture, Planning, and Design), Dean White (College of Arts and Sciences), and Dean King (College of Engineering). The Geographic Information Systems Spatial Analysis Laboratory (GISSAL) will house all non-CNS and iTAC personnel. The Department of Geography's Remote Sensing Research Laboratory (RSRL) will provide its extensive library of non-commercial satellite images to the University Spatial Data and Application Server.

#### **3.2 State Collaboration**

The Project director will continue a close working relationships with the State of Kansas Information Architect and GIS Coordinator through participation in the Kansas GIS Policy

Board and GIS Technical Advisory Committee. This important connection is invaluable in communicating the university's commitment to geospatial technology, its capabilities, and ability to serve state needs in GIS education, research, and outreach.

This proposal also contains funding to enable cooperation with the Kansas Data Access and Support Center (DASC) as consultants for the design of the University Spatial Data and Application Server (see attached letter). Since its creation in 1991, DASC has served as the central archival and distribution center for the Kansas GIS Core Database and as an outreach arm for the Kansas GIS Policy Board. Currently, the DASC GIS Core Database server contains 41 databases that can be ordered using their Core Database Catalog (published annually), or are accessible via FTP from their website (<http://gisdasc.kgs.ukans.edu>).

#### **4 ENSURING PROJECT SUCCESS**

The structure of the proposed project, with substantive infrastructure enhancements spread over several complementary components (teaching, research, outreach) calls for centralized operational control with a distributed leadership framework to ensure maximum benefits to the entire university community. The GISSAL will serve as the “headquarters” for the two new GIS coordinators (Research and Education/Outreach) and the GIS Programmer, providing the necessary support network and day-to-day management of ongoing activities. GISSAL will work closely with CNS networking and database specialists on aspects of the University Spatial Data and Application Server, with CNS responsible for control and maintenance of related computing hardware and software (including GIS and database software). In addition, GISSAL will support iTAC technical support activities (e.g., software access and installation) by providing training assistance to iTAC staff over the course of the project.

The organization described here offers numerous advantages for the project. While allowing for themes in each component of the project to be supervised by dedicated staff without additional faculty responsibilities, it also promotes interaction within and between components by all project collaborators (present and future). The benefits of this system will be both practical and scientific. Cross-component participation benefits the scientific or outreach goals of each component by encouraging input and exchange of ideas from a larger group of scientists. Practically, it also allows research to be guided by faculty ideas, as well as extension needs and services.

##### **4.1 GIS Advisory Council**

Administrative oversight and assessment of program success will be provided by a multidisciplinary GIS Advisory Council who will meet at least twice per year and provide feedback to college deans and central administrators through an annual report prepared by the Council Chair. Modeled after a similar organization at the Pennsylvania State University, the mission of the K-State GIS Advisory Council will be to:

- Facilitate GIS-related activities,
- Assist in the preparation of major research proposals with geospatial emphases,
- Increase the awareness of GIS on campus,
- Identify where geospatial expertise exists on campus, and
- Define GIS-related issues on campus and provide recommendations for achieving/solving them.

The GIS Advisory Council will provide recommendations and strategies for ensuring the continuation of faculty and graduate student lines, education and outreach programs, and hardware/software requirements after the Targeted Excellence funding period expires. The Council will also be responsible for evaluating and awarding faculty travel and training grants and sponsoring a GISSAL Seminar Series to showcase faculty geospatial research.

#### 4.2 Assessment

Basic metrics for tracking and evaluating the success of the proposal will be of four types: (1) GIS course enrollments and number of students and professionals exposed to or trained in GIS and geospatial technologies, (2) increases in the number, amount, and types of extramural research projects, (3) publication of teaching and research scholarship, and (4) greater multidisciplinary collaborations and establishment of a campus GIS Advisory Council. Examples of possible benchmarks that may be adopted by the GIS Advisory Council are listed in Table 10.

BENCHMARKS	DESCRIPTION
Teaching	<ul style="list-style-type: none"> <li>▪ Enrollment increases in GIS and GIS applications courses.</li> <li>▪ K-State Online modules completed each year.</li> <li>▪ University Geospatial Technology Laboratory Classroom operational.</li> <li>▪ Social science GIS faculty hired.</li> </ul>
Research	<ul style="list-style-type: none"> <li>▪ University Spatial Data and Application Server online by year 2.</li> <li>▪ GIS Research Coordinator hired and involved in \$5 million in grant research by year 5.</li> <li>▪ One or more seminars per year by faculty receiving travel grants.</li> </ul>
Outreach	<ul style="list-style-type: none"> <li>▪ Instruct 25 students per year in each ESRI workshop.</li> <li>▪ Regents GIS network formed – K-State contributes with one (or more) courses.</li> </ul>
Other	<ul style="list-style-type: none"> <li>▪ K-State named an ESRI Authorized Learning Center.</li> <li>▪ K-State membership and participation in UCGIS.</li> <li>▪ Centralized funding of annual ESRI site license.</li> </ul>

Table 10. Specific proposed objectives for outreach activities.

#### 4.3 Program Continuation and Growth

The GIS Advisory Council will be charged with developing *strategies to ensure the long-term success of proposed and future geospatial technology enhancements*. In conjunction with the Advisory Council, the Council Chair (initially the Project Director) will collect data to help quantify overall project success (e.g., publications, course enrollments, extramural funding, teaching evaluations, graduate interviews, employer comments, etc). Annual “State of GIS” reports prepared by the Council will update key administrative leaders on the status of campus geospatial activities and related measures of success. Those leaders will then be in an informed position to continue support for proposed budget expenditures and programmatic enhancements that are not guaranteed to continue beyond the lifespan of Targeted Excellence.

The opportunity to improve on K-State’s historical success in extramural funding for GIS research, or projects with a significant GIS component, is excellent. During the period of 1995-2003, nearly 70 projects in 7 departments were funded, averaging in excess of \$2 million per

year (Table 11). The \$16 million total is significant but an underestimate of the impact of GIS on research funding, as survey results from the Departments of Computing and Information Science, Civil Engineering, and Geology are not included. Also not factored are geospatial enhancements included in recent university proposals directed towards funding earmarked for Homeland Security and Agricultural Biosecurity (NRC 2002; Thomas et al. 2002; Hutchinson et al. 2003).

Department/Unit	No. of Projects	Amount
Biology	6	\$4,248,010
Geography	24	\$3,141,173
NILMAT	4	\$3,959,293
Agronomy	24	\$2,250,194
KS Coop Fish & Wildlife	3	\$1,308,000
Biological & Agricultural Engg	6	\$ 934,500
Sociology and Anthropology	1	\$ 245,702
<b>Total</b>	<b>68</b>	<b>\$16,086,872</b>

Table 11. Extramural funding for GIS-related research projects (1995-2003).

An important activity of the GIS Advisory Council will be to document the significant impact of GIS software and users on the university’s total research budget. This will serve to better inform administrators, faculty, staff, and students on GIS activities on campus, and is a basic requirement for membership into the University Consortium for Geographic Information Science (UCGIS). Other projected or potential revenue streams to continue the proposed project are shown in Table 12.

REVENUE SOURCE	DESCRIPTION
Workshops	<ul style="list-style-type: none"> <li>▪ \$45,000 per year (all proposed classes @ 25 student per year each).</li> <li>▪ Five year total = \$172,500.</li> </ul>
GIS Standard Budget Items	<ul style="list-style-type: none"> <li>▪ GIS Advisory Council recommends budget line items, and amounts, to be included by researchers in GIS and related research projects.</li> </ul>
Research Overhead	<ul style="list-style-type: none"> <li>▪ Total extramural funding for GIS and related projects &gt; \$16 million from 1995-2003.</li> <li>▪ Annual average for GIS and related extramural funding &gt; \$2 million.</li> </ul>
GIS Technology Fee	<ul style="list-style-type: none"> <li>▪ If established, could generate \$270,000 per year (\$15 per student x 18,000 students).</li> <li>▪ Sufficient to pay for all personnel costs (in 2003 dollars).</li> </ul>

Table 12. Possible sources of revenue for project continuation.

## 5 BENEFITTING THE UNIVERSITY

The goal of this proposed Targeted Excellence GIScience Infrastructure Enhancement Program is to **provide the means to facilitate the diffusion of GIScience and geospatial technologies into the general university community**. Approval of this Geospatial Infrastructure Enhancement program will elevate Kansas State University to a leadership position in GIS education and service for the State of Kansas, and serve as a necessary first step toward national and international recognition for cross-disciplinary application of geospatial technologies. Though K-State may be considered to be “late adopter” in terms of geospatial

technology, we now have the opportunity to leap forward and be an active participant and leader in what Dobson (1993, p. 437) has called “an intellectual revolution comparable to earlier intellectual revolutions prompted by the printing press and the computer.”

The field of GIScience and supporting geospatial technologies fully compliments the university’s core missions, is an integral component of several other Targeted Excellence proposals, and will provide a springboard for the development of unique disciplinary and multidisciplinary programs (e.g., agricultural biosecurity, plant and animal disease modeling, spatial economics, water resources, and GIS-related certificate programs). Strengthening the requisite human and equipment infrastructure will enhance the status of K-State in the areas of GIScience while helping students and faculty/staff to maximize the effectiveness of geospatial technologies in the curriculum, basic research, applied studies, and outreach services. The impacts resulting from approval of this proposal fit hand-in-glove with the published evaluation criteria for the Targeted Excellence initiative and include:

- Provides for the critical faculty, facilities, and equipment needed to make K-State a premier institution in the instruction and application of GIScience and geospatial technologies.
- Enhances the spatial and technical literacy of students.
- Develops and maintains nationally recognized GIScience education and outreach services, including K-State Online GIS modules for a diverse array of large enrollment classes and graduate/undergraduate certificate programs in GIS and GIScience.
- Builds from the existing strength of multidisciplinary GIScience research in the applied biological, physical, and social sciences to include geospatial research in business, veterinary medicine, and other areas currently under-utilizing this important technology.
- Provides comprehensive geospatial support for proposed/funded research projects, including several Targeted Excellence programs.
- Promotes, at multiple levels, the informed and responsible use of GIScience and geographic analysis for the benefit of the citizens of Kansas through a Regents distance education network and participation in the Kansas GIS Policy Board and GIS Technical Advisory Committee.
- Calls for a GIS Advisory Council administrative structure to promote stakeholder involvement and collaborative decision-making to guide future activities and minimize duplication of effort and resources.

## 6 REFERENCES

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## 7 PROJECT DIRECTORS - CURRICULUM VITAE

### JAMES MICHAEL SHAWN HUTCHINSON

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#### Professional Preparation

- Ph.D., Geography, 2000; Kansas State University, Manhattan, Kansas
- M.A., Geography, 1997; Kansas State University, Manhattan, Kansas
- B.S., Wildlife Biology, 1990; Colorado State University, Fort Collins, Colorado

#### Appointments

- Asst. Professor, Department of Geography, Kansas State University; August 2001 – Present.
- Director, Geographic Information Systems Spatial Analysis Laboratory (GISSAL), Department of Geography, Kansas State University; February 2002 – Present.
- Visiting Asst. Professor, Department of Biological & Agricultural Engineering, Kansas State University; August 2000 – July 2001.

#### Research Interests

Agricultural biosecurity, applications of remote sensing and GIS for land cover assessment and natural resource management, water resources and watershed environmental modeling, biogeography and human impacts on the environment, boundary layer climatology and vegetation-climate relations - North America and Great Plains emphasis.

#### Publications Related to this Proposal

*(Selected publications from more than 11 refereed publications)*

- Goodin, D.G., J. Gao, J.M.S. Hutchinson. 2003. Seasonal, topographic, and burn frequency effects on biophysical/spectral reflectance relationships in tallgrass prairie. *International Journal of Remote Sensing*, in review.
- Hutchinson, J.M.S., J.A. Harrington, Jr., and L.J. Marzen. 2004. Geospatial contributions to watershed-scale surface water quality modeling. In World Minds: 100 Geographic Solutions to Saving Planet Earth. B. Warf, D. Janelle, and K. Hanson, eds, forthcoming.
- Hutchinson, J.M.S., N.J. Leathers, J. Herynk, L.R. Campbell, and J.C. Reese. 2003. Agricultural plant pathogen disease pathways: Predicting the dispersal of exotic soybean aphids. *Papers and Proceedings of the Applied Geography Conference* 26:471-478.
- Hutchinson, J.M.S. 2003. Estimating near surface soil moisture using active microwave satellite imagery and optical sensor inputs. *Transactions of the American Society of Agricultural Engineers* 46(2):225-236.
- Bhuyan, S.J., K.R. Mankin, J.M.S. Hutchinson, D.G. Goodin, J.K. Koelliker. 2002. Deriving land cover of a large agricultural watershed from multiple Landsat scenes. *Journal of Environmental Hydrology*, Paper 6, Volume 10 ([www.hydroweb.com/jeh.html](http://www.hydroweb.com/jeh.html)).

#### Synergistic Activities

- Consultant, Great Plains Diagnostic Network (<http://www.gpdn.org/>)



- Director, Graduate Certificate in GIScience Program, Kansas State University; 2002-Present.
- Member, State of Kansas GIS Policy Board, 2001-Present.
- ESRI Authorized Introduction to ArcView Instructor; 2003.
- Lead Investigator, Kansas State University GIScience Infrastructure Enhancement Program.

### **Research Summary**

*(Geospatial environmental research program totaling more than \$2.7 million in awards during the past five years from sponsors including: NASA, USDA APHIS, USDA NRCS, National Park Service, Kansas Dept. of Health and Environment, and Kansas Dept. of Administration)*

- Hutchinson, J.M.S. 2003. Vegetation Mapping of National Parks in the Southwestern United States. U.S. Dept. of Interior National Park Service, \$63,533.
- Hutchinson, J.M.S. 2003. Travel to Paraguay in Support of Student Exchange and Research Activities. Faculty Development Award, Kansas State University, \$1,500.
- Steichen, J., S.L. Hutchinson, P. Barnes, J.M.S. Hutchinson, D. Althoff, J. Oviatt, N. Zhang. 2003. Assessing the Impact of Maneuver Training on NPS Pollution and Water Quality. Strategic Environmental Research and Development Program (SERDP), \$1,217,512.
- Reese, J., J.M.S Hutchinson, and J. Campbell. 2003. Post Hoc Exercise on the Spread of a Potential Bioterrorism Agent. USDA Animal and Plant Health Inspection Service (APHIS) and the KSU National Agricultural Biosecurity Center. \$70,395.
- Goodin, D.G., J.A. Harrington, Jr., and J.M.S. Hutchinson. 2002. HYSPIRE: Hyper-Spectral Remote Sensing of Kansas Rural Environments. NASA, \$970,000.
- Hutchinson, J.M.S. 2002. GPS Base Station Operation and Technical Support. Kansas Department of Administration, \$39,000.
- Hutchinson, J.M.S. and J.A. Harrington, Jr. 2001. Soil Survey Geographic (SSURGO) Digitization. USDA Natural Resources Conservation Service, \$25,000
- Mankin, K.R., J.K. Koelliker, J.A. Harrington, and J.M.S. Hutchinson. 2000. Kanopolis Watershed Water Quality Assessment. Kansas Department of Health and Environment (KDHE), \$385,995.

### **Educational Activities**

- Developing GIS minor within Department of Geography at Kansas State University (2004)
- Developed ESRI-authorized GIS outreach workshops through Kansas State University Division of Continuing Education (2003-04).
- Created, and now administer, the Graduate Certificate in GIScience program at Kansas State University (2002).
- Teach graduate and undergraduate geospatial techniques courses at Kansas State University including: Cartography & Thematic Mapping, GIS I, Computer Mapping & Geographic Visualization, and GIS II.

### **Current and Previously Completed Projects**

- Vegetation Mapping of National Parks in the Southwestern United States  
*U.S. Dept. of Interior National Park Service; \$63,533*  
Manage project and supervise one GRA who is assisting Park Service ecologists in classifying vegetation using high-resolution infrared aerial photography and converting that information into GIS format.

- Assessing the Impact of Maneuver Training on NPS Pollution and Water Quality  
*Strategic Environmental Research and Development Program (SERDP); \$1,217,512*  
 Co-PI of major research effort at Fort Riley studying the impact of military training on surface water quality, with a special emphasis on sediment transport. Supervising one GRA and one undergraduate student in creating a regional climate atlas, developing GIS data layers to serve as landscape water quality model inputs, and using satellite sensors to quantitatively estimate near surface soil moisture conditions.
- Post Hoc Exercise on the Spread of a Potential Bioterrorism Agent  
 USDA Animal and Plant Health Inspection Service (APHIS); \$70,395  
 Co-PI of research collaboration with entomologists examining the spatial distribution, potential habitat, and rate of dispersal for an exotic soybean aphid species. Supervising one GRA in GIS-based spatial analysis.
- HYSPIRE: Hyper-Spectral Remote Sensing of Kansas Rural Environments  
 National Aeronautical and Space Administration (NASA); \$970,000  
 Assisting PI in multi-scale analysis of grassland biophysical properties as determined by remotely-sensed images. Conduct summer field campaigns at Konza Prairie to assess canopy physical, biological, and chemical characteristics.
- GPS Base Station Operation and Technical Support  
 Kansas Department of Administration, \$39,000  
 PI of state-funded global positioning system (GPS) base station. Supervise one GRA in the processing of known location data collected continuously at the Salina campus to assist GPS users in the differential post-processing of field-collected data. Designed and operate GPS base station webpage and FTP site.
- Kanopolis Watershed Water Quality Assessment  
 Kansas Department of Health and Environment (KDHE); \$385,995  
 Supervise one GRA in the processing of satellite imagery to classify landcover within the watershed. Assist in developing landscape water quality model inputs from GIS and satellite data.
- Soil Survey Geographic (SSURGO) Digitization  
 USDA Natural Resources Conservation Service; \$25,000  
 Supervise multiple undergraduate students in digitizing NRCS soil surveys and converting them into GIS formats.

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Professional Preparation

Michigan State University	Geography	Bachelor of Science, 1972
University of Minnesota	Geography	Master of Arts, 1974
Michigan State University	Geography	Doctor of Philosophy, 1980

Appointments

1999-	Kansas State University: Geography Department Head
1996-	Kansas State University: Professor
1994-1996	Kansas State University: Associate Professor
1993-1994	Indiana State University: Professor
1989-1993	Indiana State University: Associate Professor
1988-1994	USDA Agriculture Research Service: Remote Sensing Specialist
1986-1989	New Mexico State University: Associate Professor
1985-1986	University of Nebraska-Lincoln: Assistant Professor
1980-1985	University of Oklahoma: Assistant Professor
1978-1980	University of Oklahoma: Visiting Assistant Professor

Selected Publications

- 2003 "An Integrated Approach for Water Quality Assessment of a Kansas Watershed" S.J. Bhuyan, J.K. Koelliker, L.J. Marzen, and J.A. Harrington, Jr., Journal of Environmental Modelling and Software Vol. 18(5), 473-484.  
"Southwest Kansas: Local Emissions and Non-Local Determinants" J. Harrington, Jr., D. Goodin, L. Harrington, D. Kromm, and S. White, p. 57-78, in Global Change in Local Places: Estimating, Understanding, and Reducing Greenhouse Gases, R. Abler editor., Cambridge University Press
- 2002 "Land Cover Change and Associated Trends in Surface Reflectivity and Vegetation Index in Southwest Kansas: 1972-1992," D.G. Goodin, J.A. Harrington, Jr., and B.C. Rundquist, Geocarto International Vol. 17(1), 43-50.  
"Assessment of runoff and sediment yield using remote sensing, GIS and AGNPS," S.J. Bhuyan, L.J. Marzen, J.K. Koelliker, J.A. Harrington, Jr., and P.L. Barnes Journal of Soil and Water Conservation Vol. 57(6), 351-364.
- 2001 "Teaching Site-Specific Agriculture: Three Semesters' Experience with a Multi-Disciplinary Approach," J.P. Schmidt, M.D. Ransom, G.J. Kluitenberg, M.D. Schrock, J.A. Harrington, Jr., R.K. Taylor, and J.L. Havlin, Journal of Natural Resources and Life Sciences Education Vol. 30, 77-83.  
"KATS: A GIS-based Spatial Decision Support Tool for Water Resource Management in Kansas," Max Lu and J. Harrington, Jr., Papers and Proceedings of Applied Geography Conferences, Vol. 24, 106-112.  
"Using AGNPS 98 and GIS to Model Sediment Yield from a Newly Constructed Golf Course," S.K. Starrett, Y. Su, L. Chen, and J. Harrington, in Urban Drainage Modeling Symposium 2001, R.W. Brashear and C. Maksimovic (eds.), American Society of Civil Engineers.

- 2000 "The Effects of Climatic Factors on Vegetation Dynamics of Tallgrass and Shortgrass Vegetation Cover," B.C. Rundquist and J.A. Harrington, Jr., Geocarto International Vol. 15(3), 31-36.
- "Water Quality Modeling in the Red Rock Creek Watershed, Kansas," L.J. Marzen, J. Harrington, Jr., S.J. Bhuyan, J.K. Koelliker, L.D. Frees, and C.G. Volkman, Papers and Proceedings of Applied Geography Conferences, Vol. 23, 175-182.
- "GIS Development for the Colbert Hills Golf Course," J. Harrington, Jr. and N. Leathers, Papers and Proceedings of Applied Geography Conferences, Vol. 23, 183-189.
- 1998 "Balancing Scientific and Ethical Values in Environmental Science" J.R. Harman, J.A. Harrington, Jr., and R.S. Cerveny, Annals, Association of American Geographers, Vol. 88, 277-286.
- "Local Greenhouse Gas Emissions: A Case Study in Southwest Kansas," D.G. Goodin, J.A. Harrington, Jr., G.I. Holden, Jr., and B.D. Witcher, Great Plains Research Vol. 8, 231-253.
- "Vegetation Change in the Mount St. Helens Blast Zone, 1979-1992," L.M.B. Harrington, J.A. Harrington, Jr., and P.M. Frenzen, Geocarto International Vol. 13, 75-82.
- "Remote Sensing of Temporal and Spatial Variations in Pool Size, Suspended Sediment, Turbidity, and Secchi Depth in Tuttle Creek Reservoir, Kansas: 1993," M.D. Nellis, J.A. Harrington, Jr., and J. Wu, Geomorphology Vol. 21, 281-293.
- 1997 "Monitoring Conservation Reserves: A Geographic Approach," N. Leathers and J.A. Harrington, Jr. Papers and Proceedings of Applied Geography Conferences, Vol. 20, 25-34.
- "Satellite-Based Herbaceous Biomass Estimates in the Pastoral Zone of Niger," B. Wylie, I. Denda, R. Pieper, J. Harrington, Jr., B. Reed, and M. Southward Journal of Range Management Vol. 48, 159-164.
- "Remote Sensing of Suspended Sediments: The Lake Chicot, Arkansas Project, F.R. Schiebe, J.A. Harrington, Jr., and J.C. Ritchie International Journal of Remote Sensing, Vol. 13, p. 1487-1509.
- "A Satellite-based Range Assessment System for the Sahel of Africa," B. Wylie, J. Harrington, Jr., R. Pieper, and I. Denda Geocarto International, Vol. 7(1), 79-85.

### Synergistic Activities

For the period 1988-1990, I served, with range scientists, veterinarians, and rural social scientists, as the geospatial technology (remote sensing and geographic information systems (GIS)) resource person on a USAID funded project with the African country of Niger. We developed a capability for government scientists to use near real-time satellite imagery to estimate rangeland forage production from the annual grasslands. The project brought two Nigerian government scientists to the US for MS degrees and also established the first working GIS in the country. This work on remote sensing of rangelands led to my selection as a member of the Society for Range Management's, Remote Sensing and GIS Committee. Another committee member and I co-edited a 1996 special issue of *Geocarto International* dealing with the theme, "Remote Sensing of Rangelands".

During the period 1988-1994, I was a consultant for the USDA ARS National Ag. Water Quality Laboratory. I provided remote sensing and GIS expertise for scientists at the lab. Our

collaborative work appeared in numerous publications and our collective efforts help guide policy formation related to on-going ARS efforts in developing new geospatial technology applications.

At Kansas State University, I have been elected and have served on the Board of Directors for the interdisciplinary Natural Resources and Environmental Sciences (NRES) Secondary Major since 1996. I have frequently been one of the interdisciplinary team of instructors for the capstone class and served a three year term as NRES Director from 1998-2000.

Since 1996, I have been involved in two major multi-university research projects involving teams of geographers. The three year Global Change in Local Places (GCLP) project was funded by NASA and involved teams from K-State, Toledo, and Appalachian State, and leadership from three past-President of the Association of American Geographers. We looked at sources, drivers, and mitigation opportunities for greenhouse gas emissions in southwest Kansas and compared results with the other regional study teams. The current project, Infrastructure to Develop Human-Environment Regional Observatories (HEROs), involves teams from K-State, Clark, Penn State, and Arizona. Our research is looking at local and regional vulnerability to climate variations that are related to land use/cover changes. For both the GCLP and HERO projects, I have coordinated the K-State effort and managed budgetary aspects.

I worked with John Havlin and a team of interdisciplinary faculty in Agriculture and Engineering on a proposal to establish a precision agriculture/GIS class and fund computers for the laboratory in Throckmorton Hall. AGRON 655 (Site Specific Ag) is now team-taught each year. A co-authored article about our experience was published in 2001.

### Current and Previously Completed Projects

Infrastructure to Develop Human-Environment Regional Observatories    NSF    \$290,000  
2000-2005    I spend about 10% of my time in project management and research.

I am supervising GRAs who are using satellite imagery to assess land cover change.

HERO Research Experience for Undergraduates    NSF    \$ 80,000  
2002-2005    I spend less than 5% of my time managing this effort.

Others have supervised the student summer research in the past; I do it this summer.

With a student assistant, I will supervise three students for six weeks this summer.

Kanapolis Watershed Water Quality Assessment    EPA/KDHE    \$385,995  
2000-2004    I spend less than 5% of my time on this effort. I help supervise a GRA

who is using remote sensing of land cover and GIS to assist in hydrologic modeling.

Evaluating Models Predicting Livestock Output Due to Climate Change    DOE/NIGEC    \$180,000  
2001-2004    I am the K-State PI for this effort that involves an animal scientist

from Nebraska. I spend about 10% of my time on this project supervising a GRA

and writing scholarly manuscripts based on our effort.

Soil Survey Geographic Digitization    USDA/NRCS    \$ 25,000  
2001-2002    I am a co-PI on this project and spent less than 5% of my time helping

Shawn Hutchinson supervise the work, that was done in GISSAL.

Hyper-spectral Remote Sensing of Kansas Rural Environments    NASA    \$292,709  
2001-2004    Doug Goodin is the PI and I spend less than 5% of my time on this

project discussing project strategy and helping coordinate GRA activities.

8 BUDGET (PAS BUDGET WORKSHEET REV. 1/15/04)

Kansas State University Budget Summary											
<b>PRINCIPAL INVESTIGATOR:</b> Hutchinson, J.M. Shawn				For PAS Office Use Only			Date:				
<b>TITLE:</b> Geospatial Technology Infrastructure Enhancement							PP#				
A. Senior Personnel: PI/PD, Co-Pis, Faculty and Other Senior Associates (Lists each separately with title, L10 Shows number in brackets)			Person-Months			Funds Requested					
			CAL	ACA	SUMR	YR 1	YR 2	YR 3	YR4	YR5	TOTAL
1	Hutchinson, J.M. Shawn	Assistant Professor									
2	Harrington, Jr., John A.	Professor and Head									
3	Townsend, Harvard	Director									
4	Gould, Rebecca	Professor and Director									
5	Social Science GIS Faculty	Assistant Professor		36.00			45,000	45,585	46,178	46,778	183,541
6											
7											
8											
9											
10	Additional Personnel:										
	<b>5 Total Senior Personnel (1-10)</b>			36.00			45,000	45,585	46,178	46,778	183,541
<b>B. Other Personnel</b>											
1	1	Post Doctoral Associates	60.00			40,000	40,520	41,047	41,580	42,121	205,268
2	1	Other Professionals, Classified	60.00			44,000	44,572	45,151	45,738	46,333	225,795
3		Other Professionals, Unclassified									
4	2	Graduate Students				50,000	50,650	51,308	51,975	52,651	256,585
5	4	Undergraduate (>=6 hours)					8,000	8,104	8,209	8,316	32,629
6		Undergraduate (<6 hours)									
7		Secretarial - Clerical, Classified									
8		Secretarial - Clerical, Unclassified									
9		Other, Classified									
10		Other, Unclassified									
<b>Total Other Personnel</b>						134,000	143,742	145,611	147,504	149,421	720,277
<b>C. Fringe Benefits (if charged as direct costs)</b>						29,020	43,003	43,562	44,128	44,702	204,415
<b>TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)</b>						163,020	231,745	234,758	237,809	240,901	1,108,233
<b>D. Equipment (list item and dollar amount for each exceeding \$5,000 on budget justification page).</b>						495,000	35,000	35,000	35,000	145,000	745,000
<b>E. Travel</b>											
1	Domestic (incl. Canada, Mexico and U.S. Possessions)					5,000	5,000	5,000	5,000	5,000	25,000
2	Foreign							5,000	5,000	5,000	15,000
<b>F. Participant Costs</b>											
1	Stipends										
2	Travel										
3	Subsistence										
4	Other										
<b>G. Other Direct Costs</b>											
1	Materials and Supplies		30,000			90,000	30,000	30,000	30,000	30,000	210,000
2	Publication Costs/Documentation/Dissemination		43,000			3,000	3,000	3,000	3,000	3,000	12,000
3	Consultant Services		5,000			5,000					10,000
4	Computer Services										
5	Tuition										
6	SubAwards (Note: Each SubAward will require a separate budget)										
7	Other		8,000			8,000	8,000	8,000	8,000	8,000	40,000
<b>TOTAL OTHER DIRECT COSTS</b>			43,000			106,000	41,000	41,000	41,000	41,000	272,000
<b>H. TOTAL DIRECT COSTS (A through G)</b>			706,020			377,745	320,758	323,809	436,901	436,901	2,165,233
<b>I. Indirect Costs (F&amp;A)</b>											
<b>J. TOTAL PROJECT COSTS (H + I)</b>			706,020			377,745	320,758	323,809	436,901	436,901	2,165,233
<b>K. Cost Sharing</b>											

**Kansas State University  
YEAR 1 Budget Summary**

PRINCIPAL INVESTIGATOR:		Hutchinson, J.M. Shawn			PAS Use Only	
TITLE:	Geospatial Technology Infrastructure Enhancement				Date:	
					PP#	
A. Senior Personnel: PI/PD, Co-Pis, Faculty and Other Senior Associates <small>(Lists each separately with title, L10 Shows number in brackets)</small>		Person-Months			Funds Requested	
		CAL	ACA	SUMR	YEAR 1	
1	Hutchinson, J.M. Shawn      Assistant Professor					
2	Harrington, Jr., John A.      Professor and Head					
3	Townsend, Harvard      Director					
4	Gould, Rebecca      Professor and Director					
5	Gould, Rebecca      Assistant Professor					
6						
7						
8						
9						
10	Additional Personnel:					
	<b>5 Total Senior Personnel (1-10)</b>					
<b>B. Other Personnel</b>						
1	1 Post Doctoral Associates	12.00				40,000
2	1 Other Professionals, Classified	12.00				44,000
3	Other Professionals, Unclassified					
4	2 Graduate Students					50,000
5	Undergraduate (>=6 hours)					
6	Undergraduate (<6 hours)					
7	Secretarial - Clerical, Classified					
8	Secretarial - Clerical, Unclassified					
9	Other, Classified					
10	Other, Unclassified					
	<b>Total Other Personnel</b>					134,000
<b>C. Fringe Benefits (if charged as direct costs)</b>						29,020
<b>TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)</b>						163,020
<b>D. Equipment</b> (list item and dollar amount for each exceeding \$5,000 on budget justification page).						495,000
<b>E. Travel</b>						
1	Domestic (incl. Canada, Mexico and U.S. Possessions)					5,000
2	Foreign					
<b>F. Participant Costs</b>						
1	Stipends					
2	Travel					
3	Subsistence					
4	Other					
<b>G. Other Direct Costs</b>						
1	Materials and Supplies					30,000
2	Publication Costs/Documentation/Dissemination					
3	Consultant Services					5,000
4	Computer Services					
5	Tuition					
6	SubAwards (Note: Each SubAward will require a separate budget)					
7	Other					8,000
	<b>TOTAL OTHER DIRECT COSTS</b>					43,000
<b>H. TOTAL DIRECT COSTS (A through G)</b>						706,020
<b>I. Indirect Costs (F&amp;A)</b>						
<b>J. TOTAL YEAR COST (H + I)</b>						706,020
<b>K. Cost Sharing</b>						

**Kansas State University  
YEAR 2 Budget Summary**

<b>PRINCIPAL INVESTIGATOR:</b> Hutchinson, J.M. Shawn		<b>PAS Use Only</b>	
<b>TITLE:</b>	Geospatial Technology Infrastructure Enhancement	Date:	
		PP#	
<b>A. Senior Personnel: PI/PD, Co-Pis, Faculty and Other Senior Associates</b> (Lists each separately with title, L10 Shows number in brackets)		<b>Person-Months</b>	
		<b>CAL</b>	<b>ACA</b>
		<b>SUMR</b>	<b>Funds Requested</b>
			<b>YEAR 2</b>
1	Hutchinson, J.M. Shawn Assistant Professor		
2	Harrington, Jr., John A. Professor and Head		
3	Townsend, Harvard Director		
4	Gould, Rebecca Professor and Director		
5	Social Science GIS Faculty Assistant Professor		45,000
6			
7			
8			
9			
10	<b>Additional Personnel:</b>		
	5 Total Senior Personnel (1-10)	9.00	45,000
<b>B. Other Personnel</b>			
1	1 Post Doctoral Associates	12.00	40,520
2	1 Other Professionals, Classified	12.00	44,572
3	Other Professionals, Unclassified		
4	2 Graduate Students		50,650
5	4 Undergraduate (>=6 hours)		8,000
6	Undergraduate (<6 hours)		
7	Secretarial - Clerical, Classified		
8	Secretarial - Clerical, Unclassified		
9	Other, Classified		
10	Other, Unclassified		
<b>Total Other Personnel</b>			<b>143,742</b>
<b>C. Fringe Benefits (if charged as direct costs)</b>			<b>43,003</b>
<b>TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)</b>			<b>231,745</b>
<b>D. Equipment</b> (list item and dollar amount for each exceeding \$5,000 on budget justification page).			<b>35,000</b>
<b>E. Travel</b>			
1	Domestic (incl. Canada, Mexico and U.S. Possessions)		5,000
2	Foreign		
<b>F. Participant Costs</b>			
1	Stipends		
2	Travel		
3	Subsistence		
4	Other		
<b>G. Other Direct Costs</b>			
1	Materials and Supplies		90,000
2	Publication Costs/Documentation/Dissemination		3,000
3	Consultant Services		5,000
4	Computer Services		
5	Tuition		
6	SubAwards (Note: Each SubAward will require a separate budget)		
7	Other		8,000
<b>TOTAL OTHER DIRECT COSTS</b>			<b>106,000</b>
<b>H. TOTAL DIRECT COSTS (A through G)</b>			<b>377,745</b>
<b>I. Indirect Costs (F&amp;A)</b>			
<b>J. TOTAL YEAR COST (H + I)</b>			<b>377,745</b>
<b>K. Cost Sharing</b>			



**Kansas State University  
YEAR 3 Budget Summary**

PRINCIPAL INVESTIGATOR:		Hutchinson, J.M. Shawn			PAS Use Only	
TITLE:	Geospatial Technology Infrastructure Enhancement				Date:	
					PP#:	
A. Senior Personnel: PI/PI, Co-PIs, Faculty and Other Senior Associates <small>(Lists each separately with title, L10 Shows number in brackets)</small>		Person-Months			Funds Requested	
		CAL	ACA	SUMR	YEAR 3	
1	Hutchinson, J.M. Shawn      Assistant Professor					
2	Harrington, Jr., John A.      Professor and Head					
3	Townsend, Harvard      Director					
4	Gould, Rebecca      Professor and Director					
5	Social Science GIS Faculty      Assistant Professor		9.00			45,585
6						
7						
8						
9						
10	Additional Personnel:					
	<b>5 Total Senior Personnel (1-10)</b>		9.00			45,585
<b>B. Other Personnel</b>						
1	1 Post Doctoral Associates	12.00				41,047
2	1 Other Professionals, Classified	12.00				45,151
3	Other Professionals, Unclassified					
4	2 Graduate Students					51,308
5	4 Undergraduate (>=6 hours)					8,104
6	Undergraduate (<6 hours)					
7	Secretarial - Clerical, Classified					
8	Secretarial - Clerical, Unclassified					
9	Other, Classified					
10	Other, Unclassified					
	<b>Total Other Personnel</b>					145,611
<b>C. Fringe Benefits (if charged as direct costs)</b>						43,562
<b>TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)</b>						234,758
<b>D. Equipment</b> (list item and dollar amount for each exceeding \$5,000 on budget justification page).						35,000
<b>E. Travel</b>						
1	Domestic (incl. Canada, Mexico and U.S. Possessions)					5,000
2	Foreign					5,000
<b>F. Participant Costs</b>						
1	Stipends					
2	Travel					
3	Subsistence					
4	Other					
<b>G. Other Direct Costs</b>						
1	Materials and Supplies					30,000
2	Publication Costs/Documentation/Dissemination					3,000
3	Consultant Services					
4	Computer Services					
5	Tuition					
6	SubAwards (Note: Each SubAward will require a separate budget)					
7	Other					8,000
	<b>TOTAL OTHER DIRECT COSTS</b>					41,000
<b>H. TOTAL DIRECT COSTS (A through G)</b>						320,758
<b>I. Indirect Costs (F&amp;A)</b>						
<b>J. TOTAL YEAR COST (H + I)</b>						320,758
<b>K. Cost Sharing</b>						

**Kansas State University  
YEAR 4 Budget Summary**

<b>PRINCIPAL INVESTIGATOR:</b> Hutchinson, J.M. Shawn				<b>PAS Use Only</b>	
<b>TITLE:</b> Geospatial Technology Infrastructure Enhancement				<b>Date:</b>	
				<b>PP#:</b>	
<b>A. Senior Personnel:</b> PI/PD, Co-Pis, Faculty and Other Senior Associates <small>(Lists each separately with title, L10 Shows number in brackets)</small>			<b>Person-Months</b>		<b>Funds Requested</b>
			<b>CAL</b>	<b>ACA</b>	<b>SUMR</b>
			<b>YEAR 4</b>		
1	Hutchinson, J.M. Shawn	Assistant Professor			
2	Harrington, Jr., John A.	Professor and Head			
3	Townsend, Harvard	Director			
4	Gould, Rebecca	Professor and Director			
5	Social Science GIS Faculty	Assistant Professor		9.00	46,178
6					
7					
8					
9					
10	<b>Additional Personnel:</b>				
	<b>5</b>	<b>Total Senior Personnel (1-10)</b>		9.00	46,178
<b>B. Other Personnel</b>					
1	1	Post Doctoral Associates	12.00		41,580
2	1	Other Professionals, Classified	12.00		45,738
3		Other Professionals, Unclassified			
4	2	Graduate Students			51,975
5	4	Undergraduate (>=6 hours)			8,209
6		Undergraduate (<6 hours)			
7		Secretarial - Clerical, Classified			
8		Secretarial - Clerical, Unclassified			
9		Other, Classified			
10		Other, Unclassified			
<b>Total Other Personnel</b>					147,504
<b>C. Fringe Benefits (if charged as direct costs)</b>					44,128
<b>TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)</b>					237,809
<b>D. Equipment</b> (list item and dollar amount for each exceeding \$5,000 on budget justification page).					35,000
<b>E. Travel</b>					
	1	Domestic (incl. Canada, Mexico and U.S. Possessions)			5,000
	2	Foreign			5,000
<b>F. Participant Costs</b>					
	1	Stipends			
	2	Travel			
	3	Subsistence			
	4	Other			
<b>G. Other Direct Costs</b>					
	1	Materials and Supplies			30,000
	2	Publication Costs/Documentation/Dissemination			3,000
	3	Consultant Services			
	4	Computer Services			
	5	Tuition			
	6	SubAwards (Note: Each SubAward will require a separate budget)			
	7	Other			8,000
<b>TOTAL OTHER DIRECT COSTS</b>					41,000
<b>H. TOTAL DIRECT COSTS (A through G)</b>					323,809
<b>I. Indirect Costs (F&amp;A)</b>					
<b>J. TOTAL YEAR COST (H + I)</b>					323,809
<b>K. Cost Sharing</b>					

**Kansas State University  
YEAR 5 Budget Summary**

<b>Kansas State University YEAR 5 Budget Summary</b>			
<b>PRINCIPAL INVESTIGATOR:</b> Hutchinson, J.M. Shawn		<b>PAS Use Only</b>	
<b>TITLE:</b> Geospatial Technology Infrastructure Enhancement			Date:
			PP#:
<b>A. Senior Personnel: PI/PD, Co-Pis, Faculty and Other Senior Associates</b> (Lists each separately with title, L10 Shows number in brackets)	<b>Person-Months</b>		<b>Funds Requested</b>
	<b>CAL</b>	<b>ACA</b>	<b>SUMR</b> <b>YEAR 5</b>
1 Hutchinson, J.M. Shawn Assistant Professor			
2 Harrington, Jr., John A. Professor and Head			
3 Townsend, Harvard Director			
4 Gould, Rebecca Professor and Director			
5 Social Science GIS Faculty Assistant Professor		9.00	46,778
6			
7			
8			
9			
10 Additional Personnel:			
<b>5 Total Senior Personnel (1-10)</b>		9.00	46,778
<b>B. Other Personnel</b>			
1 1 Post Doctoral Associates	12.00		42,121
2 1 Other Professionals, Classified	12.00		46,333
3 Other Professionals, Unclassified			
4 2 Graduate Students			52,651
5 4 Undergraduate (>=6 hours)			8,316
6 Undergraduate (<6 hours)			
7 Secretarial - Clerical, Classified			
8 Secretarial - Clerical, Unclassified			
9 Other, Classified			
10 Other, Unclassified			
<b>Total Other Personnel</b>			149,421
<b>C. Fringe Benefits (if charged as direct costs)</b>			44,702
<b>TOTAL SALARIES, WAGES, AND FRINGE BENEFITS (A+B+C)</b>			240,901
<b>D. Equipment</b> (list item and dollar amount for each exceeding \$5,000 on budget justification page).			
<b>E. Travel</b>			
1 Domestic (incl. Canada, Mexico and U.S. Possessions)			5,000
2 Foreign			5,000
<b>F. Participant Costs</b>			
1 Stipends			
2 Travel			
3 Subsistence			
4 Other			
<b>G. Other Direct Costs</b>			
1 Materials and Supplies			30,000
2 Publication Costs/Documentation/Dissemination			3,000
3 Consultant Services			
4 Computer Services			
5 Tuition			
6 SubAwards (Note: Each SubAward will require a separate budget)			
7 Other			8,000
<b>TOTAL OTHER DIRECT COSTS</b>			41,000
<b>H. TOTAL DIRECT COSTS (A through G)</b>			436,901
<b>I. Indirect Costs (F&amp;A)</b>			
<b>J. TOTAL YEAR COST (H + I)</b>			436,901
<b>K. Cost Sharing</b>			

## 9 BUDGET JUSTIFICATION

### Salaries and Wages – Total Requested = 903,818 (excluding fringe benefits)

1. Senior Personnel
  - a. Salaries for senior project personnel include only the nine-month salary for a new Social Science GIS faculty member beginning at \$45,000 in year 2. Salary for years 3-5 assumes an annual 1.3% increase.
2. Other Personnel
  - a. One post-doctoral research associate is proposed to serve as the GIS Research Coordinator. Salary begins in year 1 at \$40,000. Salary for years 2-5 assumes an annual 1.3% increase.
  - b. One classified employee will serve as a new Systems Administrator for Geospatial Data in support of the University Spatial Data and Application Server. Salary begins year 1 at \$44,000 and increases by an annual rate of 1.3% for years 2-5.
  - c. Support for two graduate student research assistants (GIS Education and Outreach Coordinator, GIS Programmer) is requested. The GIS Education and Outreach Coordinator will work cooperatively with faculty on K-State Online learning modules and assist with DCE GIS workshops and distance education initiatives. The GIS Programmer will be responsible for program creating and modification and serve as the interface between faculty and the new CNS Systems Administrator. Salary for each GRA will be \$25,000 per year beginning in year one and increase annually by a rate of 1.3%.
  - d. Funding is also requested for approximately four undergraduate hourly students to supplement the iTAC technical support staff. A annual total of \$8,000 is sought. This amount increases by an annual rate of 1.3%.

### Fringe Benefits – Total Required = \$204,415

1. Fringe benefits are calculated at the normal rates for the university (see <http://www.ksu.edu/research/preaward/fringe.htm>).

### Equipment – Total Requested = \$745,000

1. GIS Technology Classroom Construction – Total Request = \$375,000
  - a. \$375,000 of the proposed budget has been allocated during year 1 to offset construction costs for the proposed University Geospatial Technology Laboratory Classroom.
2. Redundant Database + SDE Server Package – Total Request = \$160,000
  - a. \$80,000 is requested in year 1 to purchase two database+spatial database engine server systems as the backbone of the proposed University Spatial Data and Application Server. This will be a fully redundant system with failover capabilities.
  - b. An additional \$80,000 is requested in year 5 to replace the year 1 systems, based upon a 3-4 replacement schedule on Windows-based systems.
3. SAN Storage – Total Request = \$60,000

- a. \$30,000 is requested in year 1 to purchase 1 terabyte of SAN storage as part of the hardware upgrades required for the University Spatial Data and Application Server.
- b. An additional \$30,000 is also needed to upgrade SAN capabilities for future data holding capability.
- 4. Software – Total Request = \$150,000
  - a. \$25,000 per year for years 2-5 (\$100,000 total) is requested to pay for the annual ESRI GIS software university site license.
  - b. \$10,000 per year for years 1-5 (\$50,000 total) is requested as partial payment for Oracle database software.

**Travel – Total Requested = \$40,000**

- 1. Domestic and foreign travel support is requested to assist project directors and new staff in defraying travel expenses for attending national-level professional conferences in the fields of geography, computer science, and GIScience. Approximately half of the annual domestic travel and all of the foreign travel is earmarked for this purpose.
- 2. The remaining domestic travel request is included to award as Faculty Travel and Training Grants for professional development of KSU faculty members.

**Other Direct Costs – Total Requested = \$272,000**

- 1. Materials and Supplies – Total \$210,000
  - a. \$15,000 per year for years 1-5 are requested for the purchase of expendable geospatial laboratory materials (e.g., color laserjet toner, wide-format plotter ink and paper) for the GISSAL.
  - b. An additional \$15,000 for years 1-5 (approximately 20% of the database+SDE server cost) is needed by CNS for routine annual maintenance and expansion (e.g., more memory, software upgrades, maintenance contracts, UPS batteries).
  - c. \$60,000 is requested for year 2 (\$60,000 total) to outfit the proposed University Geospatial Technology Laboratory Classroom with computer workstations and standard tech classroom audio-visual equipment.
- 2. Publication Costs/Documentation/Dissemination – Total = \$12,000
  - a. \$3,000 per year for years 2-5 required to offset publication and page charge costs for scholarly publication.
- 3. Consultant Services – Total = \$10,000
  - a. \$5,000 per year for years 1-2 (\$10,000 total) to compensate personnel from the State of Kansas Data Access and Support Center (DASC) for consulting services regarding design of the University Spatial Data and Application Server.
- 4. Other – Total = \$40,000
  - a. A standard \$5,000 per year for years 1-5 (\$25,000 total) of the project is requested for OOE to support CNS Systems Administrator with office furniture and equipment and professional development.
  - b. \$3,000 per year for years 1-5 (\$15,000 total) for administration charges associated with proposed GIS workshops to be offered through the KSU Division of Continuing Education.

**Total Direct Costs – Total Requested = \$2,165,233**

1. Budget Breakdown by Category (Years 1-5)
  - a. Senior Personnel = \$183,541 or 8.5% of project total
  - b. Other Personnel = \$720,277 or 33.3% of project total
  - c. Fringe Benefits = \$204,415 or 9.4% of project total
  - d. Equipment = \$745,000 or 34.4% of project total
  - e. Travel = \$40,000 or 1.8% of project total
  - f. Participant Costs – N/A
  - g. Other Direct Costs = \$272,000 or 12.6% of project total
2. Non-personnel Costs related to University Geospatial Technologies Laboratory Classroom – 20.1% of project total
  - a. Construction costs = \$375,000 or 17.3% of project total
  - b. Computers and A/V Equipment = \$60,000 or 2.8% of project total
3. Non-personnel Costs related to University Spatial Data and Application Server – 10.2% of project total
  - a. Year 1 Servers and SAN purchase = \$110,000 or 5.1% of project total
  - b. Year 5 Replacement Servers and SAN Expansion = \$110,000 or 5.1% of project total

10 APPENDIX A – LETTERS OF SUPPORT



Vice Provost for Academic  
Services and Technology  
Dean of Continuing Education  
108 Anderson Hall  
Manhattan, KS 66506 -0113  
785-532-6520  
Fax: 785-532-6507  
E-mail: beth@k-state.edu

October 28, 2003

Dr. James R. Coffman  
Provost and Professor of Clinical Sciences  
106 Anderson Hall  
Kansas State University  
Manhattan, KS 66506

Dear Dr. Coffman:

**Subject: Letter of Support for GIScience Infrastructure Enhancement Program**

Geographic information science (GIScience) and geographic information system (GIS) technology is integral to the success of many of our most critically important research and teaching programs. GIS has become an essential and vital tool in such far-reaching areas as planning, public safety, urban renewal, economic development, disease detection and control, marketing, population studies, aviation, precision agriculture, and ecosystem analysis. In short, virtually every field of study is, or can be, enhanced by the addition of GIS capability.

This proposal provides the initial infrastructure for a campus GIS facility for teaching and research including individuals to assist users and also those to maintain the laboratory to be created.

It is my pleasure to provide a strong recommendation for the Targeted Excellence proposal entitled, "GIScience Infrastructure Enhancement Program." The content and scope of this proposal is exactly what was envisioned when the KSU Targeted Excellence program was created.

Sincerely,

A handwritten signature in black ink, appearing to read 'Elizabeth A. Unger'.

Elizabeth A. Unger, Ph.D.  
Vice Provost, Academic Services and Technology  
Dean of Continuing Education

bcc: S. Hutchinson  
J. Harrington



February 9, 2004

James Coffman, Provost  
Anderson Hall CAMPUS

**K-State Research and Extension**

Department of Biological  
and Agricultural Engineering  
College of Engineering  
147 Seaton Hall  
Manhattan, KS 66506-2906  
785-532-5580  
Fax: 785-532-5825

RE: Support for Geospatial Technology Infrastructure Enhancement Project

Dear Provost Coffman:

I have been a member of the GIS Advisory Committee for the past three and a half years since Dr. Shawn Hutchinson joined K-State. I am fully aware of the potential and the need for improvement in the geospatial technology infrastructure at K-State. It is vital to enhancing learning, research, and outreach at K-State. This tool is essential to improve learning by students in nearly every field in the university. It is a fundamental and essential tool for much of the research base at K-State that will drive us toward Top Ten status. This technology is very important to our state as the way to examine our use and management of natural resources, protect our environment, and enhance our economic development. All these reasons make enhancing our infrastructure in geospatial technology a necessity.

Our current resources and people involved in this area have made excellent use of the very limited resources we now have. We are, however, only able to play in the "minor leagues" with what we have. I, personally, and as head of the Biological and Agricultural Engineering Department give my fullest support to this project. I will continue to serve on the advisory committee for this area. I recognize that this project will have great impact and I want to be a part of making it successful.

I look forward to this proposal being supported by the Targeted Excellence Program so that this important effort can improve our abilities to meet our mission and so that K-State can move forward quickly to improve our national recognition.

Yours truly,

James K. Koelliker, Ph.D., P.E.  
Professor and Head

**Kansas State University  
Agricultural Experiment  
Station and Cooperative  
Extension Service**

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LETTER for Shawn for Target Excl.DOC



**Department of Entomology**  
123 Waters Hall  
Manhattan, KS 66506-4004  
785-532-6154  
Fax: 785-532-6232  
[www.oznet.kau.edu/entomology/](http://www.oznet.kau.edu/entomology/)

February 9, 2004

Dr. J. M. Shawn Hutchinson,  
Director  
Geographic Information Systems and Spatial Analysis Laboratory  
Department of Geography  
Seaton Hall  
CAMPUS

Dear Shawn:

I am writing to express my very strong support for your Targeted Excellence proposal, Geospatial Technology Infrastructure Enhancement Program.

Everywhere we turn these days, knowing where organisms are, where they have been, and predicting where they may go next, has proven to be absolutely essential to dealing appropriately and efficiently with introduced (accidental or purposeful) pathogens and pests. The capabilities we currently have on campus for geospatial analysis have been critical in attracting extramural funds, in solving real problems, and in training our graduate students. However, as interest in this area increases in a geometric progression, your facilities and capabilities are in danger of being overwhelmed. So, a significant enhancement of these facilities will benefit our research programs in many different disciplines, our students, and our extension related activities.

Please let me know if you need any additional information.

Sincerely,

A handwritten signature in black ink, appearing to read 'John C. Reese'.

John C. Reese  
Professor  
JCR/me

Kansas State University  
Agricultural Experiment  
Station and Cooperative  
Extension Service

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February 9, 2004



Department of Civil Engineering  
2118 Fiedler Hall  
Manhattan, KS 66506-5000  
785-532-5862  
Fax: 785-532-7717

Dear Sir or Madam:

The GIS activities proposed by Drs. Harrington and Hutchinson would cause a tremendous improvement on teaching, research, and service at Kansas State University. Specifically in civil engineering, we solve problems, analyze situations, and design and build solutions to improve the quality of life. The improvements that GIS provides in each of these topics is extensive. I have taught CE 857 "Advanced Civil Engineering Design" for four years. Civil engineering students can greatly improve their "value" to employers when they have experience using GIS as a tool to solve engineering problems. One former student of CE 857 has become a critical resource at his engineering consulting firm because of his GIS abilities related to flood plain determination, and hydrology and hydraulic modeling. Undergraduate civil engineering students would also greatly benefit from having GIS skills, however resources to teach many more students are currently not available at Kansas State. This project would enable many more students to obtain a skill that industry places important value on. This project would also provide educational benefits for many faculty by creating a mechanism for the interchange of teaching related ideas.

Research in all areas of civil engineering (water resources, transportation, environmental, structures, and geotechnical) would be greatly enhanced by this project. Currently, there is very limited support to find "basic" GIS software answers on campus. For example, Dr. Shawn Hutchinson graciously gives his valuable time to help many faculty and graduate students answers of which has no benefit to him. K-State research activities using GIS would explode if the support mechanism of this project were in place.

Many Kansas communities, organizations, companies are using GIS and desire a much better understanding of the technology. The GIS service needs of Kansas are tremendous, this project would help many groups to move forward with determining better solutions.

I have worked with Dr. John Harrington, Jr. and Dr. Shawn Hutchinson many times. They are experienced leaders, flexible, open minded and very well liked. I am totally confident that, through their leadership, this project would be highly successful.

Sincerely,

A handwritten signature in black ink that reads "Steve Starrett". The signature is written in a cursive, flowing style.

Steven K. Starrett, Ph.D., P.E.  
Associate Professor of Civil Engineering



Department of Landscape  
Architecture/Regional and  
Community Planning  
302 Seaton Hall  
Manhattan, KS 66506 -2909  
785-532-5961  
Fax: 785-532-6722  
E-mail: la-rcp@ksu.edu  
<http://aalto.arch.ksu.edu/lar/>

February 12, 2004

RE: Support for Targeted Excellence Geospatial Technology Infrastructure Enhancement.

The College of Architecture, Planning and Design and the Department of Landscape Architecture / Regional & Community Planning is very supportive of the proposed targeted excellence program, **Geospatial Technology Infrastructure Enhancement**.

Experience with this technology is now critical in most of the professions dealing with the planning, design and management of the built and natural environment and therefore critical for our students and faculty. We teach about a half dozen courses each semester that make direct or indirect use of this technology. Several of the courses are also open to students from outside our College. A number of our faculty also use this technology in their scholarly/research and professional development activities.

Our faculty also participate in a number of interdisciplinary joint ventures that would benefit by the enhancement of the University's geospatial technology infrastructure.

We believe that this proposed targeted excellence program will be valuable to our students and faculty and their professional constituencies and clientele. We also expect to be able to make greater contributions of collaboration with our GIS colleagues throughout the University community.

We would be happy to provide further information upon request. We encourage support of this proposed program.

Cordially,

Eric A. Bernard  
Assistant Professor

Kenneth R. Brooks  
Professor

copies: Dan W. Donelin, Head, Landscape Architecture / Regional & Community Planning  
Dennis L. Law, Dean, Architecture, Planning & Design



**K-State Research and Extension  
Department of Communications**

301 Umberger Hall  
Manhattan, KS 66506-3402  
785-532-5804  
Fax: 785-532-5633  
<http://www.oznet.ksu.edu>

February 13, 2004

Reviewers  
Targeted Excellence Program  
Kansas State University

Dear Reviewers:

The Department of Communications supports Mary Knapp's involvement in the GIScience Infrastructure Enhancement Program that is being proposed as a Targeted Excellence program.

By coordinating the GIS activities on campus, the University can maximize the value of its investment in GIS technologies. The Weather Data Library in the Department of Communications seeks to be a voice in the direction of GIS activities on campus.

This project, if funded, could also provide increased opportunities for students outside of Geography to acquire GIS expertise that can be applied to their fields. By better understanding GIS, these students can increase their ability to communicate information effectively in this subject area. Further this project can enhance the pool of students who have GIS skills and can work on research and Extension activities. .

Again, we are supportive of this project and believe it will be a benefit to this campus and its efforts to increase the national status of the University.

Sincerely,

Kristina M. Boone, Interim Head  
Communications

**Agricultural  
Communications  
and Journalism**

301 Umberger Hall  
532-5804  
Fax: 532-5633

**Information and  
Educational Technology**

211 Umberger Hall  
532-6270  
Fax: 532-6487

**KKSU-AM 580**

20 McCain Auditorium  
532-5851  
Fax: 532-5709

**News**

113 Umberger Hall  
532-5806  
Fax: 532-6458

**Production Services**

**Distribution Center**  
24 Umberger Hall  
532-5830  
Fax: 532-7938

**Production Services**

**Duplicating Center**  
11 Umberger Hall  
532-5816  
Fax: 532-7938

**Publications**

311 Umberger Hall  
532-5805  
Fax: 532-2293

**Television**

119 Dale Hall  
532-7692  
Fax: 532-7699

**Weather Data Library**

21 Umberger Hall  
532-7019  
Fax: 532-6487

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Department of Geology  
108 Thompson Hall  
Manhattan, KS 66506-3201  
785-532-6724  
Fax: 785-532-5159

Dr. Mary Hubbard  
785-532-2241  
MHUB@KSU.EDU

2/13/04

Dr. Shawn Hutchinson  
Dept. of Geography  
Seaton Hall  
K-State Campus

Dear Shawn,

I am writing in support of your GIScience Infrastructure Enhancement Targeted Excellence proposal. It is clear that the need to display and analyze many types of data require the use of a GIS approach. In geology, much of our data has a spatial component. Many of our students already take the GIS courses in Geography and several of our students have been enrolled in the GIS Graduate Certificate.

The successful development of GIS capabilities on campus will certainly require the training of faculty and students from disciplines across campus. This training should be greatly facilitated with the proposed enhancements. Good luck on this endeavor and let me know if there is anything further that the Department of Geology can do to help.

Sincerely,

A handwritten signature in cursive script that reads "Mary Hubbard".

Mary Hubbard



**Department of Arts, Sciences,  
and Business**

College of Technology and Aviation  
Kansas State University at Salina  
2310 Centennial Road  
Salina, KS 67401 -8196  
785-826-2692

February 13, 2004

J.M. Shawn Hutchinson, Ph.D.  
Assistant Professor and Director, GISSAL  
Department of Geography  
118 Seaton Hall, Kansas State University  
Manhattan, KS 66506

Dear Dr. Hutchinson:

I am pleased to offer my support regarding the proposed targeted excellence program, titled, "Geospatial Technology Infrastructure Enhancement".

As stressed in your proposal, this project will provide significant opportunities for Kansas State University to become a leader in GIScience teaching, research, and outreach. I agree with you wholeheartedly that this is a rapidly expanding field and its use is becoming vital in many diverse disciplines. The fact that this project has the potential to enhance and compliment so many other disciplines already well known for their excellence at Kansas State University is of particular significance. I think your proposal is thorough and shows a promising vision with focus and a great deal of forethought.

Again, I would like to express my support and encouragement for the project, "Geospatial Technology Infrastructure Enhancement".

Sincerely,

A handwritten signature in cursive script that reads 'Don Von Bergen'.

Don Von Bergen, Ph.D.  
Department Head

Cc John Harrington



Kansas State University

Information Technology  
Assistance Center

509 Hale Library  
Manhattan, KS 66506-1201

785-532-4918

Fax: 785-532-3199

<http://www.ksu.edu/itac>

February 16, 2004

James Coffman, Provost  
Kansas State University  
106 Anderson  
CAMPUS

Re: Geospatial Targeted Excellence proposal

Dear Provost Coffman,

This letter is written in support of the Targeted Excellence proposal entitled *Geospatial Technology Infrastructure Enhancement Program*. There is a need to develop and enhance the spatial literacy of K-State students. This proposal expands K-State's abilities to do just that by developing web-based modules, creating a GIScience teaching laboratory, enhancing the expertise of faculty and staff in geospatial technology, increasing faculty competitiveness for extramural funding, and more.

Assistance with mediated course materials is one of the functions of iTAC. Our staff routinely works with faculty to incorporate appropriate technology in online and resident courses. The GIS Education and Outreach Coordinator and other faculty will use the resources on campus including the K-State Online course management system, and the hardware, software and staff expertise in the Media Development Center.

iTAC's role in this proposal would be to assist in developing state-of-the-art modules in GIScience and GIS Technology and to provide technical support for the Geographic Information Science software. Staff in the Information Technology Assistance Center is excited about participating in this venture.

Sincerely,

A handwritten signature in blue ink, appearing to read "Rebecca Gould". The signature is fluid and cursive.

Rebecca Gould  
Director, Information Technology Assistance Center  
Professor, Hotel, Restaurant, Institution Management and Dietetics

## 11 APPENDIX B – LETTER OF DASC COORDINATION

J.M. Shawn Hutchinson, Ph. D.  
Assistant Professor and Director, GISSAL  
Department of Geography  
118 Seaton Hall, Kansas State University  
Manhattan, KS 66506

Dear Shawn,

I am writing this letter of support and cooperation regarding your Geographic Information System (GIS) infrastructure enhancement proposal for Kansas State University (KSU). In support of this initiative, the State of Kansas GIS Data Access & Support Center (DASC) agrees to provide fee-based consulting services to assist in the development of an internal university spatial data server at KSU. The establishment of such a server at KSU would enhance academic experience for those studying the field of GIS and would assist in the expansion of GIS technologies across campus and curriculums at KSU. I strongly encourage the KSU administration to give serious consideration to your proposal and look forward to working with you and your colleagues at KSU on this initiative.

Sincerely,

Kenneth A. Nelson  
KGS GIS Coordinator  
DASC Manager



## 12 APPENDIX C – HISTORICAL EXTRAMURAL GIS FUNDING

### **Division of Biology – \$4,248,010 (6 projects)**

#### ***POC Brent Brock***

- Long-Term Ecological Research in Tallgrass Prairie: The Konza Prairie LTER Program  
Investigators: Alan Knapp, John Blair, John Briggs  
Agency (Amount): National Science Foundation (\$20,010)  
Period: In November 2001 “Awards”; Office of Research and Sponsored Programs
- Long-Term Ecological Research in Tallgrass Prairie: The Konza Prairie LTER Program (LTER IV)  
Investigators:  
Agency (Amount): National Science Foundation (\$600,000/yr)  
Period: 1996-2000
- Land-Cover Change in the Great Plains: Predicting the Impacts of Regional Forest Expansion on Biogeochemical Processes.  
Investigators:  
Agency (Amount): NASA/Land Cover and Land-Use Change Research (\$485,000)  
Period:
- Scaling Up the Ecosystem Consequences of Forest Expansion in the Great Plains Region: A Renewal Proposal.  
Investigators:  
Agency (Amount): NASA/Land Cover and Land-Use Change Research (\$575,000)  
Period:
- Species boundaries in the woodroach, *Cryptocercus*. Srinu Kambhampati.  
Investigators: Srinu Kambhampati  
Agency (Amount): National Science Foundation (\$150,000); DEB98-06710  
Period:
- Assessment of Physicochemical, Biological, and Landscape Features Influencing Topeka Shiner (*Notropis topeka*) Distribution in Kansas Streams  
Investigators: Christopher Guy, Matthew Whiles  
Agency (Amount): U.S. Geological Survey-Biological Resources Division (\$18,000)  
Period: 1999-2000

### **Department of Geography – \$3,141,173 (24 projects)**

#### ***POC John Harrington***

- Human Resources GIS Database and Map Development.  
Investigators: Shawn Hutchinson, E. Bernard  
Agency (Amount): Union Pacific Railroad (\$1,700)  
Period: September 2001-October 2001
- HYSPIRE: Hyperspectral Remote Sensing of Rural Kansas Environments  
Investigators: D.G. Goodin  
Agency (Amount): KSU/Kansas NASA EPSCoR (\$970,000)  
Period: April 2001-March 2004

- High Plains Dairy Suitability Assessment Map Project  
Investigators: Shawn Hutchinson  
Agency (Amount): KSU Ag Extension and Dept. of Animal Sciences (\$6,000)  
Period: August 2001-September 2001
- Earth Systems Science Fellowship  
Investigators: John Harrington, Shawn Hutchinson  
Agency (Amount): NASA (\$66,000)  
Period: August 1997-July 2000
- Environmental Fellowship  
Investigators: Shawn Hutchinson  
Agency (Amount): Department of Defense (\$50,000)  
Period: August 1995-July 1997
- Infrastructure to Develop a Human-Environment Regional Observatory  
Investigators: Steve White, Doug Goodin, John Harrington, Max Lu, Lisa Harrington  
Agency (Amount): National Science Foundation (\$290,000)  
Period: August 2000-June 2004
- Kansas Water Quality Action Targeting System 14 Regression Analysis Training  
Investigators: Max Lu  
Agency (Amount): Kansas Dept. of Health and Environment (\$8,365)  
Period: June 2000
- Kanopolis Watershed Assessment  
Investigators: Kyle Mankin, John Harrington  
Agency (Amount): Kansas Dept. of Health and Environment (\$120,746)  
Period: April 2000-April 2001
- Using Landsat Imagery and AGNPS Model for Water Quality Assessment in the Cheney Lake Watershed  
Investigators: Jim Koelliker, John Harrington  
Agency (Amount): Kansas Dept. of Health and Environment, City of Wichita (\$60,012)
- Development of a GIS for Colbert Hills  
Investigators: John Harrington  
Agency (Amount): Colbert Hills Environmental Research Team (CHERT) (\$7,400)  
Period: October 1998-June 2001
- Spatial and Spectral Scale Dimensions for Modeling Rural Resource Systems: Projections for Global Change  
Investigators: Doug Goodin  
Agency (Amount): NASA EPSCoR (\$740,900)  
Period: January 1997-December 2001
- Global Change in Local Places  
Investigators: Lisa Harrington, John Harrington, Steve White  
Agency (Amount): National Institute for Global Environmental Change (\$118,000)  
Period: July 1996-June 1999
- Global Change and Local Places  
Investigators: John Harrington, Steve White  
Agency (Amount): NASA, Assoc. of American Geographers (\$180,000)  
Period: January 1996-December 1999

- Soil Survey Geographic (SSURGO) Soils Recompilation and Digitizing  
Investigators: John Harrington, Shawn Hutchinson  
Agency (Amount): USDA Natural Resources Conservation Service (\$25,000)  
Period: End September 2001
- Soil Survey Geographic (SSURGO) Soils Recompilation and Digitizing – CO Recompile  
Investigators: John Harrington, Shawn Hutchinson  
Agency (Amount): USDA Natural Resources Conservation Service (\$8,000)  
Period: End September 2001
- Soil Survey Geographic (SSURGO) Soils Recompilation and Digitizing – KS, CO  
Investigators: Sy Syler  
Agency (Amount): USDA Natural Resources Conservation Service (\$102,500)  
Period: End September 2001
- Soil Survey Geographic (SSURGO) Soils Recompilation and Digitizing – Kansas  
Investigators: Sy Syler  
Agency (Amount): USDA Natural Resources Conservation Service (\$45,000)  
Period:
- Soil Survey Geographic (SSURGO) Soils Recompilation and Digitizing – KS  
Investigators: Sy Syler  
Agency (Amount): USDA Natural Resources Conservation Service (\$51,000)  
Period: End September 1999
- Soil Survey Geographic (SSURGO) Soils Recompilation and Digitizing – KS  
Investigators: Sy Syler  
Agency (Amount): USDA Natural Resources Conservation Service (\$60,000)  
Period: September 1998
- Soil Survey Geographic (SSURGO) Soils Recompilation and Digitizing – KS  
Investigators: Sy Syler  
Agency (Amount): USDA Natural Resources Conservation Service (\$125,050)  
Period: End September 1997
- Soil Survey Geographic (SSURGO) Soils Recompilation and Digitizing – West Greeley, CO  
Investigators: Sy Syler  
Agency (Amount): USDA Natural Resources Conservation Service (\$9,300)  
Period:
- Soil Survey Geographic (SSURGO) Soils Recompilation and Digitizing – CO  
Investigators: Sy Syler  
Agency (Amount): USDA Natural Resources Conservation Service (\$15,600)  
Period:
- Soil Survey Geographic (SSURGO) Soils Recompilation and Digitizing – CO  
Investigators: Sy Syler  
Agency (Amount): USDA Natural Resources Conservation Service (\$57,100)  
Period:
- GIS Database Development for Marais de Cygnes  
Investigators: Sy Syler  
Agency (Amount): U.S. Fish and Wildlife Service (\$23,500)  
Period:

**National Institute for Land Management and Training – \$3,959,293 (4 projects)**

***POC Randy Griffith***

- Assessing the Impact of Maneuver Training on NPS Pollution and Water Quality.  
Investigators: James Steichen, Stacy Hutchinson, Phil Barnes, Shawn Hutchinson, Donald Althoff, Jack Oviatt, Naiquian Zhang  
Agency (Amount): Strategic Environmental Research and Development Program (SERDP) (\$1,217,512)
- Integrated Training Area Management Demonstration Project  
Investigators: Donald Rathbone, James Steichen, Bert Biles  
Agency (Amount): U.S. Army (\$1,750,000)  
Period: February 1995-September 1999
- Integrated Training Area Management (ITAM) Program Support for TRADOC  
Investigators: James Steichen  
Agency (Amount): U.S. Army Environmental Center (\$663,000)  
Period: September 2000-January 2002
- Active/Inactive (A/I) Range Inventory Support for the U.S. Army Environmental Center  
Investigators: James Steichen  
Agency (Amount): U.S. Army Environmental Center (\$328,781)  
Period: July 2000-September 2002

**Department of Agronomy – \$2,250,194 (24 projects)**

***POC John Schmidt***

- Addressing a familiar problem with new technology.  
Investigators: Schlegel, A.J., C.R. Thompson, R.K. Taylor, and J.P. Schmidt  
Agency (Amount): Kansas Corn Commission (\$80,279)  
Period: July 1999-July 2002
- Evaluating nitrate leaching characteristics for various nitrogen management strategies for irrigated corn along the Lower Arkansas River.  
Investigators: Schmidt, J.P., L.R. Stone, A.J. Schlegel and D.H. Rogers  
Agency (Amount): Kansas Department of Agriculture (\$25,000)  
Period: March 2001-February 2002
- Improving the current N recommendation for irrigated corn.  
Investigators: Schmidt, J.P., A.J. Schlegel, L.D. Maddux, and B. Gordon  
Agency (Amount): Fertilizer Check-Off Funds (\$27,260)  
Period: March 2001-February 2002
- Integrated agricultural management systems (IAMS) using BMP's to improve the quality of Kansas surface water.  
Investigators: Hargrove, W., D. Bernardo, K. Janssen, D. Regehr, W. Heer, P. Barnes, D. Devlin, J. Schmidt, K. McVay, G. Kilgore, and D. Sweeney  
Agency (Amount): Kansas Corn Commission (\$75,025)  
Period: July 2000-June 2001
- Integrated agricultural management systems (IAMS) using BMP's to improve the quality of Kansas surface water.  
Investigators: Hargrove, W., D. Bernardo, K. Janssen, D. Regehr, W. Heer, P. Barnes, D.

Devlin, J. Schmidt, K. McVay, G. Kilgore, and D. Sweeney  
Agency (Amount): Kansas Soybean Commission (\$43,650)  
Period: July 2000-June 2001

- Site-specific lime applications to reduce phosphorus loading in the Cheney watershed.  
Investigators: Schmidt, J.P., R.E. Lamond, and R.K. Taylor  
Agency (Amount): Reno County Conservation District (\$41,556)  
Period: January 1998-December 2000
- Variable nitrogen management for protecting groundwater quality.  
Investigators: Schmidt, J.P., R.E. Lamond, and M.D. Schrock  
Agency (Amount): Kansas Corn Commission (\$64,900)  
Period: July 1998-June 2000
- Precision application of phosphorus to winter wheat.  
Investigators: Schlegel, A.J., and J.P. Schmidt  
Agency (Amount): Foundation for Agronomic Research and Fluid Fertilizer Foundation (\$9,100)  
Period: January 1998-December 1998
- Precision agricultural research at Kansas State University.  
Investigators: Schmidt, J.P.  
Agency (Amount): Ag-Chem Equipment Co., Inc. (\$5,000)
- Predicting potential mineralizable nitrogen by remote sensing.  
Investigators: J. Schmidt, G. Kluitenberg, and C. Rice  
Agency (Amount): USDA/CSREES (\$148,416)  
Period: 09/95-12/99
- Variable nitrogen management for improving groundwater quality  
Investigators: J. Schmidt, R. Lamond, M. Schrock, and D. Buchholz  
Agency (Amount): KDHE (\$319,374)  
Period: 7/96-9/00
- Geographic Information Systems in agricultural science education.  
Investigators: J. Schmidt, G. Kluitenberg, M. Schrock  
Agency (Amount): USDA Higher Education Challenge Grants (\$68,000)  
Period: 09/96-09/99
- Geographic Information Systems in agricultural science education.  
Investigators: J. Schmidt, G. Kluitenberg, M. Schrock  
Agency (Amount): USDA Higher Education Challenge Grants (\$68,000)  
Period: 09/96-09/99
- Kansas Grazing Land Water Quality  
Investigators: Paul Ohlenbusch, Rodney Jones  
Agency (Amount): Kansas Dept. of Health and Environment (\$46,658)  
Period: 1997
- Kansas Grazing Land Water Quality  
Investigators: Paul Ohlenbusch, Rodney Jones  
Agency (Amount): Kansas Dept. of Health and Environment (\$94,600)  
Period: 1998
- Kansas Grazing Land Water Quality  
Investigators: Paul Ohlenbusch, Rodney Jones

Agency (Amount): Kansas Dept. of Health and Environment (\$122,218)  
Period: 1999

- Kansas Grazing Land Water Quality  
Investigators: Paul Ohlenbusch, Rodney Jones  
Agency (Amount): Kansas Dept. of Health and Environment (\$122,218)  
Period: 2000
- Kansas Grazing Land Water Quality  
Investigators: Paul Ohlenbusch, Rodney Jones  
Agency (Amount): Kansas Dept. of Health and Environment (\$122,218)  
Period: 2001
- Water Resources Assessment and Protection Program Area  
Investigators: G. Kluitenberg, J. L. Havlin, C. W. Rice, N. Zhang, and R. B. Ferguson  
Agency (Amount): USDA National Research Initiative Competitive Grants Program (\$268,755)  
Period: January 1996-December 1998
- Kansas Agricultural Experiment Station. Soil Moisture Monitoring in the Black Vermillion Watershed  
Investigators: G. Kluitenberg, J.M. Ham, and P.L. Barnes  
Agency (Amount): Kansas Agricultural Experiment Station (\$105,000)  
Period: January 1997-September 2000
- Variable rate corn seeding..  
Investigators – Scott Staggenborg  
Agency (Amount): Kansas Corn Commission (\$16,000)  
Period: 1996-97
- Using infrared image as scouting tools.  
Investigators: Scott Staggenborg  
Agency (Amount): Kansas Corn Commission (\$20,000)  
Period: 1998-99
- Landscape-Level Trace Gas Fluxes on Grazed and Ungrazed Tallgrass Prairie I  
Investigators: C.E. Owensby, J.M. Ham, A.K. Knapp  
Agency (Amount): U.S. Dept. of Energy (\$271,361)  
Period: 9/99-9/02
- Landscape-Level Trace Gas Fluxes on Grazed and Ungrazed Tallgrass Prairie II  
Investigators: C.E. Owensby, J.M. Ham, A.K. Knapp  
Agency (Amount): U.S. Dept. of Energy (\$153,606)  
Period: 10/99-10/02

**Kansas Cooperative Fish and Wildlife Research Unit – \$1,308,000 (3 projects)**

***POC Jack Cully***

- Habitat selection by three sensitive bird species at Fort Riley Military Reservation, Kansas.  
Investigator:  
Agency (Amount): Department of the Army (\$108,000)  
Period:
- Gap Analysis in Kansas  
Investigator:

Agency (Amount): USGS, KDWP, Kansas Water Office, EPA, and others (>\$1,000,000)  
Period:

- Landscape dynamics of sylvatic plague associated with black-tailed prairie dogs.  
Investigator:  
Agency (Amount): USGS, KDWP, USFS, USFWS (\$200,000)  
Period:

### **Department of Biological and Agricultural Engineering – \$934,500 (6 projects)**

#### ***POC James Koelliker***

- Smoky Hill River Water Quality Improvement Program, Phase I  
Investigators: James Koelliker, Kyle Mankin, John Harrington  
Agency (Amount): Kansas Dept. of Health and Environment (\$300,000)  
Period: 2000-2002
- Cheney Agricultural Nonpoint Source Evaluation of AGNPS Modeling in Cheney Lake NPS Management Area  
Investigators: James Koelliker, Kyle Mankin, John Harrington  
Agency (Amount): Kansas Water Office (\$25,000)  
Period: 1999-2000
- Clinton Reservoir Watershed Assessment  
Investigators: James Koelliker, Kyle Mankin  
Agency (Amount): Kansas Dept. of Health and Environment (\$72,500)  
Period: 1997-1999
- Comprehensive Computer Simulation Modeling of Cheyenne Bottoms Water Supply  
Investigators: James Koelliker, Rao S. Govindaraju  
Agency (Amount): Kansas Water Office (\$265,000)  
Period: 1994-1999
- Melvern Reservoir Water Quality Assessment  
Investigators: James Koelliker, Prasanta Kalita, Kyle Mankin  
Agency (Amount): Kansas Dept. of Health and Environment (\$60,000)  
Period: 1996-1998
- Development of a Computer Simulation of the Hydrology of the Rattlesnake Creek Basin for the Sub-basin Water Resources Management Program  
Investigators: James Koelliker, Rao S. Govindaraju  
Agency (Amount): Kansas Division of Water Resources (\$212,000)  
Period: 1994-1997

### **Department of Sociology, Anthropology, and Social Work – \$245,702 (1 project)**

#### ***POC Richard Goe***

- The Effects of Economic and Social Restructuring on Rural Localities  
Investigators: W.Richard Goe, Leonard Bloomquist  
Agency (Amount): National Research Initiative, U.S. Department of Agriculture (\$245,702)  
Period: September 1995-September 1999