Center for Spatially Integrated Social Science

ANNUAL REPORT

Year 2

1 July 2000 – 30 June 2001

University of California, Santa Barbara

July 2001

Center for Spatially Integrated Social Science

ANNUAL REPORT

Year 2

1 July 2000 – 30 June 2001

Compiled by Donald G. Janelle

Center for Spatially Integrated Social Science
University of California, Santa Barbara
3510 Phelps Hall
Santa Barbara CA 93106-4060

Office: (805) 893-8224
Fax: (805) 893-8617
URL: CSISS.org
Email: CSISS@CSISS.org

July 2001

CENTER FOR SPATIALLY INTEGRATED SOCIAL SCIENCE

Executive Committee
University of California, Santa Barbara

Director and PI
Michael F. Goodchild

Program Director
Donald G. Janelle

Senior Researchers
Richard P. Appelbaum, *co-PI*
Helen Couclelis
Barbara Herr-Harthorn
Terence R. Smith
Stuart Sweeney

Luc Anselin
PI for Tools Development
University of Illinois
Urbana-Champaign

Learning Resources Manager
Matt Rice

Science Advisory Board

Brian Berry, *Chair*
University of Texas at Dallas
Richard A. Berk
University of California Los Angeles
Bennett I. Bertenthal
University of Chicago
Jack Dangermond
Environmental Systems
Research Institute
Amy K. Glasmeier
Pennsylvania State University
Carol Kohfeld
University of Missouri – St. Louis
Nancy G. LaVigne
U.S. Department of Justice
John R. Logan
University at Albany, SUNY
Emilio F. Moran
Indiana University
Peter A. Morrison
Rand Corporation
Robert Sampson
University of Chicago
B.L. Turner II
Clark University
Susan M. Wachter
University of Pennsylvania
Michael D. Ward
University of Washington

CENTER FOR SPATIALLY INTEGRATED SOCIAL SCIENCE ANNUAL REPORT AND INCREMENT REQUEST, JULY 2001

Summary

The Center for Spatially Integrated Social Science (CSISS) is an infrastructure program funded by the National Science Foundation to facilitate communication and sharing of research ideas and methodologies among researchers in the social and behavioral sciences. The CSISS approach to integrating knowledge across disciplines and paradigms is to be achieved by broadening the user base of spatially integrated social science (SISS)—cartographic visualization, geographic information systems (GIS), pattern recognition, spatially sensitive statistical analysis, and place-based search methodologies. The Center's programs make use of Web technologies to promote accessibility to these tools and to related information, foster opportunities for scholars to learn about and master spatial methodologies, and provide intellectual foci for engaging a broad range of scholars in intensive discussion and program development.

CSISS began its operations in October 1999. The first nine months (through June 2000) were spent laying the infrastructure for the operations of CSISS. In contrast, the last 12 months have seen the successful launching of a series of annual workshops and specialist meetings, preparations for a book on best practices in spatially integrated social science, the development of innovative tools for spatial analysis, and provision of significant resources for teaching and research on the Center's website, www.csiss.org. This report summarizes the progress made in each of the Center's programs since the last report was issued, in July 2000. In addition, it highlights the results of two key developments – the growing centrality of the www.csiss.org in administering programs and delivering services, and, because of a successful strategic planning retreat in May 2001, the targeting of resources towards a long-range vision for meeting the needs of the social science community.

CSISS acknowledges the support from NSF under BCS-9978058 and requests the second increment of funding for the project for the period 1 October 2001 through 30 September 2002.

Table of Contents

CENTER FOR SPATIALLY INTEGRATED SOCIAL SCIENCE
BACKGROUND

The Center for Spatially Integrated Social Science was established in 1999 with a grant from the National Science Foundation's Directorate for Social, Behavioral, and Economic Research (SBE). CSISS is one of six awards given in 1999 under SBE's initiative to build research infrastructure in the social and behavioral sciences.

CSISS recognizes the key role space plays in human society, and promotes research that advances understanding of spatial patterns and processes. The tools of spatially integrated social science (SISS)—cartographic visualization, geographic information systems (GIS), pattern recognition, spatially sensitive statistical analysis, and place-based search methodologies—are used to integrate knowledge across disciplines and paradigms. From research design to the interpretation of research findings, the use of SISS can advance understanding in nearly every domain of the social and behavioral sciences.

The management structure for CSISS includes a Science Advisory Board of prominent social science researchers and an Executive Committee consisting of Principal Investigators, Senior Researchers, and a Program Director. The Advisory Board has met twice, in May 2000 and December 2000, and will convene once again in October 2001. A Report on the December 2000 meeting is attached as Appendix A. The Science Advisory Board reviews all Center activities and plans, and reports to the Executive Committee and to the National Science Foundation. The Executive Committee convenes at least once a month to review the actual implementation of the various programs within its mandate. In fulfilling its mandate, CSISS operates seven programs, including:

(1) sponsorship of **specialist meetings** on major themes in the social sciences;
(2) **national summer workshops** in new methods, aimed at young scholars;
(3) development of new **tools for spatial analysis** based on emerging software technologies;
(4) preparation of Web-accessible **learning resources** covering all aspects of the spatial approach;
(5) identification of **best-practice examples** of spatial analysis in the social sciences, converting these into publications and learning resources that demonstrate authoritative applications of spatial perspectives.
(6) implementation of **place-based search** tools for identifying and delivering geographically referenced information on the WWW and in digital libraries; and
(7) creation of a **virtual community** of Web-based services to the social sciences.

This report outlines progress towards fulfilling the objectives in the second year of the program, from 1 October 2000 to 30 June 2001.[1]

CSISS MISSION STATEMENT AND OBJECTIVES

A highlight of recent CSISS activities was a retreat of the CSISS Executive Committee and special guests (Peter Morrison, member of the CSISS Advisory Board, and Arthur Getis, President of the University Consortium for Geographic Information Science). The results of the retreat, a CSISS Strategic Plan, will be presented to the Board of Advisors at its next meeting on 3-4 October 2001. It is useful here to present the CSISS mission statement, principal goal, and objectives -- they express the standard to which the success of CSISS is to be judged. This is followed by a review of developments related to CSISS programs for the report period (1 July 2000 – 30 June 2001).

The CSISS Mission

CSISS is founded on the principle that analyzing social phenomena in space and time enhances our understanding of social processes. Hence, CSISS cultivates an integrated approach to social science research that recognizes the importance of location, space, spatiality, and place.

The **GOAL** of CSISS is to integrate spatial concepts into the theories and practices of the social sciences by providing infrastructure to facilitate: (1) the integration of existing spatial knowledge, making it more explicit, and (2) the generation of new spatial knowledge and understanding.

Objectives

1. To encourage and expand applications of new geographic information technologies and newly available geographically referenced data in social science.
2. To introduce the next generation of scholars to this integrated approach to social science research.
3. To foster collaborative interdisciplinary networks that address core issues in the social sciences using this approach.
4. To develop a successful clearinghouse for the tools, case studies, educational opportunities, and other resources needed by this approach.

The strategic interests of CSISS are advanced through programs that meet our stated objectives. All CSISS activities, outcomes, and measures of success are seen as derivative from six interrelated tactics: to involve, to inform, to illustrate, to innovate, to infiltrate, and to integrate.

- *Inform* – tell others what CSISS is doing and encourage them to inform others. This requires excellent contact data resources, effective use of advertising in a variety of formats for targeted client groups, outreach through conference presentations and publications, and promotion of the centrality of resources at www.csiss.org .

- *Involve* – engage others as active participants in, and organizers of, CSISS programs. These include broad interdisciplinary membership on the Board of Advisors and on

steering committees of conferences and instructional teams for workshops. Strong disciplinary mix among authors for CSISS publications and online resources, and among satisfied repeat visitors to www.csiss.org is also important.

- *Illustrate* – provide clear examples and demonstrations that enable the mastery of spatial thinking and spatial analytic procedures. Learning-resource offerings, presentations, best practice demonstrations and *CSISS classics* of appropriate and effective use of spatial data and spatial analytic tools are needed to document the value added through spatial perspectives.

- *Innovate* – introduce improved methods and tools, and new uses, of spatial analysis; provide new means for spatially searching library holdings, and create new resources for learning about the uses of tools and spatial data. Place-based search tools for accessing spatial data and information about places, Windows-based SpaceStat, specialized search engines, and creation of metadata resources are among the innovations that CSISS promotes.

- *Infiltrate* – to engage CSISS participants (from workshops, Specialist Meetings) and CSISS personnel in active dissemination of spatial thinking and analytic resources within their departments, workplaces, institutions, publications, research specialties, and disciplines.

- *Integrate* – to draw on and to contribute to the intellectual achievements of diverse social science disciplines through spatial analysis, seeking common ground toward the development of a unifying perspective for spatial social science.

CSISS PROGRAMS

To fulfill its objectives, CSISS has formulated its strategic plan around the execution of seven interrelated programs. These programs focus on the methods, tools, techniques, software, data access, and other services needed to promote and facilitate a spatially integrated approach to the social sciences. Activities related to each of these programs over the period 1 July 2000 – 30 June 2001 are described in the following sections, along with plans for the year ahead. More detailed information on all of these activities are available through www.CSISS.org .

I.   Specialist Meetings

CSISS organizes meetings on core issues in the social sciences that cut across traditional disciplinary boundaries to focus on gaps in knowledge that can be addressed through a spatial perspective. Topically, these meetings address traditional domains of social science inquiry (e.g., equity, cultural analysis, externalities, and globalization), as well as new areas of investigation where spatial perspectives and technologies might add value (e.g., location-based services that exploit GPS and wireless technologies). These meetings identify scientific agendas and workshop needs for young scholars, propose learning resources essential to the diffusion of tools and concepts, suggest the creation of new spatial research tools, explore dissemination practices to reach potential users of spatial perspectives, foster collaborative networks among meeting participants, and develop best-practice publications of exemplary social science applications.

Two specialist meetings were held in the past year, and plans are underway for at least four more specialist meetings over the next two yeas. These are summarized below.

Specialist Meeting on Social Inequality and Equity

In response to a recommendation by the CSISS Advisory Board at its May 5-6, 2000, meeting, CSISS held its first specialist meeting on **November 13-14, 2000**, in Santa Barbara. The purpose of the meeting was to identify ways in which CSISS could better achieve its goal of supporting the development and dissemination of spatial theories, tools, concepts and techniques in the social sciences, with reference to studying and addressing problems of social inequality and equity.

The workshop brought together twenty-one specialists from diverse disciplines (sociology, anthropology, criminology, political science, economics, geography, biostatistics, transportation engineering, and history), representing an equally diverse range of substantive interests in inequality which we categorized into four broad groupings: access, crime and social justice, urban inequality (including racial, and ethnic stratification), and economic inequality and labor markets. The meeting was co-chaired by Richard Appelbaum (Sociology and Global & International Studies, UCSB) and Helen Couclelis (Geography, UCSB); the Steering Committee included Appelbaum and Couclelis, along with John Logan (Sociology, SUNY-Albany) and John Sprague

(Political Science, Washington University). Detailed biographical information on the participants and copies of their position papers are available at
http://csiss.org/aboutus/archives/equity/summary.pdf

The specific goals of the meeting were:
1. To identify research questions related to inequality and equity, where consideration of the spatial dimensions of the issues has led to, or is most likely to lead to, new insights. This includes the identification of issues requiring new developments in spatial theory, methodology or technology.
2. To identify specific learning materials and best practice examples that could be collected, developed, and disseminated by CSISS through its virtual community, to support research and instruction on the spatial aspects of inequality and equity.
3. To identify and prioritize specific software tools, including methods, statistical techniques, platforms, and implementations, that CSISS could refine or further develop to support research.
4. To suggest future CSISS workshops and specialist meetings based on the foregoing issues and concerns.

The workshop concluded with discussions on three cross-cutting issues: problems of data and visualization; the use of public data (including confidentiality issues); and opportunities afforded by Census 2000 and Congressional redistricting. In all of these discussions, there was a tacit agreement that space should be made a more central, explicit concept in social science. This is already true of some disciplines (for example, human geography and, increasingly, anthropology), but in general, social theories need to be brought into spatial representation and analysis. Within the GIS paradigm, the center of activity needs to move from formal modeling of spatial processes with highly refined spatial statistics to relating these models more directly to underlying social processes. A dominant critique concerned temporal factors, which are implicit in social processes, and that cannot be excluded from spatial questions and from spatial techniques and technologies. CSISS was encouraged to offer advice to software producers, and to provide programs (e.g., workshops) to assist social scientists with the problems of data visualization on maps. A wide range of potential learning materials and best practice examples were identified by participants, which will be incorporated into the CSISS website.

Specialist Meeting on Spatial Externalities

Following a recommendation by the CSISS Advisory Committee, a specialist meeting on "Spatial Externalities" was held at the Upham Hotel, Santa Barbara CA, **January 11-13, 2001**. The meeting participants consisted of a group of leading scholars from a range of fields in economics, including urban and regional economics/regional science, real estate economics, environmental economics and natural resource economics. The steering committee included Luc Anselin (chair), Jan Brueckner (Department of Economics, University of Illionis, Urbana-Champaign), and Robert Deacon (Department of Economics, UCSB). The singular focus on economics as a discipline was motivated by the perceived lack of dissemination of a "spatial" perspective in economics relative to the progress made in other social sciences.

The objectives of the specialist meeting were two-fold:
- To assess the status and future of "spatial thinking" in economics in general, and in the context of the study of spatial externalities in particular. Specifically, participants were asked to address what is the perceived added value of spatial models and spatial methods, to identify critical impediments and to suggest the most promising research directions where a spatial perspective can provide added value to the solution of economic questions.
- To assess the infrastructure needs to enhance and facilitate spatial thinking in economics and other social sciences. Specifically, this included identifying critical needs for learning materials, topics suitable for the organization of workshops, priorities in software tool development, and other materials for inclusion in the CSISS "virtual community" framework.

The meeting was organized around three main topics: theoretical perspectives on spatial externalities; methodological perspectives on spatial externalities; and spatial analysis in economic research. Each topic was introduced by a short overview presentation by the session moderator, followed by brief statements from a subset of the participants, and then opened for general discussion. In addition, presentations were made on the overall goals of CSISS and the vision of "spatial analysis" as an integrating force, on the various CSISS programs dealing with learning materials, best practices and workshops, and on the CSISS software tools program. In addition, participants presented materials on promising data sources for use in the study of agglomeration economies and real estate analysis.

Some common themes that emerged from the wide ranging discussion were the importance of space and scale in the measurement of economic phenomena (particularly in the interaction between economics and natural phenomena), the role of space in the conceptualization of interaction, and the necessity of proper model specification, identification and closure (equilibrium conditions). Specific recommendations for future CSISS activities included holding specialist meetings on the role of space in real estate analysis and in environmental economics, and on the frontier of methods in spatial econometrics. Suggestions for workshops included a strong endorsement of existing workshops on spatial data analysis and a new workshop on locational equilibrium models (non-market valuation). In terms of software tools, the need was identified for a computational infrastructure, with an emphasis on modularity, and on a role for CSISS to serve as a clearinghouse for spatial analysis software (and data access). Interest was expressed to start a collection of best practices to promote spatial analysis in economics. A detailed report on this meeting is available at
http://csiss.org/aboutus/archives/externalities/report.pdf

Specialist meeting on Location-Based Services December 14-15, 2001

In December, CSISS will hold a specialist meeting on location-based services, under the joint sponsorship of CSISS and the University Consortium for Geographic Information Science, a consortium of some 70 U.S. research universities in the U.S. The Global Positioning System and cellular technologies are enabling a new generation of electronic devices that know where they are, and are capable of modifying the information they

collect and present based on that knowledge. The Wireless Communication and Public Safety Act of 1999 permits operators of cellular networks to release the geographic locations of users in certain emergency situations, and a range of electronic services are now being developed and offered to assist users in finding nearby businesses and other facilities. A location-based service (LBS) could be defined as an information service that exploits the ability of technology to know where it is, and to modify the information it presents accordingly. The Open GIS Consortium (www.opengis.org) has begun a number of initiatives related to technical specifications for LBS.

We propose to hold a specialist meeting to explore these new services, and their implications and significance for the social sciences and for geographic information science. Specific issues to be addressed include:

- the use of LBS to support primary data capture in the social sciences, with emphasis on spatial and temporal components;
- requirements for new representations, and for analytic tools to visualize and investigate such data;
- privacy and related issues associated with LBS data;
- new forms of social behavior enabled by LBS;
- new technologies that extend current concepts of LBS;
- needs for learning materials, examples, and other resources that could help to facilitate social science research related to LBS;
- the use of LBS-derived data for modeling in the social sciences.

The specialist meeting will be held December 14–15, 2001 at the Upham Hotel in Santa Barbara, CA, and will follow the format of previous specialist meetings organized by CSISS and by the National Center for Geographic Information and Analysis. Applications for participation are being invited from interested researchers in universities, the private sector, and public agencies. As with other specialist meetings, this will provide CSISS with input on the forms of research infrastructure needed to promote and facilitate the use of LBS in research, and also help to identify core social science themes that may be informed by LBS, or relevant to LBS-based research. The co-chairs for this meeting are Michael Goodchild and Gerard Rushton (Geography, The University of Iowa).

Specialist Meeting on Software Tools (Spring or Summer 2002)

As part of the CSISS Software Tools Program, a Specialist Meeting is planned for Spring/Summer 2002 in Santa Barbara on the current state of the art of software tools to solve spatial analytical problems. The meeting will bring together up to 40 participants, half by invitation and half selected through an open call for participation. The objectives of the meeting are two fold. First, it will complement the ongoing Tools Clearinghouse initiative of CSISS by assessing the state of the art in both commercial and academic spheres with respect to software that deals with geovisualization, exploratory spatial data analysis, spatial statistics (including geostatistics) and spatial econometrics. To accomplish this, participants will be requested to submit a regular size paper to appear in an edited volume (possibly as a web publication). The papers will be made available to

the participants before the meeting, so that the latter will be devoted to a comparison and discussion of the advantages and disadvantages of different designs, methodological approaches, platforms, dissemination and other technical issues as they pertain to making the tools relevant to the social science community, rather than to a presentation of the papers themselves.

The second objective is to guide the CSISS open source spatial analysis software initiative by providing a forum to discuss standards and guidelines for the development of spatial analysis software "components". The goal is to consult with the community of high end developers in both academia and the private sector to obtain a consensus on the format and structure for the building blocks for the evolving collection of CSISS spatial analysis components. It will also provide an opportunity for a vigorous discussion of various paradigms that may be used in the development of the next generation of analysis tools. It is anticipated that a summary of this discussion and/or the conclusions will yield one of more articles aimed at the statistical software community.

A steering committee has been established, chaired by Luc Anselin (CSISS and University of Illinois, Urbana-Champaign) and Sergio Rey (San Diego State University) and including Richard Berck (UCLA), Ayse Can Talen (Fannie Mae Foundation) and Geoffrey Jacquez (BioMedware Inc. and TerraSeer Inc.).

Future Specialist Meetings

CSISS maintains active consideration of a large number of potential specialist meetings. Those that are most likely to develop in the next year or two are the following:

The Environment-Human Interface. CSISS is in discussion with the CIPEC (Center for the study of Institutions, Population, and Environmental Change. Indiana University), the Graduate School of Geography and George Perkins Marsh Institute (Clark University), and other organizations to develop a co-sponsored meeting on applications of agent-based modeling in landuse and land cover change.

Small Area Data Analysis. Stuart Sweeney (CSISS Executive Committee) is in active communication with the Bureau of Labor Statistics and the Ford Foundation for possible co-sponsorship with CSISS of a meeting which addresses the potentials and problems associated with the geo-referencing and analysis of small-area data.

II. National Workshops

CSISS sponsors intensive weeklong workshops and provides participant scholarships to introduce the latest and most authoritative approaches to the methods and tools of spatially integrated social science. The primary client group for workshops include PhD candidates, postdoctoral students, and untenured Assistant Professors. However, some senior scholars are included to provide a bridging across academic generations.

Consistent with CSISS objectives, workshop invitees are selected from a broad mix of social science disciplines. Effort is made during the workshops to build collaborative networks among participants by stressing the commonality of the spatial perspective to problem identification and research approach.

The following workshops have been organized for Summer 2001:

Accessibility in Space and Time: A GIS Approach
16-20 July 2001, Columbus OH

Topics Covered: Measuring and analyzing accessibility in physical space, social space, and cyberspace; network approaches to connectivity and accessibility; graphical visualizations and computational approaches to the analysis of individual space-time behavior; statistical modeling of spatial interaction patterns; and spatial optimization techniques. Applications and exercises will feature a broad range of social science issues. No prior experience in GIS is required. For further details, see
 http://csiss.org/events/workshops/access/index.htm .

Instructors: Mei-Po Kwan (coordinator), Alan Murray, Morton O'Kelly, Michael Tiefelsdorf, and Irene Casas (all of The Ohio State University).

Map Making and Visualization of Spatial Data in the Social Sciences
23-27 July 2001, Santa Barbara CA

Topics covered: Thematic mapping for the social sciences; principles of scientific visualization; graphical design and cartographic symbolization; geographic visualization; functions and types of maps, use of current graphical design and GIS software (e.g., FreeHand, Photoshop, ArcView); interactive maps for the WWW; mapping statistical data over space and time; and current developments in geographic visualization. No prior experience with visualization software is required. For further details, see
 http://csiss.org/events/workshops/map/index.htm

Instructors: Sara Fabrikant (coordinator), Keith Clarke, and Waldo Tobler (all of University of California Santa Barbara), Barbara P. Buttenfield (University of Colorado), and Dan Dorling (University of Leeds)

Introduction to Spatial Pattern Analysis in a GIS Environment
6-10 August 2001, Santa Barbara CA

Topics covered: Introduction to GIS, pattern statistics and measures of spatial pattern, point-pattern software, research and developments in spatial pattern analysis, and exploratory data analysis. No prior experience in spatial analysis is required. For further details, see http://csiss.org/events/workshops/pattern/index.htm

Instructors: Arthur Getis (coordinator), John R. Weeks, and John Kaiser (all of San Diego State University) and Michael Goodchild (CSISS, University of California, Santa Barbara)

In collaboration with the Interuniversity Consortium on Political and Social Research, CSISS contributes scholarships to assist registrants in the following workshops sponsored by the ICPSR. The CSISS PI for Tools Development, Luc Anselin, is the instructor for both workshops.

Introduction to Spatial Data Analysis
16-20 July, Santa Barbara CA

Topics covered: Spatial data visualization and exploration, analysis of clusters and point patterns, global and local indicators of spatial autocorrelation, variogram analysis, and introduction to spatial regression analysis, SpaceStat software. Prior familiarity with multivariate statistics and basic concepts of probability theory, and some knowledge of desktop GIS software, expected of participants. For further details, see
 http://csiss.org/events/workshops/data/index.htm .
Instructor: Luc Anselin, University of Illinois, Urbana-Champaign

Spatial Regression Analysis
6-10 August, Ann Arbor MI

Topics covered: Spatial econometrics, incorporating spatial effects in regression models, maximum likelihood and other estimation methods for spatial regression models, specification searches in spatial regression analysis, and implementation of spatial regression analysis in standard software packages. Participant background in intermediate regression analysis or intermediate econometrics, and familiarity with introductory spatial data analysis, expected. For further details, see
 http://csiss.org/events/workshops/regression/index.htm
Instructor: Luc Anselin, University of Illinois, Urbana-Champaign

Short Workshops Offered or Supported by CSISS:

CSISS was a co-sponsor with Florida International University (Center for Transnational and Comparative Studies) of a **Workshop on Political Processes and Spatial Analysis**, which met in Miami, Florida, 5-6 March 2001. CSISS provided travel-support for graduate students attending the conference. The participants were largely from Political Science and Geography.

With ICPSR, CSISS co-sponsored the **Advanced Workshop on Spatial Analysis in Social Research**, held at the University of Michigan, 17-20 May 2001. The workshop brought together leading methodologists in spatial analysis from across the social sciences to explore the transfer of new analytic technologies among mainstream social sciences. Information on the meeting is available at

http://www.csiss.org/events/workshops/sasr/

The Wharton GIS Lab (The Wharton School, University of Pennsylvania) and CSISS will co-sponsor a 3-day workshop on **Spatial Data Analysis in the Social Sciences**, in Philadelphia, August 29-31, 2001. Michael Goodchild and Luc Anselin will join Susan Wachter, Ayse Can Talen, and Paul Amos as instructors. For details, see
 http://csiss.org/events/workshops/wharton/index.htm

Workshop Application and Participation Patterns

The number applicants for CSISS workshops and ICPSR scholarship support expanded from 149 for the Summer 2000 workshops to 262 for the Summer 2001 workshops. These numbers do not include those participating in the short workshops described above. Table 1 documents the general status of applicants and final participants for each of the three CSISS and two ICPSR CSISS-supported workshops. The large number of applicants relative to positions reflects a significant demand for understanding spatial analytic approaches across the social sciences. This is also reflected in the breadth of disciplinary mix among applicants (Table 2). CSISS was able to serve only 39% of the applicants in 2001 in contrast to 49% in 2000. We are currently investigating methods for video capture of workshops and hope to have prototypes of completed virtual workshops ready for debut in 2002. Women represent 53 percent of year 2001 participants, in contrast to 34 percent in the previous year. The number of universities with applicants expanded by 87 percent (from 71 to 133) while the number of universities with participants grew by 35 percent (from 48 to 65. This growth reflects a growing awareness of CSISS programs and a growing demand for resources and training in spatial analysis across the social sciences.

Table 1					
CSISS Workshop Participants & Applicants, Summer 2001					
Participant & Applicant Status	**Accessibility**	**Map Making**	**Pattern Analysis**	**ICPSR**	**Total Participants/ Applications**
PhD Candidate	18	13	10	15	56/137
Post Doc	1	2	2	2	7/15
Untenured Faculty	5	5	6	4	20/46
Tenured Faculty	3	3	1	1	8/21
Other	1	1	4	2	8/43
No. of Women Participants/ Applications	14/20	13/38	15/42	13/25	55/125

Note: ICPSR totals apply only to CSISS scholarship recipients

Table 2

Distribution of CSISS Workshop Participants & Applications by Discipline & for Number of Universities, Summer 2001

Discipline/Area	Accessibility	Map Making	Pattern Analysis	ICPSR	Total Participants/Applications
Agriculture/Agricultural Engineering	1				1/1
Anthropology	1	6	1		8/22
Archaeology	1	2	1		4/10
Communications		1			1/3
Criminology	1	1	2	2	6/10
Demography/Population Studies	2	1	1	2	6/10
Economics	5		2	5	12/45
Environmental Policy/Planning	2		1		3/10
Epidemiology			1	3	4/6
Ethnic Studies		1			1/1
Geography	5	1	4	2	12/31
GIS/Remote Sensing	4	1		1	6/21
Health Studies	1		1		2/2
History		2			2/2
Information Science					0/4
Natural Resources				1	1/2
Operations Research & Management Science					0/1
Political Science		3	2		5/12
Psychology			1		1/2
Public Policy & Administration	2		1	2	5/12
Regional Science					0/2
Sociology	1	2	3	7	13/31
Spatial Analysis		1		1	2/7
Statistics			1	1	2/4
Urban Studies/Planning	2	2	2		6/11
Totals:	28	24	24	27	103/262
No. of Universities & Other Institutions	23/38	18/55	22/70	23/54	-- 65/133*

Discipline / Area labels are based on the self-identification of applicants.

* These totals are based on participants and applicants for all workshops, excluding the duplicates of universities represented across workshops.

III. Best Examples

CSISS seeks to identify outstanding uses of spatial analytic approaches that advance theoretical understanding and empirical testing in social science. Specialist Meetings are charged with recommending specific researchers whose publications qualify as best practices. Such exemplary research is featured in CSISS publications and workshops, and is targeted for the development and solicitation of learning resources. A current initiative is to publish a book that provides examples of spatial analytic practice in a broad range of social sciences. The book, ***Spatially Integrated Social Science: Examples in Best Practice***, will be edited by Michael Goodchild and Donald Janelle. Negotiations with Oxford University Press are underway.

This book will illustrate how the spatial perspective adds value and insight to social science research, beyond what traditional non-spatial approaches might reveal. Approximately 20 chapters will provide substantive empirical content, and illustrate application and interpretation of specific spatial analytic methods. The book is intended as an advanced-level text for a trans-disciplinary audience. Individual chapters will average 5,000 words, plus 3 to five illustrations.

CSISS conducted a broad survey to identify potential contributors. We looked for authors of articles with relevant content that had been widely cited; researchers being funded by the National Science Foundation and the National Institute for Health and prominent individuals associated with spatial thinking within the major disciplines of social science.

As a supplement to the book, authors are encouraged to contribute Learning Resources related to their chapters for inclusion at www.CSISS.org. Learning Resources will include exercises based on data used in the analyses, PowerPoint presentations that document the research and arguments of the chapter, and extended annotations of literature related to the themes of the chapters.

The individuals listed among the authors have agreed to participate in the project.

Michael F. Goodchild and **Donald G. Janelle**, editors

- **Michael F. Goodchild** and **Donald G. Janelle**
- Introduction: Thinking Spatially in the Social Sciences
- **Itzhak Benenson** Agent-Based Modeling of Urban Residential Choice and Mobility
- **Ted K. Bradshaw**
- Shaping Policy Decisions with Spatial Analysis
- **Gilberto Câmara, Antonio Monteiro, Frederico Roman Ramos, Aldaiza Sposati,** and **Dirce Koga**
- Mapping Social Exclusion/Inclusion in Developing Countries: Social Dynamics in São Paulo in the 1990s
- **Jacqueline Cohen** and **George Tita**
- Measuring Spatial Diffusion of Shots Fired Activity Across City Neighborhoods
- **Munroe Eagles, Paul Bélanger,** and **Hugh C. Calkins**

- The Spatial Structure of Urban Political Discussion Networks
- **Anthony C. Gatrell** and **Jan Rigby**
- Spatial Perspectives in Public Health
- **Jean-Michel Guldmann**
- Telecommunication Flows Analysis: Spatial Interaction and Urban Network Modeling
- **John Kantner**
- Geographical Approaches for Reconstructing Past Regional Behavior from Prehistoric Roadways
- **Mei-Po Kwan**
- Interactive 3D Geo-visualization: Exploratory Spatial Data Analysis in Social Science
- **Patrick Daly** and **Gary Lock**
- Time, Space and Landscape Archaeology: Constructing Connections in the First Millennium BC.
- **John R. Logan**
- Identifying Ethnic Neighborhoods with Census Data: Group Concentration and Spatial Clustering
- **Steven F. Messner** and **Luc Anselin**
- Spatial Analyses of Homicide with Areal Data
- **Emilio F. Moran**
- Inferring the Behavior of Households from Remotely Sensed Changes in Land Cover in the Brazilian Amazon: Current Methods and Future Directions
- **David O'Sullivan**
- Too Much of the Wrong Kind of Data: Implications for the Practice (and Theory) of Micro-Scale Spatial Modeling
- **Sergio J. Rey**
- Spatial Analysis of Regional Economic Growth: Inequality and Change
- **Robert J. Sampson** and **Jeffrey D. Morenoff**
- Neighborhood Structure, Social Processes, and the Spatial Dynamics of Urban Violence
- **Qing Shen**
- Updating Spatial Analysis Approaches in Urban Studies
- **Stuart H. Sweeney** and **Edward J. Feser**
- Spatial Externalities: Theoretical and Measurement Issues
- **John R. Weeks**
- The Role of Spatial Analysis in Demographic Research
- **Roger White, Bas Straatman**, and **Guy Engelen**
- Planning Scenario Visualization and Assessment: A Cellular Automata Based Integrated Spatial Decision Support System

IV. Software Tools

Under the direction of Dr. Luc Anselin, CSISS researchers at the University of Illinois at Urbana-Champaign seek to develop and disseminate a powerful and easy-to-use suite of software for spatial data analysis, to advance methods of statistical analysis to account for spatial effects, and to integrate these developments with GIS capabilities. Dissemination of these tools is promoted on the CSISS website (www.CSISS.org), through Specialist Meetings, Workshops, Best Practice publications, and Learning Resources.

Objectives
The objectives of the software tools program of CSISS are to disseminate and develop software to enable the analysis of spatial data, to facilitate the incorporation of spatial effects such as spatial autocorrelation and spatial heterogeneity in empirical analysis and to promote state of the art methods for spatial econometric analysis in the social sciences. As such, the activities carried out under this program consist of software dissemination as well as software development and methodological development.

Status
The period of 1 July 2000 to 30 June 2001 constituted the first complete year of operation for the software tools program at UIUC. The project was able to secure laboratory space in the Regional Economics Applications Laboratory (REAL) at UIUC and a project team was put together. In part following up on the feedback and comments provided during the meetings of the CSISS Advisory Board and the Specialist Meetings on Spatial Equity and on Spatial Externalities, the software tools activities during Year 2 focused on four main efforts: the initialization of a software tools clearinghouse, the implementation of tools for spatial analysis with existing statistical toolboxes, the completion of tools for dynamic ESDA with GIS, and the development of open source spatial software. In addition, some effort was devoted on further methodological developments in spatial econometrics.

Personnel
In addition to Anselin who directed the project and focused on overall design and methodological issues, the project team included Sergio Rey (San Diego State University), Yongwook Kim (web programmer), Ibnu Syabri (graduate student, UIUC), Yanqui Ren (graduate student, UIUC), Andre Mbassa (graduate student, UIUC), and Widodo Baroka (graduate student, UIUC). Rey spent one summer month on the project collaborating on the outline for the open source SpaceStat project, the development of open source ESDA tools and is co-organizer of the planned Software Tools Specialist Meeting; Kim was a half time programmer primarily involved in adding spatial analytical capability to maps presented over the web (sponsored in part by a grant from the National Consortium on Violence Research, NCOVR); Syabri, and Ren were on a 50% graduate assistantship and focused on the development of DynESDA2, and Baroka was an hourly programmer assisting with Windows MFC programming issues pertaining to DynESDA2. Mbassa was on a 50% graduate assistantship and collected the initial set of information for the software tools clearinghouse as well as other supporting materials.

Rey, Syabri and Kim will continue to be involved with the project during year 3. In addition, Dr. Oleg Smirnov will join the project as a Senior Research Associate in August 2001. Dr. Smirnov collaborated with Anselin on the development of the original DynESDA software as well as various other spatial analysis tools and will take on the primary responsibility for the management of the development of the open source software tools. In addition, staff members at CSISS Santa Barbara will take on the completion of the software tools clearinghouse and its installation on the CSISS web site.

Sofware Tools Clearinghouse
The software tools clearinghouse is intended to complement CSISS' own software development efforts with a comprehensive collection of links to software developed by others, primarily in the academic sector. In addition to links to sites containing spatial software tools, a system will be developed to allow scholars to contribute their code to a collection that will be maintained for distribution (free and over the web) by CSISS. The implementation of the clearinghouse on the CSISS web site will provide capabilities to search for tools by technique, platform, etc. and will eventually contain links to brief technical descriptions of the methods as well as demonstrations and tutorials.

Initially, the focus is on collection four types of information:
- links to "portal sites", that is, existing sites (such as ai-geostats) that contain a collection of links to spatial statistical software sites
- links to collections of code developed for specific statistical toolboxes (such as Matlab or S-Plus)
- links to specialize software sites (such as SpaceStat or CrimeStat)
- a collection of downloadable programs.

An initial set of links has been collected and during the summer of 2001 the CSISS staff at Santa Barbara will implement the first iteration of the clearinghouse on the CSISS web site.

Spatial Analyisis with Statistical Toolboxes
In order to facilitate and stimulate the application of spatial analytical techniques with existing statistical and econometric toolboxes, an initial set of routines was developed to carry out model specification diagnostics for spatial effects and the estimation of spatial regression models. As part of Anselin's graduate course in spatial econometrics at UIUC two student teams worked respectively in XlispStat and Ox to develop a set of routines that would complement existing regression functionality. XlispStat was chosen initially because it is freely available and works on a number of different platforms, such as various flavors of Microsoft Windows, Apple Macintosh and Unix/Linux. XlispStat already has a large collection of contributed code maintained at a web site by the Statistics Department at UCLA. Ox is freely available as well (for Linux and for academic use in MS Windows) and is increasingly used as a development tool by econometricians (to some extent it is considered to be a free "clone" of the commercial Gauss package).

A working version of a set of routines has been completed and is currently in the process of fine-tuning and testing. These routines deal with estimating models that include spatial heterogeneity (spatial regimes, spatial analysis of variance), diagnostics for spatial autocorrelation in regression residuals (Moran's I, Lagrange Multiplier tests, Kelejian-Robinson tests, double length regression tests), maximum likelihood estimation of spatial error and spatial lag models and instrumental variables/generalized methods of moments estimation of spatial error and spatial lag models. The initial focus is on getting working code to illustrate the methods, rather than optimizing for speed and problem size. The functionality mimics (and in some cases exceeds) that of the current version (1.90) of SpaceStat. It is anticipated that the collection of routines and associated documentation will be available from the CSISS web site by Fall 2001. Anselin and Florax also discuss the code in a chapter forthcoming in an edited volume on "Advances in Spatial Econometrics".

These routines are part of a "template" of modules that is being organized to facilitate development of similar routines by others for other toolboxes. The detailed description of this template will be completed during Summer 2001 and made available as a working paper.

In contrast to the work in XlispStat, which does not break new ground in terms of functionality (basically replicating the functionality of SpaceStat), the development of code in Ox deals with the estimation and diagnostic testing for models for which code is currently not readily available. Specifically, a series of estimating routines are being implemented in Ox to estimate the spatial probit model and to carry out diagnostics for spatial effects in "standard" probit models. Most of the code is completed and is currently being tested. It is anticipated that the collection of routines and associated documentation will be available from the CSISS web site by Fall 2001. The code and the comparative performance of the different methods is also discussed in a chapter forthcoming in an edited volume by Anselin and Florax on "Advances in Spatial Econometrics".

The efforts in XlispStat will be continued during year 3, but focused on the implementation of ESDA methods in conjunction with LiveMap (a simple XlispStat mapping program) as well as using component methods ("com") using ArcView and/or Arc8 as the mapping server. The efforts in Ox will move on to the estimation and diagnostics for spatial panel data models.

The developments of routines in these toolboxes are seen as ways to quickly prototype new methods and tools and form the basis for further development in the freestanding (Python based) open source effort. The development of similar routines for other platforms and toolboxes will be an important aspect of the open source effort as well. Once the full suite in XlispStat and Ox is made available a concerted effort will be made to interest the community at large in developing and contributing routines that follow the template, thereby leveraging the CSISS development efforts.

Dynamic ESDA with GIS
During year 2, a major part of the software tools program dealt with porting Anselin and Smirnov's DynESDA extension for ArcView 3.2 to a freestanding version. Currently, a prototype of DynESDA2 has been finished and is in the final stages of testing. It is anticipated that it will be provided for beta testing by early Fall 2001.

DynESDA2 is implemented in Visual C++ using ESRI's MapObjects 2.0 collection of components to implement mapping and simple GIS functionality. It is based on a design of dynamically linked windows in which each statistical graph and map is linked to all others. A detailed description of the design and functionality of DynESDA2 is provided in a paper that was presented at the Interface 01 (33rd Symposium on the Interface of Computing Science and Statistics) Conference in June 2001 (Anselin et al. "Visualizing Spatial Autocorrelation with Dynamically Linked Windows"), which is currently being extended for journal submission.

DynESDA2 includes a number of standard choropleth mapping functions as well as box maps, percentile maps and a map movie. Its ESDA functionality consists of dynamically linked histograms, box plots, scatterplots, Moran scatterplot and LISA maps. The latter were not included in the original extension. New is also the inclusion of multiple linked maps and true "brushing" of multiple maps.

During year 3, work on DynESDA2 will consist of finalizing the software for release, completing the documentation and extending the conversion to a fully "com" compatible architecture. The latter will allow parts of the ESDA functionality to be added to any "com-compliant" statistical or GIS software.

A second aspect of ESDA-GIS tools is the parallel development of a set of modules in Python/Tkinter under the direction of Sergio Rey. An initial version of STARS (Space Time Analysis of Regional Systems) is currently being tested. It implements dynamically linked windows and focuses on the study of the evolution of regional disparities. It contains a simple map, histograms, time series and Moran scatterplots. It's modular structure allows for easy extension with other techniques. STARS will be incorporated into the open sources spatial tools project in the near future.

Anselin and Rey at the 97th Meeting of the Association of American Geographers in March 2001 made a presentation on "Open software tools for ESDA" that covered both DynESDA2 and STARS.

Open Source Spatial Software
The open source project for spatial analysis software tools is in its initial planning stages (this is in addition to the toolbox efforts described above, which are also open source). A number of development platforms were considered and evaluated and a decision was made to proceed using the Python language and the Numpy collection of numerical analysis routines. Python is a cross-platform development language that lends itself easily to an open source project. In addition to providing users with the complete details of the

program structure, a compiles "shrink wrapped" version of the software can easily be developed as well.

A prototype of ESDA functionality in Python is the STARS suite of modules, which is currently being tested. A beta release will be available by the end of Summer 2001.

During year 3 of the project, an increasing amount of time will be spent on actual code development. The first stage of development will include porting the SpaceStat functionality in terms of regression diagnostics and estimation of spatial regression models to Python. Once the "template" is complete, the project will be opened to the community for further development. A major aspect of this will be the discussion of formats and standards during the planned Software Tools Specialist Meeting.

Methodological Development
In addition to tools development, a number of methodological issues were considered as well. Anselin has started collaboration with a number of groups to make headway on a several issues. Most of these are in an initial phase, but it is anticipated that some of them will evolve into proposals for specific research to be submitted to external funding agencies thereby leveraging the efforts funded as part of CSISS.

Examples of such collaboration include the discussion of cross-fertilization between statistically-based ESDA and machine learning approaches with the Geoviz Project at Pennsylvania State University, the development of new tests and estimation methods for spatial panel data models with the econometricians Badi Baltagi (Texas A&M) and Anil Bera (UIUC) and the evaluation of the introduction of spatial effects in categorical models with William Greene (NYU, Limdep).

These efforts are currently documented in a number of papers in progress as well as in a paper by Anselin and Moreno ("Properties of tests for spatial error components") currently under publication consideration.

Dissemination
Several of the routines developed during year 2 are close to an initial beta release. It is anticipated that this will be accomplished by Fall 2001 with formal releases by early 2002.

In addition to the software code itself, two presentations were made dealing with the software design and functionality, one at the Annual Meeting of the Association of American Geographers (Anselin and Rey) and one at Interface 01 (Anselin et al.). Also, Anselin made three presentations dealing with methodological issues, one presentation on CSISS as a whole and four presentations on the CSISS Software Tools program.

A number of publications appeared during this period covering spatial tools development, contained in a special issue of the *Journal of Geographical Systems* (Vol 2 No 3) devoted to "Computing Environments for Spatial Data Analysis" and guest edited by Anselin. A review of methodological issues will be contained in an edited volume on "Advances in

Spatial Econometrics" currently being finalized by Anselin and Raymond Florax (Free University of Amsterdam). A number of other publications dealing with spatial econometric methods appeared as well.

Work Plan
The work plan for year 3 of the project will be carried out in three phases.

Summer 2001:
During the summer, the CSISS staff in Santa Barbara will finalize the first iteration of the software tools clearinghouse. This clearinghouse will be continually updated and fine tuned during the year. At Illinois, the focus will be on finishing the beta release of DynESDA2 and completing the documentation and fine-tuning of the XlispStat routines and Ox routines mentioned above. A beta release of the second version of STARS will be released by the end of the summer. In addition, the planning and organization of the Tools Specialist Meeting will be carried out.

Fall 2001:
During the Fall, attention shifts to the port of SpaceStat functionality to Python and the development of the "template" for the open source effort. The initial focus will be on implementing linear regression with diagnostics for spatial effects, and to complete a set of routines to construct and manipulate spatial weights. The XlispStat routines will be extended with ESDA functionality, first in conjunction with LiveMap, and later using the component compliant architecture of ESRI's Arc8. Extension of the template to the "R" platform will be initialized. By the end of the fall, DynESDA2 (with documentation and tutorials) should be released.

Spring 2002:
During Spring, the goal is to release a first set of routines developed in Python and complete the documentation and tutorial materials (including those for the XlispStat, Ox routines). The routines will include a number of methods to estimate spatial lag and spatial error regression models. Another iteration of the ESDA functionality in Python (STARS) will be released. The toolbox development effort will be moved to an open source initiative. It is anticipated that the template will be implemented in Xlispstat, Ox and R by this time, other platforms being left to the open source community effort. A draft document will be prepared with guidelines for the development of the "next generation" spatial tools, based on the findings of the Software Tools Specialist Meeting.

V. Learning Resources

CSISS aims to develop learning resources covering core spatial concepts and exemplary research approaches. These include lecture outlines, exercises, interactive learning modules, and demonstrations, and are made available through the website **www.CSISS.org**. CSISS Learning Resources emphasize problems and approaches that will be of value to a wide range of social sciences. Workshop and Specialist Meeting participants are encouraged to recommend Learning Resources for development and are

solicited for contributions. In addition, CSISS works to develop collaboration with other institutions engaged in the production and dissemination of learning resources on spatial approaches to the social sciences.

Matthew T. Rice was appointed as the Learning Resource Manager in September 2000.

The CSISS Learning Resources Archive
The CSISS Learning Resource Archive has an important role in providing educational materials for spatially integrated social science research. At present, there are few comprehensive textbooks, references, or materials to address the needs of social science educators and researchers in spatially integrated social science. The CSISS Learning Resource Archive will provide an important part of the research and education infrastructure within the social sciences by functioning as a central portal for spatially integrated social science education.

The primary objectives of the CSISS Learning Resource Archive are to:
- Increase the use of spatial analysis and visual representation in the social science domains
- Increase the quality and power of social science research through the use of spatial analysis
- Improve the discipline of geography through discovery of new contexts, applications, and methods in social science
- Increase the potential for collaboration between social scientists
- Find ways to address old problems in new ways and discover new problems to be solved
- Ensure feedback from the users of the Learning Resources to improve the quality of our material, ideas, and services
- Direct spatially integrated social science resources at instructors and researchers

The internet and its inherent flexibility allows the web-based Learning Resource Archive to develop and adapt to CSISS research objectives and to the changing needs of the Social Science community. Because it can be changed and grow rapidly, the CSISS Learning Resource Archive will be much more valuable than a textbook in providing support for the spatially integrated social science community.

Learning Resource Archive Infrastructure
Many of the preliminary tasks for setting up a large digital archive of learning materials have been accomplished this year, including the creation of a permanent Internet site for the archive, http://csiss.org/learning_resources/, establishment of linkages with the other portions of the CSISS web site, establishment of searching capabilities, creation of a metadata structure, preliminary content building, and the establishment of agreements with external content providers and collaborators.

Content Building Activities
A primary goal of our activities this year has been building content. To this end, we have established collaborations with many individuals and groups that do relevant teaching

and research. Our goal is to find and document existing resources for spatially integrated social science, and to feature them on our site. The National Center for Geographic Information and Analysis has a long history of providing cutting edge learning materials in Geographic Information Science, and has a large body of material for CSISS to feature in the Learning Resource Archive. This NCGIA learning resource material was prepared during the last decade through a joint effort of internal authoring and partnering with outstanding external research scientists and teachers. CSISS is following a similar pattern for producing learning resources, preparing internal materials, and gathering contributions from excellent external sources. At present, there are several organizations contributing important resources. They include the aforementioned National Center for Geographic Information and Analysis (NCGIA), the Spatial Analysis and Modeling specialty group of the Association of American Geographers (SAM), the ARGUS and ARGWorld program of the Association of American Geographers, the Inter-University Consortium for Political and Social Research (ICPSR), the University Consortium for Geographic Information Science (UCGIS), and the Center for Advanced Spatial Analysis (CASA). In addition to these organizations, 12 additional professors have developed, are developing, or have agreed to develop material for our Learning Resource Archive, representing fields such as economics, geography, statistics, and cartography. All material contributed to our Learning Resources Archive is edited and approved by the Learning Resources Manager and the members of the CSISS Executive Committee.

Another content building effort involves both automated and manual web searches to identify existing learning resources. If a high quality learning resource exists, we want to reference and link to it, not only to improve the quality of our site, but to also save effort in creating duplicate resources. Each result from the searching process is ranked according to the following criteria:

Content & Evaluation
- Are the information and links provided complete and accurate?
- Are the links relevant and appropriate for the site?
- Is there an appropriate balance between inward-pointing links and outward-pointing links?
- Are the links comprehensive or do they just provide a sampler?
- Is multimedia appropriately incorporated?
- How valuable is the information provided in the web page (intrinsic value)?

Source & Date
- Is any sort of bias evident?
- When was the web item produced?
- When was the web item last revised?
- How reliable are the links; are there blind links, or references to sites that have moved?
- Is contact information about the author or producer included in the document?

Structure
- Does the document follow good graphic design principles?
- Do the icons clearly represent what is intended?
- Can the text stand alone for use in line-mode (text only) web browsers?

- Is there an option for line-mode browsers?
- Is attention paid to the needs of the disabled -- e.g., large print and graphics options; audio; alternative text for graphics?
- Are links provided to web "subject trees" or directories -- lists of subject-arranged web sources?
- How usable is the site? Can visitors get the information they need within a reasonable number of links   (preferably 3 or fewer clicks)?

Resource Organization

The first step in making this learning resource material available and accessible to the social science community is by comprehensively cataloguing each resource and recording the relevant details in a metadata database. This database provides the means of searching the Learning Resource archive. This metadata database, similar to a library catalog, includes fields such as author, origin, title, description, format, length, rights of use, subject domain, CSISS discipline, and CSISS interest area. These metadata fields are defined according to the IMS Global Learning Consortium's Learning Resource Metadata Information Model V1.1, which we have adopted (see http://www.imsproject.org/metadata/mdinfov1p1.html). This standard has also been adopted by other Learning Resource Archives including the Digital Library for Earth Science Education (http://www.dlese.org) and the Alexandria Digital Library at UCSB (http://www.alexandria.ucsb.edu). A common metadata format will allow us to share content, search capability, catalog entries, and development tasks with these other groups.

To implement the metadata structure, a Filemaker Pro v5.0 database has been created, with data exported to a searchable MySQL database on the CSISS server. These databases are maintained by the Learning Resource Manager and the Web Manager, and form the basis for any of the queries or searches from our web page.

CSISS Curriculum Development

In order to provide a curriculum model for University-level courses in spatially integrated social science, we are presenting many of our learning resources as part of an organizing structure depicting a curriculum. This evolving curriculum model was developed by executive committee members Michael Goodchild and Donald Janelle, and Matt Rice, Learning Resources Manager. At present, several individual authors are contributing specific resources for the curriculum model, including modules on Von Thunen Models, Adaptive Spatial Sampling Methods, Demographic and Population Applications of Remote Sensing, Centrographic Measures for Spatial Data, GINI Coefficients and Lorenz Curves, Integrated Surveying Applications in the Social Sciences, and Spatial Cluster Analysis. A comprehensive description of this curriculum model can be found on the learning resources archive website: http://csiss.org/learning_resources/curriculum/.

VI. Place-Based Search

In collaboration with UCSB's Alexandria Digital Library and its ADEPT initiative (Alexandria Digital Earth Prototype), CSISS is developing services to enable search and delivery of geographically referenced information on the World Wide Web and in digital libraries. A gazetteer interface with the CSISS Internet search engine will permit refined searches for spatial analytic applications by place and region.

The concept of the place-based search program is to enable social scientists to discover, assess, and retrieve information based on geographic location. Much of the information used by social scientists in research is place-based, in other words it refers to a specific area on the Earth's surface termed its *footprint*. Such information includes primary data, secondary data, the results of previous analyses, and research papers and reports. Success in research depends to some degree on the researcher's ability to quickly identify and obtain access to research relevant to a proposed project. The place-based search program is intended to enhance this ability, as a contribution to the infrastructure of social science research.

The place-based search program leverages the Alexandria Digital Library project (ADL) and its successor the Alexandria Digital Earth Prototype (ADEPT), both at UCSB. Both projects have been funded by NSF's Digital Library Initiatives. ADL is an instance of a *geolibrary*, or a library whose primary search mechanism is geographic, enabling it to respond to queries of the form "What have you got about *there*?"

Under this program, we have initiated a study of existing social science data archives, and the extent to which they offer place-based services; in other words, are capable of responding to a geolibrary query. We have found that while many such archives offer some degree of geographic indexing, this is often a comparatively minor component of the search mechanism. Moreover, it is rarely integrated with other geographic services, such as the ability to combine data with representations of geographic reporting zones, or to create maps and perform rudimentary forms of spatial analysis. Finally, the limited geolibrary services of data archives are not interoperable, and it is therefore impossible to conduct a search across distributed archives. For example, a place-based search is possible within the archive of the Electronic Cultural Atlas Initiative (ECAI), and indeed is one of the archive's most important features, but the protocols used while standard within ECAI are not shared with any other archives.

We have also initiated a project to study the role of *gazetteers* in place-based search. A gazetteer is defined as a service for transforming between systems of georeferencing, and is an essential component of a geolibrary. Most users of geolibrary services use place-names to formulate searches, and are generally unable to provide equivalent coordinates. A transformation is therefore required before the search can be executed, since geolibraries use coordinates such as latitude and longitude for internal referencing. We are studying the particular issues surrounding gazetteer use in the social sciences (e.g., the importance of FIPS and other standard zone identification schemes, cross-linguistic issues such as non-Roman alphabets, and the use of vaguely defined regions). This

coming summer we will examine the potential use of gazetteers in Web-based searches for information relevant to spatially integrated social science, by expanding the capabilities of our current search engine to include gazetteer services.

Another important application of gazetteers is in *geoparsing*, or the identification of place-names in text. When applied to social science literature, for example, a geoparsing service is capable of linking a paper to other papers about the same or nearby areas. We will explore the possibilities of geoparsing services in the social sciences, and develop some examples of use cases and best practice.

VII. Virtual Community (**www.csiss.org**)

CSISS is developing an open, virtual community to share spatial analytic software, foster discussion about spatial approaches in the social sciences, provide learning resources, and highlight information on workshops, conferences, and the latest innovations and applications of spatial analysis. The vehicle for these community-building and outreach efforts is http://www.CSISS.org . CSISS aims to position this website as the primary port-of-call for researchers and students of spatial analysis in the social sciences. To this end, it has developed a specialized Internet search engine to identify relevant resources on the World Wide Web and provides consolidated bibliographical resources derived from a broad range of on-line sources.

CSISS Website 2000-2001

Ann Ricchiazzi replaced Abby Caschetta as CSISS webmaster in November 2000.

The CSISS website, http://www.CSISS.org/, is a central component of CSISS programs. The objective of CSISS.org is to provide resources, tools, and methods to integrate spatial concepts into the theories and practices of social science. The website is intended to encourage and facilitate: (1) the integration of existing spatial knowledge, making it more explicit, and (2) the generation of new spatial knowledge and understanding. All of the core programs are, or will be, delivered or assisted through the website.

The website has grown to over 300 static html pages and several dozen dynamically created pages this year, reflecting the growing infrastructure and content related to the core programs of CSISS. The website role for each of the core programs is described below:

National Workshops
The web presence of the CSISS Workshops has been particularly successful this year. CSISS.org was used at every stage, including the application process, application review and approval, participant surveys, travel and accommodations, venue, agendas, and workshop handouts.

Given the difficulties in accommodating all applicants to CSISS workshops, we have initiated an experiment to make some of the workshop material over the website. Two of this summer's workshops, *Introduction to Spatial Data Analysis* and *Map-Making and Visualization of Spatial Data*, will be taped by UCSB Instructional Development Services. Pertinent clips from the tapes will be posted on the website. Later this year, the clips will be imbedded in webpages to create the transitions and coherency to tie them together into "Virtual Workshops". In addition, one of our summer students is working on a survey and procedures to evaluate the effectiveness of learning in this way.

Specialist Meetings
The web site has served as a resource before, during, and after the Specialist Meetings. The typical meeting page has menu links to the agenda, description, participants & papers, travel, venue, final report, and additional resources. Participants of the *Equity and Inequality Specialist Meeting* produced 22 papers, which are posted on-line, as well as a substantial final report. *Externalities Specialist Meeting* participants produced 16 papers and a final report.

Learning Resources
A primary objective of the CSISS website, especially in this second year, is to deliver Learning Resources to site visitors. Learning Resources include lecture outlines, exercises, learning modules, and demonstrations to introduce the next generation of scholars to spatial thinking in the social sciences. These resources are a special challenge because of their various formats, e.g., animations, text, html, spreadsheets, images, and mixed-media. In collaboration with DLESE and the CSISS Learning Resource manager, a metadata database has been developed for cataloging materials. The metadata structure provides thirty-three fields to describe each learning object. A search interface for the metadata database is offered through the Learning Resources menu. At present, the interface offers a simple keyword search, finding matches in any of four metadata fields – title, contributor, description, and keywords. Title, contributor, and description are displayed for all matching records, with links to additional metadata, and a link to the actual learning resource.

As of 30 June there were 26 objects cataloged in the metadata database. There are many more objects waiting to be cataloged, including substantial contributions from ARGUS/ARGWorld (a project of the Association of American Geographers), so this collection is expected to grow this year.

Work tasks for the coming year include the development of a mechanism for users to submit materials to the CSISS collection and to migrate the existing mySQL database to Oracle. Oracle's macro capabilities, and XML support are expected to be essential as we consider ways to join the distributed community of other such metadata collections.

We are still in discussion about how to best cross-reference related learning objects, i.e., a compound resource ("parent") that refers to several other learning objects ("children").

Best Practices and *CSISS Classics*
A best practices book, now in preparation, was described earlier in this report. The authors are encouraged to provide learning materials related to their chapters for the website. A related concept, *CSISS Classics*, is a lively and growing presence on the website. The objective of *CSISS Classics* is to provide summaries and illustrations of major contributions to spatial thinking in the social sciences, primarily before 1980. Classics are being compiled by summer graduate students, and submitted to a database by way of a form interface. The Classics are displayed by way of a Learning Resources menu option, which invokes the PHP scripts to access the Classics database.

Spatial Tools
The principal effort here is towards the development of a Spatial Tools Clearinghouse. The Clearinghouse is intended to be a growing collection of spatial tools and techniques, initially populated through the efforts of a summer graduate student. The conceptual framework for this clearinghouse is in place, and the database and cgi scripts are in progress. The database has two tables – one for tools, and the second for techniques. CGI scripts, coupled with dynamically created web pages will perform the submission and retrieval functions of the clearinghouse. A peer review process will be established for evaluating the merit of submissions for the collection. A prototype version of the clearinghouse will be in place by the end of this summer.

CSISS Search Engine and Place-Based Search
The CSISS Search Engine (developed by Eric White) is now accessible throughout the website. The search engine looks for the user's search string in CSISS-relevant urls, returning the matching urls. The Internet search is modeled after Eric's award-winning Anthro.net search engine.

In collaboration with ADL/ADEPT, we have started the development of a true Spatial Search Engine. We expect this can be accomplished by cross-referencing page content with a gazetteer, to attach a footprint to the page. This is in the conceptual stage at this time. Some work will be devoted to exploring this further in the coming year.

Website Look and Feel
Web authoring software, *Macromedia Dreamweaver*, was used to create a template now attached to 86 pages, giving the site exceptional consistency. The template allows for global edits, and rapid update. *Cascading Style Sheets* (CSS) are now referenced on every single page of the site. This contributes to the overall consistency of CSISS.org, in terms of colors, fonts, and other site-wide features.

While this consistency is important, variety might be equally important. A task for next year is to introduce a variety of templates, styles, and new images. Drop-down menus will be implemented as well. Another change will be expanding the apparent window size from 640 pixels to 800 pixels, now commonly accepted as a standard in the industry.

Evaluation

The CSISS Systems Administrator has been keeping log files of site usage dating back to the website's inception. *Web Trends Log Analyzer* was installed this year. This enables us to analyze website traffic and site usage. Until recently, two things have obscured useful information in the log files: our own internal behavior, and absolute paths through the site, recently converted to relative paths.

We are now in a position to gather useful information from the log files, and expect to create the baseline reports this summer. By this time next year, we will be able to make some observations about website traffic, and how it has changed over the year.

CSISS WORK PLAN – SUMMER 2001

This work plan is intended to continue on-going efforts to implement and refine the core programs of CSISS. The UCSB CSISS Summer 2001 team for research and program development, and their appointed tasks, include:

Jorge Sifuentes (geography)
Bibliographic search and update
Search/retrieval method refinement
Analysis of trends in Spatial Analysis in the social sciences / index measures
Review ability to post abstracts on the web
Benchmarking of CSISS and spatial analysis in the social sciences

David Fearon (sociology)
Bibliographic search and update
Search/retrieval method refinement/ filtering procedures
Analysis of trends in Spatial Analysis in the social sciences / index measures
Interface Filemaker data with CSISS.org
Possibly, implement new version of Filemaker

Matt Rice (geography)
Learning resources promotion and development
SAM
CASA
ARGUS/ARGWorld
Metadata implementation
Brochure on learning resources

Eric White (anthropology)
CSISS search engine refinements / directories / button for browser
Integrating the portal with other CSISS resources
FAQ narrative / help kiosk
Integration of search engine with gazetteer-based spatial search capabilities (with Ann Ricchiazzi and Linda Hill) – possibly access via a clickable map interface

Scott Crozier (geography)
CSISS Classics page prototype development / CSISS Classics page authoring
Web access of geo-referenced Spatial Data bases for social sciences – inventory of databases / assessment / linkage from CSISS.org
Standardized methods / metadata for treating models in Alexandria digital library (with Linda Hill)

Linda Hill (Alexander Digital Library
Gazetteer integration with search engine / place-based search

Matt Ungerer (geography)
Place-based search – programming a prototype browser of models and test run with data (with Linda Hill, Mike Goodchild)

Barkha Saxena (statistics and applied probability)
Oracle Database development and transition from MySQL (with Ann Ricchiazzi)

Kevin Konty (geography)
Develop a Tools Clearinghouse model (with Ann Ricchiazzi)
Populate the Tools Clearinghouse database with tools and techniques

Nicholas Nagle (geography)
Video editing and clip formulation for web presentation of Luc's workshop on Introduction to Spatial Data Analysis (coordinate with Ann and Luc)

Nina Brown (anthropology
CSISS Glossary on Web
CSISS Classics identification / development
Video editing and clip formulation for web presentation of Sara's workshop on Map / Making and Visualization of Spatial Data in the Social Sciences (coordinate with Ann and Sara)

John Corbett (geography)
Glossary of Spatial Analysis
CSISS Classics identification for different disciplines
CSISS Classics page development

Information on the CSISS 2001 summer research at the University of Illinois, Urbana-Champaign is contained in this report under section IV, Software Tools (Personnel / Work Plan).

RESEARCH-RELATED ACTIVITIES
CSISS EXECUTIVE COMMITTEE

Members of the CSISS Executive Committee have prepared narrative statements and listings of publications and presentations covering their scholarly activities over the period 1 July 2000–30 June 2001. In many cases, these reflect activities outside the direct context of CSISS. However, given the important role of outreach to the fulfillment of CSISS infrastructure objectives, these activities are useful indicators of CSISS contact with the various research communities within the social sciences.

Michael F. Goodchild, P.I. and Director

My efforts during the past year have been directed at organizing CSISS programs, overseeing the organization, and promoting its activities among new audiences. In the area of *national workshops*, I participated as an instructor in the workshop on spatial analysis using GIS in August 2000, leading four sessions, and will repeat that role this coming August. This year I will attend the workshop on accessibility in Columbus in July, make a short presentation on CSISS objectives, and provide guidance to the organizers and participants. In the area of *best practices*, I have worked with Don Janelle on the development of the outline and recruitment of authors, and with Don, am in negotiation with Oxford University Press. In the area of *learning resources*, I have contributed several modules, participated in the development of the overall design, and acted as initial liaison to the Digital Library for Earth System Education (DLESE); this collaboration allows CSISS to take advantage of the results of DLESE's efforts to develop protocols and standards for managing large archives of learning resources.

In the area of *place-based search,* I have developed linkages between CSISS and organizations similarly concerned with facilitating search and access to distributed information resources based on geographic location. This includes the Electronic Cultural Atlas Initiative, an organization of scholars in the humanities and social sciences devoted to enabling the sharing of primary and secondary data, and DLESE. I am particularly concerned with the importance of the gazetteer, as an interface between the informal place-name geography of scholars and the public, and the formal coordinate-based geography of GIS and digital libraries.

In the area of *specialist meetings*, I attended and introduced CSISS at both of the meetings held to date, on equity and externalities. I developed a proposed outline for a specialist meeting on location-based services, and enlisted Gerard Rushton as co-organizer of this meeting that will be jointly sponsored by CSISS and the University Consortium for Geographic Information Science (UCGIS).

I have given several presentations on CSISS at conferences and meetings, and attempted to publicize its activities in other presentations. In September, I attended a workshop organized under the auspices of the University of California Pacific Rim program at Scripps Institute of Oceanography, and made a presentation on potential contributions of geographic information sciences to health studies. In October, I attended the National

Forum on Advanced GIS Applications and Database Needs for Civil Infrastructure Systems at New York University and gave a keynote presentation on GIS. This meeting was organized by an NSF-funded project integrating social science and engineering perspectives on infrastructure. In November, I participated in a special session on CSISS at the meetings of the American Society of Criminology. At the annual meetings of the Association of American Geographers in New York in February, I organized and participated in a session designed to provide a critical analysis of CSISS, and a geographic perspective on research infrastructure. I also made a February presentation on CSISS to the Russell Sage Foundation in New York. In March, I participated in a workshop organized by the Social Science Research Council and made a presentation on the value of GIS and spatial analysis. In May, I participated as an invited speaker in a weeklong symposium at the University of Idaho on the role of tools in scholarship, and gave a keynote presentation at Virginia Tech in a one-day symposium on spatial analysis and genomics.

Conference and Other Presentations

"New Directions in GIS". Department of Computer Science, Keele University, July 2001.

"The Nature and Value of Geographic Information". "The I in GIScience", Manchester, UK, July 2001.

"GIS and Spatial Analysis". Interuniversity Consortium for Social and Political Research, Ann Arbor, May 2001.

"Models for Uncertainty in Area Class Maps". GEOIDE workshop on spatial statistics, Quebec, May 2001.

"Tools and Scholarship in Natural Resources: A Creative Tension?". Tools Symposium, University of Idaho, April 2001.

"Geographic Information Technologies in Transportation: New Directions". Iowa State University, Center for Transportation Research and Education, March 2001.

"Collaboration through Internet GIS". Social Science Research Council, workshop on Information Technology in Social Science Research, University of Michigan, March 2001.

"Introduction to the Alexandria Digital Earth Prototype". Association of American Geographers, New York, February 2001.

"Introduction to CSISS". "Center for Spatially Integrated Social Science: A Critical Evaluation", Association of American Geographers, New York, February 2001.

"Transportation Infrastructure Management". Conference on Remote Sensing and Spatial Information Technologies for Transportation, Transportation Research Board, National Academy of Sciences, December 2000.

"Applications of Remote Sensing". Workshop, Conference on Remote Sensing and Spatial Information Technologies for Transportation, Transportation Research Board, National Academy of Sciences, December 2000.

"Center for Spatially Integrated Social Science". American Society of Criminology, San Francisco, November 2000.

"GIS for Infrastructure Applications". National Forum on Advanced GIS Applications and Database Needs for Civil Infrastructure Systems, New York University, October 2000.

"Challenges of Mathematical Geography". Teias Matematicas, University of Coimbra, Portugal, October 2000.

"Scale in Remote Sensing and GIS". Symposium on Spatial Statistics for Remote Sensing, ITC, Enschede, Netherlands, October 2000.

"Potential Contributions of Geographic Information Sciences to Health Studies". Pacific Rim Health Studies Workshop, Scripps Institute of Oceanography, September 2000.

"Models for Uncertainty in Area Class Maps". Remote Sensing Society, Leicester, UK, September 2000.

"Adding Value to Geographic Information". Keynote Presentation, Remote Sensing Society, Leicester, UK, September 2000.

"Digital Earth". Keynote Presentation, Fourth International Conference on Integrating GIS and Environmental Modeling, Banff, September 2000.

Publications
Articles in Refereed Journals

V. Noronha and M.F. Goodchild (2000) Map accuracy and location expression in transportation - reality and prospects. *Transportation Research C* Special Issue on GIS-T 8: 53-69.

M.F. Goodchild (2001) Foreword to Nadine Schuurman, Critical GIS: Theorizing an Emerging Science. *Cartographica* 53, pp. 3–4.

M.F. Goodchild (2000) Cartographic futures on a digital Earth. *Cartographic Perspectives* 36: 3–11.

M.F. Goodchild (2000) GIS and transportation: status and challenges. *GeoInformatica* 4(2): 127–139.

M.F. Goodchild, L. Anselin, R.P. Appelbaum, and B.H. Harthorn (2000) Toward spatially integrated social science. *International Regional Science Review* 23(2): 139-159.

M.F. Goodchild (2000) The current status of GIS and spatial analysis. *Journal of Geographical Systems* 2: 5–10.

M.F. Goodchild (2000) New horizons for the social sciences: geographic information systems. *ISUMA: Canadian Journal of Policy Research* 1(1): 158–161.

M.F. Goodchild (2000) Communicating geographic information in a digital age. *Annals of the Association of American Geographers* 90(2): 344–355.

M.F. Goodchild (2000) Introduction: special issue on 'Uncertainty in geographic information systems'. *Fuzzy Sets and Systems* 113: 3–5.

Books

C.T. Hunsaker, M.F. Goodchild, M.A. Friedl, and E.J. Case, editors (2001) *Spatial Uncertainty in Ecology: Implications for Remote Sensing and GIS Applications*. New York: Springer.

P.A. Longley, M.F. Goodchild, D.J. Maguire, and D.W. Rhind (2001) *Geographic Information Systems and Science*. New York: Wiley.

Articles in Books

M.F. Goodchild and E.J. Case (2001) Introduction. In C.T. Hunsaker, M.F. Goodchild, M.A. Friedl, and E.J. Case, editors, *Spatial Uncertainty in Ecology: Implications for Remote Sensing and GIS Applications*. New York: Springer, pp. 3–14.

M.F. Goodchild (2001) Towards a location theory of distributed computing and e-commerce. In T.R. Leinbach and S.D. Brunn, editors, *Worlds of E-Commerce: Economic, Geographical and Social Dimensions*. New York: Wiley, pp. 67–86.

M.F. Goodchild (2000) Spatial analysis: methods and problems in land use management. In M.J. Hill and R.J. Aspinall, editors, *Spatial Information for Land Use Management*. Amsterdam: Gordon and Breach Science Publishers.

M.F. Goodchild (2000) Geographic information system. In A. Ralston, E.D. Reilly, and D. Hemmendinger, editors, *Encyclopedia of Computer Science*. Fourth Edition. London: Nature Publishing Group, pp. 748–749.

M.F. Goodchild and E.S. Sheppard (2000) Foreword. In D.G. Janelle and D.C. Hodge, editors, *Information, Place, and Cyberspace: Issues in Accessibility*. New York: Springer, pp. v–vi.

M.F. Goodchild (2000) New horizons for the social sciences: geographic information systems. In *Social Sciences for a Digital World: Building Infrastructure and Databases for the Future*. Paris: Organisation for Economic Cooperation and Development, pp. 163–172.

A.M. Shortridge and M.F. Goodchild (2000) Tile intersection probabilities for lines and areas in GIS. In G.B.M. Heuvelink and M.J.P.M. Lemmens, editors, *Accuracy 2000: Proceedings of the 4th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences, Amsterdam*, pp. 577–584.

M.F. Goodchild (2000) Communicating the results of accuracy assessment: metadata, digital libraries, and assessing fitness for use. In H.T. Mowrer and R.G. Congalton, editors, *Quantifying Spatial Uncertainty in Natural Resources: Theory and Applications for GIS and Remote Sensing*. Chelsea, MI: Ann Arbor Press, pp. 3–16.

M.F. Goodchild (2000) Geographic information systems; Databases; Expert systems; Analogue; Artificial intelligence; Digital library; Digitising; Error propagation; Fractal; Geocoding; Geodemographics; Global Positioning System; Pixel; Quadtree; Raster; Relational database; Remote sensing; Spatial decision support systems; Topology; Vector data; Virtual reality. in R.J. Johnston, D. Gregory, G. Pratt, and M. Watts, editors, *The Dictionary of Human Geography*, 4th Edition. Oxford: Blackwell.

M.F. Goodchild (2000) Foreword. In D. Wright and D. Bartlett, editors, *Marine and Coastal Geographical Information Systems*. London: Taylor and Francis, pp. xiii–xvi.

Articles in refereed Conference Proceedings

M.N. Khan, M.T. Odman, H. Karimi, and M.F. Goodchild (2000) Developing and integrating advanced GIS techniques in an adaptive grid air quality model to reduce uncertainty. *Proceedings, 4th International Conference on Integrating GIS and Environmental Modeling (GIS/EM4): Problems, Prospects and Research Needs. Banff, Alberta, Canada, September 2 - 8, 2000*

http://www.Colorado.EDU/research/cires/banff.

Other Publications

L.L. Hill, S.J. Crosier, T.R. Smith, and M.F. Goodchild (2001) A content standard for computational models. *D-Lib Magazine* 7(6).

http://www.dlib.org/dlib/june01/hill/06hill.html

M.F. Goodchild (2000) First Impressions: SMSS 3.0 software, manage your metadata. *Geo Info Systems* 10(5): 43–45.

M.F. Goodchild (2000) Perspective: Browsing metadata, where do we go from here? *Geo Info Systems* 10(5): 30–31.

Donald G. Janelle, Program Director

As CSISS Program Director, I work closely with Michael Goodchild to oversee the integration of CSISS programs toward the common goal of building social science infrastructure. This involves considerable outreach to the social and behavioral sciences, emphasizing the fundamental role that spatial perspectives can play in achieving cross-disciplinary communication and enhanced research. Since the last report to NSF, outreach activities have included formal presentations and sessions for the following groups: The American Society of Criminology annual meeting in San Francisco (Nov 2000), a joint research seminar of Political Scientists and Political Geographers (Miami, April 2001), the University of California-Stanford Map Librarians (Santa Barbara, March 2001), the Association of American Geographers (New York, March 2001), and the Canadian Association of Geographers (Montreal, May 2001). In addition, I have helped to set up similar special sessions that will take place over the next few months -- a 4-hour workshop on spatial analysis that Richard Appelbaum has arranged for the annual meeting of the American Sociological Association (Anaheim, Aug 2001), a special session for the Social Science History Association (Chicago, Nov 2001), and a session for the interdisciplinary Digitial Communities Conference (Chicago, Nov 2001). Looking ahead, CSISS is hoping to organize a session for the American Anthropological Association (New Orleans, Nov 2002) and is vigilant to other opportunities that may arise.

In the past year, my efforts have concentrated on offerings for the summer 2000 National Workshop series, facilitating the development of the workshop program for summer 2001, assisting with implementation of the first two CSISS Specialist Meetings (Spatial Equity, November 2000; Spatial Externalities, January 2001); identifying and soliciting authors for a book on Spatially Integrated Social Science, to be edited with Mike Goodchild and to be published in 2002 with Oxford University Press. Other principal

duties have involved supervising the CSISS research and development teams (graduate students) in the production and dissemination of resources for the CSISS website, working closely with the CSISS webmaster to make resources easily accessible to site users, and day-to-day contact with the administrative staffs of CSISS and the University. Basic revisions in advertising brochures, and in the contact database used in advertising programs have yielded stronger outreach to social science researchers.

I am responsible for structuring the agenda for meetings of the Scientific Advisory Board (met last in December 2000) monthly meetings of the CSISS Executive Committee, and, in May 2001, of a two-day Strategic Planning retreat to formulate a strategic plan for CSISS. This plan is still being refined, and will be the focus of the next planned meeting of the Advisory Board, in October 2001.

Current research interests focus on space-time analyses of individual behavior, the time-geography of cities, the temporal-spatial ordering of social systems, and the role of space-adjusting technologies in structuring new patterns of social and economic organization. The interdisciplinary context of this work provides a base for representing the interests of CSISS to a broad community of social and behavioural scientists.

Other responsibilies in the past year relate to my role as co-chair of the Centennial Planning Committee for the Association of American Geographers. I have also participated in the Association's Strategic Planning Initiative.

Presentations

"Building National Infrastructure for Enhancing Spatial Analysis in the Social Sciences", Social Science History Association, Chicago IL 15-17 November 2001.

With Jorge Sifuentes, "Spatially Integrated Perspectives on Information Technology and Urban Life", Conference on Digital Communities 2001, Chicago IL, 4-7 November 2001.

"Threats to Regional Social Captial and to Entrepreneurial Development in The New Economy". Workshop on Entrepreneurship, Information Technology and Regional Development Policy; Common Lessons, Amsterdam, The Netherlands, 7-8 June 2001.

"Building Infrastructure to Enhance Spatial-Temporal Analysis in the Social Sciences", Canadian Association of Geographers, Montreal, 31 May-3 June 2001.

"Center for Spatially Integrated Social Science", Workshop on Political Processes and Spatial Analysis, Florida International University, Miami FL, 5 March 2001.

"Thinking Spatially in the Social Sciences", California Polytechnic University, San-Luis Obispo CA, 15 February 2001.

"CSISS Programs", American Society of Criminology, San Francisco CA, November 2000.

"Issues in Accessibility in the Information Age", Social Science E*Space Forum on "Bits and Places: Investigating the Geography of the Information Age", East Lansing MI: Michigan State University, April 2000.

"The Internet Threat to Local Social Capital and Regional Development", Association of American Geographers, Pittsburgh, PA, April 2000.

Books

DG Janelle and DC Hodge, editors, *Information, Place, and Cyberspace: Issues in Accessibility* (Berlin and Heidelberg: Springer-Verlag 2000, 382 pages.

Refereed Journal Articles and Book Chapters

DG Janelle, Transportation, in B Feintuch and D Watters, eds, *Encyclopedia of New England Culture* (New Haven: Yale University Press, in press, 2002).

DG Janelle, Time-space, in Geography, in NJ Smelser and P Baltes, eds, *International Encyclopedia of the Social and Behavioral Sciences* (Amsterdam: Pergamon - Elsevier Science, in press, 2001) 2 pages.

DG Janelle and M Beuthe Globalization and Transportation: Contradictions and Challenges, in W. Black and P. Nijkamp, eds., *Social Change and Sustainable Transport*, (Bloomington IN: Indiana University Press, in press 2001).

DG Janelle Transport Culture and the Economy of Speed: Speed Limits and Changing Patterns of Accessibility in the United States, in W. Black and P. Nijkamp, eds., *Social Change and Sustainable Transport*, (Bloomington IN: Indiana University Press,in press 2001).

DG Janelle, Globalization, the Internet Economy, and Canada, *The Canadian Geographer* 45 (2001) 92-97.

Richard Appelbaum, co-PI

My research examines global commodity chains, focusing in particular on the locational determinants of labor-intensive low-wage production, and its impacts on industrial upgrading as well as economic inequality. One key aspect of this work is the spatial distribution of production sites, the formation of industrial districts. I am especially concerned with the global regulation and enforcement of labor standards, particularly with regard to apparel production.

In this regard during the past year I have served on the Advisory Council of the Worker Rights Consortium, a national organization comprised of 65 universities, labor unions, student groups, and NGOs concerned with implementing university codes of conduct that regulate trademark licensing. I also served as a member of the University of California's System-wide Committee on Trademark Licensing, in the Office of the President. I have advised the County of Santa Barbara on implementing a Code of Conduct, and have testified before the City of Santa Barbara concerning adopting a living wage ordinance to cover all city contract and temp workers. During the past year I have given talks and met with university officials concerning trademark licensing and codes of conduct at the University of Rochester, University of Arizona, and Trinity College (San Antonio, Texas).

My co-authored book *Behind the Label: Inequality in the Los Angeles Apparel Industry* (with Edna Bonacich, University of California Press, 2000) was selected by the *Los Angeles Times* as one of the best non-fiction books of 2000, and is currently a finalist for the annual C. Wright Mills Award of the Society for the Study of Social Problems (award announced August 2001). The book was the subject of a Presidential Session of the Pacific Sociological Association, and will be featured in an "author meets critics" session of the American Sociological Association (August 2001).

My work is situated within the world-systems framework, which seeks to understand cycles of economic growth and decline within the global economic system. (I am president-elect of the American Sociological Association's Political Economy of the World-System section.) Much of my work examines low-wage labor in the global apparel industry, examining labor standards and their enforcement. *Behind the Label* analyzed the significant increase in apparel industry factory work in Los Angeles, and the importance of low-wage labor in a vibrant industrial district in that growth. The downtown fashion district is a vital industrial center, with thousands of small contracting factories, buying offices that provide services for the country's principal retailers, fashion schools, fabric providers, and numerous other providers of apparel-related goods and services, enabling the industry to provide extremely quick turnaround of small batch production, giving it a vital edge over other regions (and other countries) in the production of fashionable items. The spatial contiguity of numerous actors in the fashion industry acquires special symbolic significance in Los Angeles, where image is all-important: Los Angeles is a center of fashion design thanks in large part to the entertainment industry (movies, television, and music) and the image of the California lifestyle it connotes. Nonetheless, the industry is beginning to move to Mexico, driven by stricter enforcement standards in Los Angeles and the ease of movement under NAFTA. Understanding such respatialization of production represents a significant challenge.

A related aspect of my work concerns the development of legal regimes to regulate increasingly global businesses. *Rules and Networks:Adapting Legal Cultures*, a co-authored edited volume that grew out of a conference held at the Oñati International Institute for the Sociology of Law (published 2001 by Hart Publishers in Oxford) reflects this concern. The book reflects the premise that international business transactions are heavily influenced by culture, practice and rule. The construction and fate of business relationships within a nation-state may encounter differences in the generation of norms and the processing of disputes, but these conflicts are magnified many times over in cross-border transactions where nation-state control and support is weak or absent. The book seeks different explanations of the ways in which business people and their legal advisers try to minimize the effect of these magnified difficulties. Since most explanations are dominated by North American and European legal scholarship and practice, a second concern of the book is to open up the discussion to competing explanatory frameworks. Specifically, the book advances the idea that global legal convergence may not be the immediate, inevitable result of increased global economic interaction. Rather, less formal mechanisms for achieving normative understanding and predictability in business dealings may also flourish. These include four possible sources

through which the international business community might be considered to have supplemented nation-state conflict prevention and dispute resolution institutions – an international legal order, the development of a private normative order based on common business practices (denominated the *lex mercatoria*), through the efforts and work product of internationalized law firms, and by means of extensive, thick personal relationships often referred to by their Chinese term guanxi).

Presentations

"A Living Wage for Santa Barbara City Temporary and Contract Workers," testimony before Santa Barbara City Council (June 19. 2001)

"Growth and Growth Control in Santa Barbara," Val Verde Retirement Community, Santa Barbara, California (May 24, 2001)

"Global Standards, Local Enforcement," Emory University, Atlanta, Georgia (April 26, 2001)

"Global Standards, Local Enforcement," Trinity College, San Antonio, Texas (April 6, 2001)

Guest Lecture, two introductory sociology classes and graduate seminar, on globalizaiton and labor standards, Trinity College, San Antonio, Texas (April 5, 2001)

"Author Meets Critics: *Behind the Label*, Presidential Session of the Pacific Sociological Association (March 31, 2001)

"Globalization: The Shrinking of the World," Val Verde Retirement Community, Santa Barbara, California (March 21, 2001)

"Global Standards, Local Enforcement: Securing Labor Rights in Global Production Chains," program in international studies, Ventura College (February 26, 2001)

TV Program on Labor and Sweatshops, Channel 17, Santa Barbara (February 1, 2001)

"Both Ends of the Continuum: The Fashion Industry and Labor Standards," University of California at Davis HRI Seminar (November 30, 2000)

"Jewish Values and the Global Campaign Against Sweatshops," guest sermon at Shabbatt services, Hillel, University of Southern California (November 10, 2000)

"Globalization," guest lecture at Santa Barbara City College (November 2, 2000)

"The Student Anti-Sweatshop Movement and Global Labor Standards Enforcement," University of Arizona (October 26, 2000)

"Monitoring Labor Standards: The Woker Rights Consortium and the Fair Labor Association, University of Rochester (October 12, 2000)

"Fighting Sweatshops: Problems of Enforcing Global Labor Standards," paper presented at annual meetings of the American Sociological Association, Washington, D.C. (August 16, 2000)

interview on sweatshops, KPFK (June 19, 2001)

Publications

Rules and Networks:Adapting Legal Cultures (ed.) with William L.F. Felstiner and Volkmar Gessner) Oxford, England: Hart, 2001

Volkmar Gessner, Richard P. Asppelbaum, and William L.F. Felstiner, "Introduction: The Legal Culture of Global Business Transactions," pp. 1-36 in Richard P. Appelbaum, William L.F. Felstiner and Volkmar Gessner (eds.), *Rules and Networks:Adapting Legal Cultures*. Oxford, England: Hart, 2001

"Fighting Sweatshops: Problems of Enforcing Global Labor Standards," UCSB Institute for Social, Behavioral, and Economic Research: Center for Global Studies (August 2000)

Richard P. Appelbaum and Edna Bonacich, "The Key Is Enhancing the Power of Workers," *The Chronicle of Higher Education* (April 7, 2000): B4-5.

Luc Anselin, P.I. for CSISS Tools Development

In this past year, most of my efforts have focused on organizing and starting up the CSISS software tools unit at UIUC. Related to this, I have made a number of presentations to various audiences outlining the goals of the tools program and the ongoing and planned activities (a detailed listing is given below). I have been involved with outlining the design and architecture of the new dynamically linked software tools for ESDA and the open source effort to develop the next generation spatial statistical software, some of this jointly with Sergio Rey (San Diego State University).

Substantively, I have continued to work with a number of collaborators at various universities on issues related to the incorporation of spatial interaction and spatial effects in social science models. This includes work on the spatial patterning of homicides with Steve Messner and Glenn Deane at SUNY Albany and Rob Baller at the University of Iowa (funded by the National Consortium on Violence Research), some of which is forthcoming in an article in *Criminology*. I also continued analysis of the role of spatial effects in ecological inference with Wendy Cho at UIUC, the study of the sensitivity of impact measures of air quality to the type of space-time methodology that is employed (funded by NSF/EPA) jointly with James Murdoch (UT Dallas) and Mark Thayer (San Diego State University), and the development and assessment of specification tests for spatial effects in various econometric models, jointly with Rosina Moreno (University of Barcelona), Anil Bera (UIUC) and Badi Baltagi (Texas A&M University).

In addition to the software tools program, I have been involved in other CSISS activities. I chaired the steering committee and organized the Specialist Meeting on Spatial Externalities (Santa Barbara, January 2001), organized the Advanced Workshop on Spatial Analysis in Social Research (Ann Arbor, May 2001) and am organizing the Specialist Meeting on Spatial Tools (Spring 2002). I continue to teach two workshops that are part of the ICPSR Summer Program on Quantitative Methods and co-sponsored by CSISS (Introduction to Spatial Data Analysis and Spatial Regression Analysis) and have contributed several materials to the Learning Materials program.

I also continue to co-edit the *International Regional Science Review* and am in the process of finalizing an edited volume with Raymond Florax (Free University of Amsterdam) on *Advances in Spatial Econometrics*, to be published by Springer-Verlag. I

guest edited a special issue of the *Journal of Geographical Systems* devoted to "Computing Environments for Spatial Data Analysis" which was published in Fall 2000.

Presentations

GIS Colloquium Series, University of Illinois, Urbana-Champaign, Sept. 20, 2000: "*The Center for Spatially Integrated Social Science*"

47th North American Meetings of the Regional Science Association International, Chicago, IL, Nov. 9-11, 2000: "*Regional Science Publication Patterns in the 1990s*"

Specialist Meeting on Spatial Equity, Center for Spatially Integrated Social Science, Santa Barbara, CA, Nov. 12-14, 2000: "*The CSISS Spatial Tools Program*"

2001 Annual Convention of the Allied Social Science Associations, New Orleans, LA, Jan 5-7, 2001: "*Spatial Effects in Econometric Practice in Environmental and Resource Economics*"

Specialist Meeting on Spatial Externalities, Center for Spatially Integrated Social Science, Santa Barbara, CA, Jan. 11-13, 2001: "*Methodological Perspectives on Spatial Externalities*", "*CSISS Spatial Tools*"

40th Annual Meeting of the Western Regional Science Association and Meeting of the Applied Econometrics Association, Palm Springs, CA, Feb. 25-28: "*Properties of Tests for Spatial Error Components*"

97th Annual Meeting of the Association of American Geographers, New York, NY, March 1-3, 2001: "*Open Software Tools for ESDA*"

Workshop on Qualitative Dependent Variable Estimation and Spatial Effects, College of ACES, University of Illinois, April 20, 2001: "*Issues in Spatial Probit Models*", "*The CSISS Software Tools Program*"

Econometrics Workshop, Department of Economics, Texas A&M University, College Station, TX, April 26, 2001: "*Properties of Tests for Spatial Error Components*"

Advanced Workshop on Spatial Analysis in Social Research, ICPSR, University of Michigan, Ann Arbor, MI, May 17-20, 2001: "*Exploratory Spatial Data Analysis*", "*Spatial Regression*", "*CSISS Software Tools Program*"

33rd Symposium on the Interface of Computing Science and Statistics (Interface 01), Orange County, CA, June 13-16, 2001: "*Visualizing Spatial Autocorrelation with Dynamically Linked Windows*"

Publications

L. Anselin, "Spatial Effects in Econometric Practice in Environmental and Resource Economics," *American Journal of Agricultural Economics* (in press).

L. Anselin, "Rao's Score Test in Spatial Econometrics," *Journal of Statistical Planning and Inference*, (in press).

R. Baller, L. Anselin, S. Messner, G. Deane, D. Hawkins, "Structural Covariates of U.S. County Homicide Rates, Incorporating Spatial Effects," *Criminology* (in press).

O. Smirnov and L. Anselin, "Fast Maximum Likelihood Estimation of Very Large Spatial Autoregressive Models: A Characteristic Polynomial Approach," *Computational Statistics and Data Analysis* 35 (3), 2001: 301–319.

L. Anselin, "Spatial Econometrics," In B. Baltagi (ed.), *A Companion to Theoretical Econometrics*. Oxford: Basil Blackwell, 2001: 310–330.

L. Anselin, A. Varga, Z. Acs, "Geographic Spillovers and University Research: A Spatial Econometric Approach," *Growth and Change* 31 (4), 2000: 501–515.

L. Anselin, A. Varga and Z. Acs, "Geographic and Sectoral Characteristics of Academic Knowledge Externalities," *Papers in Regional Science* 79 (4), 2000: 435–443.

L. Anselin, "The Alchemy of Statistics, or Creating Data where No Data Exist," *Annals, Association of American Geographers* 90 (3), 2000: 586–592.

L. Anselin, "Computing Environments for Spatial Data Analysis," *Journal of Geographical Systems* 2 (3), 2000: 201–225.

S. Bao, L. Anselin, D. Martin, D. Stralberg, "Seamless Integration of Spatial Statistics and GIS: the S-Plus for ArcView and the S+Grassland Links," *Journal of Geographical Systems* 2 (3), 2000: 287–306.

S. Rey and L. Anselin, "Regional Science Publication Patterns in the 1990s," *International Regional Science Review* 23 (4), 2000: 323–344.

L. Anselin, S. Rey and E. Talen, "The Expanded and Revised IRSR Subject and Author Index," *International Regional Science Review* 23 (4), 2000: 345–349.

L. Anselin, J. Cohen, D. Cook, W. Gorr, G. Tita, "Spatial Analyses of Crime," In David Duffee (ed.), *Criminal Justice 2000: Volume 4. Measurement and Analysis of Crime and Justice*. Washington, DC: National Institute of Justice, 2000: 213–262.

Helen Couclelis

My research efforts have been about evenly divided between my two major ongoing interests: the integration of urban and environmental modeling, and the geography of the information society. The first theme has gathered increasing momentum in recent years with the realization that environmental processes cannot be fully understood, let alone managed, independently from socioeconomic processes. Advances in computational methods and techniques and increased data availability, political interest, and funding have resulted in a major expansion of research in the various aspects of integrated modeling, with most of the effort centered around applied and technical issues. My own work in this area is focused on what I perceive to be a major weakness in the current attempts to merge society and the physical environment, which is the near-total lack of any plausible theoretical framework for integrating processes that have thus far been studied completely separately within very different scientific traditions. Geographic information proves to be the powerful common denominator across the social and physical domains, so that the idea of a 'spatially integrated social science' that CSISS promotes is here taken to its logical conclusion, that of a spatially integrated *science*. My research this past year has concentrated on two specific issues: the issue of predictability in connection with integrated urban-environmental models, and its implication for policy; and the development of a common conceptual format for social-science and environmental-science sub-models, for the purpose of enabling logically consistent integration.

The second strand of my research, the "geography of the information society", falls entirely within the social science domain. At issue here are the wide-ranging socioeconomic, institutional, and cultural changes that go hand in hand with the increasing penetration of information and communication technologies (ICTs) in everyday life and social practices. There is hardly a social science that is not affected by these developments, either through the effects of ICTs on the social processes it studies, or through the new tools, perspectives and capabilities introduced through ICTs into the discipline itself (e.g., criminology and the use of GIS in tracking and analyzing crime patterns). Again, these socioeconomic and cultural adjustments to the information age are reflected in (and further facilitated by) corresponding changes in geographical structure at all scales. My own research in this area continues to explore the concept of the 'fragmentation of activity' I proposed in earlier work – that is, the notion that human activities, such as work or shopping, that used to be performed at one place and one time, may now be performed piece-wise at a variety of different places and times. I recently applied this notion to e-commerce in an attempt to sort out the implications for retail structure and for the location of commerce-related jobs in urban neighborhoods.

Over the past year these two research thrusts have resulted in a number of original, single-authored papers that I have presented nationally and internationally. During all of these presentations I had the opportunity to mention CSISS and to distribute CSISS materials to interested members of the audience. One manuscript ("The third domain": see below) deals explicitly with the first two CSISS Specialist Meetings and examines the conditions under which an intellectual innovation – in this case, the use of spatial analysis techniques – may be adopted by members of different social science research communities. In addition, I was co-organizer (steering committee member) of the first CSISS Specialist Meeting on "Inequality & Equity" and an active participant in both that and the "Externalities" Specialist Meeting.

Presentations
"Modeling frameworks, paradigms, and approaches". 4th International Conference on Environmental Modeling, Banff, Canada. Tutorial, September 2000.

"The geography of time and ignorance: dynamics and uncertainty in integrated urban-environmental models". 4th International Conference on Environmental Modeling, Banff, Canada. Paper presentation, September 2000.

"A plenum ontology of spatial change". GISc 2000, Savannah, Georgia. Paper presentation, October 2000.

"E-commerce and the changing structure of retail: are jobs threatened in vulnerable neighborhoods?" CSISS Specialist Meeting in Inequality & Equity, Position Statement, December 2000.

"Landscape change: issues in environmental, social, and design science". Workshop in Landscape Change, Santa Barbara. Invited keynote, January 2001.

"Modeling frameworks, paradigms, and approaches: what's what in environmental research? CCRS, Natural Resources Canada, Ottawa, Canada. Invited lecture, February 2001.

"Towards a framework for integrated urban-environmental models". AAG Annual Meeting, New York, February 2001.

"Integrated urban-environmental modeling: issues in prediction and policy analysis". University of Michigan, Ann Arbor. Invited lecture, March 2001.

"The third domain: the spread and use of GIS within social science". Workshop on GIS in a Changing Society, Center for Mapping, Columbus, Ohio. Invited paper, May 2001.

"Pizza over the Internet: e-commerce, the fragmentation of activity, and the tyranny of the region". Tinbergen Institute, Amsterdam, The Netherlands. Invited paper, June 2001.

"The social construction of the digital city". EURESCO Conference on Digital Cities, Granada, Spain. Invited keynote, June 2001.

Barbara Herr-Harthorn

Barbara Herr Harthorn is Assistant Research Anthropologist and Co-Director of the Center for Global Studies in the Institute for Social, Behavioral, and Economic Research at UC Santa Barbara and Director of Social Science Research Development for the UC Santa Barbara campus. Her current research projects center on critical cultural analysis of immigrant health in California, present and past, and issues of Anglo and Latino community health at the interface of urban and rural agricultural sectors. Current projects look at issues of maternal health, reproduction, and living and working conditions among Santa Barbara County farmworkers. A particular focus is on farmworker perceptions of risks related to exposure to agricultural chemicals, with grants from the UCSB Center for Chicano Studies, and the UC MEXUS program. A second project, also funded by the UC MEXUS program, is an historical analysis of biomedical discourse about immigrants and infectious disease (particularly tuberculosis) in the first 3 decades of this century in California. The study explores the participation of biomedicine in the racialization of Latino immigrants. A third study, collaborative with Professors Susan Stonich (Anthropology and Environmental Studies), Michael Goodchild (Geography) and Oliver Chadwick (Geography) and funded by the UCSB Research across Disciplines (RAD) program, looks at the possible roles of PPGIS in mediating community conflict over pesticide drift in the northern Santa Barbara Co. community of Lompoc.

Presentations

"Risks to Women Farmworkers' Health: Stratified Reproduction and the Feminization of Labor," Paper presented in panel at the American Anthropological Assoc. meetings, San Francisco, Nov. 15-19, 2000.

"Revising Risk: Shifting Perceptions of the Public's Health and the Social Contract"

Herr-Harthorn, B. & L. Oaks, Co-Chairs, Society for Medical Anthropology panel, American Anthropological Assoc. meetings, San Francisco, Nov. 15-19, 2000.

"Geographic Information Science and Health Inequality," NSF Center for Spatially Integrated Social Science, Specialist meeting on Equity/Inequality, Santa Barbara, CA, Nov. 12-14, 2000.

"Community conflict at the agricultural-urban interface: Concerns over the health effects

of agricultural pesticides." Herr-Harthorn, B. & S. Stonich. Paper presented at the Society for Applied Anthropology, San Francisco, CA, March 21-25, 2000.

Publications:

S. Guendelman, C. Malin, B. Herr-Harthorn, P. Vargas (2001) "Orientations to motherhood among pregnant Mexican and Mexican-origin women: A bi-national study," *Social Science and Medicine* 52:1805-1813.

Stuart Sweeney

Most of the activities I engaged in last year were relevant to the goals of CSISS. My research activites were primarily focused on the second year of the NSF U.S. business clusters grant. I completed several manuscripts with my colleague, Ed Feser, but most of those are currently in review and are not on the current list of publications. However, I do list three book chapters that were completed during the period. I have also been working with my graduate student on issues related to population forecasting. That effort resulted in the technical report to ALMIS and a manuscript that is currently under review at an academic journal. I made several presentations of the research work at academic and policy conferences.

I also spent last summer and the fall quarter developing teaching resources for an introductory human geography course. That material was developed for both CSISS and ADEPT. The completed resources are available on the CSISS website.

Finally, I was elected the vice-chair of the Spatial Analysis and Modeling group of the Association of Amercian Geographers.

Presentations

"Point process methods and industry cluster research" World Bank, Washington, DC 2000 (invited speaker)

"Cross metropolitan comparison of business clustering in the U.S." North American meetings of the Regional Science Association International, Chicago. 2000

"An overview of CSISS and ADEPT" Office of Policy, Development, and Research, U.S. Department of Urban Development." 2001 (invited speaker)

"A descriptive analysis of discrete U.S. industrial clusters" Southern Regional Science Meetings, Austin, TX, April 5-7. 2001

"Population forecasting with non-stationary multiregional growth matrices." Association of American Geographers, annual meeting, New York. 2001

Labor Statistics, National Labor Market Information conference, Charlotte, NC 2001 (plenary speaker)

Long-term projections and census tools consortium meeting, Kalispell, MT. 2001

Publications
Peer Review Articles

Feser, E. and S. Sweeney 2000 "A test for the coincident economic and spatial clustering of business enterprises" *Journal of Geographical Systems* 2: 349-373.

Book Chapters

Feser, E. and S. Sweeney 2000 "Spatially binding linkages in manufacturing product chains" (forthcoming) in Rod McNaughton and Milford Green book *Networks and Proximity, Volume 1: Theory, Measurement, and Policy.*

Feser, E. and S. Sweeney 2001 "Theory, methods, and a cross-metropolitan comparison of business clustering." (forthcoming) in Phil McCann book *Industrial Location Economics.*

Sweeney, S. and E. Feser 2002 "Business location and spatial externalities: tying concepts to measures." (forthcoming) in Michael Goodchild and Donald Janelle book *Spatially Integrated Social Science* (New York: Oxford University Press)**.**

Technical Reports

Sweeney, S. 2001 "Feasibility and benefits of UCSB/HUD spatial data partnership" U.S. Department of Housing and Urban Development

Sweeney, S. and H. Goldstein 2001 "Migration and the state occupational employment projections process." Report to the U.S. Department of Labor, ALMIS Long-term projections and census tools consortium.

Appendix A

REPORT FROM THE CSISS ADVISORY BOARD TO CSISS EXECUTIVE COMMITTEE (15-16 DECEMBER 2000)

Santa Barbara CA. **Board Members**: R. Berk, J Dangermond, A. Glasmeier, P. Morrison, R. Sampson, B.L. Turner, (S. Wachter had to leave just prior to this session). **CSISS Executive**: L. Anselin, R. Appelbaum, H. Couclelis, M. Goodchild, B. H-Harthorn, and D. Janelle, S. Sweeney. **CSISS Research and Technical Staff**: D. Fearon, A. Ricchiazzi, M. Rice, E. White, and J. Sifuentes. Others in attendance during parts of the two-day meeting: J. Frew, L. Hill, L. Lucius, S. Rey, M. Ungerer, and F. Cordova.

(presentation by Billy Lee Turner and notes on discussion from D Janelle)

Outreach

Workshops
- Continue those that work ["canned ones"]
- Create 2-3 others by CSISS that match these so as to have 5 consistently successful workshops by end of year 5
- Suggested candidates: visualization, analytical cartography, spatial statistics

Targeted short-courses [1 day]
- Topically defined from expert meetings [e.g., equity]
- Taken to institutions & organizations to demonstrate how "spatial" advances understanding of the topic
- Explore means of undertaking this

Expert meetings [combine senior + junior researchers]
- Should be focused & address a "problem" for which a substantial body of research exists
- Explore alternative "structures" for meetings
- Visualization; 2000 census + equity or ?
- Work with board on others + don't forget Human-Environment theme

Tools
- Remain focused on user-defined needs
- Web site: software tool/tool kits lists and links
- What can be learned from other "tool" producing units?

Various Comments
- Reach to "private" sector, government & otherwise expand links [use the board, expert meetings]
- **Strategic planning**: not clear in terms of long-term
- Evaluation plan needed & difficult without a strategic plan

- Think about funding in yr 6; scout areas now that will move in the future; begin to engage possible funders
- It is possible to get an **"economist"** (applied, environmental-resource); work with board
- **Epidemiologist** [?]
- Work with the BOARD on the agenda of Board mtgs. And seek Board member suggestions on the Human-Environment Interface Specialist Meeting

Discussion (notes from DGJ on the final joint session)

Elaboration on the **1-day short-course concept**. Peter Morrison suggested links with organizations (Population Association) and sponsorship of short workshops involving scholars such as John Weeks. Focus would be on hands-on applications. The American Sociological Association has 3-hour workshops at annual meetings. CSISS could also link up with the Census Bureau with a 'spatial add-on' to their workshops regarding Census 2000. Other organizations mentioned – Rand Graduate School, Wharton West Coast, and Professional Association of Policy Management. Involve experts from within such organizations to help in the organization of workshops with CSISS. Graduate students might be involved. Identity of target workshops would be dictated in part by opportunities that arise. These short workshops are seen as 'technology transfer' opportunities.

Workshops. Capitalize on what CSISS does well; seek excellent teachers who want to do this and who will do it well. The Board supported the idea of a Visualization workshop providing it had an strong analytical thrust and could be presented as an exploratory tool for social science research.

Specialist Meetings. Phil Rubin and Richard Berk noted the idea of looking at visualization from the perspective of bioengineering and MRI (It might be useful to structure a specialist meeting of researchers from different fields regarding visualization tools and approaches and to eventually incorporate ideas from different fields within CSISS workshops).

The Board suggested that it might be worthwhile to **explore different formats for meetings** (Examples mentioned included the use of web chat rooms during the meeting so that people could engage in several different discussions at the same time. Helen Couclelis suggested that CSISS seek advise from the UCSB Communications department.

Census 2000 provides an opportunity for a specialist meeting – treating analytical questions regarding redistricting, access to data, race, etc. Peter noted that the audiences are diverse and that it would be good to focus in specific areas, e.g, Jack noted DOJ';s interest in inequalities.

A general theme suggested by Norman Bradburn was "**How to represent uncertainty?**" This was a theme covered in several NCGIA/Varenius projects that could be brought forward for CSISS consideration.

Amy stressed the importance of seeing **specialist meetings as 2-way communication opportunities** --- how do they reveal new emerging themes in the social sciences that CSISS needs to consider.

A specialist meeting on **Location-Based Services** was suggested by Jack Dangermond. There is substantial applied interest; but there is need for academic attention.

Tools Development. Build alliances with other tools developers. Include links to tools developers and demos on CSISS.org. Luc and Jack suggested a Specialist meeting of Tool producers – to consider interoperability in the service of social science researchers.

Regarding the suggestion for **a Strategic Plan**, Mike asked if any Board members were interested in participating in a one or two-day retreat. Amy was interested, but the consensus was that a plan proposed by CSISS might provide focus for the next meeting of the Advisory Board. It was noted that the original CSISS proposal had elements of a strategic plan – these should be considered for adjustment following the first 1+ years of experience, showing the order of outcomes relating to resource allocation and time commitments. Tom Baerwald noted that part of being strategic is to consider the issue of broad focus to several social science communities versus concentration on 4 or 5 communities. Norman Bradburn suggested that this strategic plan look beyond the 5 years of NSF funding to strategically place CSISS in a position to attract support from other organizations (NIH/Ford Foundation, McArthur Foundation,/EPA, etc.).

Amy saw the **strategic plan** as providing an opportunity to consider **Assessment of CSISS** impact on the social science community.

Phil Rubin and Norman Bradburn described the intent of NSF infrastructure programs and the importance of communication of program results to the social sciences and public agencies. Building a community of spatial social science was described as a desirable outcome. NSF's initiatives for 2003 will likely focus on the development of new tools to solve long-term social problems. GIS is one such area, and the CSISS role could help to resurrect spatial analysis as an important dimension of social science research for NSF initiatives.

Helen Couclelis noted her conception that CSISS had a dimension that went beyond technology transfer. Amy also touched on this in requesting that CSISS see "theory as the thematic driver" in formulating programs.

Mike asked about the importance of International linkage (internationalization of infrastructure) in the eyes of NSF. Joint initiatives with ESF and European research networks were noted.

The Next Meeting of the Board. Alternatives in June (preference of Board Members) and September (preference of CSISS) will be forwarded to Brian Berry for consideration by the Board.

Appendix B

Extracts from the CSISS Fastlane report to the National Science Foundation

Annual Report for Period:10/2000 - 06/2001 **Submitted on:** 07/09/2001
Principal Investigator: Goodchild, Michael F. **Award ID:** 9978058
Organization: U of Cal Santa Barbara
Title: Center for Spatially Integrated Social Science

Individuals involved in CSISS Development Projects in 2000-2001 (not discussed elsewhere in report):

Name: Smith, Terence
Worked for more than 160 Hours: Yes
Contribution to Project
Terrance R. Smith directs the Alexandria Digital Library Project and is PI on a five-year award to develop the Alexandria Digital Earth Prototype (ADEPT) under NSF/NASA/ARPA's DLI-2 program. This provides direct linkage to the CSISS program on Place-Based Search, developing services to enable search and delivery of geographically referenced information on the World Wide Web and in digital libraries. His research Interests include individual and aggregate decision making, and the application of methods of artificial intelligence models to such problems; and land surface transport in physical geography.

Name: Kemp
Worked for more than 160 Hours: Yes
Contribution to Project
Karen Kemp (University of Redlands) was the CSISS Learning Resources Consultant in the first year of the project. She spent parts of May, June, and July (2000) on site in Santa Barbara, helping CSISS formulate its strategy for providing Web-based learning resources. She was replaced in this role in September 2000, but still serves informally as a consultant on Learning Resources. Her background in GIS education and her previous lead role in developing the GIS Core Curriculum with the National Center for Geographic Information and Analaysis provided an authoritative base for initating the CSISS Learning Resources program. Although she has not been involved in a formal way with CSISS since September 2000, she continues an extensive dialogue with CSISS and has contributed valuable insights to potential CSISS outreach to the social sciences.

Name: Hill, Linda
Worked for more than 160 Hours: Yes
Contribution to Project
Linda is a Library information scientist who is working to implement gazetteer-based spatial search tools for accessing information about places. She is the CSISS link to the UCSB Alexandria Digital Library initiative (NSF funded), and works closely with the CSISS search engine developer (Eric White, Webmaster (Ann Ricchiazzi), and CSISS researchers (Matt Ungerer and Scott Crosier).

Name: Rey, Sergio
Worked for more than 160 Hours: No
Contribution to Project
Sergio Rey is an Associate Professor of Geography at San Diego State University. He is collaborating on CSISS tools development with Luc Anselin. He spent one summer month on the project collaborating on the outline for the open source SpaceStat project and the development of open source ESDA tool. He is co-organizer of the planned Software Tools Specialist Meeting which will take place in Santa Barbara in late Spring, 2002.

Post-doc / Graduate Students
Name: Sifuentes, Jorge
Worked for more than 160 Hours: Yes
Contribution to Project
Jorge Sifuentes is a Ph.D student in Geography. Since January 2000 he has helped to develop the CSISS mailing list for advertising programs, has searched potential Web linkages for the portal function of CSISS.org, and has developed data bases on social science organizations that fall within the CSISS mandate. He is working with David Fearon in developing methods to monitor the progress of spatial analysis in the social sciences.

Name: White, Eric
Worked for more than 160 Hours: Yes
Contribution to Project
Eric is a PhD candidate in Anthropology at UCSB, who joined the CSISS team in October 2000 as a research associate to lead the development of an Internet Search Engine devoted exclusively to spatial analysis in the social sciences. This search engine was functional on the CSISS website in Spring 2001. Eric continues work on refinements to the search engine and to link its functionality to a gazetteer of places.

Name: Fearon, David
Worked for more than 160 Hours: Yes
Contribution to Project
David is a PhD candidate in Sociology at UCSB, who joined the CSISS team in July 2000 as a research associate to develop a system to document and monitor the dissemination of spatial analytic methods across the social sciences. This has required the development of an extensive bibliography database from online sources that can be analyzed for trends by discipline, research theme, time periods, and methods of spatial analysis. The database now contains more than 6,000 entries, covering all aspects of spatial analysis as applied in the social sciences -- GIS, spatial econometrics, spatial optimization modeling, spatial simulation, spatial statistics, and analytical cartography.

Name: Ungerer, Matt
Worked for more than 160 Hours: Yes
Contribution to Project
Matt is a geography PhD student at UCSB. His primary role has been in computer programming initiatives related to CSISS programs, especially the place-based search program and the program to develop spatial analytic tools.

Name: Syabri, Ibnu
Worked for more than 160 Hours: Yes
Contribution to Project
Mr. Syabri worked on on a 50% graduate assistantship under the supervision of Luc Anselin. The work focused on the development of the dynamic exploratory spatial data analysis tool (DynESDA2)..

Name: Ren, Yanqui
Worked for more than 160 Hours: Yes
Contribution to Project
Ms Ren worked on a 50% graduate assistantship under the supervision of Luc Anselin. The work focused on the development of the dynamic exploratory spatial data analysis tool (DynESDA2).

Name: Baroka, Widodo
Worked for more than 160 Hours: No
Contribution to Project
Mr. Baroka was an hourly programmer assisting with Windows MFC programming issues pertaining to DynESDA2. He worked under the supervision of Luc Anselin.

Name: Mbassa, Andre
Worked for more than 160 Hours: Yes
Contribution to Project
Mr. Mbassa was on a 50% graduate assistantship and collected the initial set of information for the software tools clearinghouse, as well as other supporting materials. He worked under supervision of Luc Anselin.

Undergraduate Student
Name: Crozier, Scott
Worked for more than 160 Hours: Yes
Contribution to Project
Scott has worked on the development of metadata standards for handling information on spatial models. This work relates directly to the indexing and retrieval of Learning Resources and Spatial Tools on the CSISS website, and contributes to projects that are jointly being developed between CSISS and the UCSB NSF-funded ADEPT project (Alexandria Digital Earth Prototype).

Organizational Partners

University of Illinois at Urbana-Champaign
UIUC is host to the CSISS program to develop tools for spatial analysis. Luc Anselin is the PI on this CSISS subcontract.

University of California-Santa Barbara
Three organizations at UCSB are involved directly in the initiatives of CSISS:
1. Intstitute for Social, Behavioral, and Economic Research. ISBER is home to the co-PI (Richard Applebaum) and to Barbara Herr-Harthorn (Senior Personnel), and, as such, is a primary contributor to the intellectual framework and outreach of CSISS. ISBER also oversees the administration of personnel and finances for CSISS, and provides facilities and technical support for CSISS programs.
2. National Center for Geographic Information and Analysis. NCGIA provides the space requirements for housing CSISS personnel and offers collaborative expertise in the social science applications of Geographic Information Science.
3. Map and Imagery Library. MIL is home to the Alexandria Digital Library and its NSF-supported initiative on the Alexandria Digital Earth Prototype (ADEPT). Through Terence Smith (PI for ADEPT and Senior Personnel with CSISS) and Linda Hill, MIL is contributing to the social science orientation of Place-based Search tools to be made available through www.CSISS.org.

Other Collaborators or Contacts
CSISS has expanded its collaboration significantly over the past year. Organizations that have collaborated with CSISS on projects include:

(1) The Interuniversity Consortium for Political and Social Research (ICPSR);
(2) The University of Washington's Center for Statistics and the Social Sciences (CSSS), in summer 2000, in co-sponsoring a CSISS workshop on Perspectives on Spatial Analysis in the Social Sciences;
(3) UCLA's Center for Computational Social Science and Social Informatics (CCSSSI), in summer 2000, in co-sponsoring a CSISS workshop on Agent-based Spatial Modeling;
  (4) the Environmental Systems Research Institute (ESRI), offering free access to the ESRI Virtual Campus for participants in CSISS sponsored workshops;
(5) The Ohio State University, in July 2001, in co-sponsoring a CSISS workshop on Accessibility in Space and Time;
(6) University Consortium on Geograhic Information Science (UCGIS);
(7) Association of American Geographers, in making available learning resources for dissemination through www.csiss.org

(8) Centre for Advanced Spatial Analysis (CASA), University of London -- we are seeking to develop an initiative to cross reference resources, particularly in the area of learning materials on agent-based modeling.

(9) The Wharton School (University of Pennsylvania) will sponsor a CSISS workshop on Introduction to Spatial Data Analysis in the Social Sciences, in August 2001.

(10) Digital Library for Earth System Education (DLESE) In the area of learning resources, Mike Goodchild has developed several modules, participated in the development of the overall design, and acted as initial liaison to the DLESE.

(11) CIPEC (Center for the Study of Institutions, Population, and Environmental Change. Indiana University) -- working to arrange a jointly sponsored specialist meeting on applications of agent-based modeling in landuse and landcover change.

(12) Graduate School of Geography and George Perkins Marsh Institute (Clark University)-- working to arrange a jointly sponsored specialist meeting on applications of agent-based modeling in landuse and land cover change.

Details on each of these collaborations follow:

The Interuniversity Consortium for Political and Social Research (ICPSR) offers two summer courses on spatial analysis, both organized and taught by Luc Anselin. These include Introduction to Spatial Data Analysis (May 2000) at the University of Illinois at Urbana-Champaign / (July 2001) at UCSBand Spatial Regression Analysis (August 2000/2001) at the University of Michigan. In addition, ICPSR and CSISS organized a 3-day joint Advanced Workshop on Spatial Analysis in Social Research in Ann Arbor in May 2001. This was directed by Luc Anselin (CSISS) and Hank Heitowit (ICPSR). CSISS provides scholarships to PhD Candidates from the social sciences who participate in these workshops ($500 each). This contribution helps to defray the expenses of attending the workshops. Since participants come from a broad range of disciplines, it is a useful way of contributing to the infrastructure goal of spreading the expertise of spatial analysis to the social sciences. ICPSR does not make any direct financial contribution to CSISS and would most likely offer these courses without CSISS scholarship support for participants. CSSIS scholarships are targeted at Ph.D. candidates in the social sciences, hoping to increase their representation among course registrants beyond what might otherwise occur.

Under the organizational leadership of Dr. Michael Ward (Political Science), the **University of Washington's Center for Statistics and the Social Sciences (CSSS)** hosted a CSISS workshop in June 2000 on Perspectives on Spatial Analysis in the Social Sciences. The principal instructors included Julian Besag (Statistics) and Martina Morris (Statistics and Sociology). CSSS supplemented financial support from CSISS with funding for participant lodging and meals, and for workshop administration.

Under the coordination of Nicholas Gessler, UCLA's Center for Computational Social Science and Social Informatics hosed the CSISS-sponsored workshop on Multiagent Spatial Modeling (24-28 July 2000). Gessler was the principal instructor, but experts from around the country were featured speakers during the workshop. UCLA provided facilities for the workshop.

The **Environmental Systems Research Institute (ESRI)** is a developer of GIS (Geographic Information Systems) software. ESRI is working with CSISS to incorporate tools for spatial statistical anlaysis as part of GIS functionality, and to intergrate spatial statistics within the visualization capabilities of GIS. ESRI has provided free access to its popular Virtual Campus for CSISS workshop participants. This valuable contribution helps in the dissemination of GIS tools more broadly among mostly young scholars in the social sciences.

The **Department of Geography at The Ohio State University** will host a workshop on Accessibility in Space and Time: A GIS Approach on 16-20 July 2001. This will be directed by Professor Mei-po Kwan. Additional instructors include Alan Murray, Morton O'Kelly, and Michael Tiefelsdorf.

Collaboration with **UCGIS** is focused currently on organizing an jointly-sponsored Specialist Meeting on Location Based Services, to take place in Santa Barbara in December 2001. Mike Goodchild (CSISS) and Gerard Rushton (UCGIS) are the coordinators. In addition, the current UCGIS President (Arthur Getis) has

helped to organize CSISS summer workshops (2000 and 2001), has attended a CSISS Executive Meeting, and participated in the recent CSISS Strategic Planning Retreat.

The **Association of American Geographers** has given CSISS the right to make selected instructional modules from the ARGUS (Advanced Readings in Geography of the United States) and ARGWorld (Advance Readings in Geography of the World) avaiable through the CSISS Learning Resources Program. These will provide superb entry-level materials on analytic techniques and basic spatial models.

The **Centre for Advanced Spatial Analysis, University of London**, is a leader in the application of agent-based modeling to understanding issues of urban development. A program to make available there instructional materials in this area is currently under negotiation.

The Wharton School will host a three-day CSISS Workshop in August 2001. This will focus on social scientist from universities in northeastern United States. Luc Anselin and Mike Goodchild will be the primary instructors, and will work closely with Susan Wachter and Ayse Can Talen.

Collaboration with **DLESE** allows CSISS to take advantage of the results of DLESE's efforts to develop protocols and standards for managing large archives of learning resources. Many of these ideas are directly transferable to the provision of access tools for Learning Resources on the CSISS website.

Discussions have commenced with **CIPEC (Center for the study of Institutions, Population, and Environmental Change, Indiana University)** and the **Graduate School of Geography and George Perkins Marsh Institute (Clark University)** to arrange a jointly sponsored specialist meeting on applications of agent-based modeling in landuse and landcover change. A meeting in Irvine CA has been set up for early October to develop guidelines for this meeting.

Activities and Findings
Project Training and Development
As an infrastructure program, CSISS does not yield research findings in the traditional sense. In summer 2000, CSISS initiated procedures that would help establish benchmark data so that we can measure changes in the use of spatial analytic approaches in the social sciences. This project continues the assembly of basic bibliographic information into a FileMaker database. In Summer 2001, the analysis of these data will be a high priority, allowing for cross referencing of spatial analytic activity by discipline, time period, journals, and other attributes.

Research Training
CSISS is employing graduate research assistants to work on the development of CSISS programs. One, Jorge Sifuentes, has been involved since the start of CSISS in October 1999, and three additional Ph.D. candidates joined the research team for work over the summer of 2000. They are engaged in building data bases, searching for web based resources, developing programing code for managing our Web site, and establishing monitoring sysems for determining the status of spatial analysis in the social sciences and for determining the success of CSISS programs. A more detailed description of their 2000-2001 work plan was provided in the Year 1 Annual Report to NSF. Included in this report is a listing of research and development activities associated with each member of the current research team at Santa Barbara, provided in the Activities section of this report under 'Work Plan - Summer 2001'.

Six individuals, including graduate students, were employed in the past year at the University of Illinois, working on the software development project with Luc Anselin. In addition, CSISS regards Workshop scholarship awardees as scholars 'who worked on the project'. It is our anticipation that they will return to their home institutions and act as agents for the diffusion of spatial methodolgies through their research and teaching. The CSISS National Workshop program for summer 2000 provided 75 scholars from more than a dozen different social science disciplines from more than 50 different universities with opportunities to acquire specific research skills that will potentially enhance both their research and teaching. The participation listings for the Year 2001 Summer Workshops (including short workshops) feature approximately 150 scholars who will benefit from intensive training and who will hopefully aid in our dissemination efforts.

Outreach Activities

CSISS is conceived of as an outreach project, but the orientation is to social science researchers rather than to the general public. Our outreach to increasing public understanding has been limited to interviews with the local press and with university in-house publications. We envision, however, that the broad dissemination of spatial perspectives will result eventually in a stronger focus on skills for spatial thinking within the K-12 educational environment. The CSISS one-page advertising brochure is circulated widely, but mostly within the scientific community. Of more direct importance to broad public outreach, the Website www.CSSIS.org represents an open resource that is available to anyone with computer access. It is expected that by the end of 2001, we will have our initital 'primers' available to demonstrate the value-added in understanding that can be achieved through application of spatial methodologies. These will be prepared in language accessible to the educated public. Our collaboration with the Association of American Geographers in making some their high-school oriented teaching materials (ARGUS and ARGWorld) available through www.CSISS.org is one example, and these resources will be on-line by August 2001. In addition, we have started a new Learning Resource series, called CSISS Classics. These recognize that the foundations of spatial analysis span many disciplines over many generations of researchers and practitioners. CSISS Classics provide summaries and illustrations of major contributions to spatial thinking in the social sciences. Primary emphasis is given to research before 1980, with an attempt to capture and acknowledge the repository of spatial thinking in the social sciences for the last few centuries. The summaries, along with key references and Web linkages are intended as guides for those interested in exploring the intellectual inheritance from previous generations. They are writen to be accessible to a broad audience.

Web/Internet Site

URL(s):
www.CSISS.org
www.ncgia.edu/CSISS

Description

CSISS is developing an open, virtual community to share spatial analytic software, foster discussion about spatial approaches in the social sciences, provide learning resources, and highlight information on workshops, conferences, and the latest innovations and applications of spatial analysis. The delivery vehicle is the CSISS Website, www.CSISS.org, launched officially on 21 June 2000. Prior to this, details on CSISS activities were found at www.ncgia.ucsb.edu/CSISS/.

Some of the highlights of the Website include the latest information about all of the core programs of CSISS--such as workshops and specialist meetings, bulletin boards on key topical areas, and private sites for communication among members of the CSISS Executive Committee and Science Advisory Board. Possibilities to host online expert-mediated discussions on specific topics are under consideration.

In early 2001 CSISS introduced its own Internet Search Engine, built on weekly scans of the Internet to update material of relevance to spatial analysis in the social sciences. Approximately 25,000 sites make up the basic database, searchable by any user-defined keywords. In addition, CSISS is developing extensive resources for literature search in the social sciences, to be augmented with a clearinghouse on spatial analytic tools, and inventories of geo-referenced data for social science researh. One of the highlights of the past year has been the full integration of the website into serving the administrative needs of CSISS to develop and advertize workshops, specialist meetings, and other activities. This has also assisted in basic editorial review of materials (e.g., learning resources) before they are posted to the site. CSISS integrated databases are derived through user interfaces similar to those of NSF"s FastLane. The Activites section of this report gives more complete information on CSISS Internet dissemination.

Contributions within Discipline

CSISS is focused on the collective social and behavioral sciences. Hence, contributions are relevant to a broad range of disciplines. The development of tools for spatial analysis and for place-based search, the provision of Learning Reources, and the development of web resources (for example, the CSISS Internet

Search Engine) provide new research techniques and information resources that are of value to anyone interested in spatial analysis in the social sciences. As described in the Activities section of this report, CSISS organized specialist meetings on 'Social Inequality and Equity' (November 2000) and 'Spatial Externalities' (January 2001) served participants from several disciplines and resulted in reports offering concrete suggestions for the kinds of training and research resources that would best serve students, instructors, and researchers in the social sciences.

Similarly, CSISS workshop programs for 2000 (75 participants from 12 disciplines) and 2001 (approximately 150 participants from about two dozen disciplines) have served to spread understanding of spatial anlytic methods to a broad cross section of young scholars. These are described in the Activities section of the report.

CSISS was a co-sponsor with Florida International University (Center for Transnational and Comparative Studies) of a Workshop on Political Processes and Spatial Analysis, which met in Miami, Florida, 5-6 March 2001. CSISS provided travel-support for graduate students attending the conference. The participants were largely from Political Science and Geography.

Contributions to Other Disciplines
Given its mission of 'integrated social science,' CSISS has chosen to view the Social Sciences as a single body. Hence, we have described the contribution of findings, techniques, and products to the section on 'Contributions Within Discipline'.

Contributions to Human Resource Development
The National Workshop program for summer 2000 served approximately 75 scholars from more than a dozen different social science disciplines to explore the theory and applications of spatial analysis in intensive one-week programs. These participants represented more than 50 different American universities. More than one-third were women scholars, and half were Ph.D. candidates. The balance of participants were mostly post-doctoral scholars and untenured assistant professors.

The workshop program for summer 2001 will serve about 150 participants (103 in the CSISS and ICPSR CSISS-supported workshops) from an even broader range of disciplines and universities than those of the previous year. The concept behind these CSISS workshops is that the participants will return to their own institutions and help to disseminate further what they have learned in the workshop settings.

Contributions to Science and Technology Infrastructure
The contribution of resources for research and education is one of the primary missions of CSISS, the other being to disseminate these contributions as broadly as possible among the social sciences. These are treated in the Activities section under Learning Resources and in the section on Internet dissemination regarding the CSISS Virtual Community.

Contributions: Beyond Science or Engineering
The CSISS tools development program is likely to have spillover benefits beyond academic and scientific research. The planned December 2001 Specialist Meeting on Location-Based Services and the spring 2002 Specialist workshop for spatial analyic tools software developers are intended to bring together commercial, academic, and government innovators to explore common issues. CSISS participation with the ADEPT project (Alexandria Digital Earth Prototype) is also likely to expand the technical range of information access in ways that will be of interest to commercial developers and could also benefit initiatives aimed at digital governance.