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Year 4

1 May 2002 – 30 April 2003

University of California, Santa Barbara

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CSISS is funded by the National Science Foundation (NSF BCS 9978058) to support the development of research infrastructure in the social and behavioral sciences

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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

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CENTER FOR SPATIALLY INTEGRATED SOCIAL SCIENCE

CENTER FOR SPATIALLY INTEGRATED SOCIAL SCIENCE ANNUAL REPORT AND INCREMENT REQUEST, MAY 2003

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.

Since its inception in October 1999, CSISS has sponsored seven weeklong workshops (Summers of 2000, 2001, 2002) and five specialist meetings on spatial analytic themes of interest to the social science research community. It has established an important web resource for social scientists at www.csiss.org and has made significant progress in developing new software tools for research and teaching. Two additional specialist meetings are in development – Spatial Analysis of Health Risk Assessment (10-11 October 2003) and Time Mapping of Globalization in the World System (6-7 February 2004). Four more weeklong workshops are planned for summer 2003, including totally new themes on Geographically Weighted Regression, 4-8 August 2003 (UCSB) and Population Science and GIS, 19-23 May 2003 (Pennsylvania State University).

By the end of the summer 2003 workshop period, nearly 280 scholars will have participated in CSISS-sponsored workshops, more than 160 will have contributed to the success of specialist meetings, and another 150 will have benefited from CSISS support to ICPSR workshops on spatial analysis. Many more participated in CSISS-sponsored events at annual meetings of learned societies – in the past year these have included the American Anthropological Association, the Population Association of America, the Regional Science Association, the American Sociological Association, the Southern Demography Association, and The Social Science History Association. For the coming year, plans are in place for workshop/sessions at the annual meeting of the American Anthropological Association, the Rural Sociology Society, and the American Agricultural Economics Association.

The CSISS Best Practice book – *Spatially Integrated Social Science* – was submitted to Oxford University Press in November 2002, and will be released in December 2003. Another book, *Advanced Spatial Econometrics*, will be published by Springer-Verlag.
This report summarizes the Center's progress since April 2002. CSISS acknowledges the support from NSF under BCS-9978058 and requests the fifth increment of funding for the project for the period 1 October 2003 through 30 September 2004.

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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 four times, in May 2000, December 2000, October 2001, and October 2002. It will convene again in December 2003. A Report on the October 2002 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.

(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 period from 1 May 2002 to 30 April 2003.[1]

[1] The Government has certain rights in this material; and support by the NSF is gratefully acknowledged. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not reflect the views of NSF.

CSISS STRATEGIC PLAN

In October of each year, CSISS updates its Strategic Plan for presentation to the Advisory Board. This plan draws from a mission statement, a set of program objectives, and tactics – available at www.csiss.org, and outlined in the Annual Report for 2001. The detailed actions associated with this Plan are summarized in a set of tables, one for each of the seven CSISS Programs.

Annual Plan Implementation (October 2002 – September 2003)

The following tables outline the short-term activities, anticipated outcomes, and measures of success associated with each of the seven CSISS programs. On an annual basis (in September), a new short-term plan is formulated for implementation over the next twelve months and the expected long-term outcomes are reassessed and modified, as needed. Annual CSISS reports document the outcomes and measures of outreach and infrastructure development associated with CSISS programs. The activities listed in the following tables reflect anticipated initiatives for the period through 30 September 2003.

Specialist Meetings

Short-term Activities (Oct 02 - Sept 03)_	**Inputs / Outcomes**	**Measures**

Follow-up on Previous Meetings:
- Location-Based Services – possible special publication
- Spatial Tools Software
  - Edited book publication
  - White paper on Open Source spatial software
 	
Active Planning / Hosting of Future SMs
- Globalization and the World System
- Spatial Interactions in Economics
- Spatial Analysis of Health Risk Perception
- Social Networks and Spatial Analysis in Violence Research (with NCOVR and UCSB Quantitative Methods in the Social Sciences Group
 	
Active SM Topic Assessment (e.g.)
- Agent-Based Spatial Modeling of Land Cover Change
- Small-Area Analysis
- Remote Sensing and the Social Sciences or Privacy and Confidentiality (with CIESIN/
- Management of large spatial data sets
 	
Long-term Activities
Moving from topic assessments to active planning and hosting of specialist meetings in 2004, seeking external funding for sponsorship
	Inputs
	Breadth of advertising to target experts and potential users of spatial analysis
	- Web-based meeting management for applications, sharing information, and disseminating agenda and logistics
	Partnering with other organizations in co-sponsorship of meetings and shared funding
	
	Outcomes
	Participation
	- Approx. 20 – 30 specialists/meeting
	- Diversity of discipline representation
	Identification of Resources:
	- Websites
	- Literature references
	- Best-practice examples
	- Candidates for *CSISS Classics*
	- Data sources
	Identification of Needs
	- Tools development
	- Data resources
	- Workshop training
	- Collaborative opportunities
	Publications to Inform and Illustrate
	- Position statements
	- Final Report (web and hardcopy)
	- Possible journal special issues / edited books
	Seek Funding from Selected Participants for follow-up activities
		Outreach
		Magnitude & Breadth of Exposure / Participation
		- Number of applicants to open calls
		- Participant distribution by discipline
		- Number of institutions represented
		- Web access to SM position statements
		
		Assessment of Success
		- Extent to which innovative resources are identified and integrated on CSISS.org
		- Extent to which CSISS tools development and workshop offerings are altered to reflect the needs identified from SMs
		
		Infrastructure Development
		Response to follow-up surveys
		- Evidence of future collaboration among CSISS participants (no. of articles, proposals, grants)
		- Evidence of interdisciplinary co-operation (articles, grants, courses, programs)

Workshops

Short-term Activities (Oct 02 – Sept 03	**Inputs / Outcomes**	**Measures**
Assess 2002 workshop results - Review of entry & exit surveys – summarize and share with instructors, exec. committee and board **Review candidate topics and instructional teams for CSISS 2003 workshops** **Plan & implement 2003 National workshop program** Target workshops to: - Entry-level, - Routine Applications, and - High-level Exploratory Developments **Consider alternative formats for workshops** - CSISS organized sessions at meetings of academic societies (e.g., American Anthropological Association, 11/02) - Half-day workshops at meetings (e.g., American Anthropological Association (11/02)) - Two and three-day workshops (e.g., hosting the Geography Working Group DDI Committee in 08/02) **Encourage participation in ICPSR spatial analysis workshops** **Consider alternative delivery media** - Filming workshops and creating video clips for web access (e.g., workshop on Map Making (07/02, Spatial Pattern Analysis (08/02) **Long-term Activities** - Consider on-line workshops or discussions	**Inputs** - Breadth of advertising – targeting young scholars who are potential users of spatial analysis - Web-based meeting management for applications, sharing information, disseminating agenda and logistics - Planning for accommodations, instructional facilities and resources - Funding and administration of participant scholarships - Possibly, move towards a self-support funding model for workshops. **Outcomes** Participation - Approx. 20 to 30 per workshop - Diversity of discipline representation/integration - Breadth of institutional representation Instruction and practice in use of: - Spatial data - Spatial analytic software - Spatial methods and measures **Long-term Outcomes (- Sept 04)** - To feature workshops on the full range of spatial analytic approaches for spatial social science - To seed expertise in spatial analysis in a broad range of social science disciplines and institutions - To foster interdisciplinary communications and networks for spatial analysis among social science scholars	**Outreach** Magnitude & Breadth of Exposure / Participation: - Number of applicants to open calls - Participant distribution by discipline - Number of institutions represented - Web access measures to the workshop video clips **Assessment of Success** Review of entry & exit surveys for: - Evidence of having learned from the experience - Strength of Recommendations to offer the workshop again **Infrastructure Development** Responses to follow-up surveys - Evidence of future collaboration among CSISS participants (articles, proposals, grants) - Evidence of interdisciplinary co-operation (articles, academic meetings, grants, courses, programs) - Participant expectation to include what they have learned in teaching and course design New tools and resources from High-level Exploratory Development workshops

Best Practices

Short-term Activities (Oct 02 - Sept 03)	Inputs / Outcomes	Measures
Editing and Publication of - Submit ***Spatially Integrated Social Science***, to Oxford University Press (Oct 2002 - Designate as CSISS Best Practice, ***Advances in Spatial Econometrics*** (Springer-Verlag) - Establish **web presence** of Best Practices – based initially on materials that supplement chapters in the above books (solicited from authors) - ***CSISS Classics*** in Learning Resources at www.csiss.org **Long-term Activities Under Consideration** - Sponsor International Conference on *Spatial Social Science* -- 2003 - Develop and host an on-line refereed publication on *Spatially Integrated Social Science* – 2004 - Publications (book / articles) from international conference - 2004 - Consider hardcopy publication of *CSISS Classics* – 2004	**Inputs** - Solicitation of manuscripts and contributions for the web site - Selected honoraria to encourage participation - Web-based management of publication development - International Conference self funding - Selectivity over keynote speakers and special programs for international conference. **Outcomes** Participation - Diversity of discipline representation - Breadth of institutional representation Exemplary research uses of - Spatial thinking - Spatial data - Spatial analytic software - Spatial measures **Long-term Outcomes** Expanded range and quantity, and improved quality of resources for teaching and research	**Outreach** Magnitude & Breadth of Exposure / Participation - Participant distribution by discipline - Number of institutions represented in publications **Assessment of Success** - Measures of web access to *CSISS Classics* - Sales and course usage of *Spatially Integrated Social Science / Advances in Spatial Econometrics* - Numbers of applicants to participate in the international conference - Citations of CSISS publications and references to CSISS programs **Infrastructure Development** - CSISS publications as a basis for research generation and teaching - Increasing general production of spatial analytic teaching and research publications across the social science disciplines – monitored via literature surveys

Virtual Community www.csiss.org

Short-term Activities (Oct 02 - Sept 03)	Inputs / Outcomes	Measures
Website Look-and-Feel - Implement updated and enhanced sitemap. - Update drop-down menus to accommodate Macintosh browsers. **Web support for CSISS events** - Host workshop / Specialist meetings. - Add clips for workshops 2002 - Improve on clips from previous years by using latest technologies - Add in depth content on Best Practices page - **Learning Resources** - Improve on metadata search interface and make more accessible on the site. - Incorporate an order by mechanism for author, concept, time or gender for CSISS Classics. - Find more opportunities to integrate Glossary into site. - Encourage review process on content. **Infrastructure** - Continue integration of search engines into design. - Implement a mechanism for the storage and retrieval of custom search lists. - Develop a general means of submitting and collecting user feedback. **Spatial Tools Clearinghouse** - Implement tools review process. **Long-term Activities** - Continue implementing **CSISS Social Science Archive Search Tool** - Continue implementing **Place-Based CSSAST** - Reconstruct L. Anselin's workshop for website. - Integrate site resources through common search interface.	**Inputs** - Equipment updates consistent with objectives - Keeping up with latest developments to enhance web delivery and ease of user navigation - Update site content to reflect developments of spatial analysis in the social sciences - Promote and publicize CSISS.org - User surveys to evaluate website use and content value - Consider focus-group review of CSISS web resources **Outcomes** - An expanding content-rich and accessible website - Visually appealing and non-distractive presentation - Ease of use and navigability for site users **Long-term Outcome** - CSISS.org seen as the primary online resource for spatial social science	**Outreach** - Success in attracting applicants to open calls for CSISS events - Encouragement of increased user input **Assessment of Success** - Web Trends Site traffic analysis of CSISS log files. - Search engine relevance for particular spatial terms - Incorporation of CSISS website content in university courses - The number of applicants per event over time **Infrastructure Development** • Document innovation / provision of services not previously available (or not as easily available) in social sciences and spatial analysis

Learning Resources

Short-term Activities (Oct 02 – Sept 03)	Inputs / Outcomes	Measures
Expand Content: • Consider partnering with other organizations for resource development (e.g., CASA on agent modeling) • CSISS in-house development (e.g., *CSISS Classics* and the *GIS Cookbook*) **Add discipline Access:** • Expand archive of course syllabi on spatial analysis in different social science disciplines • Develop introductory modules (such as the CSISS *GIS Cookbook* and *CSISS Classics* related to spatial thinking and analytic approaches by discipline **Implement a Search Engine to harvest existing learning resources from the World Wide Web** **Continue to Improve Presentation and User Search Capability for Content** - Expand and refine metadata schema - Catalog each learning resource to allow searching by author, format, keyword, discipline, and interest area. - Create a browse interface for retrieving CSISS learning resources - Refine resource portal layout and presentation to highlight special resources, such as *CSISS Classics* and the CSISS *GIS Cookbook* - Implement a review process for evaluating Learning Resource collection **Advertise Learning Resources** Design news releases, brochure - Announcing available resources to potential users - Soliciting contributions **Long-term Activities** - Implement metadata searching and learning resource object retrieval mechanisms with other collaborating organizations – DLESE, ADEPT, and ICPSR	**Inputs** - Selected Honoraria for authors of learning resources - Promotion / dissemination of information about CSISS Learning Resources - Solicitation and management of learning resource contributions by external authors and organizations - Extraction, preparation, and formatting of learning resources from local sources (NCGIA, UCSB Geography) - Web site organization and development of new interfaces for learning resource presentation - Surveys of users and potential users of CSISS Learning Resources **Outcomes** - Access to large-scale learning resource contributions from CSISS summer researchers and external sources. - Improved Learning Resource web portal and subsequent community involvement - Use of CSISS Learning Resource Portal for class instruction and individual education **Long-term Outcomes** - Develop Model Curriculum for teaching "Spatially Integrated Social Science" based on CSISS Learning Resource Portal.	**Outreach** - Level of Involvement of external authors in Creating/contributing Learning Resources - Documentation on the size, institutional affiliations, and disciplinary origins of the user community for CSISS Learning Resources - Level of collaboration with other organizations in building learning resources **Assessment of Success** - Trends in the number of externally authored learning resource modules - Assessment of size of CSISS Learning Resource user community. Based on Web Trends measures and on surveys of educators. **Infrastructure Development** - Enhanced mechanisms for searching and retrieving learning materials from other similar and complementary archives, such as DLESE, ADEPT. - Learning Resources available at CSISS .org that are not found elsewhere. - Expanded CSISS Learning Resource Archive use by social science community. - Adoption of CSISS-based curriculum to aid in teaching topics addressed by the Learning Resource Portal

Spatial Analytic Tools

Short-term Activities (Oct 02 - Sept 03)

- Refinement and update of **Spatial Tools Clearing-house**
- Fill in gaps and augment existing **R tools for spatial regression** in collaboration with R Bivand et al.
- Continued development of **OpenSpace** project
  - **Web-based spatial analysis** (run basic spatial statistics, construct spatial weights, run spatial regression)
  - **Spatial regression analysis libraries** (in Java and Python)
  - **Java-based exploratory spatial data analysis** (in collaboration with GeoVsta Studio at Penn State)
- Continued development of tutorials and supporting materials
  - Tools for Intro Spatial Data Analysis course and for Spatial Regression course
  - Spatial weights and sample data sets
  - Sample regression analyses
- **Specialist Meeting Edited Volume**

Long-term Activities

- Implement strategy and infrastructure for Open Source Community Contributions to OpenSpace project
- Continual updating and refinement of spatial tools clearinghouse
- Expand tools clearinghouse to include demonstrations and tutorials
- Consider expansion of clearinghouse to include areas such as mapping and visualization, remote sensing, geo-statistics, etc.

Inputs / Outcomes

Inputs

- Programming new software
- Documenting attributes of existing spatial tools
- User feedback

Outcomes

Spatial tools site added to CSISS.org (Oct 2002)

Python module(s) for spatial regression analysis (Spring/Summer 2003)

Java application/applet for spatial regression analysis (Spring/Summer 2003)

CVS and active development community for Python/Java programming activities (Summer 2003)

Web-based spatial analysis service operational (Fall 2003)

Long-term Outcomes

- An easy-to-use open source suite of software for spatial data analysis
- Advances in the use of spatial econometric methods in social sciences
- Improved accessibility to information about spatial analytic tools

Measures

Outreach

- Dissemination of tools via www.csiss.org, specialist meetings, workshops, best practice publications, and Learning Resources

Assessment of Success

- Number of users of new software tools developed through CSISS
- Adoption of CSISS software tools in teaching laboratories
- Demonstrated use of CSISS tools and resources in literature

Infrastructure Development

- New tools for spatial analysis
- Clearinghouse that provides users with information about state-of-the-art spatial analytic tools
- Via specialist meeting, new networks among spatial tools developers will help foster standard protocols and coordination of tools development efforts

Place-Based Search www.csiss.org

Short-term Activities (Oct 02 - Sept 03)	Inputs / Outcomes	Measures

Develop services to **search and deliver geo-referenced information** via WWW and via digital libraries.
- Update and extend inventory of on-line social science data archives
  - Document geographical coverage, spatial resolution, etc
  - Document / refine metadata standards
 	
Explore role of gazetteers for social science research and information retrieval:
- Define gazetteer services and protocols, including service to provide geography of standard (FIPS) reporting zones
 	
Develop a gazetteer interface for the CSISS Search Engine of websites that offer information of relevance to spatially integrated social science
 	
Long-term Activities
Continue activities listed above
In later stages,
- Demonstrate use of new resources
- Enhance best practices in spatially integrated social science
- Offer workshop(s), specialist meetings to illustrate practices and applications of tools for place-based search
- Consider developing a clearinghouse of GIS shape files accessed through place-based search routines.
	Inputs
	- Collaborate with UCSB's Alexandria Digital Library and its ADEPT (Alexandria Digital Earth Prototype) and Text-Geography Interface (TGI) initiatives
	- Collaborate with ICPSR to enhance ICPSR's DDI metadata standards for geo-spatial applications through the DDI geography working group
	- Promote the ICPSR DDI
	- Collaboration on the Electronic Cultural Atlas Initiative (Berkeley)
	
	Outcomes
	Enhanced access to resources:
	- Web linkages to place-based information
	- Web links to data sources
	- Allow for sharing data across archives
	Evaluation
	- Of spatial attributes of existing social science data
	Enhanced web display and analysis of existing data resources
	- Match data with spatial zones
	- Create maps
	- Rudimentary spatial analysis
		Outreach
		Document extent of collaboration with organizations to improve the spatial information about data resources
		
		Assessment of Success
		Document the use of the CSISS website for accessing, mapping, and analysing information on spatially referenced social science data
		
		Infrastructure Development
		- Document expansion of spatial referencing of social science data sources
		- Expanded range of tools for exploring information by user-defined spatial units

CSISS PROGRAMS – 1 MAY 2002 30 APRIL 2003

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 May 2002 – 30 April 2003 are described in the following sections, along with plans for the year ahead. More detailed information on all of these activities is 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.

Since the last annual report, two specialist meetings were held, and two more are in preparation. These are described below.

Specialist Meeting on New Tools for Spatial Data Analysis

Upham Hotel, 10-12 May 2002, Santa Barbara, CA

The specialist meeting was co-chaired by Luc Anselin and Segio Rey, assisted by a steering committee consisting of Richard Berk (UCLA), Di Cook (Iowa State), Mark Gahegan (Pennsylvania State), Geoffrey Jacquez (BioMedware) and Ayse Can Talen (Fannie Mae Foundation).

The objectives of the meeting were threefold. First, it provided an opportunity to demonstrate, showcase and benchmark state of the art tools and to interact with other specialized developers. Second, it facilitated and promoted a dialogue among the wide range of developers about priorities and guidelines for software design, data and model standards, interoperability, and open environments. Third, the meeting also served as a way to introduce CSISS' software development initiatives and served as a forum to obtain feedback and comments.

Participants for the meeting were solicited using a dual approach consisting of targeted invitations and an open call for participation. All respondents to the call were required to submit an abstract. A final list of participants was selected by the steering committee. Due to logistical and financial constraints, the number of participants was limited. All participants submitted a full paper for inclusion in the meeting's Proceedings, edited by Anselin and Rey (see below). The list of participants and abstracts is given at http://www.csiss.org/events/meetings/spatial-tools/participants.htm.

The two-day meeting was organized around a format of plenary presentations, followed by in-depth discussion in breakout groups, with a report back to the plenary meeting. After two introductory presentations on the CSISS program and the goals of the workshop, there were four themes: (1) Discovery and inference, computational support for constructing geographic knowledge (Mark Gahegan); (2) Spatial models and spatial modeling (Roger Bivand); (3) Software architectures for spatial data analysis (Geoffrey Jacquez); (4) User perspectives (Asye Can). In addition, there was an open "posture session" on the first evening, where several participants demonstrated their software.

Considerable discussion ensued after the breakout session presentations, but some common themes emerged:

- the need for communication of user needs to software developers (STEPS, spatial tools enhancement proposals)
- open environments, interoperability, high level interfaces
- the need for standards (data documentation, methods documentation, software architectures)
- the usefulness of "show and tell" sessions and for opportunities for developers to interact.
- the need for benchmarks (both data sets as well as "correct" results)
- the need to continue communication

There was a strong sense to build upon the momentum of the meeting and to continue interaction. Plans are being considered to organize a second meeting to follow up. In addition, suggestions were made to develop two white papers, one devoted to software architecture, another to the "core" tools that would need to be included in any toolbox.

Also, Anselin and Rey have solicited additional papers from individuals who were not able to participate in the meeting but expressed strong interest. The complete collection of papers was included on a Proceedings CD, distributed by CSISS and is currently undergoing review with the objective of publishing them as an edited volume, a journal special issue, or a combination of both. The full list of papers is given below.

New Tools for Spatial Data Analysis
Proceedings of a Workshop
Edited by Luc Anselin and Sergio Rey
CSISS, University of California, Santa Barbara

Contents of Proceedings CD-ROM

- Jared Aldstadt and Arthur Getis, **Point Pattern Analysis in an ArcGIS Environment**
- Luc Anselin, Ibnu Syrabi and Oleg Smirnov, **Visualizing Multivariate Spatial Correlation with Dynamically Linked Windows**
- Roger Bivand, **Implementing Spatial Data Analysis Software Tools in R**
- Gilberto Camara, Marcos Neves, Antonio Miguel Vieira Monteiro, Ricardo Cartaxo Modesto De Souza, Joao Argemiro Paiva and Lubia VinhasSPRINT and TerraLib: **Integrating Spatial Analysis and GIS**
- Daniel B. Carr, Jim Chen, B. Sue Bell, Linda Pickle and Yuguang Zhang, **Interactive Linked Micromap Plots and Dynamically Conditioned Choropleth Maps**
- John Corbett, Fernanda Zermoglio and Stewart Collis, **The AWhere(TM)ACT Program: An Object Oriented Framework for Integrating Social Science and Natural Resource Management Tools**
- Jason Dykes, **Developing Tools for GeoVisualization Research**
- Robert Edsall and Anna J. Roedler, **An Enhanced GIS Environment for Multivariate Exploration: A Linked Parallel Coordinate Plot Applied to Urban Greenway Use Survey Data**
- Leila De Floriani and Paola Magillo, **Multi-resolution Terrain Processing and Visualization with VARIANT**
- Chris Fulcher, Yan Barnett and Chris Barnett, **Spatial Analysis Software Tools for Community Decision Support**
- Konstantin Krivoruchko, **Bridging the Gap Between GIS and Solid Spatial Statistics**
- Ned Levine, **The CrimeStat Program: Characteristics, Use, and Audience**
- Atsuyuki Okabe, Kelichi Okunuki, Shino Funamoto, Kimie Okano and Fumiko Itoh, **Software for Spatial Analysis on a Network**
- Hanan Samet and Robert E. Webber, **Extending the SAND Spatial Database System for the Visualization of Three-Dimensional Scientific Data**
- Shashi Shekhar and Ranga Raju Vatsavai, **Spatial Data Mining Research by the Spatial Database Research Group**, University of Minnesota
- Juergen Symanzik, Deborah F. Swayne, Duncan Temple Long and Dianne Cook, **Software Integration for Multivariate Exploratory Spatial Data Analysis**
- Masahiro Takatsuka, **An Open Component-Oriented Visual Programming Environment for Integrating Geospatial Data Analysis and Visualization Tools**
- Hans Voss, Natalia Andrienko and Gennady Andrienko, **Exploratory Data Analysis and Decision Making with Descartes and Common GIS**.
- Monica Wachowicz, Xu Ying and Arend Ligtenberg, **Land Use Change Explorer: A Tool for Geographic Knowledge Discovery**
- Ningchuan Xiao, Marc P. Armstrong and David A. Bennett, **ChoroWare: A Software Toolkit for Choropleth Map Classification**

Spatial and Social Interactions in Economics

Upham Hotel, Santa Barbara CA, 4-5 April 2003

Empirical analysis of spatial and social interactions by economists was quite limited until about a decade ago, when interest and activity grew on a number of fronts simultaneously. These include the study of peer effects within schools and classrooms, a rebirth of urban economics, the "new" growth theory in macroeconomics based on education externalities, the development of theoretical models of social learning and information cascades, and the application of the techniques of "labor-metrics" – a research style developed in labor economics – to empirical questions in epidemiology and environmental economics.

Despite this resurgence of interest in spatial and social interactions within economics, GIS and related advances in geography have to date made relatively few inroads into the economics profession. This has been reflected, in part, in the relatively low participation of economists in CSISS workshops during the first few years of CSISS operation. The goal of this meeting was to make a major outreach by CSISS to the economics community, with the aim of disseminating these advances into economics. This was accomplished by bringing together cutting-edge researchers on spatial and social interactions in the economics profession, having them present examples of their current research on spatial issues, exposing them to information on new developments in GIS and new spatial econometric software, and initiating a discussion on possible uses of these tools, as well as further development of these tools, within economics.

The outcomes of the meeting were at least seven-fold. First, as a result of both Luc Anselin's and Mike Goodchild's presentations, the meeting exposed an influential group of economists to new developments in spatial econometrics and software of which many had been unaware. In fact, according to a follow-up survey[2], fully 95% of respondents indicated that the meeting introduced them "to spatial tools, data or ways of thinking that were new to you". Conversations with participants revealed particular enthusiasm for the ability of spatially-weighted regression to estimate spatially-varying coefficients, and for mapping software that allowed one to "pan" across a map to see how such coefficients varied across space. Second, the meeting appears very likely to change the future direction of research among those who attended; in fact ninety percent of respondents reported that the meeting was moderately or very helpful in advancing their own research. More importantly, fully 96 percent of respondents indicated that the meeting was likely to add a *spatial dimension* to their future research. Of this 96 percent, 52 percent said the extent of this influence on their research would be "considerable" or "a great deal". Since many of the conference participants are highly regarded researchers in the economics profession, the influence of space in economics seems very likely to spread as a result of this meeting.

Third, the meeting created the foundations of new research community in the area of spatial and social interactions in economics. Working on their own, some of the economists who attended had previously felt isolated within their profession; bringing

[2] Details of the survey methodology and a complete description of responses are provided in an Appendix.

them together provided a sense to all involved that a critical (but previously scattered) mass does indeed exist in the economics profession in the spatial area. This was reflected in a great deal of enthusiasm among the participants to find a way to continue meeting and collaborating (on which we elaborate further below). Fourth, a number of new interdisciplinary links among faculty were forged. These included links between geographers and econometricians (for example Luc Anselin and Tim Conley), geographers and economists (Stuart Sweeney and Enrico Moretti), and economists and hydrologists (Olivier Deschenes and Jeff Dozier). These links can be expected to enhance the future research productivity of all involved, and again to foster the penetration of spatial perspectives into economics. Fifth, the meeting had a considerable impact on graduate students in both geography and economics, in part simply because they were introduced to students in the other discipline; in part because they were exposed to top-flight research of common interest. A likely consequence is that the economists among them may be more likely to pick a spatial topic, or simply to treat space in a more sophisticated manner, in their dissertation research. Graduate students in geography benefited from exposure to economists' perspectives on how to distinguish causal connections from simple spatial correlations using methods like instrumental variables and natural experiments that have not made substantial inroads into geography. In fact, in anticipation of the benefits of this event to graduate students, UCSB's graduate division contributed special funding to facilitate graduate student participation in the meeting.

Sixth, based on information on future funding opportunities provided by NSF representative Kwabena Gyimah-Grempong, the meeting provided a jumping-off point for future joint research and funding initiatives between economists and geographers. Of the faculty responding to the follow-up survey, 79 percent indicated they would be interested in approaching NSF for funding to continue meetings and activities of this kind. Finally, the papers presented at the meeting are now accessible to the broader community, especially of non-economists, via the CSISS website, thus reaching an audience they might not otherwise reach.

Conference Presentations:
The full program and papers are available at
http://www.csiss.org/events/meetings/spatial-interactions/.
In the listing below, presenting authors in CAPS:

Environmental Effects

- Olivier DESCHENES (UCSB) and Michael Greenstone (University of Chicago) "Using Fluctuations in Climate to Estimate the Economic Impacts of Global Warming"
- Matthew NEIDELL, University of Chicago "Air Pollution, Health and Socioeconomic Status: The Effect of Outdoor Air Quality on Childhood Asthma".

Spatial Interactions among Firms and Unions

- Tom HOLMES (University of Minnesota) "Geographical Spillover of Unionism"
- Tim Conley (Chicago GSB) and Giorgio TOPA (New York University) "Dynamics of Local Interaction Models: Persistence and Propagation of Local Shocks".

Econometric Issues

- Tim CONLEY (Chicago Graduate School of Business) and Francesca Molinari (Northwestern University) Spatial Correlation Robust Inference without Perfect Distance Measurements"
- Steve DURLAUF and William Brock (University of Wisconsin, Madison), "Multinomial Choice with Social Interactions"

New Directions in Spatial Research

- Mike GOODCHILD (UC Santa Barbara). "New Technologies for Collecting Spatial Data"
- Luc ANSELIN (University of Illinois, Urbana-Champaign) "Software for spatial econometrics: a review and assessment"
- Kwabena GYIMAH-BREMPONG (National Science Foundation) "Emerging Funding Opportunities for Spatial Research in Social Science"

Social Interactions in the Classroom

- Kevin LANG (Boston University) and Joshua Angrist (MIT). "How Important are Classroom Peer Effects?"
- Jesse ROTHSTEIN (UC Berkeley). "Good Principals or Good Peers? Parental Valuation of School Characteristics, Tiebout Equilibrium, and the Incentive Effects of Competition among Jurisdictions"

"Spatial and Social Interactions in Economics" Meeting Follow-up Survey:

Emails were sent to all 26 individuals for whom some record of attendance at the meeting exists, excluding members of the CSISS executive committee and the NSF representative. Twenty of these were faculty and six were graduate students. The response rate was 70% for faculty, 83% for students, or 73% overall. Responses were emailed to a research assistant, and survey participants were informed that (with the exception of question 4, which may be used in formulating a future grant application) their identities would not be revealed to the conference organizer. Counts and percentage distributions of answers to the four structured survey questions are as follows:

Q1**: Overall, how helpful did you find the meeting in advancing your own research?** Choose from [unhelpful/only a little/moderately helpful/very helpful].

- Unhelpful: 0 (0%)
- Only a little: 2 (10%)
- Moderately helpful: 9 (48%)
- Very helpful: 8 (42%)

Q2: **Did the meeting introduce you to spatial tools, data, or ways of thinking spatially that were new to you?** [Yes/no]

- Yes: 18 (95%)
- No: 1 (5%)

Q3: **To what extent is the meeting likely to add a spatial dimension or refine the spatial component of your future research?** Choose from [not at all/ only a little/ considerably / a great deal]

- Not at all: 0 (0%)
- Only a little: 8 (42%)

- Considerably: 8 (42%)
- A great deal: 2 (10%)
- N/A: 1 (6%)

Q4: [For faculty only] **Would you be interested in participating in a submission to NSF to fund further meetings of this kind, plus perhaps other activities organized around a "spatial economics" theme?** [Yes/no].

- Yes: 11 (79%) ----out of faculty response
- No: 2 (14%) -----out of faculty response
- Non response: 1 (7%)
- Not faculty: 5

Future Specialist Meetings

CSISS maintains active consideration of potential specialist meetings. The Executive Committee reviews topics on a monthly basis and decides on sponsorship of meetings based on the greatest likely benefit to the objectives outlined in the CSISS Strategic Plan.

Specialist Research Meeting on Spatial Analysis of Health Risk Perception
Upham Hotel, Santa Barbara, 10-11 October 2003

Organizers: Barbara Herr Harthorn, Laury Oaks, and Susan Stonich (all of the Department of Anthropology, UCSB)

This specialist research meeting will convene an interdisciplinary group of about 15 behavioral science and health researchers whose work has centered on the areas of social risk theory, cultural constructions of health and risk, and spatial analysis of health. The purpose of the meeting will be to explore common grounds for new interdisciplinary research proposals that bring together spatial analysis with work looking at perception of health risk. People's perceptions of health risks are much more consistently associated with their behavior than are the epidemiological distribution of risk factors in populations or experts' judgments and communications about risk and risk factors. Judgments about risk acceptability have also assumed a central position in the current global geopolitical environment (e.g., in relation to food safety, location of infrastructure systems, migration and immigration, infectious diseases, and worker safety, to name only a few). Spatial analysis of health risk perception offers the possibility of helping to resolve paradoxical aspects of the social amplification of risk as well as processes of optimistic bias associated with risky behaviors, yet it is a largely unexplored arena. The format of this Research Specialist Meeting will be a 2-day meeting that alternates formal presentations with extensive discussion. Possible outcomes include networking that may lead to new collaborative research proposals to the NSF (e.g., under the new Spatial Social Science initiative) and the NIH (where the poor response of the lay public to conventional risk communication continues to be one of the most serious problems), a larger, international research conference and resultant publication(s), and dissemination of spatial analysis tools through CSISS. Relevant federal agency representatives are being invited to attend.

Time-mapping Globalization in the World-System
University of California, Riverside (UCR) in Riverside, California, 7-8 February 2004

Co-sponsors: Center for Spatially Integrated Social Science (UCSB), Institute for Research on World Systems (UCR) and the Vice Chancellor for Research (UCR)
Organizers: Richard P. Appelbaum (CSISS, Sociology, UCSB), Christopher Chase-Dunn (IRWS, Sociology, UCR) and Helen Couclelis (CSISS, Geography, UCSB)

Prominent scholars on globalization are being invited to take a multi-disciplinary approach to research on globalization that uses new research technologies and sources of information not typically employed in globalization studies – especially temporal Geographical Information Systems (TGIS).

Discussion will focus on worldwide studies of social processes and on projects that explicitly compare recent global processes with those that have operated in the past. We are also interested in mapping the spatial scale and intensity of human interaction networks in order to study the emergence of global integration and its contemporary patterning. We hope that the meeting will generate projects by the participants on the use of TGIS analytic and visualization technology, to shed light on issues of historical and contemporary globalization. We hope to accomplish this with a format that will enable participants with substantive knowledge to interact with those who possess technical sophistication in spatial and network analysis. Paper presentations will address several pre-selected conference themes, including, Commodity Chains in the World Economy, Global Business Networks, Global City System, Hegemony and Power Configurations in Interstate Systems, Global Transportation and Communications Networks, and Transnational Social Movements

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 2003:

Population Science and GIS
19–23 May 2003, University Park, State College PA
Topics covered: An overview on the uses of geospatial information technologies within the population sciences; applications to problems of urban poverty, neighborhood research, racial/ethnic diversity, maternal/child health, epidemiology, and population-

environment; spatial analytical methods for demographic inquiry, issues in geospatial data handling, and using spatial analysis tools within GIS (ArcGIS 8.2, ArcView 3.3) for data visualization and modeling. No experience in spatial analysis required.
Instructors: Stephen Matthews (coordinator), Mark Gahegan, and David O'Sullivan (all of The Pennsylvania State University), Livia Montana (Macro International), Trudy Suchan (U.S. Census Bureau), David Wong (George Mason University), Frank Tanser (Medical Research Council, Durban, South Africa), and Paul Voss (University of Wisconsin, Madison).
Co-sponsors with CSISS and Host institution: The Pennsylvania State University (Population Research Institute, Social Science Research Institute, Department of Geography, and the GIS Council).

Accessibility in Space and Time: A GIS Approach
7–11 July 2003, Columbus OH
Topics covered: Measuring and analyzing accessibility in physical and social space, and in cyberspace; network approaches to connectivity and accessibility; graphical visualization 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 range of social science issues. No experience in GIS required.
Instructors: Mei-Po Kwan (coordinator), Alan Murray, Morton O'Kelly, Michael Tiefelsdorf (all of The Ohio State University).
Co-sponsor with CSISS and Host institution: Department of Geography, The Ohio State University (www.geography.ohio-state.edu).

Introduction to Spatial Pattern Analysis in a GIS Environment
28 July–1 August 2003, Santa Barbara CA
Topics covered: Introduction to concepts in GIS, spatial pattern analysis (exploratory and confirmatory), autocorrelation statistics, and geostatistics (including variogram analysis and kriging). Lectures cover research methods in spatial pattern analysis in the social sciences. Exercises include an introduction to ArcInfo 8.0 and data exploration of social, behavioral and economic phenomena. No experience in spatial analysis required.
Instructors: Arthur Getis (coordinator), John R. Weeks, and Jared Aldstadt (all of San Diego State University) and Michael Goodchild (CSISS, University of California, Santa Barbara).
Host institution: CSISS, University of California, Santa Barbara
(CSISS.org/events/workshops/).

Geographically Weighted Regression and Associated Statistics
4–8 August 2003, Santa Barbara CA
Topics covered: Local statistics and local models, the basics of GWR with examples, statistical inference and GWR, GWR and spatial autocorrelation, extensions to the basic GWR framework and concept, applications of specialized GWR software (provided), and visualizing the output in ArcView 3.3.
Instructors: A. Stewart Fotheringham (coordinator), Chris Brunsdon, and Martin Charlton (all of The University of Newcastle).

Host institution: CSISS, University of California, Santa Barbara (CSISS.org/events/workshops/).

ICPSR 2003 Summer Workshops
CSISS encourages participation in the workshops taught by Luc Anselin (University of Illinois, Urbana-Champaign) for the Interuniversity Consortium on Political and Social Research. See www.icpsr.umich.edu/TRAINING/summer.html for details on time, place, and registration.

Introduction to Spatial Data Analysis
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 and related software. Familiarity with multivariate statistics and basic concepts of probability theory expected, and some knowledge of desktop GIS software required. See http://sal.agecon.uiuc.edu/courses/index.html#intro for details.

Spatial Regression Analysis
Spatial econometric analysis, incorporating spatial effects, maximum likelihood and other estimation procedures, specification searches, and implementation in standard software packages. Participant background in intermediate regression analysis or intermediate econometrics, and familiarity with introductory spatial data analysis, expected. See http://sal.agecon.uiuc.edu/courses/index.html#reg for details.

Short Workshops and Conferences

Supported by CSISS Since April 2002

Short Course on the Economics of Urban Sprawl. CSISS co-sponsored with the UCSB Economics Department and the Bren School a one-day Workshop on Urban Sprawl and Land Use Change. CSISS Scholarship support was provided for a dozen graduate students. The workshop preceded the meeting of the World Congress of Environmental and Resource Economists (Monterey, 24-26 June 2002). Michael Goodchild and Keith Clarke demonstrated the application of GIS and spatial analysis tools in providing perspective on sprawl. Details on the workshop may be found at: http://www.bren.ucsb.edu/news/conference/sprawl/.

CSISS hosted a two-day meeting of the **International DDI (Data Documentation Initiative) Geography Working Group** at UCSB. The purpose was to extend the metadata standards for social science data to include metadata for spatial data. August 2002.

CSISS sponsored the participation of Michael Goodchild and Raymond Wong (Sociology, UCSB) in a research workshop with representatives from the **National Center for Violence Research (NCOVR)** in Irvine, California. The purpose was to explore possible common research and infrastructure initiatives between CSISS and

NCOVR. The possibility of a jointly-sponsored specialist meeting was discussed. September 2002.

CSISS sponsored the participation of Dr. John R. Logan in a special workshop at Ohio State University as part of an initiative of the **American Sociological Association** to promote spatial perspectives in sociological research. September 2002.

Workshop Application and Participation Patterns

The number of applicants for the 2003 CSISS summer workshop was 328, a 46 percent increase over the previous year. The trend in numbers (excluding the ICPSR workshop participants) follows: 136 (152 with ICPSR workshops) in 2000, 235 (262 with ICPSR workshops) in 2001, 224 in 2002, and 328 in 2003. In 2000 and 2001, CSISS offered scholarship support for participants in ICPSR workshops, a practice discontinued in 2002 because of increasing pressure on funds. In all years, interest in spatial analysis workshops among social scientists exceeded capacity by a significant margin. CSISS was able to serve 49 percent of applicants in 2000, 43 percent in 2001, 31 percent in 2002, and 28 percent in 3003.

The disciplinary mix of applicants and acceptances for all workshops is illustrated in Table 1 for the four summer workshop seasons:

Table 1. Numbers of Applicants and Attendees in CSISS Summer Workshops

	ATTENDEES					APPLICANTS					Ratio
Discipline	2000	2001	2002	2003	**Totals**	2000	2001	2002	2003	**Totals**	**Accepted**
Economics	9	12	7	7	**35**	10	45	21	25	**113**	**0.31**
Political Science	14	5	4	9	**32**	26	12	7	13	**63**	**0.51**
Sociology	11	13	9	11	**44**	14	31	22	18	**98**	**0.45**
Anthropology	5	12	10	6	**33**	10	32	25	15	**94**	**0.35**
Geography	17	20	22	20	**79**	46	61	73	110	**310**	**0.25**
Public Policy	2	8	4	1	**15**	9	23	25	21	**86**	**0.17**
Urban Studies/Plan	3	6	3	8	**20**	6	11	10	48	**81**	**0.25**
Statistics	3	2	0	2	**7**	4	4	0	5	**15**	**0.47**
Criminology	3	6	3	1	**13**	4	10	7	6	**33**	**0.39**
Population/Health	1	12	6	24	**43**	2	18	22	61	**115**	**0.37**
Other, social science	1	5	3	4	**13**	4	8	7	5	**29**	**0.45**
Other, not social science	3	2	1	0	**6**	17	7	5	1	**32**	**0.19**
	72	103	72	93	**340**	152	262	224	328	**966**	**0.35**

Table 1 reveals a broad disciplinary representation. While geography is the most strongly represented, this representation has declined as a proportion of all participants. The increase in population and demography in 2003 reflects the specialized workshop in this area at Pennsylvania State University.

Tables 2 and 3 for the **2003 workshop season** represent the data on applicants in the same format as in previous annual reports. Women represent 45 percent of the applicant

pool for 2003, down from a previous high of 48 percent in 2001. The large number of universities with applicants reflects a strong general awareness of CSISS programs. Younger scholars (PhD candidates, other graduate students, post doctorate scholars, and untenured faculty) are the primary client group, accounting for 75 percent of applicants.

Table 2
CSISS Workshop Applicants, Summer 2003

Participant & Applicant Status	Pop Science	Accessibility	Pattern Analysis	GWR	Total Applications
PhD Candidate	18	10	22	22	72
Other Graduate Student	22	22	36	35	115
Post Doc	6	3	5	6	20
Untenured Faculty	8	9	8	14	39
Tenured Faculty	7	8	11	9	35
Other/Unspecified	21	14	7	5	47
No. of Women	**42/82**	**28/66**	**42/89**	**36/91**	**148/328**

Survey of Participants in CSISS Programs

In March 2003, the UCSB Social Science Survey Research Center administered a web-based survey of all applicants/participants for CSISS programs. Responses on a few questions are especially useful in evaluating the success of the workshop and specialist meeting programs. The survey targeted 518 participants and 223 non-participant applicants to CSISS programs since January 2000. Excluding email bounces of approximately 20%, the response rate was 55 percent – this included 232 participants and 92 non- participants. Some responses follow:

- 87% of participants "**strongly agree" or "agree"** that **"My CSISS experience has had positive impacts on my research"**
- 57% of participants **"strongly agree" or "agree"** that **"CSISS experience has had positive impacts on my teaching"**

Full details on the survey will provide cross-tabulations by discipline, status of participant (e.g. graduate student / tenured professor), and level of expertise in spatial analysis. **A full report on this survey will be available at www.csiss.org/survey in early June 2003.**

Table 3
Distribution of CSISS Workshop Participants & Applications by Discipline & for Number of Universities, Summer 2003

Discipline/Area	Participants Accepted in Workshops				Total Acceptances & Applications
	Pop Science	Accessibility	Pattern Analysis	GWR	
Anthropology/ Archaeology	4		2		6/15
Communications			1		1/1
Criminology				1	1/6
Demography/ Population Studies	4	2		3	9/34
Economics	2	2	2	1	7/25
Environmental Studies/Planning			1		1/21
Epidemiology/ Health Studies	5	5	1	4	15/27
Geography		4	2	1	7/32
GIS/Remote Sensing	2	6		2	10/67
Information Science					0/1
Political Science		2	4	3	9/13
Psychology			3		3/4
Regional Science		1	1	1	3/11
Sociology	3	5	2	1	11/18
Statistics		1		1	2/5
Urban Studies/ Planning	1	2	2	3	8/48
Totals:	**21**	**30**	**21**	**21**	**93/328**
No. Universities & Other Institutions	19/57	25/48	17/66	19/63	68/159

Discipline / Area labels are based on the self-identification of applicants.
* These totals are based on participants and applicants for all workshops, excluding duplicates of universities represented across workshops.

III. Best Examples

Spatially Integrated Social Science

Edited by Michael Goodchild and Donald Janelle, this book was submitted to Oxford University Press for publication in November 2002. Distribution will begin in December 2003.

In identifying contributors, we looked for authors of articles with relevant content who were widely cited, supported from major peer-reviewed funding programs, and noted for use of spatial approaches within their disciplines. Though the authors represent several disciplines, they have one major attribute in common – the application of spatial thinking in their research designs and execution.

This book illustrates how the spatial perspective adds value and insight to social science research, beyond what traditional non-spatial approaches might reveal and makes available outstanding examples on the uses of spatial thinking. Twenty-one chapters illustrate how spatial analysis fosters theoretical understanding and empirical testing. Each chapter exemplifies the founding principle for the Center for Spatially Integrated Social Science (CSISS) – that the analysis of social phenomena in space and time enhances our understanding of social processes. The chapters offer substantive empirical content for illustrating the interpretation of specific spatial analytic approaches suited to advanced research in the social sciences. It is our hope that the book will help cultivate an integrated approach to social science research that recognizes the importance of location, space, spatiality, and place. Aside from demonstrating applications of spatial analysis in research, it is anticipated that this book will also be suited as an advanced-level text for a trans-disciplinary audience.

A special web page, http://csiss.ncgia.ucsb.edu/best-practices/siss/, provides the table of contents, abstracts of each chapter, access to graphics and tables featured in the book, and supplementary resources contributed by the authors.

A second CSISS Best Practice book will be released late in 2003 by Springer-Verlag. The editors are Raymond Florax (Free University Amsterdam), Sergio Rey (San Diego State University), and Luc Anselin (University of Illinois, Urbana Champaign).

Advances in Spatial Econometric Modeling

Methodology, Tools and Applications

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CSISS Classics

Another initiative, ***CSISS Classics,*** supplements the book series with a web presence. It is simultaneously part of the Learning Resources program. This short descriptive statement of intent appears on the website:

> The foundations of spatial analysis span many disciplines over many generations of researchers and practitioners. ***CSISS Classics*** provides 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, are intended as guides for those interested in exploring intellectual inheritance from previous generations.

Currently, there are nearly 50 items in the collection and more are under development. Our goal is to expand the collection to 70 by the end of the CSISS program and to achieve a broad representation from several disciplines.

In 2002 a user comment feature was added to each selection. Since then we have received numerous responses and suggestions. *CSISS Classics* are the biggest draw to the website, accounting for more than 45,000 visits to www.csiss.org between 3 May 2002 and 20 April 2003.

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.

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

During the period of 1 May 2002 to 30 April 2003, the software tools program at UIUC again had to relocate due to space constraints in the Geography Department. The program is now housed in the newly established Spatial Analysis Laboratory (SAL) at the Department of Agricultural and Consumer Economics (ACE), where it occupies a large room adjacent to Anselin's faculty office. The establishment of SAL represents a major effort by the ACE leadership to promote the use of spatial analytical techniques in social science research. In addition to Anselin (Director of SAL), SAL faculty affiliates include Nelson and Brozovic (new faculty) in ACE. The College of Agricultural, Consumer and Environmental Sciences (ACES) at the University of Illinois has made a three-year commitment towards funding the basic infrastructure of SAL.

Year 4 of the project yielded several new products and dissemination activities, the most important of which were:

- Specialist Meeting on Software Tools, held in Santa Barbara, CA, May 10-12, 2002.
- Release of GeoDa (formerly DynESDA) software for exploratory spatial data analysis and the GeoDa User's Guide in February 2003, available for downloading from http://sal.agecon.uiuc.edu/csiss/geoda.html.
- Launch of the SAL web site (CSISS Tools link on the CSISS web site) at http://sal.agecon.uiuc.edu/csiss in January 2003.
- Completion of a collection of web-based tools for spatial analysis, available at http://sal.agecon.uiuc.edu/webtools.
- Completion of a set of software routines for the estimation of spatial autoregressive models for very large data sets (> 1 million observations), to be made available as open source software on the SAL site in late Spring 2003.
- Completion of a collection of spatial weights matrices for U.S. States and Counties, in a format for use by several software packages (such as SpaceStat, ClusterSeer, spdep package in R, etc.) available through an interactive user interface at http://sal.agecon.uiuc.edu/weights.

- A discussion list was launched in Spring 2003 to promote the discussion of open source development of spatial software tools and to support the CSISS software products (such as GeoDa) as opentools@sal.agecon.uiuc.edu (69 subscribers to date).

In additional, substantial progress was made in the development of a collection of modules for spatial econometric analysis in Python (PySpace) and towards the construction of a set of Java language tools for spatial data analysis (OpenSpace).

A number of collaborative ventures were continued or initiated, such as the collaboration on the development of Java-based modules for spatial data analysis with the GeoVISTA project at Pennsylvania State University, on the enhancement of Roger Bivand's collection of R routines for spatial econometrics (the spdep package), and an exploration of the introduction of spatial regression capability in Ned Levine's NIJ-distributed CrimeStat package.

Personnel

In addition to Dr. Anselin, who directed the project and focused on overall design and methodological issues, the project team during Year 4 included Dr. Sergio Rey (San Diego State University), Dr. Oleg Smirnov (Senior Research Associate, UIUC), Ibnu Syabri (graduate student, UIUC), Yong Wook Kim (programmer, UIUC), Youngihn Kho (graduate student, UIUC), Reshmi Theckethil (graduate student, UIUC), and Visiting Scholar Dr. Julie LeGallo (University of Dijon, France).

Rey co-chaired the CSISS Specialist Meeting on Spatial Software tools, co-edited the meeting Proceedings and collaborated on the development of open source ESDA tools. Oleg Smirnov continued to be primarily responsible for the implementation of the OpenSpace open source software tools, and was the lead developer on the large data set ML estimation project. Syabri was on a 50% graduate assistantship and was the lead software engineer in the development of GeoDa. Young Wook Kim (academic professional) joined the project on a part-time basis to assist in the development of Java language tools for spatial data analysis. He was the lead developer of the webtools (funded initially by a grant from the National Consortium on Violence Research – NCOVR). Youngihn Kho joined the project in the Fall of 2002 on a 50% graduate assistantship to assist in the C++ development of GeoDa and to write customized Python modules for space-time visualization. Reshmi Theckethil joined the project in December 2002 on an hourly basis to assist in the collection and presentation of support materials (weights matrices). Dr. Julie LeGallo joined the team in the summer of 2002 as a post-doctoral researcher. She has been involved in the development of Python routines for spatial econometric estimation, and specifically wrote routines to carry out discrete choice estimation and spatial panel data analysis.

Rey, Smirnov, Syabri, Kho and LeGallo will continue to be involved with the project during Year 5. Kim has moved to the software tools development funded by a current NCI project, and still supports the CSISS efforts on an informal basis. Theckethil will graduate in Spring 2003.

Specialist Meeting on Spatial Data Analysis Software Tools

The Specialist Meeting on Spatial Data Analysis Software Tools was held at the Upham Hotel in Santa Barbara, CA, 10-12 May 2002. A detailed report is provided elsewhere.

Sofware Tools Clearinghouse

The software tools clearing house is intended to complement CSISS' own software development efforts with a comprehensive collection of links to software developed by others, in both the private and public sector (including academics).

The clearinghouse was launched in October 2001 and was maintained throughout Year 4 of the project. It is part of the CSISS web site and consists of three main entry points:

- a spatial tools search engine,
  http://www.csiss.org/cgi-bin/texis/webinator/clearsearch
- a collection of links to portals
  http://www.csiss.org/clearinghouse/links.php3
- a collection of links to specific software sites (select tools)
  http://www.csiss.org/clearinghouse/select-tools.php3

In addition, a fourth entry point, dealing with CSISS' own software tools program was linked to the SAL web pages in February 2003. Its content is detailed below in a separate section.

Details on the CSISS tools web pages were provided in the Annual Report for 2001-2002. Year 4 activities consisted of maintaining and fine-tuning the existing content.

CSISS Tools Web Site

The CSISS Tools Web Site is linked to the main CSISS Tools page and resides at http://sal.agecon.uiuc.edu/csiss. The site is still under active development. It contains seven main links:

- to subscribe to the Openspace mailing list
- a link back to the main CSISS Tools web site (on csiss.org)
- GeoDa, exploratory spatial data analysis with dynamically linked windows
- OpenSpace, Java applets and applications for spatial data analysis
- PySpace, spatial statistical analysis in Python
- large data Set SAR
- supporting materials

All but the first two (which are self-explanatory) are described in more detail in the sections below.

GeoDa

GeoDa, the *Geodata Analysis software*, is the successor to and a replacement for DynESDA2 and the DynESDA extension for ESRI's ArcView 3.x GIS. It is a freestanding program, built on ESRI's MapObjects LT2 technology, using the shape file format as the standard for storing spatial information. *GeoDa* version 0.9 (beta) was released on 5 February 2003.

GeoDa consists of an user-friendly interactive (point and click) environment that combines maps with statistical graphics, using the technology of dynamically linked windows. Besides its mapping functionality (including smoothers for rate maps) it contains the usual EDA graphs (histogram, box plot, scatterplot) and implements *brushing* for both maps and statistical plots. Maps can be constructed for points as well as polygons, and tools are provided to create one from the other (centroid computation, Thiessen polygons), as well as to construct various types of spatial weights. In addition, GeoDa contains functionality for spatial autocorrelation analysis, in the form of a Moran scatterplot and LISA maps, both univariate as well as bivariate.

GeoDa can be downloaded from the CSISS site and comes with an installation program, an 82 pp. User's Guide and three sample data sets that are widely referred to in the social science literature (Cressie's data on SIDS deaths in North Carolina counties, Anselin's Columbus crime data set and Dubin's point data set on Baltimore house sales). A system was put in place on the e-commerce server in the Department of Agricultural and Consumer Economics at UIUC to implement safe downloads and keep statistics on downloading activity. The system will also enable a safe and efficient handling of orders for later shrink wrapped versions of the software on CD, etc.

To date (28 April 2003) over 300 unique downloads of *GeoDa* have been recorded since its launch on February 5. A first upgrade is slated for release around 5 May 2003, with extended functionality in terms of data input and output, refinement of the spatial autocorrelation statistics for rates and a completely reworked "table." It is anticipated that upgrades will continue to be released at roughly three-monthly intervals.

Technical details can be found in Anselin, L. (2003), *GeoDa 0.9 User's Guide*. Spatial Analysis Laboratory, Department of Agricultural and Consumer Economics, University of Illinois, Urbana-Champaign. Additional background is also contained in Anselin, L., I. Syabri and O. Smirnov (2002). "Visualizing Multivariate Spatial Correlation with Dynamically Linked Windows," in L. Anselin and S. Rey (Eds.), *New Tools for Spatial Data Analysis: Proceedings of a Workshop*. Center for Spatially Integrated Social Science, University of California, Santa Barbara, May 2002 (CD-ROM).

OpenSpace

OpenSpace is an ongoing effort to develop a collection of open source Java applets (for use with a web browser) and applications (for freestanding use) to implement exploratory spatial data analysis and spatial regression.

A spatial regression Java *application* continues to be developed and is currently a working prototype. It implements diagnostics for spatial correlation in linear regression models, as well as the estimation of both spatial lag and spatial error models by means of a variety of approaches (maximum likelihood, instrumental variables).

The Java *applets* implement spatial data analysis in a web environment, and can be accessed at http://sal.agecon.uiuc.edu/webtools. They are developed by extending the Geotools open source mapping toolkit. Functionality includes specialized mapping of outliers (box maps), rate map smoothing, and spatial correlation analysis by means of a

Moran scatterplot. Currently, these methods can be applied to six sample data sets: Anselin's Columbus crime data, Cressie's North Carolina SIDS data, and county level homicide data for three time periods for the US as a whole, and for counties surrounding St. Louis, Atlanta and Houston (the latter four data sets were part of an Atlas of US homicides, developed as part of an NCOVR funded project).

Technical details on the webtools were presented at the GIScience 2002 Conference in Boulder, CO (22-28 Sept. 2002) and are contained in Anselin, L., Y-W Kim and I. Syabri (2003). "Web-Based Analytical Tools for the Exploration of Spatial Outliers". Working Paper, Spatial Analysis Laboratory, Department of Agricultural and Consumer Economics, University of Illinois, Urbana-Champaign (invited submission for publication consideration for a special issue of the *Journal of Geographical Systems*).

Current and ongoing development of the webtools is no longer funded by CSISS, but is part of a grant from the National Cancer Institute as a joint project with MacEachren and Gahegan at Pennsylvania State University. Functionality is extended and ported to java beans to interface directly with the GeoVISTA Studio environment. The resulting software tools can be used both in a web-based setting (as an applet) and as a standard desktop application. Because the development is carried out in Java, the resulting applications are cross-platform. These applets and applications will continue to be available from the CSISS web site (as well as from the GeoVISTA development web site on Sourceforge).

PySpace

PySpace is an open source development effort to create a collection of object-oriented modules to implement cross platform functionality for spatial statistics and spatial econometrics. To date, this has yielded a prototype module to carry out spatial econometrics for the linear regression model. The included functions contain procedures for a range of specification tests against spatial correlation, as well as maximum likelihood and instrumental variables estimators for spatial lag and spatial error models. The prototype is currently undergoing a major revision consisting of an organization into classes, implementation of sparse weights matrix functionality and the addition of a user interface. A command line version of *PySpace* will be used in Anselin's "Spatial Regression" course in the ICPSR summer program in 2003. Current development is focused on the incorporation of specification tests for spatial effects and estimators of spatial lag and spatial error models in panel data settings.

Three other efforts that are part of the overall *PySpace* framework were carried out during Year 4 of the project. As part of Anselin's Fall 2002 course on "Computational Techniques for Spatial Analysis" (ACE492CT), a group of graduate students developed Python code to implement simulation estimators (simulated maximum likelihood, method of simulated moments) for probit and tobit models, as well as various utilities required in the process (e.g., Geweke-Hajivassiliou-Keane simulator, Recursive Importance Simulator). These functions form the basis for the implementation of estimators for spatial probit and spatial tobit, which are currently under development.

A second group of students implemented basic functionality in Python for network analysis and the study of point patterns on networks. This has yielded an initial prototype that works both as a freestanding program and as a web service. Current functionality includes shortest path computation between nodes on the network as well as between points located anywhere on the network. Work is continuing on incorporating some basic statistical point pattern analysis functionality.

A third additional activity under *PySpace* consisted of developing functionality to visualize space-time patterns of local association and outliers in a realistic three-dimensional rendering of a landscape. This involved the combination of functionality from MySQL (the database containing the space-time data), Vtk (the visualization toolkit) with Python code to compute outliers and locations with significant local spatial autocorrelation. The result is an interactive "movie" that allows the analyst to browse through data for 1095 daily observations for 400 cross sectional units. The tool was applied to an analysis of the effect of air quality on respiratory disease in the Los Angeles basin (funded in part by an NSF/EPA grant). The tool was demonstrated and included in presentations at the Allied Social Science Associations meetings in Washington, DC (Jan 2003), as well as at departmental seminars at the University of Texas, Dallas, the University of Illinois and the University of Wisconsin. Ongoing activity is focused on lessening the degree of "hard coding" to the LA data set and developing into a generic toolkit for three-dimensional visualization of local spatial (and space-time) association.

Large Data SAR

An increasingly common impediment to the application of spatial regression analysis is the size of the data set. The standard, eigenvalue based method to implement maximum likelihood estimation for spatial lag and spatial error models breaks down for data sets with more than 1,000 observations. A small number of alternatives have been suggested in the literature, but few work effectively for data sets with more than 1 million observations. A method based on characteristic values, recently suggested by Smirnov and Anselin (*Computational Statistics and Data Analysis*, 2001) was implemented in C++ to remove this impediment. The resulting code is able to estimate a spatial lag model by means of the maximum likelihood method for 1 million observations within about 7 minutes on a current vintage desktop.

A remaining problem was the computation of the asymptotic variance matrix, which involves the inverse of a non-sparse matrix of dimension equal to the size of the data set (e.g., a 1 million by 1 million matrix). Smirnov developed a new approach that approximates the solution with an acceptable degree of precision and within reasonable computation time. Technical details are provided in a working paper by Smirnov (2003), "Computation of the Information Matrix for Models of Spatial Interactions" (SAL Working Paper), which has been accepted for presentation at the Society of Computational Economics 9th Annual Conference on Computing in Economics and Finance, University of Washington, Seattle, WA, 11-12 July 2003.

The new algorithm has been implemented as C++ code, which will be made available on the CSISS Tools web site by late Spring 2003. Current work deals with developing a

simple user interface and ensuring that compilation of the source code can be accomplished on a wide range of platforms.

Supporting Materials

A collection of supporting materials is in the process of being developed, consisting of sample data sets, spatial weights files, tutorials and exercise sets. Currently, the Tools Web site contains an interactive user interface to select and download spatial weights files for the contiguity structure among counties in each state of the US as well as for the US as a whole and for the US States. The interface was implemented in Python and runs on the server, at http://sal.agecon.uiuc.edu/weights.

Dissemination

The dissemination of the products developed under the Software Tools project took on three forms:

- web pages on the SAL web site
- published papers, proceedings and working papers
- conference and workshop presentations

The contents of the web pages were outlined above. Publications included a Proceedings CD of the papers submitted to the Software Tools Specialist Meeting (held in May 2002) and a series of working papers and conference proceedings dealing with dynamically linked windows and web-based spatial analysis. Two papers by Anselin provided reviews of methodological issues in spatial econometrics, one appeared in the special issue of the *International Regional Science Review* devoted to the Spatial Externalities specialist meeting, the other was part of a special issue of the journal *Agricultural Economics*, devoted to spatial analysis. A complete list is given below.

Several presentations were made on aspects of the Software Tools program, including demonstrations of the GeoDa software at national conferences of social science associations. This includes GIScience 2002 (Boulder, CO, Sept 2002), the American Society of Criminology (Chicago, Nov 2002), The Regional Science Association International (San Juan, Nov 2002), the American Anthropological Association (New Orleans, Nov 2002), and the Allied Social Science Associations (Washington, DC, Jan 2003). This was supplemented with several departmental seminar presentations. In addition, the software was used in several short courses devoted to spatial data analysis (see Training, below).

List of Papers (directly related to Software Tools project):

- L. Anselin, *GeoDa 0.9 User's Guide*, Spatial Analysis Laboratory and Center for Spatially Integrated Social Science (CSISS), Department of Agricultural and Consumer Economics, University of Illinois, Urbana-Champaign, 2003 (82pp.).
- L. Anselin, "Spatial Externalities, Spatial Multipliers and Spatial Econometrics," *International Regional Science Review* 26 (2), 2003: 153-166.
- L. Anselin and S. Rey (eds.), *New Tools for Spatial Data Analysis: Proceedings of a Workshop*. Center for Spatially Integrated Social Science, University of California, Santa Barbara, May 2002 (CD-ROM).

- L. Anselin, Y-W Kim and I. Syabri, "Web-Based Spatial Analysis Tools for the Exploration of Spatial Outliers," in *GIScience 2002*, The Second International Conference on Geographic Information Science, Boulder, CO, Sept. 25-28, pp. 12-15, 2002 (a more extensive version is a SAL Working Paper).
- L. Anselin, I. Syabri and O. Smirnov, "Visualizing Multivariate Spatial Correlation with Dynamically Linked Windows," in L. Anselin and S. Rey (Eds.), *New Tools for Spatial Data Analysis: Proceedings of a Workshop*. Center for Spatially Integrated Social Science, University of California, Santa Barbara, May 2002 (CD-ROM).
- L. Anselin, "Under the Hood: Issues in the Specification and Interpretation of Spatial Regression Models," *Agricultural Economics* 17 (3), 2002: 247-267.
- O. Smirnov, "Computation of the Information Matrix for Models of Spatial Interactions", SAL Working Paper, 2003.

Training

Anselin continues to involve graduate students in the development and application of the software tools. The above-mentioned course on computational techniques involved 7 graduate students in Python programming of spatial data analysis software. Early versions of GeoDa were used in the lab sessions for workshops held at the University at Albany and the ICPSR Summer Program. In addition, the software was used extensively in the lab sessions for Anselin's "Introduction to Spatial Analysis" Fall 2002 course. Feedback from this experimental use was instrumental in improving the user interface and inspiring current and future functionality.

Both Syabri (Geography) and Kho (Computer Science) are making their work in the Tools project a part of their own research agenda and dissertation.

Work Plan

As in previous years, the work plan for Year 5 of the project will be organized in three phases. However, throughout, there will be a slight shift in emphasis from code development and methodological work to the fine tuning of materials for delivery, the writing of support documents, tutorials and "how to" web pages. At the end of Year 5, it is anticipated that *GeoDa* will be stable and include a broad range of spatial data analysis functionality in a user-friendly point-and-click format. By then, the web tools will be fully integrated in the GeoVISTA Studio framework, source code and documentation for maximum likelihood estimation for spatial lag and spatial error models will be available, and the development of *PySpace* will be ready for a move to the Sourceforge open source platform. In addition, it is expected that a first release of a user-friendly "shrink-wrapped" version of *PySpace* will available at that point.

Summer 2003:

The focus of activities during the summer will be on the first non-beta (Version 1.0) release of GeoDa and its supporting materials (User's Guide, tutorial, sample data). In addition, supporting materials for the large data SAR code will be developed. PySpace coding will continue, with the goal of having a command line version used during Anselin's ICPSR Spatial Regression course. Attention will also focus on an effective user interface and streamlining of the functions developed so far. A parallel effort will consist

of the consolidation and streamlining of R code for spatial data analysis, in cooperation with the R spatial data analysis development community in Europe.

Fall 2003:
The emphasis in the Fall will be on fine tuning and extensive testing of the PySpace spatial regression functions, in conjunction with Anselin's graduate spatial econometrics course. Functionality for panel data models will be incorporated and all functions should be converted to the use of sparse spatial weights.

GeoDa development will focus on the functionality for Version 2.0, which is expected to be in early alpha stage by the end of the Fall.

Spring/Summer 2004:
During Spring and Summer, the focus will be on consolidation of accomplished results, finalizing shrink-wrapped versions for PySpace and GeoDa (2.0), completing documentation and tutorial support and continuing to build a large user base as well as a growing open source development community. This time period will also see attention to finishing a number of papers reporting on various aspects of the GeoDa and PySpace software development efforts.

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, all made available through the CSISS website.

CSISS Learning Resources are available through the Learning Resources Portal at http://www.csiss.org/learning_resources. This report identifies the current content of the Learning Resource Archive, documents the resource collection process, and notes tasks that are in progress. The primary objectives of the CSISS Learning Resource Archive are outlined in the original NSF grant proposal, http://www.csiss.org/aboutus/reports/csiss_descript.pdf and in the Annual Report for year 1, http://www.csiss.org/aboutus/reports/ar2000.pdf.

In 2002, an effort was initiated to flag resources for specific social science disciplines, implemented through linkage to outstanding examples of syllabi on spatial analytic courses. See (http://www.csiss.org/learning_resources/content/syllabi/). This is seen as a first step to establishing a strong identity for the resource in the user community and as an aid to scholars wishing to incorporate spatial perspectives that are relevant to their disciplines.

Learning Resource Organization and Search Tools
The CSISS Learning Resources are comprised primarily of html-based resources, searchable via two principal tools: 1) a web browser, and 2) a PHP/MySQL-based search form that queries a local database of CSISS Learning Resource meta-data. These access mechanisms were described in detail in the 2002 Annual Report.

Resources Added in 2002-2003

GIS COOKBOOK

The CSISS Cookbook was devised as a means of providing simple tutorials on basic GIS operations. It is aimed at social science researchers with minimum knowledge of GIS and its underlying principles, and minimal knowledge of geography. Such people frequently report a need for basic help in standard GIS operations of relevance to social science. For example, a social scientist may have considerable difficulty making a choice between available map projections, or in understanding how to go about the task of geocoding. A textbook or course would provide far too much information in such cases; rather, it seems that something more akin to a cookbook would be appropriate, providing a short tutorial, examples, guidance in overcoming common mistakes, and references to additional information.

In the summer of 2002 NSF provided supplementary funding to CSISS under its Research Experiences for Undergraduates (REU) program, sufficient to fund three UCSB undergraduates for three months each. These students had all taken a full undergraduate sequence of courses in GIS. Supervision and guidance was provided by a graduate student and by CSISS faculty. An overall design for the cookbook was developed, with the intention of continuing to populate the book in the coming years. Tools were developed by the CSISS Webmaster to support the input of material into a series of standard cookbook templates.

By the end of the summer the REU students had completed the nucleus of a superlative series of documents. Geocoding was given some prominence, on the grounds that it is frequently used by social scientists to provide geographic references for survey records, can be technically difficult, and is subject to numerous misapprehensions. The finished documents were mounted on the CSISS web site, and have been well received by the user community. The REU students were integrated into the broader REU-supported summer internship program at UCSB, where they had the opportunity to mix with students in other disciplines, and to experience something of the nature of multidisciplinary research, as well as presenting their own work. The project was presented to the CSISS Advisory Board in October 2002, and very well received.

Internal Resources Under Development

Two workshops held in the summer of 2002 were videotaped for inclusion on the CSISS website on the learning resources page. Videos of the workshops were edited and prepared by Gamaiel Zavala (CSISS webmaster). The videos can be found at http://www.csiss.org/streaming_video/. They include the workshops “Map Making and Visualization of Spatial Data in the Social Sciences” and “Spatial Pattern Analysis in a GIS Environment”. These supplement video recordings from the 2001 series of workshops at UCSB.

In Summer 2003, efforts will be made to expand the metadata search tool, fill in some disciplinary gaps for the Syllabi collection, expand the selection of CSISS Classics, and add new recipes in the *GIS Cookbook.*

VI. Place-Based Search

CSISS is interested in facilitating spatial social science. Many users of geographic information systems and other tools for spatial analysis report that the majority of their time is spent in searching for suitable data, and bringing data into compatibility, before analysis can begin. Any techniques that can be used to reduce the complexity of this stage, the time taken to complete it, and the knowledge needed to complete it successfully would clearly be welcome in the social science research community. One of the seven CSISS programs is directed specifically at this problem, under the title of Place-Based Search.

Place-based search is defined as the process of searching for data and information related to a place, defined by a suitable means such as a placename, or a set of coordinates. It is a central process of a geolibrary, defined as a digital library whose primary search mechanism is based on geographic location. Geolibraries can store and retrieve any information related to a place, including maps and images but also reports, photographs, studies, papers, and even pieces of music. In recent years substantial investments have been made in building geolibraries, led in part by UCSB's Alexandria Digital Library, an effort funded by NSF since 1994. The place-based search initiative of CSISS seeks to leverage this investment for the specific needs of social science researchers.

In previous years CSISS described the objectives of place-based search, provided links to Alexandria and to other geolibraries. We also developed a prototype place-based search engine based on ESRI's ArcIMS and made it accessible through the CSISS web site. See the discussion about CSSAST (CSISS Social Science Archive Search Tool) in the *CSISS 2002 Annual Report*. The engine allows a researcher to define a need, by specifying a geographic area of interest and other attributes of the needed data, and then automatically searches against four of the world's most prominent archives of social science data. It uses the DDI (Data Documentation Initiative) metadata standard developed by an international consortium of social scientists.

Our effort in the past year has focused on the next logical step in this process, the refinement of DDI as a tool for describing the spatial aspects of data. The standard metadata tool for geographic data is the Federal Geographic Data Committee's Content Standard for Geospatial Metadata (www.fgdc.gov), which includes elaborate facilities for describing the geographic aspects, but pays too little attention to attributes to satisfy the needs of social scientists. On the other hand DDI pays too little attention to locations to satisfy the needs of geolibraries and our search engine. In August 2002 we convened a joint meeting of the DDI geography working group and CSISS, in Santa Barbara, in order to explore ways in which the two standards could be made to work together. The DDI working group has subsequently reported back to the DDI consortium, and we expect significant advances to be made in the coming months.

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 2003

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: (a) the increased awareness of existing spatial knowledge, making it more accessible, and (b) the generation and dispersal of new spatial knowledge and resources. All of the core programs are delivered or assisted through the website. Website content has grown to well over 600 static and dynamic pages, 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 website serves as the central hub for the summer CSISS workshops. The entire process from advertisement to participant application and all the way through the selection and review process takes place on the website. Workshop materials, such as agendas, papers, participant lists, and travel and accommodations information, are housed onsite. The number of applications for 2003 increased over 47% from that of the previous year to a total of 329 applicants.

Continuing with an experiment started in 2001, two of the 2002 workshops were filmed and edited for dissemination on the CSISS website. The workshops filmed were *Map-Making and Visualization of Spatial Data in the Social Sciences* and *Introduction to Spatial Data Analysis in a GIS Environment*. By leveraging newly available technologies we were able to markedly improve on last year's attempts, notably in the areas of image and presentation quality as well as in the selection and editing of more concentrated and coherent lecture content. We were also able to save on budget by shifting the responsibilities of filming and editing from an outside source to in-house staff. Overall we consider this year's filming efforts a success.

Specialist Meetings

The website also serves as a central point of access for CSISS specialist meetings by providing details on the meeting's agenda, description, venue, and participant list. It also hosts pre-meeting position statements and final reports. Online access to these resources greatly simplifies the organization and distribution process for these meetings.

Learning Resources

One of the primary objectives of the CSISS website is to deliver learning resources in spatial social science. Learning Resources include course syllabi, lecture outlines, presentations, learning modules, exercises, and demonstrations that convey spatial thinking and analysis.

New to the Learning Resources are the Presentations section and, more notably, the *GIS Cookbook*. The *GIS Cookbook* is a collection of simple descriptions and illustrations of GIS methods written with minimal GIS jargon. Initial efforts have produced several well-received learning modules. A solid framework has also been established to create and present new "recipes", backgrounds, and glossary terms to the end user.

Along with an expanded collection of syllabi is the addition of an experimental method of cross-referencing resources. A collapsible "related info" box is accessible under each discipline on the syllabi page, the box contains categorized links to other resources on the site that are directly related to the given discipline. This method seems to be quite effective and will be incorporated into further areas of the site.

The learning resources metadata database has expanded and the search interface has been improved, but there is still much work to be done in cataloging more resources. Existing technologies will allow the migration of the database to XML to facilitate exchange if the need arises.

Best Practices and *CSISS Classics*

CSISS Best Practice publication *Spatially Integrated Social Science* has been completed and sent to Oxford University Press for printing; due for release in December 2003. An online preview and supplement has been made available on the CSISS site. This resource provides the full table of contents with links to pages for each chapter. The publication background, objectives, and contributor biographies are also provided. Each chapter page contains the abstract, tables, and color illustrations for the chapter. Authors have been asked to provide further supplementary materials if available.

Fourteen new examples of best practice in spatial analytic social science have been added to the collection of *CSISS Classics* over the last year. We plan to implement an interface to allow the user to organize the Classics by year, discipline, and spatial principle, in addition to the current ordering by name of the innovator.

Spatial Tools

The Spatial Tools section of the website has grown to include select tools, portal links, a search engine, and an offsite link to the tools project headed by Luc Anselin at the University of Illinois, Urbana-Champaign. Remote database access has been provided for Anselin to manage and update the portal links and select tools pages. A page has also been set up on the site to showcase the long awaited GeoDa software. GeoDa consists of an interactive environment that combines maps with statistical graphics, using the technology of dynamically linked windows.

CSISS Search Engines and Place-Based Search

Search Tools

Search is the most common activity preformed on the Web. CSISS has employed five search tools to facilitate the introduction of spatially integrated techniques to students and researchers visiting the site on the Web. The search tools use Texis, a commercial product produced by Texis. This product is an industrial strength search and retrieval database program similar to those used by Google.com, Altavista.com and others.

The search tools provide significant indicators of the traffic and public outreach provided by CSISS on the Web. In terms of entry points (i.e. how users find the site), the search tools averages provide between about 10 to 20 percent of the total traffic on the site.

There are six search tools currently available on CSISS: The Literature Search Tool, The Social Science Data Archive Search Tool, The Spatial Tools Search, The Site Search Tool, the Internal Site Search and finally The Spatial Resources on the Web Tool.

The Literature Search is a compilation of hand-selected articles and books on the whole of spatially integrated social sciences. While the literature search is hand selected, the search software provides users with natural language and Boolean queries, as well as find similar and related documents. The literature search currently averages between one and two percent of the total visitors or traffic on the site.

The Social Science Data Archive Tool uses the Arch IMS architecture to allow users to select a geographic region and topic and return a series of results from the Australia, UK, Swedish and ICPSR Data Archives. The goal of the project is to provide users a spatial interface to the archives mentioned above under the DDI (Data Document Initiative) architecture. Currently this is a work in progress and usage statistics are not available. While the geographic interface is currently offline pending a system upgrade, the textual search can be tested at this URL:
http://csiss.ncgia.ucsb.edu/cgi-bin/texis/webinator/metacsiss

The Spatial Tools Search Engine provides users with access to a database of hundreds of software products and reviews appropriate for facilitating spatially integrated research in the social sciences. Luc Anselin originally compiled this index of URLs and software archives. Currently, the Spatial Tools Clearinghouse references over 700 individual software titles.

The Site Search allows users to explore and navigate CSISS.org directly, as opposed to using textual links or menu bars. The goal of this feature is to improve internal visibility and to make resources readily available to our site’s visitors. This resource is regularly one of the top 30 resources visited on the site.

By far the most popular resource of value to our users is the Spatial Resources on the Web feature. This resource is comprised of a compilation of links related to spatially integrated resources available on the Internet. The list was originally comprised of external links from CSISS and the NCGIA and has been augmented by search queries generated by our visitors. The theory is that if a user is interested in a subject related to a

field that is not in our database, then we find that resource and add it to the search index. Links that are regularly of use to our users (as measured by outgoing traffic) are maintained; those that are not eventually fade from our index.

Plans are underway to provide a user interface to save and retrieve custom search results for the CSISS search engines. This will allow the user to compile a list of relevant links and later return to the site to review them.

Currently, the top search queries to this database are as follows:

- GIS (or Map Making)
- Spatial Econometrics (or Spatial Economics)
- Spatial Interaction Modeling (or Modeling, Model, etc)
- Spatial Decision Support Systems (or SDSS)
- Spatial Statistics (or Quantitative Techniques)
- Spatial Theory (or Geographic Theory)
- Segregation (or Discrimination)
- Crime Map (or Crime Mapping)
- Spatial Autocorrelation

Website Look and Feel

Site templates have been refined and now incorporate a cleaner more professional visual quality and optimized code to allow for quicker downloads. Drop-down menus have been implemented to provide single click access to key areas of the site. A collapsible site map has also been added to provide a complete site overview on a single page.

Evaluation

Feedback forms have been added throughout the site to enable users to comment on the various resources. The *CSISS Classics* get a lot of constructive feedback from users who choose to share their thoughts. We may decide to update particular Classics if suggestions merit further development or modification.

Over the course of the last year, the number of visitors to the CSISS website has more than doubled. Some of the growth can be attributed to improvements in page metadata and correctly formed URLs, both of which contribute to the successful spidering of dynamic content. This is reflected in the high search engine visibility of the *CSISS Classics*, which themselves bring a large amount of traffic to the site.

Highly detailed traffic logs have been kept and analyzed by *WebTrends Log Analyzer*. The following statistics represent an overall view of data gathered.

Currently 456 visitors per day view an average of 1,850 pages. In recent months that number has climbed to well over 2,000 pages and 500 visitors. 18% of visitors in the past year have visited more than once and 15% percent come from outside the U.S.

Of the most popular search engines, Google has by far sent the most users to the site; close to 30,000 in the past year. Yahoo follows with just over 6,500 users and then MSN with around 2,400. Other sites delivering significant traffic to the CSSIS site are

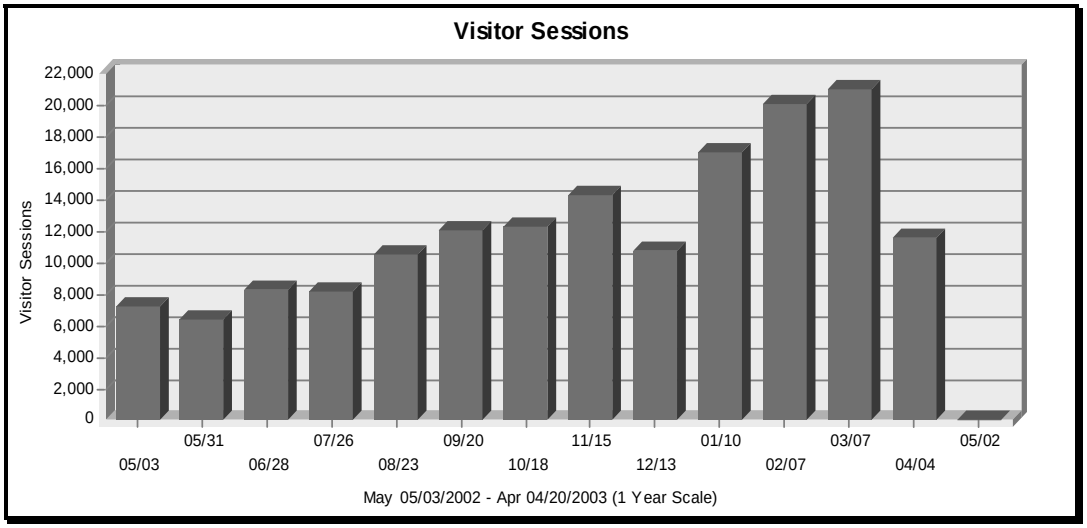
anthroglobe.net with over 6,625 users, anthro.net with close to 500, and chilca.net with just over 450.

The most requested areas of the site include *CSISS Classics* (45,148 visits), Events (32,357), Learning Resources (19,376), About Us (10,739), Tools Clearinghouse (6,076), Spatial Resources (5,422), *GIS Cookbook* (3,330) and Best Practices (1,849).

The following graphic has been included to illustrate the steady increase of interest in the CSISS web site. To get the most accurate sense of site traffic, pay special attention to the number of visits. Please note that data for the month of April are not complete.

Summary by Month

Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	KBytes	Visits	Pages	Files	Hits
Apr 2003	5989	4607	1947	482	10628	4268250	13520	54535	128999	167711
Mar 2003	7551	5693	2280	528	12681	6392440	16369	70699	176490	234082
Feb 2003	8532	6648	2975	533	11355	6200806	14942	83308	186156	238922
Jan 2003	6389	4948	1876	403	9764	5068512	12493	58158	153401	198061
Dec 2002	4875	3851	1925	301	7943	3423414	9343	59688	119403	151134
Nov 2002	5311	4265	2060	365	7913	4168992	10969	61822	127950	159334
Oct 2002	4620	3619	1622	333	7320	3445175	10325	50290	112212	143230
Sep 2002	5738	4532	2330	321	6676	3802076	9635	69904	135985	172140
Aug 2002	4716	3436	1389	249	4703	3214294	7747	43083	106544	146214
Jul 2002	6444	4659	2488	235	4419	4429067	7306	77129	144456	199790
Jun 2002	3629	2595	1253	199	3250	1333970	5993	37608	77869	108874
May 2002	3863	2709	775	221	3871	2505056	6410	22479	78565	112029
Totals						**40252052**	**125052**	**680703**	**1548030**	**2031521**



Statistics - Report Range: 05/03/2002 21:25:13 - 04/20/2003 03:57:18		
Hits	Entire Site (Successful)	1,950,453
	Average Per Day	5,541
	Home Page	29,302
Page Views	Page Views (Impressions)	651,321
	Average Per Day	1,850
	Document Views	339,832
Visitor Sessions	Visitor Sessions	160,533
Excluding CSISS internal traffic	Average Per Day	456
	Average Visitor Session Length	00:17:23
	International Visitor Sessions	14.69%
	Visitor Sessions of Unknown Origin	33.07%
	Visitor Sessions from United States	52.23%
Visitors	Unique Visitors	67,404
	Visitors Who Visited Once	55,403
	Visitors Who Visited More Than Once	12,001

These data were generated by *WebTrends*, a registered trademark of WebTrends Corporation.

CSISS Work Plan – Summer 2003

This work plan is intended to continue on-going efforts to implement and refine the core programs of CSISS. The UCSB CSISS Summer 2003 team for research and program development is not finalized and the tasks noted below are tentative. The work period will be 1 July to 30 September 2003.

General areas for development

- *GIS Cookbook* recipe entries for CSISS Learning Resources
- Updates and refinements to the Spatial Tools Clearinghouse database
- Glossary of Spatial Analysis
- *CSISS Classics* page development
- Course Syllabi identification
- Filming of Workshop – Geographically Weighted Regression
- Reviewing CSISS and NCGIA websites for missing links
- Analysis of trends in Spatial Analysis in the social sciences / index measures
- Benchmarking of CSISS and spatial analysis in the social sciences
- Learning Resources Metadata project
- CSISS search engine refinements for multi-data base searches and related directories
- FAQ narrative / help kiosk
- Integration of search engine with gazetteer-based spatial search capabilities (with web master and with liaison in the Alexandria Digital Library / ADEPT project)
- Work on a graphic visualization interface for search engine output
- Presentation development on CSISS survey results.

Information on the CSISS 2003 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 May 2002 – 30 April 2003. 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, Principal Investigator

As before, my efforts in the past year have been directed at organizing CSISS programs, overseeing the organization, managing our relationships with the Advisory Board, and promoting CSISS among new audiences. In the area of *national workshops*, I participated as an instructor in our workshop on spatial analysis using GIS in August, leading four sessions, and will repeat that role this coming July.

I made many presentations on the work of CSISS in various contexts. In June I participated in a workshop in the Bren School for Environmental Science and Management on urban sprawl, organized by economists in conjunction with an international meeting in Monterey. CSISS provided assistance to several graduate students in economics to attend the workshop. I discussed the use of GIS and spatial analysis as tools to provide a spatial perspective on sprawl. In September I participated in a meeting of NCOVR scientists at UC Irvine, and discussed spatial perspectives in that domain; and gave a similar presentation to the Quantitative Methods in the Social Sciences group at UCSB in October. Also in October I gave a keynote at a meeting on spatial statistics in Seattle, discussing the distinct worldviews of spatial statistics and GIS; and gave a guest lecture for the social sciences at Brown University. In January I gave a brownbag presentation at NSF on the value of spatial perspectives in transforming science into policy and design.

In the area of *best practices*, I worked with Don Janelle to finalize the text, which is now with the publisher. In the area of *learning resources*, I continued to provide liaison as a member of the Steering Committee of the Digital Library for Earth System Education, and as a co-PI of the Alexandria Digital Earth Prototype with links to the National Science Digital Library.

In the area of *place-based search*, CSISS has developed productive links with the Data Documentation Initiative, a worldwide effort to establish metadata standards for social science data. A joint meeting was held in August with DDI's geography working group, to define better the relationship between DDI and metadata standards for spatial data. In the area of *specialist meetings* I completed and published the report of the meeting on location-based services.

Conference and Other Presentations

"Bits of Geography". 2003 Faculty Research Lecture, University of California, Santa Barbara.

"Models for Uncertainty in Area-Class Maps". Second International Symposium on Spatial Data Quality, Hong Kong, March 2003.

"Augmenting Geographic Reality", Distinguished Lecture, Hong Kong Polytechnic University, March 2003.

"Augmenting Geographic Reality", ESRI India, Bangalore, January 2003.

"Finding the Mainstream", MapIndia 2003, New Delhi, January.

"Linking Science to Practice in Landscape Change", National Science Foundation, January 2003.

"Data Access and Data Warehousing", Keynote, GeoHealth 2002, Victoria University, Wellington, December.

"Finding the Mainstream", Keynote, Joint AURISA and ISA Conference, Adelaide, November 2002.

"Augmenting Geographic Reality", Southwest Texas State University, November 2002.

"Thinking Spatially in the Social Sciences", Brown University, October 2002.

"Augmenting Geographic Reality", University of Maryland, College Park, October 2002.

"GIS and Spatial Statistics: One World View or Two?", Spatial Statistics: Integrating Statistics, GIS, and Statistical Graphics, University of Washington, October 2002.

"What's Special about Spatial?", Quantitative Methods in the Social Sciences, UCSB, October 2002.

"Accession and Sharing of Geographic Information", CODATA, Montreal, October 2002.

"Augmenting Geographic Reality", University of Colorado, September 2002.

"What's Special about Spatial?", University of California, Irvine, September 2002.

"Field Computing", National Research Council, Mapping Science Committee, August 2002.

"Augmenting Geographic Reality", Lawrence Livermore National Laboratory, August, 2002.

"New Directions in Remote Sensing Education", NASA Workshop on Educating the Next Generation of Remote Sensing Professionals, University of New Hampshire, August 2002.

"GIS Education: The Next Level", Keynote, ESRI Education Users Conference, San Diego, July 2002.

"The Value of Spatially Explicit Modeling", Short Course on the Economics of Urban Sprawl and Land Use Change, Donald Bren School of Environmental Science and Management, University of California, Santa Barbara, June 2002.

"GIS in the Field". Keynote address, Geoinformatics 2002, Nanjing, June.

"Augmenting Geographic Reality". East China Normal University, Shanghai, May 2002.

"Augmenting Geographic Reality". University College, London, May 2002.

"The Nature and Value of Geographic Information". Association for Geographic Information, London, May 2002.

"Scales of Cybergeography". Center for Advanced Spatial Analysis, University College, London, May 2002.

Publications

Articles in Refereed Journals

J.C.J.H. Aerts, M.F. Goodchild, and G.B.M. Heuvelink (2003) Accounting for spatial uncertainty in optimization with spatial decision support systems. *Transactions in GIS* 7(2): 211–230.

S. Nusser, L. Miller, K.C. Clarke, and M.F. Goodchild (2003) Geospatial IT for mobile field data collection. *Communications of the Association for Computing Machinery* 46(1): 63–64.

T.J. Cova and M.F. Goodchild (2002) Extending geographical representation to include fields of spatial objects. *International Journal of Geographical Information Science* 16(6): 509–532.

Books

M. Duckham, M.F. Goodchild, and M.F. Worboys, editors (2003) *Foundations of Geographic Information Science*. New York: Taylor and Francis.

W. Shi, P.F. Fisher, and M.F. Goodchild, editors (2002) *Spatial Data Quality*. New York: Taylor and Francis.

Articles in Books

M.F. Goodchild (2003) Geospatial data in emergencies. In S.L. Cutter, D.B. Richardson, and T.J. Wilbanks, editors, *The Geographical Dimensions of Terrorism*. New York: Routledge, pp. 99–104.

M.F. Goodchild (2003) Data modeling for emergencies. In S.L. Cutter, D.B. Richardson, and T.J. Wilbanks, editors, *The Geographical Dimensions of Terrorism*. New York: Routledge, pp. 105–110.

M.F. Goodchild (2003) The nature and value of geographic information. In M. Duckham, M.F. Goodchild, and M.F. Worboys, editors, *Foundations of Geographic Information Science*. New York: Taylor and Francis, pp. 19–32.

T. Berger, M.F. Goodchild, M.A. Janssen, S.M. Manson, R. Najlis, and D.C. Parker (2002) Part 2: Methodological considerations for agent-based modeling of land-use and land-cover change. In *Agent-Based Models of Land-Use and Land-Cover Change: Report and Review of an International Workshop, Irvine, CA, October 4–7, 2001*. LUCC Report Series No 6. Bloomington: Indiana University, Anthropological Center for Training and Research on Global Environmental Change.

M.F. Goodchild (2002) Introduction to Part I: Theoretical models for uncertain GIS. In W. Shi, P.F. Fisher, and M.F. Goodchild, editors, *Spatial Data Quality*. New York: Taylor and Francis, pp. 1–4.

M.F. Goodchild (2002) Measurement-based GIS. In W. Shi, P.F. Fisher, and M.F. Goodchild, editors, *Spatial Data Quality*. New York: Taylor and Francis, pp. 5–17.

M.F. Goodchild (2002) Preface. In J.M. Scott, P.J. Heglund, M.L. Morrison, and others, editors, *Predicting Species Occurrences: Issues of Accuracy and Scale*. Washington, DC: Island Press, pp. xv–xvii.

M.F. Goodchild (2002) Foreword. In W.J. Craig, T.M. Harris, and E. Weiner, editors, *Community Participation and Geographic Information Systems*. New York: Taylor and Francis, pp. xix–xxiii.

Articles in refereed Conference Proceedings

Y. Leung, J.-H. Ma, and M.F. Goodchild (2003) A general framework for error analysis in measurement-based GIS: a symmary. In W. Shi, M.F. Goodchild, and P.F. Fisher, editors, *Proceedings of the Second International Symposium on Spatial Data Quality*. Hong Kong: Hong Kong Polytechnic University, pp. 23–33.

M.F. Goodchild (2003) Models for uncertainty in area-class maps. In W. Shi, M.F. Goodchild, and P.F. Fisher, editors, *Proceedings of the Second International Symposium on Spatial Data Quality*. Hong Kong: Hong Kong Polytechnic University, pp. 1–9.

M.F. Goodchild (2002) Finding the mainstream. *Proceedings, E-Futures: Into the Mainstream, a Joint AURISA and Institute of Surveyors Australia Conference*. CD

Other Publications

M.F. Goodchild (2003) GIS: Finding the mainstream. GIS Development: The Asian GIS Monthly 7(1): 8–15.

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 a formal presentation at a conference workshop organized for the American Anthropological Association in New Orleans in November 2002, and to the 2002 GIS Research UK meeting in Sheffield. 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 (Atlanta, Aug 2003), a special 4-hour workshop for the joint meeting of the Rural Sociological Society and the American Association of Agricultural Economists (Montreal in July 2003).

In the past year, my efforts have concentrated on organizing offerings for the summer 2002 National Workshop series, facilitating the development of the workshop program for summer 2003, assisting with implementation of CSISS-sponsored Specialist Meetings (Spatial Tools Development, May 2002; Spatial and Social Interactions in Economics, April, 2003). The book (jointly edited with Mike Goodchild) -- *Spatially Integrated Social Science* -- was submitted to Oxford University Press in November 2002.

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 October 2002) monthly meetings of the CSISS Executive Committee, and for updating on an annual basis a sequence of activities consistent with the CSISS Strategic Plan.

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 behavioral scientists. Currently, I serve as North American Coordinator of the STELLA (Sustainable Transport in Europe and Links and Liaisons with America) focus group on 'ICT, Innovation and the Transport System'. In January 2002, the first meeting at NSF in Arlington attracted more than 50 transportation researchers from the social sciences. I am currently organizing the group's second meeting in Newcastle UK that meets in May 2003.

Other responsibilities in the past year relate to my role as co-chair of the Centennial Planning Committee for the Association of American Geographers and co-editing one of the Association's commemorative volumes of contemporary research in geography, which will be published by Kluwer Academic in early 2004.

Presentations

Resources for Spatial Thinking and Analysis, American Anthropological Association, New Orleans, 20-24 November 2002.

Towards Spatially Integrated Social Science, Faculty of Social Science, University of Western Ontario, London, Ontario, 11 October 2002.

Issues in Space-Time Accessibility, CSISS Workshop on Accessibility in Space and Time, The Ohio State University, Columbus, Ohio, 22 July 2002.

Embedding Time in Maps of the Metropolis, and Reflections on ‘Space, Technologies, and Populations in the New Metropolis, Mobility Forum Scientific Workshop, Milan, Italy 25-26 June 2002.

Time Politics, Foresight and Transport Panel, Foresight for Transport, ‘Sustainable Mobility and Intermodality’ of the Fifth Framework Programme, European Commission, Semmering, Austria, 3-7 June 2002.

The Center for Spatially Integrated Social Science – an Overview of Objectives and Programmes, GIS Research UK 2002, Sheffield, United Kingdom, April 2002.

Collaborations in Spatial Social Science, Department of Geography, The University of Sheffield, Sheffield, UK, April 2002.

Books (in press)

DG Janelle, B Warf, and K Hansen, editors. *WorldMinds: Geographical Perspectives on 100 Problems*, commemorative publication for the Centennial of the Association of American Geographers (Kluwer Academic, in press, 2004).

MF Goodchild and DG Janelle, editors, *Spatially Integrated Social Science* (Oxford

University Press, in press, 2003).

Refereed Journal Articles and Book Chapters (in press)

DG Janelle, Time-Space Modeling, in Kimberley Kempf-Leonard, ed, *Encyclopedia of Social Measurement* (San Diego, Academic Press, in press 2004).

M-P Kwan, D. Janelle, and M Goodchild, 2003 (in press) Accessibility in Space and Time: A Theme in Spatially Integrated Social Science, *Journal of Geographical Systems* special issue, Advances in Accessibility Research, , 1-3.

A Gillespie and DG Janelle "ICT, Innovation and Transport" *Annals of Regional Science*, in press 2003.

DG Janelle, From "The Geography of the United States in the Year 2000" to the Geography of the United States in 2030' *The Professional Geographer*, in press 2003.

M Goodchild and DG Janelle "Thinking Spatially in the Social Sciences" in M Goodchild and DG Janelle, eds. *Spatially Integrated Social Science* (New York: Oxford University Press, in press, 2003).

DG Janelle, Impact of Information Technologies, in S Hanson and G Giuliano, eds, *The Geography of Urban Transportation, 3rd Edition* (NY: Guilford Press, in press 2003).

DG Janelle, Transportation, in B Feintuch and D Watters, eds, *Encyclopedia of New England Culture* (New Haven: Yale University Press, in press, 2003).

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 2002).

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 2002).

Refereed Journal Articles and Book Chapters

DG Janelle and M Beuthe. 2002. Globalization and Transportation: Contradictions and Challenges, in WR Black and P Nijkamp, eds., *Social Change and Sustainable Transport*, (Bloomington IN: Indiana University Press, 49-53.

DG Janelle. 2002. Transport Culture and the Economy of Speed: Speed Limits and Changing Patterns of Accessibility in the United States, in WR Black and P Nijkamp, eds., *Social Change and Sustainable Transport*, (Bloomington IN: Indiana University Press, 251-258.

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. 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 the immediate past-president 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. My book *Behind the Label: Inequality in the Los Angeles Apparel Industry* (University of California Press, 2000) 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. With the 2005 WTO-mandated phase-out of the Multifiber Arrangement, which established a geographically-based quota system for apparel imports, much of global apparel production is expected to move to China. I am currently involved in a research project, in conjunction with the UC Institute for Labor and Employment and a number of NGOs involved with low-wage labor, that is attempting to assess the spatial impacts of MFA phase-out, in hopes of developing programs that can mitigate the effects of job loss in apparel-producing developing nations. I am especially concerned with the global regulation and enforcement of labor standards, particularly with regard to apparel production. Another aspect concerns the ways in which national economies “move up” the commodity chain into higher value-added activities, and the extent to which such movement can translate into economic development. I continue to serve on the Advisory Council of the Worker Rights Consortium, a national organization comprised of more than 100 universities, as well as labor unions, student groups, and NGOs concerned with implementing university codes of conduct that regulate trademark licensing. During the past year I have given numerous presentations on the issue of low-wage production, and the monitoring systems that have been established to enforce codes of conduct.

A related aspect of my work concerns the development of legal regimes to regulate increasingly global businesses. *Rules and Networks: The Legal Culture of Global Business Transactions*, 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).

This year I became co-author on the 4th edition of an introductory sociology textbook (*Sociology*, NY: W.W. Norton, 2003), joining Anthony Giddens (out-going Director of the London School of Economics) and Mitchell Duneier (Princeton). The textbook has a strong emphasis on the spatial impacts of globalization.

May 1-4, 2003, I co-organized a conference at UCSB entitled "Towards a Critical Globalization Studies: Continued Debates, New Directions, and Neglected Topics." The conference, which involved some one hundred scholars, public intellectuals, and global justice activists, as well as an estimated thousand students, faculty, and people from the Santa Barbara community, had the dual purpose of examining the development of global studies in the academy and exploring the bridges between global studies and the global justice movement. Participants came from Armenia, Canada, Ecuador, France, Holland, Mexico, Pakistan, Philippines, Russia, Turkey, United Kingdom, United States, and Uruguay, among other countries. Participants included Tariq Ali, Pakistan-British novelist, playwright, social critic, and Verso Press founder-publisher; Luis Macas, leader of the Ecuadoran indigenous movement and currently Ecuador's Minister of Agriculture; Saskia Sassen, University of Chicago professor and member of the Council on Foreign Relations; Walden Bello, leader of the global justice movement and former member of the Philippine Parliament; Susan George, Paris-based author-activist, leader of the Transnational Institute and Vice-President of ATTAC; Njoki Njehu, Director of the Washington-based "50 Years is Enough!" campaign; Boris Kagarlitsky, Russian journalist, author, social critic, and former Moscow City Council member; Tom Hayden, a founder of the U.S. "new left"in the 1960s and recent California State Senator; and noted geographer David Harvey, author of the now-classic *The Condition of Postmodernity*. The conference program is available at http://www.global.ucsb.edu/projects/globalization/GlobalComputer2.pdf.

Presentations

Retail-Driven Commodity Chains and the Privatization of Enforcement: Challenges to Labor Organizing (paper presented at conference on "Towards a Critical Globalization Studies", UCSB, May 3, 2003)

Sweatshops and Low-Wage Labor in the Global Economy: Trends and opportunities for Foundations to Get Involved, Council on Foundations Annual Meeting (Dallas, Texas April 29, 2003)

Discussant, session on Political Economy of the World System, Asia in the Global Economy, American Sociological Association Annual meetings (Chicago, IL, August 2003)

Individual Exposure to Globalization in Taiwan: An Empirical Analysis (with Ming-Chang Tsai), International Sociological Association, Brisbane, Australia (July 13, 2002)

Publications

Sociology, 4th edition (with Mitchel Duneier and Anthony Giddens). New York: W.W. Norton, 2003

Luc Anselin, P.I. for CSISS Tools Development

During the period of May 2002 till April 2003, my CSISS-related efforts have continued to be primarily related to the management of the software tools development unit at UIUC. This involves activities ranging from personnel management to software design, implementation and testing. Related to this, I have made a number of presentations to various audiences about the CSISS software tools program as well as on specific methodological and software design issues.

The main focus this past year was on the launch of the GeoDa software for exploratory spatial data analysis (referred to as DynESDA in previous annual reports) and the establishment of the CSISS web site on the server of the Spatial Analysis Laboratory at the University of Illinois. I continue to lead a group of students in the programming of spatial econometric routines in the Python language (PySpace). In addition, I continue collaboration with the GeoVISTA group at the Pennsylvania State University (Alan MacEachren and Mark Gahegan) on developing a modular set of spatial data analysis functionality in the Java language. Other collaborative efforts involve Sergio Rey (San Diego State University) on space-time correlation analysis, Roger Bivand (Bergen University, Norway) on the incorporation of spatial econometric functionality in the R language, and Ned Levine (CrimeStat) on the addition of spatial regression functionality in the free CrimeStat program (distributed by the National Institute of Justice).

I have been involved in a number of other CSISS activities as well. Jointly with Sergio Rey (San Diego State University), I organized the CSISS Specialist Meeting on Spatial Tools (May 10-12, 2002) and edited a *Proceedings* devoted to this workshop. I participated in the CSISS Specialist Meeting on Spatial and Social Interactions in Economics, held in Santa Barbara April 4-5, 2003. 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. With Steve Messner (SUNY Albany), I authored a chapter on "Spatial analyses of homicide with areal data" forthcoming in the Best Practice volume edited by Mike Goodchild and Don Janelle. Another activity falling under the Best Practice program is a volume, jointly edited with Raymond Florax (Free University Amsterdam) and Sergio Rey (San Diego State University) on *Advances in Spatial Econometrics*, which will be published by Springer-Verlag in 2003.

I continue to represent the CSISS programs in a number of conference presentations and short courses, including the annual meetings of the American Society of Criminology, the American Anthropological Association and the Allied Social Science Associations.

Substantively, I continue 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 Robert Baller at the University of Iowa (funded by the National Consortium on Violence Research), some of which appeared as an article in *Homicide Studies*. I also continue 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). Some early results of this work, including new tools for space-time analysis developed under the CSISS tools program, were presented at the Allied Social Science Meetings, and at departmental seminars at the University of Illinois, the University of Texas at Dallas and the University of Wisconsin.

I continue to co-edit the *International Regional Science Review* and completed editing two special issues for this journal, one on "Spatial Analyses of Tropical Deforestation", and one on "Spatial Externalities". The latter is an outgrowth of the CSISS Specialist Meeting on this topic held in January 2001 and appeared as Vol 26 (2) in April 2003.

Presentations

DEMSEM Colloquia, University of Wisconsin, Madison, WI, April 22, 2003: "*Tools for the Exploration of Space-Time Patterns*"

Specialist Meeting on Spatial and Social Interactions in Economics, Center for Spatially Integrated Social Science, Santa Barbara, CA, April 4-5, 2003: "*Software for Spatial Econometrics: A Review and Assessment*"

Social Network and Spatial Analysis Workshop, National Consortium on Violence Research, Sarasota, FL, March 6, 2003: "*Integrating Social Network and Spatial Analysis*"

Colloquium Series, Program in Environmental and Resource Economics, University of Illinois, Urbana-Champaign, March 4, 2003: "*Tools for the Exploration of Space-Time Patterns: Applications to Concentration-Response Models"*

Colloquium Series, School of Social Sciences, University of Texas at Dallas, Richardson, TX, Feb. 27, 2003: "*Tools for the Exploration of Space-Time Patterns: Applications to Concentration-Response Models*"

2003 Annual Convention of the Allied Social Science Associations, Washington, DC, Jan 3-5, 2003: "*Tools for the Exploration of Space-Time Patterns in Concentration-Response Models*" (with J. Le Gallo, J. Murdoch, M. Thayer)

101st Annual Meeting of the American Anthropological Association, New Orleans, LA, Nov. 20-24, 2002: "*Mapping and Analysis for Spatial Social Science*"

54th Annual Meeting of the The American Society of Criminology, Chicago, IL, Nov. 12-16, 2002: "*Exploring Spatial and Temporal Patterns in Juvenile Violent Crime*" (with S. Sridharan)

GIScience 2002, Boulder, CO, Sept. 25-28, 2002: "*Web-Based Spatial Analysis Tools for the Exploration of Spatial Outliers*" (with Y-W Kim and I. Syabri)

Seminar on Spatial and Temporal Data Analysis, TerraSeer Inc, Ann Arbor, MI, Sept. 12-13, 2002: "*Introduction to Dynamic Exploratory Spatial Data Analysis using DynESDA*"

Working Group on Best Practices in Spatial Analysis, National Cancer Institute, Bethesda, MD, June 20-21, 2002.

Workshop on Geographic-Based Research in Cancer Control and Epidemiology, National Cancer Institute, Bethesda, MD, June 19, 2002: "*Geovisualization and Spatial Analysis of Cancer Data"* (with A. MacEachren).

The University at Albany, SUNY, Albany, NY, May 20-22: Short Course on "*Introduction to Spatial Data Analysis and GIS*".

Specialist Meeting on New Tools for Spatial Data Analysis, Center for Spatially Integrated Social Science, Santa Barbara, CA, May 10-11, 2002 (meeting co-organizer): "*The CSISS Spatial Tools Program*".

Publications

L. Anselin, R. Florax and S. Rey (eds.), *Advances in Spatial Econometrics. Methodology, Tools and Applications.* Berlin: Springer-Verlag, (in press).

L. Anselin, R.J.G.M. Florax and S. Rey, "Econometrics for Spatial Models, Recent Advances," in L. Anselin, R. Florax and S. Rey (Eds.), *Advances in Spatial Econometrics: Methodology, Tools and Applications*, Berlin, Springer-Verlag (in press).

L. Anselin and R. Moreno, "Properties of Tests for Spatial Error Components," *Regional Science and Urban Economics* (in press).

S. Messner and L. Anselin, "Spatial Analyses of Homicide with Areal Data," in M. Goodchild and D. Janelle (Eds.), *Spatially Integrated Social Science*, New York, Oxford University Press (in press).

L. Anselin, *GeoDa 0.9 User's Guide*, Spatial Analysis Laboratory and Center for Spatially Integrated Social Science (CSISS), Department of Agricultural and Consumer Economics, University of Illinois, Urbana-Champaign, 2003 (82pp.).

L. Anselin, "Spatial Externalities," *International Regional Science Review* 26 (2), 2003: 147-152.

L. Anselin, "Spatial Externalities, Spatial Multipliers and Spatial Econometrics," *International Regional Science Review* 26 (2), 2003: 153-166.

C-W Kim, T. Phipps, L. Anselin, "Measuring the Benefits of Air Quality Improvement: A Spatial Hedonic Approach," *Journal of Environmental Economics and Management* 45 (1), 2003: 24-39.

L. Anselin and S. Rey (eds.), *New Tools for Spatial Data Analysis: Proceedings of a Workshop*. Center for Spatially Integrated Social Science, University of California, Santa Barbara, May 2002 (CD-ROM).

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Conference on Geographic Information Science, Boulder, CO, Sept. 25-28, pp. 12-15, 2002.

L. Anselin, I. Syabri and O. Smirnov, "Visualizing Multivariate Spatial Correlation with Dynamically Linked Windows," in L. Anselin and S. Rey (Eds.), *New Tools for Spatial Data Analysis: Proceedings of a Workshop*. Center for Spatially Integrated Social Science, University of California, Santa Barbara, May 2002 (CD-ROM).

L. Anselin, "Under the Hood: Issues in the Specification and Interpretation of Spatial Regression Models," *Agricultural Economics* 17 (3), 2002: 247-267.

R. Baller, S. Messner, L. Anselin and G. Deane, "The Interchangeability of Homicide Data Sources: A Spatial Analytical Perspective," *Homicide Studies* 6 (3), 2002: 211-227.

L. Anselin and W. Tam Cho, "Spatial Effects and Ecological Inference," *Political Analysis* 10 (3), 2002: 276-297.

L. Anselin and W. Tam Cho, "Conceptualizing Space," *Political Analysis* 10 (3), 2002: 301-303.

Z. Acs, L. Anselin and A. Varga, "Patents and Innovation Counts as Measures of Regional Production of New Knowledge," *Research Policy* 31 (7), 2002: 1069-1085.

Software

L. Anselin and I. Syabri, *GeoDa, Software for Exploratory Spatial Data Analysis*, Spatial Analysis Laboratory and Center for Spatially Integrated Social Science (CSISS), Department of Agricultural and Consumer Economics, University of Illinois, Urbana-Champaign, 2003.

Helen Couclelis

My research on integrated urban models and on the geography of the information society continued this past year but has expanded to rethinking the role of spatial models within land use planning. Urban and environmental models are being developed and implemented in growing numbers around the world at considerable effort and expense in order to help understand critical processes of land use and other environmental changes. Though more recent and less well developed, models of selected spatial aspects of the information society (e.g. transportation, accessibility, economic activity location) are also attracting increasing interest within academia and governments. (This latter research area is directly connected to one of the six CSISS core programs through the themes of place-based search and location-based services). Modeling work in both these domains ultimately aims at supporting improved policymaking and indeed, especially in the case of urban and environmental models, the trend is increasingly in the direction of embedding these within Planning Support Systems (PSS) and Spatial Decision Support Systems (SDSS). However still today, more than forty years after models first entered the planning scene, their contribution to the improvement of planning methods, practices and outcomes remains quite limited. Moreover, while it is highly likely that the technological, socioeconomic and cultural transformations of the information society will have significant impacts on land use and other spatial aspects of society and the environment, these processes have thus far been studied quite independently from more traditional

processes of urban growth and change. Integrating these threads appears highly desirable at this point.

My current work is thus more than ever a 'CSISS-type project', combining a broad spectrum of social science perspectives with the spatial thinking and methods promoted by CSISS. I recently presented a keynote lecture on this topic at a major international conference in the Netherlands (see below) and I am currently working on two related manuscripts. A sabbatical leave in Spring quarter 2003 will allow me to complete these and other research papers within the next couple of months.

Presentations

"Living with uncertainty: GIS and the limits of geographic knowledge". Keynote lecture, *Accuracy 2002: 5th Inter-national Conference on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences*, Melbourne, Australia July 2002.

"The certainty of uncertainty". *GIScience 2002*, Boulder, CO. September 2002. "Modeling events, processes and actions in land use change". *Action-Oriented GIS (ACTOR) Workshop*, University of Maine, Lucerne, Maine, November 2002.

"The construction of the digital city". Invited lecture, *2003 Rackham Distinguished Faculty & Student Symposium*, University of Michigan Taubman College of Architecture and Urban Planning, March 2003.

"Where has the future gone? Rethinking the role of integrated land use models in spatial planning". Keynote lecture, *International Conference on 'Framing Land Use Dynamics*,' Utrecht, The Netherlands, April 2003.

"USA Geography as a social science". Graduate symposium presentation, Geography Department, Universite Paris-I Sorbonne, Paris, France, April 2003.

Refereed Publications

Couclelis, H. (2003). The certainty of uncertainty: GIS and the limits of geographic knowledge. *Transactions in GIS* 7:2, 165-175.

Herold M, Couclelis H, and K. Clarke (submitted). Using spatial metrics with remote sensing in the analysis and modeling of urban growth and land use change. *Computers, Environment and Urban Systems*.

Other Publications

Berger T, Couclelis H, Manson S. M., and Parker D. C. (2003) Part 1: Introduction and conceptual overview, *Agent-Based Models of Land Use and Land Cover Change*, LUCC Report Series No. 6, Indiana University.

Couclelis, H. (2003) Book review: Geographic Information Systems for Group Decision Making: Towards a Participatory Geographic Information Science, by Piotr Jankowski and Timothy Nyerges, *Transactions in GIS* 7:2, 291-293.

Couclelis, H. (2002) "Living with uncertainty: GIS and the limits of geographic knowledge". In *Accuracy 2002: 5th International Symposium on Spatial Accuracy* pp. 281-289 *Assessment in Natural Resources and Environ- mental Sciences*, eds. G. Hunter and K. Lowell, Melbourne: University of Melbourne – RMIT – Universite Laval, pp. 281-289.

Barbara Herr-Harthorn

Barbara Herr Harthorn is Associate Director of the Institute for Social, Behavioral, and Economic Research at UC Santa Barbara as well as Co-Director of ISBER's Center for Global Studies, Assistant Research Anthropologist, and Director of Social Science Research Development for the UC Santa Barbara campus. Her current research projects center on examination of the social production of racial disparities in health, looking particularly at immigrant health in California, present and past, and Anglo and Latino community health at the interface of urban and rural agricultural sectors. Current projects look at issues of maternal health, reproduction, living and working conditions, and tuberculosis treatment among Santa Barbara County female and male farmworkers. This work has examined farmworker perceptions of risks related to exposure to agricultural chemicals, including spatial dimensions of risk, 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 and policies concerned with immigrants and infectious disease, particularly tuberculosis, in the first 3 decades of this century in California. The study details the practices within California biomedicine and public health that had negative impacts on the health and health care of Latino immigrants.

Presentations

"Ethnography and Oral History," presentation in seminar, "Disciplinarity and Interdisciplinarity: Conversations for Change," UCSB Women's Studies program, May 17, 2002.

"Powerful GIS Tools to Advance Spatial and Temporal Analysis in Anthropological Research" Herr-Harthorn, B., organizer, E. Moran, chair, session of the Anthropology and Environment section, at American Anthropological Association meetings, New Orleans, Nov. 20-24, 2002.

"Workshop on Spatial Analysis in Anthropology," Herr-Harthorn, B., organizer (for Center for Spatially Integrated Social Science, at UC Santa Barbara), AAA-sponsored workshop, American Anthropological Association meetings, New Orleans, Nov. 20-24, 2002.

"Producing Inequality: Public Health's Response to Latino Immigrants with Tuberculosis,Past and Present." Paper in a panel on "Health Care for Latinos" at the Society for Applied Anthropology meetings, March 19-23, 2003, Portland, Oregon.

Discussant, Science, Religion, and the Human Experience lecture series, Anne Harrington (Harvard U) lecture on 'The "Faith Factor" in medicine; the "health factor" in religion'. April 17, 2003, Santa Barbara. Comments available online at: http://www.srhe.ucsb.edu/lectures/.

"Ethnography's place in tracing the contours of globalization," Paper presented in session on "The Global and the Local: Global Ethnographies" in the conference, "Towards a

Critical Globalization Studies," UC Santa Barbara, May 1-4, 2003.

Publications

Risk, Culture, and Health Inequality: Shifting Perceptions of Danger and Blame. B. Herr Harthorn and L. Oaks, editors. New York: Greenwood, May 2003.

"Safe exposure? Perceptions of risks from agricultural chemicals among California farmworkers," B. Herr Harthorn, In *Risk, Culture, and Health Inequality: Shifting Perceptions of Danger and Blame,* B. Herr Harthorn and L. Oaks, eds., pp. 143-162. New York: Greenwood, 2003.

"The Social and Cultural Production of Risk," L. Oaks and B. Herr Harthorn. In *Risk, Culture, and Health Inequality: Shifting Perceptions of Danger and Blame*, B. Herr Harthorn and L. Oaks, eds., pp. 3-11. New York: Greenwood, 2003.

Peter J. Kuhn

Compared to other U.S. labor economists, my interests and work are unusual in their heavy emphasis on international, interregional and other spatial comparisons. In the area of cross-national work, the 2002/3 academic year saw the publication of my edited volume *Losing Work, Moving On: International Perspectives on Worker Displacement*.[3] This twenty-two-author volume compares the frequency and consequences of worker displacement across ten industrialized economies. It also tries to identify "universal" patterns in the incidence and consequences of displacement, and attempts to assess the impacts of labor market institutions on these phenomena. In all cases the research is based on large national data sets, which offer the only way to obtain truly representative, quantitative measures of these effects.

Also in the cross-national vein, during the same period I co-directed (with Gustavo Marquez) a study of the economic effects of labor unions in Latin America, funded by the Inter-American Development Bank. Aside from descriptive research on the history of labor unions in various countries, very little is currently known about labor unions in this region, especially concerning their effects on wages, working conditions, firm productivity, profitability, investment, and a range of other outcomes. Like the displaced-worker study, a distinguishing feature of the research is the use of large national data sets (in this case of firms as well as workers) to develop truly representative, quantitative measures of effects. The volume consists of seven country studies, written by authors from throughout the region, a statistical overview chapter written by a Canadian specialist in union affiliation trends, plus a summary of results written by Marquez and myself. Work on the volume was completed in April 2003 and we expect it to appear in print soon.

My third cross-national project combines a regional with an international perspective, and is co-authored with Chris Riddell at the University of Toronto. "The Long-Term Effects of Unemployment Insurance: A Study of New Brunswick and Maine, 1940-1991" is a work in progress that studies the effects of Unemployment Insurance on a particular type

[3] In addition to securing the funding, co-ordinating the research and acting as editor, I was sole author of one of six chapters and co-author on a second.

of economy: a largely seasonal, extractive economy. While the geographic proximity of these two regions makes their industrial bases very similar, the fact that they belong to different countries makes their public policies (especially unemployment insurance) very different. This disjuncture between the relatively continuous effects of space on the underlying economy and the very discrete changes in legislation across national boundaries provides a very useful environment from which to learn how government policies affect workers. A preliminary report on the research was presented at the Canadian Economic Association meetings in Calgary, in May 2002; further work on this project is ongoing.

Finally on the international level, during the past year I continued to serve as co-editor of *Labour Economics: An International Journal*. This relatively new journal is the only labor economics journal with an explicit international focus, and is gaining rapidly in stature vis-à-vis the more traditional outlets in labor economics.

On the regional level I was involved in three projects during the past year. One consists of collaborative work with a former UCSB graduate student, Christiana Stoddard (now at Montana State University), tentatively titled "Teacher Unions, Education Reform, and Teachers' Work Hours: A Two-Decade Analysis". This project studies the effects of inter-state variation in teacher union strength, as well as in the legislation affecting teachers, on the number of hours worked by teachers. Using 20 years of microdata on reported usual weekly hours of work, we find that teachers' unions had a strong negative effect on weekly hours worked in the early part of this period, but not in the later part. This suggests either a weakening of teacher union power or a change in the general thrust of union policy over this period-- a question that certainly warrants further investigation. We also document a dramatic narrowing of the gender and race gaps in teacher hours -- facts which were completely unknown until we produced these statistics--and examine the effects of state education reform programs on teacher hours. Perhaps surprisingly, to date we have not been able to detect such an effect. We are currently exploring the ability of another factor—the average weekly work hours of women who are *not* teachers in a state—to better explain long-term trends in teachers' hours. Another fascinating feature of this study is the large and persistent difference in usual weekly work hours across U.S. states that we observe. As it is not obviously connected to other measurable aspects of state economies, we speculate that this may be due to differences in the typical spatial configurations of work and residence across states; a subject we hope to explore in future work.

Also on the regional level I have been engaged in research on the interstate diffusion of a new set of job search methods—those based on the internet—and the effects of this diffusion on both individual job search outcomes and states' economies. This past year, two outcomes of this research have been realized: a forthcoming article in the *Handbook of Economics in the Electronic Age*, and an article "Internet Job Search and Unemployment Durations" (joint with Mikal Skuterud of Statistics Canada) which has been invited for resubmission to the *American Economic Review*.

A new project with a regional focus consists of theoretical work with Carol McAusland of the Economics Department on "Trade and Superstars". Building on Sherwin Rosen's

seminal work in this area, we consider the implications of regional and international economic integration on the salaries and market shares of high-wage workers who produce quasi-public goods such as software or entertainment, as well as on overall income distribution and the economic wellbeing of other workers and of "mid-rank" and local stars.

One project I started this past year has an extremely localized spatial component. In work funded by the Dutch Social Science Research Council, joint with Arie Kapteyn and Peter Kooreman, we examine consumption and other spillovers at the level of Dutch post codes (typically a single city block). By interviewing the neighbors of persons who won the Dutch postal code lottery we hope to determine whether random shocks to a neighbor's consumption affect one's own consumption decisions (as well as one's own subjective happiness). This project is in its data collection phase.

My remaining research during the past year consists of four ongoing projects:

1. Collaborative work with Gary Charness, a junior faculty member in our department, on "Pay Compression, Pay Secrecy and Productivity: an Experimental Investigation". This is in the data-collection stage and is funded by UCSB's Academic Senate.
2. Collaborative work with Catherine Weinberger, a visiting researcher at UCSB, on our $498,000 NSF grant: "Entry, Earnings Growth, and Retention in IT careers: An Economic Study". The first survey has been completed and data analysis will start this summer.
3. Collaborative work with a graduate student, Fernando Lozano, on "Explaining the Increase in Long Work Hours Among American Men, 1979-1999". A preliminary version of the paper has been presented in seminars at the University of Victoria and The University of Texas, Austin.
4. Collaborative research with Olivier Deschenes, a junior faculty member in our department, on "Testing for Sample Selection in the Absence of Exclusion Restrictions". Deschenes is scheduled to present early results at the Australasian Meetings of the Econometric Society in summer 2003.

And four new projects:

1. Collaborative research with Arthur Sweetman of Queen's University on "Use it or Lose It? Human Capital Investment Strategies and the Earnings of Displaced Workers". This is funded by the W. E. Upjohn Institute for Economic Research. An early version was presented at the American Economics Association meetings in Washington, January 2003.
2. Collaborative research with Kelly Bedard of UCSB on "When Women Lose Work: the Impacts of Women's Job Losses on Women and their Children". This is funded by the Institute for Social, Behavioral and Economic Research (ISBER) at UCSB.
3. Collaborative research with Catherine Weinberger and Fernando Lozano on "High School Leadership Activities and the Earnings of Mexican-American Adults: Evidence from Three Decades". This is funded by the UC Linguistic Minority Research Institute.

4. Collaborative research with Catherine Weinberger on "High School Leadership Skills and Adult Labor Market Outcomes". This is funded by the American Educational Research Association.

In addition to the research program described above, during the past year I organized a CSISS specialist meeting on the topic "Spatial and Social Interactions in Economics", held April 4-5, 2003. The goal of this meeting was to assess the possible contributions of recent advances in GIS data collection/management technology and in spatial econometrics to economic research. This was accomplished by bringing together cutting-edge researchers on spatial and social interactions in the economics profession, having them present examples of their current research, exposing them to information on new developments in GIS and new spatial econometric software, and starting a discussion on possible uses of these tools, as well as further development of these tools, within economics. This meeting is described in more detail in a separate section of this report.

Conference and Other Presentations

"Leadership Skills and Wages" Society of Labor Economists, Baltimore MD (May 2002)

"The Long-Term Effects of Unemployment Insurance: A Study of New Brunswick and Maine, 1940-1991" Canadian Economics Association Meetings, Calgary Alberta (May 2002)

"Leadership Skills and Wages" Universitat Pompeu Fabra, Barcelona (June 2002)

"Leadership Skills and Wages" Universitat Autonoma Barcelona (June 2002)

"Leadership Skills and Wages" University of Heidelberg (June 2002)

"Leadership Skills and Wages" Institute for the Study of Labor (IZA), Bonn (July 2002)

"Leadership Skills and Wages" University of Arizona (October 2002)

"Leadership Skills and Wages" McMaster University (October 2002)

Comments on: "Innovation and Response in Industrial Relations and Workplace Practices Under Increased Canada-US Economic Integration" by R. Chaykowski and G. Slotsve, HRDC/Industry Canada workshop on "Social and Labour Market Aspects of North American Linkages", Montreal (November 2002)

"Explaining the Increase in Long Work Hours Among American Men, 1979-1999". University of Victoria (December 2002)

"Explaining the Increase in Long Work Hours Among American Men, 1979-1999". University of Texas, Austin (February 2003)

Publications

Losing Work, Moving on: Worker Displacement in International Perspective. (Editor) Kalamazoo, Michigan: W. E. Upjohn Institute for Employment Research, 2002.

"Summary and Synthesis", in P. Kuhn, ed. *Losing Work, Moving On: International Perspectives on Worker Displacement*. Kalamazoo, Michigan: W. E. Upjohn Institute for Employment Research, 2002.

"Worker Displacement in Canada and Japan", in P. Kuhn, ed. *Losing Work, Moving On: International Perspectives on Worker Displacement*. Kalamazoo, Michigan: W. E.

Upjohn Institute for Employment Research, 2002 (with M. Abe, Y. Higuchi, M. Nakamura, and A. Sweetman).

Stuart Sweeney

The activities I engaged in over the past year were broadly related to the goals of CSISS. My research continues to be split between industry location research, demographic analysis, and demographic forecasting. Continuing research support included grants from the National Science Foundation and the Southern California Association of Governments. I also received a small grant from the Pearl Chase Community Development Fund, UC Santa Barbara Academic Senate, to analyze school enrollment data and develop improved enrollment forecasting models. I currently have two grant proposals under review: one at NSF and another at NICHD.

In addition to presenting my own research at conferences, I tried to increase the visibility of CSISS and its activities and programs at several conferences. I participated in a session organized by CSISS Board member Peter Morrison at the Southern Demographic Association, organized a session on 'spatial tools' at the Regional Science Association International, and coordinated the presence of a CSISS information table at the 2003 Population Association of America. I also gave a series of invited demography seminar lectures at the University of Wisconsin in December 2002. Overall, my work has increasingly focused on outreach to demographers with support from CSISS board members Peter Morrison and Paul Voss. In late May I will be presenting in the first CSISS Demography workshop at Pennsylvania State University.

I continue to be interested in the use of administrative data in spatial social science analysis. That research theme is of interest to the U.S. Census Bureau and resulted in two invitations. One invitation was to speak in the Migration Speakers Series. I was also an invited participant at a workshop titled, "Developing Research Methodologies that Integrate Administrative Records with Summary Statistics from the American Community Survey."

My ongoing term as the vice-chair of the Spatial Analysis and Modeling group of the Association of American Geographers continues to provide a platform to promote the activities and programs of CSISS.

Presentations

"Correcting for sampling bias using stratified random thinning," *Regional Science Association International, San Juan, Puerto Rico, November 2002.*

"Space-time analysis of industry concentration," *Regional Science Association International, San Juan, Puerto Rico, November 2002.*

"Small area population projections using stochastic simulation," *Annual Meeting of the Association of American Geographers, New Orleans, LA, February 2003.*

"Enabling spatial demography: A review of tools and resources," *Southern Demographic Association, Austin, Texas, October 2002.*

"Enabling spatial demography: Concepts, tools, and resources," *Invited lecture, Demography Seminar, University of Wisconsin, Madison, December 2002.*

"Small area population projections using stochastic simulation," *Invited lecture, Applied Demography Seminar, University of Wisconsin, Madison, December 2002.*

"On modeling change in migration systems," *Invited lecture, U.S. Census Bureau Migration Speakers Series, May 15, 2002.*

"Stratified thinning of spatial point patterns: a cautionary tale of inference on spatially censored data," *Western Regional Science Association meeting, Rio Rico, Arizona, February 2003.*

"On the state of the geography in the BLS covered wages and employment (ES-202) series," *Western Regional Science Association meeting, Rio Rico, Arizona, February 2003.*

Publications

Peer Review Articles

Sweeney, S. and K. Konty (2002) "Population forecasting with non-stationary multiregional growth matrices" *Geographical Analysi*s.

Edward Feser and Stuart Sweeney (2003) "The geography of U.S. economic distress: Implications for development priorities." *International Regional ScienceReview.*

Karen Holmes, Dar Roberts, Stuart Sweeney, Izaya Numata, Eraldo Matricardi, Trent Biggs, Getulio Batista, and Oliver Chadwick (forthcoming) "Soil databases and the problem of establishing regional biogeochemical trends" *Global Change Biology.*

Edward Feser, Stuart Sweeney, and Henry Renski (forthcoming) "A descriptive analysis of discrete U.S. industrial complexes." *Journal of Regional Science.*

Book chapters

Edward Feser and Stuart Sweeney (2003) "Theory, methods, and a cross-metropolitan comparison of business clustering" in *Industry Location Economics*, editor Philip McCann, Edward Elgar.

Edward Feser and Stuart Sweeney (2003) "Spatially binding linkages in manufacturing product chains" in *Global Competition and Local Networks*, editors Rod McNaughton and Milford Green, Ashgate.

Stuart Sweeney and Edward Feser (2003) "Business location and spatial externalities: Tying concepts to measures" in *Spatially integrated social science: Examples in best practice*, editors M. Goodchild and D. Janelle, Oxford University Press.

Appendix A

NOTES ON THE 4TH CSISS ADVISORY BOARD MEETING 4-5 OCTOBER 2002

Radisson Hotel, Santa Barbara CA
Board Members: B. Berry (Chair), B. Bertenthal, A. Glasmeier, M. Gutmann, J. Logan, B.L. Turner, P. Voss (sitting in for P. Morrison), S. Wachter, M. Ward.
CSISS Executive Committee: L. Anselin, R. Appelbaum, H. Couclelis, M. Goodchild, B. Herr-Harthorn, D. Janelle, P. Kuhn, S. Sweeney.
CSISS staff and RAs present on Friday: C. Brown, J. Corbett, E. Sundilson, E. White, S. Ying, G. Zavala.
National Science Foundation: Richard Aspinall, Sally Kane

Friday, 4 October

Following introductions, **Don Janelle** (CSISS Program Director) gave an **overview of CSISS activities since September 2001**. A pdf version of this presentation is available on the Board's private bulletin board at http://csiss.org/xmb/

Richard Aspinall (with **Sally Kane**) gave a brief overview of **funding opportunities at NSF** that may be of relevance to CSISS and spatial social science. They noted that

The SBE Directorate Priorities for 2003-2008 include:

- Enhancing Human Resources
- Modeling Human and Social Dynamics
- Decision Making and Risk – climatic change
- Instrumentation and Data Resources Development
- Agents of Change
- Spatial Social Science – this might be cross directorate; optimistically, it could be on line for 2004

Other NSF funding opportunities include:
-ITR Information Technology Research funds (small up to $1 m, medium up to $5 m, large projects up to $15 m). GEON is a large-scale ITR project to create Cyberinfrastructure for the Geosciences.
-Science and Technology Centers 11-year funding (new initiative in 2003).
Sally Kane noted a general desire to support linkage between the social and the environmental sciences.

Aside from NSF, it was suggested that CSISS look into funding through other agencies, (e.g., USGS, NOAA (National Oceanic and Atmospheric Administration)).

NSF will be conducting a set of workshops over the next year at NSF to solicit expert advice on the structure and implementation of its priority programs.

Board met in executive session for 1 hour.

The meeting reconvened for **Presentations from CSISS**.

Mike Goodchild reviewed the **Place-based search program** and reported on the DDI Geography Working Group meeting that met in Santa Barbara in August 2002**. Linda Hill** described some of the issues regarding DDI and geographic information, possible uses of gazetteers, and the ADL (Alexandria Digital Library) services that are now available. She drew attention to the ECAI (Electronic Cultural Atlas Initiative) and its use of TimeMap – software that does a reasonably good job at space-time displays.

Discussion:
John Logan asked: where does CSISS expect to be in two years on the Place-based search program?

> Goodchild indicated a desire to have a fully operational on-line place-based search capability, but noted issues of competing standards (DDI / FGDS / Dublin) and institutional resistance – convincing social science data archives to adopt such a standard. Issues of interoperability could delay further immediate CSISS progress.

Samantha Ying (NSF REU who worked with CSISS in summer 2002, along with Carlin Wong and Ethan Sundilson) reviewed the objectives and status of the CSISS ***GIS Cookbook*** project and commented on the REU experience. The cookbook, described in the Board's briefing book, should be posted to the public section of the website later this fall.

Course Syllabi Web page – a direct response to the Board's concern at its October 2001 meeting for lack of discipline-based resources. **Peter Kuhn** described the current content for a number of disciplines and noted areas that still are missing content. He requested help from the Board in identifying course outlines and resources that could be considered. The Center is currently reviewing additional syllabi for possible inclusion in the areas of demography, history, and planning. The project requires maintenance to keep it up to date.

Discussion: **Amy Glasmeier** suggested that Public Policy might be added as a disciplinary category, and that Geography should be listed.

Amy said that CSISS should go beyond tools-oriented courses in an attempt to show greater linkage with theory development in the social sciences. She favored web resources that include live dynamic models that invite user interaction. A site at the University of Washington was mentioned.

Myron Gutmann suggested that CSISS might contact the authors of *Past Time, Past Place: GIS for History* for materials from their courses.

On mandate from the Board, scheduled presentations by John Corbett (***CSISS Classics)***, Eric White (**CSISS Search Engines**), and Mike Goodchild (**Location-Based Services Specialist Meeting**) were cancelled.

Luc Anselin presented his report on the **CSISS tools program** over lunch. Hardcopy of his PowerPoint presentation was circulated and copies of the DynESD2 user manual were on display. Discussion followed:

It was suggest that CSISS should track web access to the **DynESDA2 software**, once it is on the site. **Paul Voss** requested that a list serve for tools development and use be considered for sponsorship by CSISS.

Amy Glasmeier wanted to know when the "space-time" tools would be available? Luc noted that, currently, DynESDA2 does some space-time LISA maps and bivariate associations. But panel data tools may not be available until late summer 2003.

John Logan – how is the tools development work to be supported in the future, after CSISS? What are the best prospects for sufficient support?

Luc sees need for a large-scale initiative for funding and expressed confidence in a favorable funding outcome. He noted that the Open Source model is one way to have projects move forward even with minimal funding. He cited initiatives in Japan (Atsu Okabe). In Brazil – a government funded OpenSource GIS (headed by Gilberto Camara) is aimed against proprietary software that is too expensive for the Third World. Luc expressed advantages in tying CSISS tools development into these projects. On the other hand, staffing is seen as critical to the long-term viability of the tools project. There is a need for stable funding for professional staffing (computer programmers) and for current hardware (e.g., web servers etc.).

Executive Committee and Advisory Board in Private Discussion

Brian Berry (Chair) asked board members to convey their general concerns to CSISS.

Note from DGJ: The afternoon discussion was very informative but somewhat unstructured. My notes capture only what I could glean as the central messages from participants – participants are invited to send me amendments or more complete statements regarding their positions on issues presented. This summary follows the order of presentation. I have not attempted to restructure the discussion and I apologize in advance if I failed to capture the content or spirit of comments. I can make whatever changes are submitted, but would like to receive these by 30 October 2002. At that point, the notes will be posted to the Board's bulletin board and included in CSISS documentation.

- **BL Turner** summarized the major questions considered by the Board:
- Should there be a continuation of CSISS?
- Is there a community of spatial social science?
- If there is, how can the growth of spatial analytic users be measured?
- What can CSISS do in the next two years to transcend geography?
  Finally, what can CSISS do to improve Curricular development?

John Logan - Spatial social science will happen anyway, with or without CSISS. Spatial analysis in the social sciences is not stoppable. He thinks that tools development needs continued support but that some of the other CSISS programs should be dropped (e.g.,

place-based search). His primary concern is that no one is developing support below the level of spatial analytic technology experts. In sociology, spatial analysis is not yet in the graduate curricula, but it will probably be there in the next 5 to 10 years. There is need for substantive courses specifically targeted to sociologists. In this regard, he sees value in the new *SPACE* proposal (included in the briefing book). We need to get spatial analysis beyond geography and build human capital in other disciplines.

Amy Glasmeier – would like to see courses on the Web, but from experience at Pennsylvania State University, it is difficult to find scholars who will do this. With respect to CSISS, how will we measure whether or not CSISS has made a difference? How can the attention of CSISS be directed to integrating the tools with social science theory?

> **Stuart Sweeney** – there is a tension between tools and theory. Can we twin a technical person with a theory person to focus on presenting curricular? This was done for one of his courses for the ADEPT project (Note: This course is on the CSISS course syllabi web page and offers a large number of links to resources to illustrate course content, some of which are interactive – see http://csiss.org/learning_resources/content/syllabi/#siss.
>
> **Richard Appelbaum** – The CSISS concept is that dissemination comes from the researchers and their projects to generate a paradigm shift. There is need to spark spatial research as a stimulant to change that filters down to graduate and to undergraduate courses.
>
> **Helen Couclelis** – CSISS programs seek to create diffusion agents, but there is need for a cost-benefit analysis to assess the success of different approaches to dissemination. She noted the need to be cognizant of institutional cultures in mounting programs.

Paul Voss saw the need for spatial perspectives in his work as a sociologist and demographer. He went about learning on his own. He is now teaching 9 grad students spatial analysis in sociology and demography. His course syllabus in sociology is located on the CSISS website.
See http://csiss.org/learning_resources/content/syllabi/syllabi/soc977_01.pdf.
He expressed appreciation for the efforts of CSISS.

Susan Wachter – She sees the need to bring other social science users and geographers together to build curriculum. This is happening at the graduate level where training for research is needed. However, it will be necessary to expand this to the undergraduate level if spatial social science is to grow.

> **Peter Kuhn** – in economics, active researchers are not going to spend time on curricula development. However, if CSISS can influence leading researchers, then graduate and undergraduate courses may follow.

Mike Ward – sees the CSISS project as very ambitious and sees the development of curricula materials as far more difficult than some might imagine. *CSISS Classics*, the *GIS Cookbook* and CSISS tools are steps in the right direction.

Brian Berry – A major wave of introduction to GIS is coming on line with PhD programs. What is the additional drive that CSISS can add to stimulate collaboration in research and development of programs?

Amy Glasmeier – The need is for investigation at the theory level in order to enrich the idea pool / not just the tools pool. Current courses in economic geography are not yet using the highest level of analysis and theoretical perspectives. Why are these courses not using modern spatial analytic tools?

Susan Wachter – These types of basic courses will not arise without a CSISS-type program. The wave is there, but it needs to be directed with the help and fine tuning that CSISS programs can provide.

> **Barbara Herr-Harthorn** – Cultural anthropology is a mosaic – there is a high level of engagement in remote sensing and GIS. But, this represents a thin veneer of very sophisticated users. There is a need for broader dissemination of the methods and approaches of analysis and visualization. This is not yet a paradigm shift in anthropology.
>
> **Richard Appelbaum** – There is no tsunami of spatial work in sociology, but there is a high tide. CSISS could test curricular development – the ***SPACE*** proposal to NSF CCLI ND was submitted in June 2002.
>
> Spatial analysis is a tail waiving the dog. It should be the other way around. E.g., the **world systems research workshop** (see briefing book) will lead to specific research proposals.

Susan Wachter – She agrees with the research workshop idea.

> **Mike Goodchild** – There are no plans for a major reorientation to CSISS. But, the curricula issue needs more attention.

Someone? Could CSISS sponsor a major meeting on the Curricular issue for resource development in spatial social science?

Brian Berry asked John to comment on the spatial inequality workshop at OSU (a workshop sponsored for sociologists by the American Sociological Association). John was the CSISS representative.

John Logan noted similarity with CSISS specialist meetings, but the OSU workshop, while strong on theory, was weak on spatial analysis. There is a demand for more understanding of the tools and how they can be used.

Bennett Bertenthal – He agrees that attention to curriculum is good but he sees research as the essential task of CSISS. There needs to be a balance. He recalled when he began his appointment at Chicago that he could direct students in gaining skills in some neuroscience methodologies on their own, even though he did not have these skills.

Amy Glasmeier– I spent a summer at ICPSR. This helped develop an intuition for analysis based on a full month of intensive interaction with others in courses on data analysis.

Someone? Who comes to the workshops? CSISS workshops appear to have a junior-level focus. Should workshops be focused to a senior-level population?

> **Mike Goodchild** – does not believe that senior faculty want to go to workshops; CSISS reaches senior faculty through specialist meetings and conference presentations.

John Logan – I have taken advantage of CSISS workshops / but they move students only to a certain level. He tries to get his students talking to technical people at Albany. The workshop itself is not enough – it's an appetizer. The workshops are great, but we need to go further.

Billy Turner – the discussion is anecdotal. Why are certain groups moving quickly to spatial analysis (spatial econometrics) versus other sub disciplines? There is need to focus on applications (e.g., the ESRI conference).

> **Mike Goodchild -** The ESRI user conference attracts 15000 GIS users – but, this is not an academic conference. Our best bridge between the private sector and education is through tools and jobs.

Susan Wachter – Courses in GIS are expensive. How can modules be developed to yield a favorable cost-benefit ratio to the community?

> **Mike Goodchild** –Would this work? The sociology of social science is very complex. Economics is different from sociology and needs different modules.

Richard Aspinall - If there is a spatial social science funding program, who will NSF get proposals from?

> **Mike Goodchild**
> - Tools technology needs special funding outside of spatial social science – ITR, etc.
> - Basic Science – CSISS has built an infrastructure to understand social processes.
> - Research initiatives on major issues in social science that draw on spatial analysis should follow. Bring together scientists / two years of funding / keep the community focused on common research initiative regarding scientific issues.

- Education – prescriptive paths or modules to mix and match? Teaching disciplines is different than teaching the methods. Science develops techniques within the context of disciplines. DLESE (Digital Library for Earth Science Education) is a good example in the geo-sciences -- it has built a geo-library of learning resources to serve its needs, but the broader community can draw upon this. See www.dlese.org.

Billy Turner – agrees with Mike. He gives as examples the efforts of LUCC and CIPEC – mutual benefits. There is need to ratchet up the visibility of spatial social science by linking existing and/or new programs around major themes.

Mike Goodchild – NCEAS (National Center for Ecological Analysis and Synthesis) at UCSB is an example (a hotel concept - with periods of research in residence devoted to different themes).

Stuart Sweeney – We need to focus on career levels – e.g., mid-career grants from NSF. There is a labor shortage at this point, but this will change in time, if we focus programs on junior people.

Amy Glasmeier – likes the hotel model -- a place for 'change' for advanced scholars.

Myron Gutmann – there are mid-career awards at NIH (under subscribed – re: demographic work and related fields).

Related to the Board's questions, Is the CSISS program really set for the next two years? What can be changed? Is there flexibility for changing orientation? How are resources to be expended?

Mike Goodchild – considering the existing 7 CSISS programs:

- The website needs to be continued.
- Specialist meetings (recommended initially by the Board) are useful and should be continued. However, the themes are changeable.
- Workshops are essential.
- Place-based search – we will not make much progress on institutional end or metadata end over the next two years – this can be scaled back, but we need to be vigilant to opportunities that might arise.
- Learning resources – This is ongoing, but we are looking for novel ideas of what we can do?
- The Best Practices program will wind down when the book is published.
- The tools program is essential.
- Are there other things?

John Logan – this sounds like more of the same.

Myron Gutmann – If the Advisory Board were to suggest different allocations, how would this effect what is done?

Richard Appelbaum – we are introducing a pilot of a new kind of specialist meeting to help direct research.

Don Janelle – We are trying to make progress on research infrastructure (our primary CSISS objective), while also contributing to learning resources. We desire to move in the direction of curricular more forcefully, but additional resources are needed for this (hence, our *SPACE* proposal to NSF). We can consider different funding allocations providing they are consistent with the overall objectives of the CSISS program.

A literature database has been developed from standard online indexes to social science journals. This will be used to explore trends in spatial analysis by discipline and spatial analytic method. The analysis is in its beginning stages. We are seeking useful reference data sets to assess levels of change relative to the literature and labor resources of science generally. This will be reported tomorrow. We can use advice from the Board.

Amy Glasmeier – what affect has CSISS had?

Don Janelle – The literature database does not provide such answers; however, we have assembled entry and exit surveys from workshop participants and we carry out follow-up surveys on how workshops have impacted the work of participants 7 months later. These data provide some indication of CSISS impact. We need to do follow-up surveys of other CSISS programs.

Billy Turner – how credible are data derived from the web?

Mike Goodchild – Creditability goes beyond the web, it's based on brand, authorship, experience, etc. The intent is to make good data accessible. It is good to make census data available over the web.

Paul Voss– gets his census and remote sensing data from the web.
Paul is optimistic. Results do not happen overnight. However, his sociology students have acquired ArcView skills and spatial analytic expertise – they are using CSISS resources. The CSISS clearinghouse mechanisms are working. He would like to see fast progress on the CSISS tools development.

Brian Berry asked to hear

Reflections on the CSISS Future from the CSISS Executive Committee:

Luc Anselin

Spatial tools and statistics have exploded. CSISS is a catalyst for further development.
Workshops -- there is a role for a summer institute on spatial analysis, but this would need more human and space resources. Such an institute would give greater exposure to people over a longer period. There is no counterpart to the ICPSR model in spatial analysis.

How do we move spatial analysis into the disciplines (especially economics), even theoretical econometrics? This is happening. There is some frustration with CSISS specialist meetings. In the first two there was a clash between the infrastructure needs of CSISS and the interests of researchers. This has been resolved in more recent meetings.

Barbara Herr-Harthorn

The original grant proposal presented a broad reach to empirical and theoretical research. This is why NSF funded CSISS. CSISS should not be top down from geography. The goal should be to put social scientist researchers in touch with the technology. The disciplines need to engage at the theory level – hence, my proposal for a research meeting on health and risk assessment.

Richard Appelbaum

We need to leverage to fundamental research questions in well-focused problem areas. We need to experiment with engagement about research issues within a community of scholars, but include people from CSISS to review the spatial dimensions of these issues. A meeting on World Systems Theory would cast "flows" as a general research problem, subject to a range of approaches, e.g., hierarchical linear models and network analysis. Curricular materials could come out of this. It would be an experiment.

Peter Kuhn

Peter argues for a stronger focus on research in the next two years of CSISS. The top journals in economics are not yet using spatial methods. About 8 years ago, a color map appeared in the *American Economics Review*! (nothing since). We need to get noted economists together to stimulate with new spatial technologies. A meeting on spatial interaction would be a focus for exposing them to spatial methods.

Stuart Sweeney

There appears to be a data-method / theory dichotomy. These belong together. We need to determine how the data environment is changing and how this can be used to inform new research approaches using new technologies.

We need to consider more advanced levels of spatial analysis – more recent statistical approaches in space-time analysis and in dynamic modeling. We are in a position to put space back into the research, but we need to address how best to put space into theory.

Helen Couclelis

CSISS should move from tools to products. Infrastructure is needed to build collaborations around themes and problem areas (health, globalization, etc). We need to put the emphasis on process modeling in addition to spatial processes. New theories might grow out of this, derived from explorations of new ways of doing social science. Why is there still resistance to spatial thinking? What can we learn from exploring this question?

Discussion followed from these comments from CSISS.

Bennett Bertenthal:
Could CSISS take greater advantage of the Web to sponsor forums and access to on-line expertise? Web conferences would push the envelope for delivering CSISS. Could distance learning and other types of web collaboration be developed? With investment in televideo technology, CSISS 'brownbag' lunch discussions could be featured over the Web.

> **Peter Kuhn** – Will this bring people together by generating the need for physical contacts?

Sally Kane -- Regional EPAs (environmental protection agencies) – is this a client group for CSISS? Could these people contribute to a CSISS meeting or to its virtual programs?

> **Mike Goodchild** – this is on the edge of the CSISS mission. The social sciences are the prime focus. CSISS has tried to be as social-science oriented as possible.

- **Mike Goodchild** noted ten models for funding the future of CSISS:
  1. Large scale centers – a collaboratory
  2. The Sociology Workbench model (e.g., the San Diego Supercomputer Center)
  3. Socio Informatics
  4. Location Based Services (information technology in the field)
  5. Substantive Research
  6. Applied social science (e.g., insurance industry) linked to spatial tools
  7. Gazetteer developments in information retrieval
  8. K-12 curriculum initiatives
  9. Digital Libraries
  10. Wind-down CSISS over a few years

He asked: Is social science a fixed entity? Are there areas of social science that social scientists are not yet exploring? E.g., location-based behavior, flocking and Prince William.

Susan Wachter – As part of a wind-down strategy, a conference (not necessarily international) on the experience of CSISS could bring together people from workshops, specialist meetings, etc. to explore the results of CSISS. Maybe a killer graduate course has resulted from someone's participation in CSISS programs. Could such a meeting be considered?

> **Mike Goodchild** – there is significant risk in a large conference. There is a financial risk of about $ 50K. We would need to partner.

Susan Wachter – What about a meeting that draws participants from business, government, and academia?

> **Mike Goodchild** – This could be done if we target specific people.

Amy Glasmeier – Could ESRI underwrite the risk?

> **Mike Goodchild** -- A CSISS meeting might compete with GIScience. Mike sees difficulty in raising money for this. He is over-committed to ESRI generosity.

John Logan was pleased to hear expressions of research focus for future specialist meetings.

Saturday morning 5 October 2002

Sara Fabrikant, David Fearon, Linda Hill, and Jorge Sifuentes joined the meeting. Susan Wachter, John Corbett, Ethan Sundilson, and Sam Ying were not present for sessions on Saturday.

Jorge Sifuentes, CSISS RA, gave an overview on a preliminary analysis of **spatial social science literature**. He described the sources of the data and the goals of the analysis to identify trends by discipline in the application of different spatial analytic approaches. The intent is to establish a base for monitoring change over time. One difficulty is the identification of a suitable proxy for overall publication trends by discipline – examples included the total number of articles published by discipline in ISI journals and the overall scientific employment levels of PhDs by discipline (NSF).

Discussion pointed to the need to 'ground truth' the database (Brian Berry). Questions concerned whether or not certain classes of social science were being filtered from the database (John Logan) and the need to assess validity. General concern was expressed regarding the preliminary listings of 'leading authors' and the likelihood that the data may reflect areas that are not important (Mike Ward) or that are wrong (Myron Gutmann). Some alternative approaches were suggested – picking out specific journals from the different disciplines for detailed analysis (Mike Ward and Luc Anselin), and seeking suggestions from Board members on the appropriate listing of journals. Jorge thanked the Board for these observations and indicated that CSISS would be re-evaluating the analyses in light of the problems noted.

Don Janelle mentioned briefly the results of the CSISS **Summer 2002 workshop program** and indicated how entry and exit surveys are used to evaluate results and to plan for changes. Since most of the information was contained in the Board's briefing book, he turned the program over to Sara Fabrikant.

Sara Fabrikant presented the Perspective of a CSISS Workshop Coordinator, based on the **Map Making and Visualization of Social Science Data workshops for summers 2001 and 2002**. She illustrated the procedures for identifying instructors, reviewing and accepting participants, and the use of the Web to distribute resources over the CSISS web site (pages restricted to use by participants and instructors). She also described the filming of lecture presentations by Gamaiel Zavala and the preparation of Flash streaming video clips for eventual display as learning resources on the website.

> **Note from Don**: Board members may explore these sites by clicking 'exercises' or 'resources' on the index page for the map making workshop at:

http://www.csiss.org/events/workshops/2002/map2002/index.htm . The magic words for login: <mapmaking> and password: <maps2002>

By year's end, streaming video clips on both the Fabrikant- and Getis-led workshops will be on the website. In the meantime, you can see the progress being made by Gamaiel at http://csiss.ncgia.ucsb.edu/streaming_video/2002/ Because they are opened in a new window and are played using Flash, it will be necessary to access the clips from a browser. If you do not already have it, you can download the latest Flash player - a link is provided. Please direct any questions to Gamaiel Zavala <gamaiel@geog.ucsb.edu>

Amy Glasmeier had questions:
Amy -- how much did this workshop cost? Don indicated about $ 30 K in direct costs plus indirect costs.

Amy - Could this workshop be packaged for the Web? Sara believes that face-to-face is best; an on-line course would require too much maintenance for an academic.

Amy – How does the workshop translate into academic production – papers, proposals, etc.? Don indicated that the CSISS 7-month-later survey captures some of this information. This will be presented to the next Board meeting or in the next annual report.

Amy – could this course be repackaged to teach teachers? Sara thought this would be possible, although the current workshop is pushing the technical envelope on advanced visualization methods that might not be appropriate for teaching teachers.

Amy – Map Making is the best of the CSISS workshops (re: diversity of participants and web use). Why is it not being offered in 2003? Don noted that it would not be fair to impose on Sara for a third year. She is an untenured professor. Amy wanted to know if someone else could coordinate the workshop. Don indicated that while this might be possible, CSISS would like to reach out to other client groups with a couple of new workshops for 2003.

Amy – people are willing to pay $2000 for a GIS Certificate course. Paul Voss indicated that a MapMaking course is likely to be different. A straight GIS course may not be the best investment of time by CSISS.

Amy – Has CSISS given any thought to a Qualitative Methods course? Don and Sara noted that some qualitative methods are treated in the Map Making workshop, but there are no plans at this point to move in this direction with a dedicated workshop.

Don Janelle reviewed the proposed **Workshop program for 2003** (repeating the Getis and Kwan workshops and introducing two new workshops – one on Geographically Weighted Regression (S. Fotheringham) and one on Spatial Demographics (S. Mathews at Pennsylvania State University). General indications of course content were presented.

John Logan requested that CSISS consider a focused workshop on how to teach GIS and spatial analysis that would be useful to non-geographers. Don noted that CSISS had submitted a funding proposal to NSF DUE to focus on the needs of undergraduate course instructors in the social sciences. It was also noted that several current participants take workshops to enhance their teaching, but that most of these are in geography, where the culture of teaching spatial analysis is well established.

Mike Ward suggested that CSISS could expect a multiplier effect from workshops, whereby participants go back to their home institutions and give seminars or mini-courses on what they learned.

Someone? Asked if CSISS was ready to charge a fee to participate in workshops, similar to ICPSR charges to achieve cost recovery? **Myron Gutmann** suggested that this might be done on a trial basis for year-5 workshops. This would free up CSISS funding to spend on course resource development. **Mike Goodchild** indicated that the Getis course is the most cost-effective CSISS course, whereas the others are more experimental and may not be ready for charging participants.

Proposed CSISS Specialist Meetings for 2003-2004 were reviewed. These included:

Social Networks and Spatial Analysis in Violence Research (co-sponsored with the National Consortium on Violence Research, and UCSB's QMSS (Quantitative Methods in Social Science group). George Tita, Richard Rosenfeld, Raymond Wong, Michael Goodchild, Organizers.

Remote Sensing and the Social Sciences, or Remote Sensing, Privacy and Confidentiality. Discussions with CIESIN (Center for International Earth Science Information Network), Columbia University, and SEDAC (Socioeconomic Data and Application Center / Columbia University).

A new form of CSISS specialist meeting on **New Research Directions** is reflected in the following:

•**Globalization and the World-System,** Richard Appelbaum and Christopher Chase-Dunn, Organizers. Possible co-sponsorship with the Institute for Research on World Systems (UC Riverside)

•**Spatial Social Interactions in Economics,** Peter Kuhn, Organizer.

•**Spatial Analysis of Health Risk Perception,** Barbara Herr-Harthorn, Laura Oaks, and Susan Stonich, Organizers. Possible co-sponsorship with the Society for Medical Anthropology.These proposals (see briefing book) are oriented to establishing research proposals and agenda. Rich, Peter, and Barbara commented on their proposals and invited questions.

Discussion:

Billy Turner called attention to a new book that would be relevant to any cooperative link with CIESIN.

Bennett Bertenthal asked about the demand level for such meetings. Mike Goodchild noted that these are proactive meetings designed by CSISS and partners to build spatial

awareness in a body of research where, in some cases, there is little current demand. Hence, participants are invited to share ideas and to consider the spatial perspective. Peter noted that this was the case in economics and Barbara noted that in health risk research there was need to expose scholars to the possible uses of spatial analysis.

Amy Glasmeier asked how space fit into a meeting on health risk. Barbara Herr-Harthorn noted that the non-spatial participants working on the social construction of risk and on perception of risk were mostly unaware of spatial aspects to their problems (e.g., the mapping of hot spots of risk) and that spatial analysts could contribute to building awareness of a need for greater sensitivity to the importance of location.

John Logan liked the idea of CSISS branching out into a range of topics where spatial perspectives are less common.

Don Janelle gave a presentation on a proposal submitted by UCSB's Institute for Social, Behavioral, and Economic Research to the NSF CCLI National Dissemination program. The proposal – ***SPACE*** **(Spatial Perspectives on Analysis for Curriculum Enhancement)** was submitted in June 2002. Results are not known at this time. The proposal is based on a consortium of UCSB, Ohio State University, and the University Consortium for Geographic Information Science (approximately 60 universities are members of UCGIS).

The objectives of the proposed program are to teach the Teachers and to promote undergraduate courses in spatial analysis across a range of disciplines in the social sciences. The program would expand curricula resources in spatial social science, foster technology integration in undergraduate courses, provide follow-through professional development for teachers, encourage support networks, and achieve broad national dissemination. The primary vehicles for achieving these goals would be National Education Workshops, Instructional Development Symposia, Academic Conference Courses to Enhance Spatial Science (ACCESS), a Best Practices publication or Introducing Spatial Perspectives in Undergraduate Education, and an On-line Clearing House for Lab Exercises, Data Sets and Test Items.

In the discussion that followed, there was general support for this kind of initiative. Alternatives were suggested. **Brian Berry** wondered it was time to think of a network organization that might succeed CSISS (similar to UCGIS).

Sally Kane asked if a certificate program could be structured within such a program. She suggested that other agencies (e.g., Department of Education might be interested in this kind of proposal).

Myron Gutmann suggested that an NIH open announcement (NICHD) would lend itself for a CSISS proposal built around the training of graduate students in population research.

The Board convened in Executive session for lunch, lasting about 2.5 hours.

Joint final session of the Board and the CSISS Executive Committee

Brian Berry summed up the generic issue:
At this halfway point in CSISS, one must begin documenting the outcomes of the CSISS programmatic activities, both immediate outcomes and long-term expectations. CSISS needs to identify the lasting outcomes that are transformative beyond the period of CSISS. Can CSISS focus on the most successful activities and consider how they can be enhanced? Some activities need reflection at this point and are not ready for flagship identity.

Amy Glasmeier:
Some of the most important features (e.g., workshops) should be used to begin generating outcome measures. MapMaking is a star element of the program – maintain it as a stable part of the program from year to year. Figure out which workshops should go to a cash recovery basis and start charging in 2003.

Mike Ward:
CSISS outreach is helping and the community has benefited. The tools represent a substantial contribution. Most of the curricula concerns are well underway to solution.

Bennett Bertenthal:
The CSISS missionary role is a large and complex task. How long does it take to make a dent on communities of research interest? Prioritize resources and time to position CSISS for future activities and funding. CSISS needs to document its outcomes. Follow up with participants – send out web-based surveys to find out what they are doing with the CSISS experience.

John Logan:
The portfolio of 7 programs may be too broad – it may be time to review and scale down some activities and concentrate on those of strength. There is no point of having curricular on the web if they are not useful. It's best not to have them if they are not professional. The Place-based search system for social science data does not work well – so eliminate it at this time and substitute a statement of interest. The bibliography analysis is not a professional level at this point – it needs refinement. An outcomes assessment from past participants in specialist meetings and workshops is needed. Consider a focused meeting or conference to bring these people together again.

Paul Voss:
I have been following the center and see good results. The move beyond the past workshops to something like a demography workshop is a good choice.

CSISS might use the Board a bit more in the crafting of the draft agenda for the Meeting. CSISS might also occasionally touch bases with the Board between meetings when communication could serve to bring Board members up-to-date on certain matters, could provide the opportunity for Board input, and could give the members a stronger sense of ownership/endorsement of certain emerging plans or decisions.

Myron Gutmann:
The contributions of CSISS are evident and tangible. The Board appreciates what has been accomplished, but sees its role as a supportive critic.

Final Open Discussion:

Amy Glasmeier – More information is needed to assess the value of planned specialist meetings.
John Logan -- The outcome goals of these meetings are not clearly presented.

> **Mike Goodchild** – Precise goals are problematic since we are trying to reach new communities.
> Specialist meetings are focused on senior scholars to see whether or not they can help us define infrastructure to serve their research communities.

Amy Glasmeier – Mike's points are useful.

> **Richard Appelbaum –** The specialist meetings could also lead to new programs of research. (Amy – a good goal)

Richard Aspinall –- Would like to hear from Mike about Location-Based Services.

Sally Kane -- Having a conference at the end of the CSISS period (possibly an international meeting) could be an important part of building research communities. Sally is interested in the international component of social science community building, but notes that it takes a lot of planning. She mentioned a possible contact -- Alcira Kreimer (Disaster Management Facility of the World Bank, IFC Building in Washington).

> **Mike Goodchild** noted that Susan Wachter had mentioned on Friday that she might have access to financial resources to bring a conference about.

Paul Voss would like to see a listing of international scholars to invite.

The Bigger Picture

Brian Berry– how does **SISS** move beyond the point where dissemination from a Center is best replaced with a Network structure with coordinated activities? Is SISS ready to move to the next stage of dissemination?

> **Mike Goodchild** – drew a parallel in the transition from NCGIA to UCGIS. UCGIS saw membership as a campus-wide activity as opposed to individuals. Is this a model for designing a new SISS network or should it be a different kind of model?

> **Don Janelle** – Maybe there is an intermediate solution.

Amy – yes, an alliance approach – we would need to identify the institutions that are currently involved and involve them in defining an alliance.

Sally Kane -- The Outcomes information will be helpful for NSF. Give examples of reshaping PhDs, new courses on campuses; help to document the things that are happening.

> **Mike Goodchild** -- What about Year 6 or 6+?
> Can the Board begin to structure the Agenda for the next Board meeting?

Brian Berry – the Advisory Board needs more time for discussion internally and with the Executive Committee. It does not need as many reports – maybe the briefing book is sufficient.

Amy Glasmeier – At the next Board meeting – time will be needed to examine outcomes; CSISS needs to describe the process by which outcomes are produced. The raw data from surveys need analysis and interpretation.

Sally Kane – Prepare a list of accomplishments based on the proposal for the CSISS program. NSF is trying to understand the field and how it's moving ahead. Identify what, why, and how it's important to the field and to national dissemination.

Mike Ward – would like to see presentations on workshops, specialist meetings, nuggets, tools demonstrations, and plans for years 5 and 6.

Brian Berry – What has been the impact of the workshop on scholars? Have workshops influenced their choices?

Myron Gutmann would like to see brief presentations – and a simply set of key questions.

Paul Voss suggested presentations of less than 5 minutes, followed by specific requests for help from the Board.

> **Mike Goodchild** – there are things that cannot be accomplished in a briefing book, e.g., the results of the Location-Based Services specialist meeting. The outcomes of that meeting are measurable in terms of data, techniques, research activity, etc.

Discussion of LBS followed.

Amy Glasmeier – saw the environment and social science link as important. Results are best achieved at the global level. How does one build communication links at this level?

Sally Kane noted that Priscilla Nelson at NSF is a good contact regarding infrastructure development at the interface between social science and environment.

Richard Aspinall reminded the Board and CSISS that NSF would sponsor a workshop on spatial social science at its headquarters in early 2003.

Sally Kane wants to see how big spatial social science is. NSF may need to host more than one workshop to seek the research community's advice on funding programs.

Meeting ended at 4:00 pm

Appendix B

Extracts from the CSISS Fastlane report to the National Science Foundation

Annual Report for Period:04/2002 - 04/2003 **Submitted on:** 05/06/2003
Principal Investigator: Goodchild, Michael F. **Award ID: 9978058**
Organization: U of Cal Santa Barbara
Project Title: Center for Spatially Integrated Social Science
Project Participants
Senior Personnel
Name: Michael Goodchild

Participant Individuals:
Co-Principal Investigator(s): Richard P Appelbaum
Senior personnel(s): Donald G Janelle; Luc Anselin; Helen Couclelis; Barbara Herr-Harthorn; Linda Hill; Terence R Smith; Stuart Sweeney; Karen K Kemp; Sergio Rey
Post doctorate: Julie LeGallo
Other -- specify(s): LaNell Lucius; Christian Brown; Ben Sprague
Technician, programmer(s): Abby Caschetta; Sum Huynh; Ann Ricchiazzi; Gamaiel Zavala; Oleg Smirnov; Yongwook Kim
Graduate student(s): Jorge Sifuentes; Eric White; David Fearon; Matt Ungerer; Ibnu Syabri; Yanqui Ren; Widodo Baroka; Andre Mbassa; Nina Brown; John Corbett; Nicholas Nagle; Kevin Konty; Sortis Karkalakos; Youngihn Kho; Reshmi Theckethil;
Research Experience for Undergraduates: Ethan Sundilson; Carlin Wong; Samantha Ying
Undergraduate student(s): Scott Crosier

Partner Organizations:
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. The software tools program at UIUC moved in 2002 from UIUC's Regional Economics Applications Laboratory in Geography to facilities in the Department of Agricultural and Consumer Economics (ACE). In 2003, the Department will host the ICPSR workshops taught by Luc Anselin and promoted by the CSISS program. The establishment of the Spatial Analysis Laboratory represents a major effort by ACE to promote the use of spatial analytical techniques in social science research. The College of Agricultural, Consumer and Environmental Sciences (ACES) at the University of Illinois has made a three-year commitment towards funding the basic infrastructure of SAL.

University of California-Santa Barbara
Three organizations at UCSB are involved directly in the initiatives of CSISS: 1**. Institute 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. NCGIA is affiliated with UCSB's Department of Geography, which provides laboratory space and classrooms for CSISS workshops. 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 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 an extensive set of valued collaborators:
(1) The Interuniversity Consortium for Political and Social Research (ICPSR); CSISS has hosted ICPSR workshops in 2001 and 2002, sponsored scholarships of participants in ICPSR workshops in 2000 and 2001, and co-sponsored an Advanced Workshop on Spatial Analysis in Social Research (May 2001). Two ICPSR summer workshops are taught by Luc Anselin -- Introduction to Spatial Data Analysis and Spatial Regression Analysis. In addition, ICPSR and CSISS organized a 3-day joint Advanced Workshop on Spatial Analysis in Social Research in Ann Arbor in May 2001 (directed by Luc Anselin (CSISS) and Hank Heitowit (ICPSR)), with Michael Goodchild playing a significant role. CSISS provided scholarships to PhD Candidates from the social sciences who participated in ICPSR work workshops ($500 each) in 2000 and 2001 to help defray expenses. Since participants come from a broad range of disciplines, it was a useful way of contributing to the infrastructure goal of spreading the expertise of spatial analysis to the social sciences. Currently, CSISS and ICPSR are cooperating on introducing spatial components to the ICPSR International DDI metadata standard. A joint meeting was hosted by CSISS in August 2002 to assist in moving this forward. In addition, CSISS and ICPSR have submitted a funding proposal to NSF ITR for possible joint research on Socio Informatics.

(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. Under the organizational leadership of Dr. Michael Ward (Political Science), 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.

(3) UCLA's Center for Computational Social Science and Social Informatics (CCSSSI), in co-sponsoring a CSISS workshop on Agent-based Spatial Modeling. Under the coordination of Nicholas Gessler, CCSSSI hosted 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.

(4) The Environmental Systems Research Institute (ESRI) is reviewing with CSISS opportunities to add spatial analytic capabilities to GIS. CSISS collaborates on several fronts with its industrial partner. Jack Dangermond, the President of ESRI, is a member of the CSISS Advisory Board. In November 2001, Mike Goodchild attended a small meeting at ESRI to examine and assess alternative development directions in the area of spatial analytic tools, and that discussion continued at the CSISS Tools specialist meeting in May 2002. ESRI is working with CSISS to incorporate tools for spatial statistical analysis as part of GIS functionality, and to integrate spatial statistics within the visualization capabilities of GIS. ESRI Press recently published an excellent overview of the applications of GIS in historical research, edited by Anne Knowles. ESRI has also provided free access to its popular Virtual Campus for CSISS workshop participants. These valuable contributions help in the dissemination of GIS tools more broadly among mostly young scholars in the social sciences. Other areas of cooperation have involved research workshops on geo-browser developments (April 2003), and health research (April 2003), hosted by UCSB.

(5) The Ohio State University, in co-sponsoring CSISS workshops in 2001, 2002, and 2003 on Accessibility in Space and Time. Professor Mei-po Kwan is the director. Additional instructors include Alan Murray, Morton O'Kelly, and Michael Tiefelsdorf. Recently, OSU Geography faculty, UCGIS, and CSISS have submitted a joint proposal to NSF (DUE) for a program of national dissemination of spatial perspectives for undergraduate education in the social sciences.

(6) The University Consortium on Geographic Information Science (UCGIS), and CSISS organized and co-sponsored a Specialist Meeting on Location-Based Services in Santa Barbara in December 2001. Mike Goodchild (CSISS) and Gerard Rushton (UCGIS) were the coordinators. UCGIS /Past President Arthur Getis has organized CSISS summer workshops (2000, 2001, 2002, 2003), has attended a CSISS Executive Meeting, and participated in the CSISS Strategic Planning Retreat. In addition, UCGIS, OSU

Geography faculty, and CSISS have submitted a joint proposal NSF (DUE) for a program of national dissemination of spatial perspectives for undergraduate education in the social sciences.

(7) Association of American Geographers, in making available learning resources for dissemination through www.csiss.org. AAG gave 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), available through the CSISS Learning Resources web page. These provide superb entry-level materials on analytic techniques and basic spatial models.

(8) Centre for Advanced Spatial Analysis (CASA), University of London – cross-referencing resources on agent-based modeling. CASA is a leader in the application of agent-based modeling to understanding issues of urban development. A program to make available their instructional materials is under consideration.

(9) The Wharton School (University of Pennsylvania) sponsored a CSISS workshop on Introduction to Spatial Data Analysis in the Social Sciences, in August 2001. This attracted social scientists from universities in northeastern United States and Canada. Luc Anselin and Mike Goodchild were the primary instructors, and worked closely with Susan Wachter (member of the CSISS Advisory Board) and Ayse Can Talen.

(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. Collaboration with DLESE focuses on protocols and standards for managing large archives of learning resources. Many of the ideas developed by DLESE are directly transferable to the provision of access tools for Learning Resources on the CSISS website.

(11) CIPEC (Center for the Study of Institutions, Population, and Environmental Change, Indiana University) arranged with CSISS a jointly-sponsored workshop on applications of agent-based modeling in land use and land cover change in Oct 2001. CSISS has had a longstanding interest in spatially explicit agent-based modeling, in part because it illustrates many of the principles of spatial integration that are integral to CSISS, and in part because it represents an exciting area of cutting-edge research in the social sciences, with the potential for integration with the physical sciences. Accordingly, CSISS joined forces with CIPEC (funded under NSF's program of support for research on the human dimensions of global change, and the recipient of a recent NSF award for coupled natural and human agent-based modeling under the Biocomplexity initiative). We organized a special workshop on spatially explicit modeling in conjunction with a Sackler Symposium on agent-based modeling held under the auspices of the National Academy of Sciences at the Beckman Center in Irvine, CA in October 2001. The symposium attracted 150 participants, of whom some 25 attended the special 1.5-day workshop. A report was published jointly by CIPEC and CSISS. CSISS is maintaining a Web site and list-serve to foster continued interaction among the participants, and funded the cover for the report. Recently, Professors Emilio Moran and Eduardo Brondizio of CIPEC assisted with a CSISS workshop and special session on spatial analysis in Anthropology for the November 2002 meetings of the American Anthropological Association.

(12) Graduate School of Geography and George Perkins Marsh Institute (Clark University) -- worked with CSISS and CIPEC to sponsor the workshop on applications of agent-based modeling in landuse and land cover change that met in Irvine CA in October 2001.

(13) Department of Geography (The Pennsylvania State University) -- Exploratory Spatial Data Analysis software development and links with the GeoVista project. Luc Anselin is collaborating with Alan MacEachren and Mark Gahegan on the development of Java-based modules for spatial data analysis within GeoVISTA, and the integration of tools for the visualization of spatial and space-time associations within the GeoVista Studio framework. This leverages the current CSISS software tools development efforts in the area of dynamically linked windows and ESDA. The collaboration has resulted in a five-year joint project on 'Geovisualization and spatial analysis of cancer data,' funded by the National Cancer Institute. ESDA software, developed as part of this project, will become part of the CSISS open source initiative.

(14) Population Research Institute and the Social Science Research Institute of The Pennsylvania State University. Through the efforts to Dr. Stephen Matthews, PRI, SSRI, and the Geography Department are hosting and co-sponsoring a CSISS national workshop on Population Science and GIS in May 2003.

(15) NHGIS (The National Historic GIS project), based at the University of Minnesota -- exploring with CSISS joint initiatives regarding metadata standards for spatial data archives, and the development of learning resources on longitudinal studies using GIS and census data. NHGIS is part of a consortium with CSISS that submitted a research proposal to NSF ITR in March 2003. NHGIS is a sister to CSISS, funded under the same NSF program of support for research infrastructure in the social and behavioral sciences. We offered a pair of consecutive sessions on the two projects at the annual meetings of the Association of American Geographers in Los Angeles in February 2002. Mike Goodchild is a member of the NHGIS advisory board, and attended the first board meeting in Minneapolis in March 2002. We recognize several opportunities for intensive collaboration with NHGIS. First, NHGIS is a suitable archive for inclusion in our program of place-based search, and intends to adopt the DDI metadata standard. Second, NHGIS is a source of data to illustrate longitudinal GIS analysis, and we hope to develop a series of learning resources in conjunction with them. We will explore these and other opportunities in the coming year.

(16) University of Bergen, Norway. The CSISS spatial tools team has been exploring the enhancement of Roger Bivand's collection of R routines for spatial econometrics (the spdep package).

(17) CrimeStat. Ned Levine and Associates are working with Luc Anselin to introduce spatial regression capability in the National-Institute-for-Justice-distributed CrimeStat package.

Activities and Findings
Findings:
As an infrastructure program, CSISS does not yield research findings in the traditional sense. CSISS development of software tools, web-based search engines, literature databases, and learning resources constitute infrastructure to advance spatial social science -- they do not constitute findings in the scientific sense, though we hope they are instrumental in the support of findings through the substantive research of social scientists. These programs are described in the Activities section of the report.

Training and Development:
CSISS is employing graduate research assistants to work on the development of CSISS programs. From October 1999 through April 2003 at UCSB, seven PhD candidates, four MA/MSc students, and three REUs have contributed original work to CSISS projects. They are engaged in building data bases, developing innovate web search engines for accessing research, tools and social science data resources, authoring web pages on spatial perspectives in the social sciences, developing programming code for managing our Website, and establishing monitoring systems for determining the status of spatial analysis in the social sciences. Some of these projects have resulted in conference presentations and publications, a pattern that we expect to continue. Descriptions of researcher work plans are provided in the three previous annual reports 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 2003'.

Seven individuals, including five graduate students, have been employed at the University of Illinois, working on the spatial analysis software development project with Luc Anselin. Three of these individuals took part in the Spatial Tools Development Specialist meeting in May 2002, and three of them have co-authored scientific papers with Anselin. Over the past three summer workshop periods, an additional 14 graduate students were hired (at University of Washington, UCLA, and UCSB in summer 2000, and at UCSB and Ohio State University in Summers 2001 and 2002) to work as teaching assistants in CSISS workshops, gaining valuable technical and teaching skills. Finally, CSISS regards Workshop scholarship awardees as having '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 methodologies through their research and teaching. The CSISS National Workshop program for summers 2000, 2001, and 2002 provided nearly 300 scholars from nearly two-dozen different disciplines and from more than 150 different universities with opportunities to acquire specific research skills that will potentially enhance both their research and

teaching. The participation listings for the Year 2003 Summer Workshops will add an additional 93 scholars who will benefit from intensive training in spatial analysis. A survey completed in March 2003 (summarized in the Activities section) confirms the significant role that workshop participants play in 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. The advertising of summer workshops has attracted applications and participation from social and economic planners from Native American reservations, and from police departments and health agencies across the country. Although they may not represent the target group for CSISS programs, their inclusion in some of our workshops and meetings helps to strengthen the quality of the workshop or meeting experience for all participants.

Of more direct importance to broad public outreach, the Website www.CSISS.org represents an open resource that is available to anyone with computer access. Many of the resources we are developing are prepared in language accessible to the educated public. Our collaboration with the Association of American Geographers in making some of their high-school oriented teaching materials (ARGUS and ARGWorld) available through www.CSISS.org is one example, available through www.csiss.org since August 2001.

''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 written to be accessible to a broad audience. Currently (April 2002), there are two dozen classics appearing at www.csiss.org. In an average month, CSISS receives 30 to 40 queries about the CSISS Classics collection. More than 45,000 individuals accessed the Classics collection in the past year, since April 2002 (more details on web outreach are presented in the Activities section).

Web/Internet Site
URL(s):
- http://www.CSISS.org
- http:/www.ncgic.ucsb.edu/CSISS
- http://sal.agecon.uiuc.edu/csiss

Description:
CSISS is currently 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/. In the year ending 20 April 2003, more than 160,000 visitors (more than 450 per day visited the www.csiss.org. 18% of these, visited the site more than once.
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. Currently, there are nearly 40,000 sites in the basic database, searchable by any user-defined keywords and by directories that focus on the specialized

interests of spatial social science. CSISS also maintains an extensive web resource for literature search in the social sciences, used to monitor the progression of spatial perspectives by disciplines and research areas. In January 2002, CSISS launched another search engine to serve as a clearinghouse for information on spatial analytic tools. We are also seeking to develop a search engine that can scan social science data archives. A prototype is available on the website, but progress will require an international effort to embed spatial attributes in a standard metadata format. We are working currently with ICPSR and the Data Documentation Initiative to make achieve this. An important use of the website is in serving the administrative needs of CSISS to develop and advertise 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 Activities section of this report gives more complete information on CSISS Internet dissemination.

Other Specific Products
Product Type:
CD Rom of Meeting Proceedings
Product Description:
"New Tools for Spatial Data Analysis: Proceedings of the Specialist Meeting" Editors: Luc Anselin and Serge Rey. Contents: Twenty original research papers on software advances in spatial analysis for the social sciences. Published by CSISS, University of California, Santa Barbara, May 2002.

Sharing Information:
This is being distributed to all meeting participants and CSISS researchers, and will be made available at cost to the research community from the CSISS website.

Product Type: Data or databases
Product Description:
CSISS Web Search Engines and related databases. These include (1) The CSISS Social Science Archive Search Tool: A Place Based Search Tool for Social Science Data (CSSAST) -- this is an on-line system for searching for geo-referenced data through selected world-wide social science data archives -- it is based on the CSISS concept of 'place-based search' allowing access by place names, bounding boxes on a map, and point-to-map and click, (2) CSISS Literature database derived from diverse bibliographic sources, keyed to spatial analysis in the social sciences (about 10,000 entries, updated twice a year, and (3) the CSISS Spatial Tools Clearinghouse -- a database updated weekly for retrieving website pages that feature spatial analytic tools and measures. All of these database products are described in greater detail in the Activities section of this report.

Sharing Information:
These search engine databases are all web accessible at www.csiss.org

Product Type: Software (or netware)
Product Description:
GeoDA, the Geodata Analysis software, replaces DynESDA2 and the DynESDA extension for ESRI's ArcView 3.x GIS. It is a freestanding program, built on ESRI's MapObjects LT2 technology, using the shape file format as the standard for storing spatial information. GeoDA version 0.9 (beta) was released on 5 February 2003. GeoDA consists of a user-friendly interactive (point and click) environment that combines maps with statistical graphics, using the technology of dynamically linked windows. Besides its mapping functionality (including smoothers for rate maps), it contains the usual EDA graphs histogram, box plot, scatterplot and implements brushing for both maps and statistical plots. Maps can be constructed for points as well as polygons, and tools are provided to create one from the other (centroid computation, Thiessen polygons), as well as to construct various types of spatial weights. In addition, GeoDA contains functionality for spatial autocorrelation analysis, in the form of a Moran scatterplot and LISA maps, both univariate as well as bivariate. A first upgrade is slated for release around 5 May 2003, with extended functionality in terms of data input and output, and refinement of the spatial autocorrelation statistics for rates. It is anticipated that upgrades will continue to be released at roughly three-month intervals.

Sharing Information:
GeoDA can be downloaded from the CSISS site and comes with an installation program, an 82 pp. User's Guide and three sample data sets that are widely referred to in the social science literature (Cressie's data on SIDS deaths in North Carolina counties, Anselin's Columbus crime data set and Dubin's point data set on Baltimore house sales). A system was put in place on the e-commerce server in the Department of Agricultural and Consumer Economics at UIUC to implement safe downloads and keep statistics on downloading activity. The system will also enable a safe and efficient handling of orders for later shrink-wrapped versions of the software on CD, etc. To date (28 April 2003) over 300 unique downloads of GeoDA have been recorded since its launch on February 5. Technical details can be found in Anselin, L. (2003), *GeoDA 0.9 User's Guide*. Spatial Analysis Laboratory, Department of Agricultural and Consumer Economics, University of Illinois, Urbana-Champaign.

Contributions
Contributions within Discipline:
CSISS serves the collective social and behavioral sciences through the common theme of spatial analysis. 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 Resources, and the development of web resources (for example, CSISS Internet Search Engines for data, tools, and literature) provide new research techniques and information resources that are of value to anyone interested in spatial analysis in the social sciences.

CSISS-organized specialist meetings draw expert participants from a range of disciplines on topics of broad interest to spatial analysis ('Social Inequality and Equity' in November 2000; 'Spatial Externalities' in January 2001; 'Location-Based Services' in December 2001; 'Spatial Tools Development' in May 2002; and 'Spatial and Social Interactions in Economics' in April 2003. Reports from these meeting offer concrete suggestions for the kinds of training and research resources that would best serve students, instructors, and researchers in the social sciences.

CSISS workshop programs for 2000 (75 participants from 12 disciplines), 2001 (approximately 150 participants from about two dozen disciplines), 2002 (95 participants from 15 disciplines) help spread understanding of spatial analytic methods to a cross section of young scholars. These are described in the Activities section of the report.

CSISS also provides modest assistance to other multi-discipline organizations that feature uses of spatial perspectives in their work. This support is usually in the form of travel awards for graduate student participation. With Florida International University (Center for Transnational and Comparative Studies) CSISS co-sponsored a Workshop on Political Processes and Spatial Analysis, which met in Miami, Florida, 5-6 March 2001. In March 2000, similar support was made available to this group for a meeting at the University of Colorado. In November 2001, support for graduate students was provided for participation in the Digital Communities 2001 conference in Chicago. We are currently funding the cost of a cover for a book that is based on work presented by researchers at the CSISS co-sponsored workshop in Irvine CA (Oct 2002) on Agent-Based Modeling and Land Use Land Cover Change. In addition, CSISS provided awards for 8 graduate students to participate in a Short course on the Economics of Urban Sprawl and Land Use Change, at UCSB on 22 June 2002, organized by Antonio Bento in conjunction with the World Congress of Environmental and Resource Economics that met in Monterrey 24-26 June 2002.

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'. Nonetheless, CSISS has made substantive contributions in bringing together researchers from computer science and engineering disciplines -- especially through the May 2002 specialist meeting of spatial analytic software developers, and an April 2003 meeting sponsored at UCSB on geobrowser technologies for implementing the concept of 'digital earth'.

Contributions to Human Resource Development:
The National Workshop program brings together scholars from a mix of disciplines from across the country to explore the theory and applications of spatial analysis in the social sciences in intensive one-week programs. 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. Over the period 2000-2002, these workshops attracted scholars from dozens of universities, mostly PhD candidates, post-doctoral scholars, and untenured assistant professors. About 45 percent were women. For the 2003 workshop program, 93 participants were selected from 328 applicants. The interest in these workshops expanded 46% over the previous year. Participants have an opportunity for uninterrupted study and discussion about research techniques with an exceptional set of peer scholars and leading spatial analysts. CSISS survey results affirm the positive impact of this experience on research and teaching.

CSISS has also provided hands-on experience for about nearly three dozen student researchers (graduates and undergraduates) over the past 3.5 years, described elsewhere in the report.

Contributions to Resources for Research and Education:
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 and Engineering:
The CSISS tools development program is likely to have spillover benefits beyond academic and scientific research. The December 2001 Specialist Meeting on Location-Based Services brought together commercial, academic, and government innovators to explore common issues in an area of rapid technical change and broad social implications. A report on this workshop is available on the CSISS web site -- it has attracted several thousand hits since it was made available in June 2002.

A May 2002 Specialist workshop for spatial analytic tools software developers convened a group of academic and commercial spatial-analytic software developers to review the status of ongoing work and to recommend protocols to facilitate interoperability of software products and to establish a clearinghouse for open-source software. This project is reported on in greater detail in the Activities section of the report. 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. This initiative could also benefit research and the implementation of digital governance.

Special Requirements
Special reporting requirements: None
Change in Objectives or Scope: None
Unobligated funds: less than 20 percent of current funds
Animal, Human Subjects, Biohazards: None
Categories for which nothing is reported: None