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I. GENERAL INFORMATION

A. Education

1999. Ph.D., Geography, University of California Santa Barbara. Major field: Transportation and location science (advisor: Richard Church); Minor field: Geographic information science (advisors: Michael Goodchild and Helen Couclelis).
1995. M.A., Geography, University of California Santa Barbara. Major field: Transportation and location science (advisor: Richard Church); Minor field: Geographic information science (advisors: Michael Goodchild and Helen Couclelis).
1986. B.S., Computer and Information Science, University of Oregon. Minor in mathematics. Field: software engineering.

B. Research and Teaching Interests

Transportation and location science, risk and emergency management, geographic information science.

C. Professional Experience

- 1999 – present. Assistant Professor, Department of Geography, University of Utah, Salt Lake City.
1997. Summer Research Intern, National Center for Ecological Analysis and Synthesis (NCEAS), Santa Barbara.
- 1993 - 1996. Research Assistant, National Center for Geographic Information and Analysis (NCGIA), University of California, Santa Barbara.
- 1992 - 1997. Teaching Assistant, Department of Geography, University of California, Santa Barbara.
- 1987 - 1992. Systems Analyst and Software Engineer. Matthew Bender & Co., Inc., Oakland, California.

D. Other Professional Activities

- 2001 - present. Director, Certificate Program in Geographic Information Science, Department of Geography and Department of Computer Science, University of Utah.
- 2001 - present. Academic Councilor, GIS Specialty Group, Association of American Geographers.
- 1999 - present. Associate Director for Research, Center for Natural & Technological Hazards (C^{nth}), Department of Geography, University of Utah.

E. Editorial Board Memberships

- 2001 - present. Computers, Environment and Urban Systems, Paul Longley (ed.).

F. Professional Honors, Fellowships, and Awards

2003. Fellowship, Next Generation of Hazards Researches. \$3000.
- 1996 - 1999. Dwight D. Eisenhower Doctoral Fellowship, National Highway Institute (NHI), Federal Highway Administration (FHWA), Department of Transportation, \$59,000.
1995. International Geographic Information Foundation (IGIF) Award for Best Student Paper, GIS/LIS '95, Nashville, Tennessee, \$1000.
1995. Outstanding Student in Transportation, University of California Santa Barbara, Western Coal Transportation Association, \$1500.

II. RESEARCH AND RELATED ACTIVITIES

A. Journal articles and book chapters

2004. Cova, T.J. Cova, T.J., and Conger, S. (2004) Transportation hazards, in Transportation Engineers' Handbook, M. Kutz (ed.), in press.
2003. Cova, T.J., and Johnson, J.P., A network flow model for lane-based evacuation routing, *Transportation Research Part A: Policy and Practice*, in press.
2002. Cova, T.J. and Johnson, J.P., Microsimulation of neighborhood evacuations in the urban-wildland interface, *Environment and Planning A*, 34:12, 2211-2229.
2002. Cova, T.J. and Goodchild, M.F., Extending geographic representation to include fields of spatial objects, *International Journal of Geographic Information Science*, 16, pp. 509-532.

2000. Cova, T.J., and Church, R.L., Contiguity constraints for single-region site search problems, *Geographical Analysis*, 32, pp. 306-329.
2000. Church, R.L., and Cova, T.J., Mapping evacuation risk on transportation networks with a spatial optimization model, *Transportation Research Part C: Emerging Technologies*, 8, pp. 321-336.
2000. Cova, T.J., and Church, R.L., Exploratory spatial optimization in site search: a neighborhood operator approach. *Computers, Environment, & Urban Systems*, 24, pp. 401-419.
2000. Radke, J., Cova, T.J., Sheridan, M.F., Troy, A., Lan, M., and Johnson, R., Application challenges for GIScience: implications for research, education, and policy for risk assessment, emergency preparedness and response, *Urban and Regional Information Systems Association (URISA) Journal*, 12:2, pp. 15-30.
1999. Cova, T.J., GIS in emergency management. in *Geographic Information Systems: Principles, Techniques, Applications, and Management*, Longley, P., Goodchild, M.F., Maguire D., Rhind D. (eds), pp. 845-858.
1997. Cova, T.J., and Church, R.L., Modeling community evacuation vulnerability using GIS. *International Journal of Geographical Information Science*, 8(11), pp. 763-784.

B. Conference Papers

2001. Cova, T.J. and Johnson, J.P., Evacuation analysis and planning tools inspired by the East Bay Hills Fire, California's 2001 Wildfire Conference: 10 years after the 1991 East Bay Hills Fire, Oakland, October.
2001. Hepner, G.F., Cova, T.J., Forster, R.R., and Miller, H.J., Use of Remote Sensing and Geospatial Analysis for Transportation Hazard Assessment: an Integrated University, Government and Private Sector Consortium, IEEE/ISPRS Joint Workshop on Remote Sensing and Data Fusion over Urban Areas proceedings, IEEE-01EX482, Rome, Italy, pp.241-244.
2000. Atwood, G., and Cova, T.J., Using GIS and linear referencing to analyze the 1980s shorelines of Great Salt Lake, Utah, USA. 4th International Conference on Integrating GIS and Environmental Modeling (GIS/EM4): Problems, Prospects and Research Needs. Banff, Alberta, Canada, September 2-8.
1997. Cova, T.J., and Church, R.L., An algorithm for identifying nodal clusters in a transportation network. University Consortium for Geographic Information Science (UCGIS) Summer Retreat, Bar Harbor, Maine, June 15-21.

1995. Cova, T.J., and Church, R.L., A spatial search for neighborhoods that may be difficult to evacuate, *Proceedings GIS/LIS '95*, ACSM/ASPRS, Nashville, Tennessee, vol. 1, pp. 203-212.
1995. Goodchild, M.F., Cova, T.J. and Ehlschlaeger, C., Mean geographic objects: extending the concept of central tendency to complex spatial objects in GIS, *Proceedings GIS/LIS '95*, ACSM/ASPRS, Nashville, TN, vol. 1, pp. 354-364.
1994. Cova, T.J. and Goodchild, M.F., Spatially distributed navigable databases for intelligent vehicle highway systems (IVHS), *Proceedings GIS/LIS '94*, ACSM/ASPRS, Phoenix, Arizona, pp. 191-200.

C. Other Publications

2002. Cova, T.J. (2002) Like a bat out of hell: simulating wildfire evacuations in the urban interface, *Wildland Firefighter Magazine*, November, 24-29.
2000. Cova, T.J. (2000) When all hell breaks loose: firestorm evacuation analysis and planning with GIS, GIS Visions Newsletter, August, *The GIS Cafe*, http://www.giscafe.com/GISVision/Aug/Los_Alamos.html.
1996. Church, R., Cova, T., Gerges, R., Goodchild, M., Conference on object orientation and navigable databases: report of the meeting. *NCGIA Technical Report 96-9*.
1994. Church, R., Coughlan, D., Cova, T., Goodchild, M., Gottsegen, J., Lemberg, D., Gerges, R., Caltrans Agreement 65T155, Final Report, *NCGIA Technical Report 94-6*.

D. Papers in Progress

2003. Cova, T.J., Sutton, P.A, Theobald, D.T., Urban change detection in fire-prone regions with nighttime satellite imagery, in review.
2003. A spatial framework for modeling hazards to transportation systems, *Transactions in GIS*, *to be submitted*.

E. Invited Lectures, Presentations and Participation

2003. "When all hell breaks loose: new methods for wildfire evacuation planning," Departmental colloquium, Department of Geography, University of Arizona, January.
2002. "When all hell breaks loose: new methods for wildfire evacuation planning," Departmental colloquium, Department of Geography, Western Michigan University, November.

2001. "Regional evacuation analysis in fire-prone areas with limited egress," Departmental colloquium, Department of Geography, University of Denver, May.
2000. "Integrating Site Search Models and GIS," Colloquium, Department of Geography, Arizona State University, February.
1999. "Site Search Problems and GIS," Colloquium, Department of Geography, University of Utah.
1996. "A spatial search for neighborhoods that may be difficult to evacuate," Colloquium, Department of Geography, University of California Santa Barbara.
1995. "A spatial search for neighborhoods that may be difficult to evacuate," Regional Research Lab, Bhopal, India.
1995. "A spatial search for neighborhoods that may be difficult to evacuate," Indian Institute of Technology (IIT), Bombay, India.

F. Papers Presented at Professional Conferences

2002. Cova, T.J., Extending geographic representation to include fields of spatial objects, GIScience 2002, Boulder, September.
2002. Husdal, J. and Cova, T.J., A spatial framework for modeling hazards to transportation systems, Association of American Geographers, Los Angeles, March.
2001. Cova, T.J. and Johnson, J.P., Evacuation analysis and planning tools inspired by the East Bay Hills Fire, California's 2001 Wildfire Conference: 10 years after the 1991 East Bay Hills Fire, Oakland, October.
2001. Cova, T.J., Husdal, J., Miller, H.J., A spatial framework for modeling hazards to transportation networks, Geographic Information Systems for Transportation (GIS-T 2001), Washington DC, April.
2001. Cova, T.J., Miller, H.J., Husdal, J., A spatial framework for modeling hazards to transportation systems, *Annual Meeting of the Association of American Geographers (AAG)*, New York, New York, February.
2000. Cova, T.J., Church, R.L., Goodchild, M.F., Extending geographic representation to include fields of spatial objects, *GIScience 2000*, Savannah, Georgia, November.

2000. Cova, T.J. Microscopic simulation in regional evacuation: an experimental perspective, *Annual Meeting of the Association of American Geographers (AAG)*, Pittsburgh, Pennsylvania, March.
1999. Cova, T.J., and Church, R.L., "Exploratory spatial optimization and site search: a neighborhood operator approach," *Geocomputation '99*, Mary Washington College, Fredricksburg, Virginia.
1999. Cova, T.J., and Church, R.L., "Integrating models for optimal site selection with GIS: problems and prospects," *Annual Meeting of the Association of American Geographers (AAG)*, Honolulu, Hawaii, March 29.
1998. Cova, T.J., and Church, R.L., "A spatial analytic approach to modeling neighborhood evacuation egress," *Annual Meeting of the Association of American Geographers (AAG)*, Boston, Massachusetts.
1997. Church, R.L., and Cova, T.J., "Location search strategies and GIS: a case example applied to identifying difficult to evacuate neighborhoods," *Regional Science Association Annual Meeting*, November 6-9, Buffalo, New York (presented by R. Church).
1997. Cova, T.J. and Church, R.L., "An algorithm for identifying nodal clusters in a transportation network," *University Consortium for Geographic Information Science (UCGIS) Summer Retreat*, Bar Harbor, Maine, June 15-21.
1996. Cova, T.J., Church, R.L., "A spatial search for difficult neighborhoods to evacuate using GIS," *GIS and Hazards Session, Association of American Geographers (AAG)*, Charlotte, North Carolina, April.
1995. Cova, T.J., Church, R.L., "A spatial search for neighborhoods that may be difficult to evacuate," *GIS/LIS '95*, Nashville, Tennessee.
1995. Goodchild, M.F., Cova, T.J. and Ehlschlaeger, C., "Mean geographic objects: extending the concept of central tendency to complex spatial objects in GIS," *GIS/LIS '95*, Nashville, Tennessee, (presented by T. Cova).
1994. Cova, T.J. and Goodchild, M.F., "Spatially distributed navigable databases for intelligent vehicle highway systems (IVHS)," *GIS/LIS '94*, Phoenix, Arizona.

G. Grants

a. Funded

- 2000-2001. Modeling human vulnerability to environmental hazards. Salt Lake City Corporation and FEMA. \$20,000.

- 2000-2004. National Consortium for Remote Sensing in Transportation (NCRST): Disaster Assessment, Safety, and Hazards (DASH) research focus. \$600,000. Co-investigator with George Hepner (PI), Harvey Miller and Rick Forster.
1999. Microscopic traffic simulation of regional evacuations: computational experiments in a controlled environment. Faculty Research Grant (FRG), University Research Committee, University of Utah, \$5980.
1999. Regional evacuation analysis in fire prone areas with limited egress. Proposal Initiative Grant (PIG), College of Social and Behavioral Sciences, University of Utah, 1999, \$4000.
1999. AAG Enrichment grant to invite Michael Sheridan from SUNY Buffalo to the “GIS and Hazards” paper session at the Annual Meeting in Pittsburgh, Pennsylvania, \$335.
- b. Not funded
2002. Space-time measures of human vulnerability. National Science Foundation, \$230,000, with Harvey Miller.
2000. Analyzing spatial and temporal patterns in wildfire evacuations. National Science Foundation, \$59,451.

H. Membership in Professional Organizations

- 1993 - present. Association of American Geographers.
 1996 - present. Regional Science Association International
 1996 – present Association of Photogrammetry and Remote Sensing (ASPRS)

III. SERVICE

A. Professional and Community Service

1. Referee Duties

Journals

Applied Geography	one manuscript, 2001
Computers, Environment & Urban Systems	six manuscripts, 1997, 1999, 2000, 2001a, 2001b, 2001c, 2002a, 2002b, 2002c
International Journal of Geographical Information Science	four manuscripts, 1998, 1999, 2000a, 2000b, 2002a, 2002b
Networks and Spatial Economics	one manuscript, 2001
Photogrammetric Engineering and Remote Sensing	one manuscript, 2001
Transportation Research C: Emerging Technologies	one manuscript, 1999

Proposals

Center for Disaster Management & Humanitarian Assistance	two proposals, 2001
Faculty Research Grant, University of Utah	one proposal, 1999
Research Grants Council, Hong Kong	one proposal, 2001
UCGIS Research Committee	one proposal, 2000

2. Activities at Professional Conferences

2002. **Paper session organizer**, GIS Specialty Group Student Paper Competition, 98th Annual Meeting of the Association of American Geographers, Los Angeles, March 19-23.
2000. **Paper session co-organizer** (with Michael J. Hodgson), "GIS and Hazards," 96th Annual Meeting of the Association of American Geographers, Pittsburgh, Pennsylvania, April 4-8.
1999. **Paper session organizer**, "Location Modeling and GIS," 95th Annual Meeting of the Association of American Geographers, Honolulu, Hawaii, March 23-27.

B. University Service

- 1999 - present. Campus Delegate, University Consortium for Geographic Information Science (UCGIS).

C. College Service

None to date.

D. Departmental Service

2001. Invited Tom Painter from the University of California Santa Barbara to present a colloquium entitled, "Characterizing the Alpine Snowpack: Hyperspectral Goniometry to Imaging Spectroscopy".
2001. Invited Dr. Max Moritz from Cal Poly San Luis Obispo to present a colloquium entitled, "Spatio-temporal analysis of controls on shrubland fire regimes: age dependency, fire hazard, and suppression".
- 1999 – 2000. Chair of the Geographic Information Science Committee, Department of Geography, University of Utah.
1999. Invited Dr. Paul Sutton from the University of Denver to present a colloquium, "Census from heaven?: an estimate of the global human population using nighttime satellite imagery."

1999. Authored and graded six master's comprehensive questions for the GIS specialty focus.

IV. TEACHING

A, Typical Course Schedule

GEOGR 3140 Introduction to Geographic Information Systems (GIS) (3 credit hours). This course is an introduction to the conceptual and methodological issues associated with using digital geographic information to reason about the world. Students will be introduced to common geographic data models, data structures, and the analysis, visualization, and query of spatial data. A number of traditional GIS applications will be presented across a range of disciplines. The social, economic, and legal issues associated with using a GIS will also be examined. GIS principles will be provided in lectures, and a corresponding hands-on implementation of these principles will be provided through a series of lab exercises.

GEOGR 5140/6140 Method in GIS (4 credit hours) This course is a practical introduction to the principles and tasks associated with utilizing a geographic information system (GIS) to support geographic inquiry and decision making. Students that wish to take this class should have a conceptual understanding of the fundamental issues associated with modeling geographic reality in a GIS environment (e.g. geographic data models, basic GIS operations, common applications). The purpose of this course is to strengthen a student's technical knowledge of the common tasks that an analyst faces in applying a GIS to a particular spatial problem. The lab sections offer an opportunity to gain hands-on experience using a leading commercial GIS to complete a series of well-defined projects.

GEOGR 6960 Seminar in: (3 credit hours)

Spring 2000 - Modeling Human Vulnerability to Environmental Hazards. Assessing human vulnerability to environmental hazards is a critical component in characterizing risk. A vulnerable community can amplify the adverse consequences of a hazardous event. This is a challenging concept to define, model, and measure. It exists in many forms and varies geographically, by hazard, across scales, and over time. This seminar will review contemporary theories, mathematical/computational models, and empirical research designed to improve our understanding of human vulnerability to hazards. A primary focus will be on spatial models of vulnerability and their corresponding integration with hazard models in a GIS environment. Participants will have the opportunity to work with Utah's Division of Comprehensive Emergency Management (CEM) on the vulnerability assessment for Moab and Logan counties. This is part of FEMA's "Project Impact", a national movement to build disaster resistant communities.

GEOGR 6960 Seminar in: (3 credit hours)

Fall 2000 - Transportation and Hazards.

Transportation systems are designed to move people and resources efficiently, economically, and safely under normal operating conditions. In this seminar, we'll examine the impact of extreme natural and technological events on these systems. During many hazardous events, transportation infrastructure is disabled in some form by environmental processes like floods, earthquakes, fires, landslides, and many other events. The same system that is disrupted by these processes also plays a critical role during a hazardous event as a means for deploying resources and for moving people and property to safety. The recent fires in Los Alamos are one example of where a very constrained transportation network was partially disabled and still utilized to successfully move thousands of people to safety. The course will be based on a series of readings, software demonstrations, and field work (transportation systems are disabled often in Utah).

B. Graduate Committees

1. Chaired M.A. committees

- 2000 - present. Johnson, Justin, "Microsimulation of neighborhood evacuations", Geography.
- 2000 - present. Nelms, Lorraine, "Improved Community Earthquake Vulnerability Analysis using GIS"

2. Membership on Ph.D. committees

- 2000 - present. Hung, Ming, "Monitoring and visualizing urban growth by subpixel remote sensing", Geography.
- 2000 - present. Hernandez, Michael, "A procedural model for developing a GISci-based multiple natural hazard assessment: case study - southern Davis County, Utah," Geography.
- 2000 - present Solomon, Vickie, "Assessing the connectivity between trans-boundary grizzly bear populations," Geography.
- 1999 - present. Baumgrass, Lynn, "Implications of Arctic warming as determined by snowmelt onset dates," Geography.
- 1999 - present. Wu, Yi-Hwa, "Dynamic models of space-time accessibility," Geography.
- 1999 – present. Minton, Daphne, "Chronic technological hazard: the case of agricultural pesticides in the Imperial Valley, California," Geography.

3. Membership on M.A. committees

- 1999 - present. Barney, Chris, "Planning future urban cores," Geography.
- 1999 - present. Smith, Greg, "Modeling snow melt runoff using GIS", Geography.

- 1999 - present. Li, Lin, "Spatial data mining applications in epidemiology," Geography.
- 1999 - present. Li, Eric, "Using a geographic information system to integrate information in a cradle-to-grave roadway project," Geography.
- 1999 - present. Onstott, Paul, "Relating lake chemistry to lake morphometry," Geography.
- 1999 - 2000. Granberg, Burt, "The oversize vehicle routing problem: implementing a constrained shortest path model for the UDOT highway network," Geography, graduated.
- 1999 - 2000. Bohn, Annjanette. "A watershed analysis of the Tijuana river watershed: an investigation of the applicability of simulating general water quality associated with land utilization in an under-monitored, binational watershed." Geography, graduated.

C. Other teaching activities

1999. Developed *Advanced GIS Methods I* lab set for Geography 5150.