

Models for Organizing Collaboration: Ways of Supporting Distributed Learning

Lotus Research Proposal

Proposal Title

"Models for Organizing Collaboration: Ways of Supporting Distributed Learning"

Primary Research Objective

The goal of this research is to identify a set of models of collaboration that can serve to guide both (a) the design of collaboration software by Lotus and (b) the application of this software to specific learning situations by user organizations. The identified models will be compiled and presented in a format that has been demonstrated to be usable and useful in supporting distributed learning.

The following sequence of questions will be investigated:

- How do people learn what they need to know as part of their collaborative work ?
- What are the major phases of collaborative knowledge-building according to current theories?
- What are effective instructional methods for promoting distributed learning according to current best practices?
- What forms of computer support can support these knowledge-building phases and instructional methods?
- How can user organizations be guided in organizing the functionality of Lotus software and other resources to promote collaboration?

These questions will be pursued from the perspective of informing on-going planning, design and research on collaboration and distributed learning software at Lotus. It will build upon the existing expertise and research of the project partners and will be prioritized to meet stringent project time constraints.

Partners

Researcher(s)	Lotus Representatives
Gerry Stahl, University of Colorado Jose Rafael Lopez Islas, Monterrey Tech Inst Kamran M. Khan, Marist College	Randy Cox, Director of Engineering Nada Abu-Ghaida, Product Designer

The researchers each bring to this project a background in relevant academic research and working relationships with practitioners of distributed learning. The Lotus representatives come from strategic positions within the Lotus software development process and also bring working relationships with practitioners who will help to evaluate the results of this project. (See attached resumes.)

Gerry Stahl is a Research Professor at the Center for LifeLong Learning and Design of the University of Colorado, with a joint appointment in Cognitive Science and Computer Science. His specialty is the theory and design of collaborative knowledge-building environments.

Jose Rafael Lopez Islas is the Director of Research and Educational Technology at the Monterrey Institute of Technology's Virtual University. The Virtual University enrolls students throughout Latin America and the Monterrey Tech System is the largest user of Lotus' LearningSpace. Professor Lopez' research focuses on the social construction of knowledge.

Kamran Khan is the Vice President for Information Technology and Chief Information Officer of Marist College. His specialty is Distributed Learning, Knowledge Management and E-Commerce in education and corporate partnerships.

Randy Cox is Director of Engineering for Lotus at Redwood City, where he leads work on the next version of LearningSpace. He proposed this project on models of collaboration in order to provide a theoretical framework for planning future Lotus software.

Nada Abu-Ghaida is a Product Designer at the Cambridge offices of Lotus, where she designs interfaces for future Lotus learning technologies. She agrees with the importance of this project and emphasizes the need to help user groups to organize software functionality and other resources to support distributed learning

Proposed Scope of Work

This project addresses the problem of how to organize software functionality and content to support distributed learning. Instructors of distributed training and classes have few guidelines for how best to support distributed collaborative learning using new computer-based technologies. For instance, how does one organize course materials and activities including readings, simulations, collaborative projects, group discussions, negotiation processes and portfolio artifacts into an effective educational experience that achieves targeted instructional objectives? Even designers of this technology have no place to turn for an overview of current theoretical frameworks and best practices that can inform their designing of future functionality. If Lotus is to maintain its leadership position, it must go beyond generic discussion software and course administration with innovative functionality to support multiple phases of collaboration and of the social (i.e., group and organizational) construction of knowledge. In addition, it must provide guidance to its user community on how to organize computational and digital resources for effective distributed learning.

Stage I

The objective of this project is to develop and test a methodology or a coherent set of principles and practices for organizing software functionality to support distributed learning. This will be based on a review of models of knowledge-building activities. Stage I of the project will be the systematic review of models of collaboration from the perspective of informing computer support of distributed learning. These models will draw on several of the most influential theories (e.g., situated learning, activity theory, constructivism) and instructional design approaches (e.g., case-based and problem-based learning). The project will either develop a model that combines ideas from these different theories or will compile a set of several models of collaborative learning that are applicable to computer-supported distributed learning.

The project participants are all experts in the topic of the project at both theoretical and practical levels. Thus, they are already familiar with many of the important theoretical approaches and are experienced in the issues of distributed classroom and training settings. The project will bring together this existing knowledge, fill in important missing areas of knowledge, and organize the knowledge in a coherent and useful way.

Perhaps the most important work product is the research survey. We will attempt to accomplish this prior to summer (March - May).

In early summer, we will have a project meeting/workshop where we evaluate our findings. If we feel that we have substantially completed the research phase, we will proceed to the development and testing of a guidebook based on our research. If we feel it is important to continue the research work, we will revise our project schedule in order to ensure that the research phase is adequately accomplished. The goal is not to exhaustively catalog every possible theory, but to make sure that we have gleaned the most important implications of the major theories and methodologies. The research phase will culminate in a digital catalog of the models we have found and developed. This will include theoretical models of collaboration and individual elements in the collaborative process, relevant theories of cognition and of instructional design, existing best practices, and current commercial support tools.

Stage II

Following the research on models for organizing collaboration and our first project workshop, we will develop a guidebook for designers of distributed learning based on these models. This will be a practical guide with principles and step-by-step procedures for organizing software tools and instructional content into effective and coherent presentations. We will try to develop this methodology and draft the guidebook over the summer (June - August). Marist College is a Lotus shop and has staff and students trained in LearningSpace and other Lotus products; Khan and colleagues will take a lead role in implementing the guidebook.

Stage III

From July - November, we will assess the usability and effectiveness of the methodology and guidebook in business, research and educational settings. This will not involve the development of any new technology. Ideas for new software functionality will be assessed through mock-ups, scenario walk-throughs and in-depth surveys. The guidebook will be reviewed by potential users and will be revised in response to their feedback. The academic researchers will use typical situations in their own institutions and activities to test the guidebook in academic distributed collaborative learning settings. They will also use their industry contacts to involve industry representatives in reviewing the guidebook from the perspective of industrial distributed collaborative learning settings. For instance, Stahl will work with corporate trainers at

Athenaeum International, with managers of distributed research groups at Seagate and with employee development trainers at StorageTech, to assess the guidebook's applicability to a wide range of industrial distributed learning tasks. Lopez will test the guidebook in graduate courses taught through the Virtual University, with students located in different countries of Latin America and all over Mexico. The Lotus representatives in the project will work with people from their alpha and beta test sites and from their user community to conduct similar assessments of the guidebook.

Deliverables and Timeline

Contract and project start and end dates: March 1, 2000 - December 31, 2000.

Stage I

March - May: Catalog of models of collaboration and distributed learning instruction. The catalog will be deployed in Lotus Notes/Domino. First workshop of project participants.

Stage II

June - August: First draft of guidebook on how to support distributed learning. The guidebook will be deployed in Lotus Notes/Domino.

Stage III

July - November: Review of guidebook by user organizations. Publication of revised guidebook in Lotus Notes/Domino. Second workshop of project participants and possible third workshop with user organizations and/or Lotus representatives.

December: Final report and wrap-up.

Proposed Budget

The institutions of the three academic participants will each receive \$50,000 for personnel costs. They will use these funds to pay for release time and/or to hire students or post-docs to conduct the project research, as well as to cover associated expenses. Funds for two or three project workshops totaling \$18,000 will be managed by the University of Colorado, which will host one or more of the workshops at its central location and will reimburse participants for their travel and per diem expenses. Total budget = \$168,000. Budget administration will be handled by:

Gerry Stahl	<u>Gerry.Stahl@Colorado.edu</u>	\$68,000
Jose Rafael Lopez Islas	<u>JRLopez@campus.ruv.itesm.mx</u>	\$50,000
Kamran Khan	<u>Kamran.Khan@Marist.edu</u>	\$50,000

Biographical Sketch of Gerry Stahl

Research Professor in Cognitive Science and Computer Science

Center for LifeLong Learning and Design
Department of Computer Science, and
Institute of Cognitive Science
University of Colorado, Boulder, CO 80309-0430

(303) 492-3912 (phone)
(303) 492-2844 (fax)
Gerry.Stahl@Colorado.edu
www.cs.colorado.edu/~gerry

Education

University of Colorado
1993 Ph.D. in Computer Science
1990 M.S. in Computer Science
Northwestern University
1975 Ph.D. in Philosophy
1971 M.A. in Philosophy
University of Frankfurt
1973 Graduate study in critical social theory
University of Heidelberg
1968 Graduate study in continental philosophy
Massachusetts Institute of Technology (MIT)
1967 B.S. in Humanities & Science (Math & Philosophy)

Professional Experience

Research Professor
1999-present Department of Computer Science and
Institute of Cognitive Science, Boulder, CO
Post Doctoral Research Fellow
1996-1999 Center for LifeLong Learning and Design, Boulder, CO
President
1995-1996 Personalizable Software, Niwot, CO
Director of Software R&D
1993-1996 Owen Research Inc., Boulder, CO
Graduate Research Assistant
1990-1993 College of Environmental Design, Boulder, CO
Intern Interface Developer
1990-1991 US West Advanced Technology, Denver & Boulder, CO
Computer Science Instructor & Teaching Assistant
1989-1990 University of Colorado, Boulder, CO
Executive Director
1984-1989 Community Computerization Project, Philadelphia, PA
Planning and Evaluation Specialist
1979-1984 Southwest Germantown Community Devel. Corp., Philadelphia, PA
Community Organizer & VISTA Supervisor
1978-1979 Philadelphia Council of Neighborhood Organizations, Philadelphia, PA
Systems Programmer
1974-1977 Temple University, Philadelphia, PA
1970-1971 Northwestern University, Evanston, IL
1969-1970 Temple University, Philadelphia, PA
Applications Programmer
Summer 1966 Brown Bovari Cie, Baden, Switzerland
Summer 1965 University of Pennsylvania, Philadelphia, PA

Related Publications:

Stahl, G. (1998) Collaborative information environments for innovative communities of practice, In: Proceedings of *Proceedings of the German Computer-Supported Cooperative Work conference (DCSCW '98)*, Dortmund,

- Germany. Available at:
<http://www.cs.colorado.edu/~gerry/publications/conferences/1998/dcscw98/dcscw.html>.
- Stahl, G. (1999a) demo: WebGuide: Computational perspectives for learning communities, In: Proceedings of *Annual conference of the Center for Innovative Learning Technologies (CILT '99)*, San Jose, California. Available at: <http://www.cs.colorado.edu/~gerry/publications/conferences/1999/cilt99/index.html>.
- Stahl, G. (1999b) POW! Perspectives on the Web, In: Proceedings of *Proceedings of the WebNet World Conference on the WWW and Internet (WebNet '99)*, Honolulu, Hawaii. Available at: <http://www.cs.colorado.edu/~gerry/publications/conferences/1999/webnet99/webnet99.html>.
- Stahl, G. (1999c) Reflections on WebGuide: Seven issues for the next generation of collaborative knowledge-building environments, In: Proceedings of *Computer Supported Collaborative Learning (CSCL '99)*, Palo Alto, California, pp. 600-610. Available at: <http://www.cs.colorado.edu/~gerry/publications/conferences/1999/csc199/>.
- Stahl, G. (1999d) WebGuide: Guiding collaborative learning on the Web with perspectives, In: Proceedings of *Annual Conference of the American Educational Research Association (AERA '99)*, Montreal, Canada. Available at: <http://www.cs.colorado.edu/~gerry/publications/conferences/1999/aera99/>.
- Stahl, G. (2000a) book review: Professional Development for Cooperative Learning: Issues and Approaches, *Teaching and Learning in Medicine: An International Journal*. Available at: http://www.cs.colorado.edu/~gerry/publications/journals/medicine/coop_learn.html.
- Stahl, G. (2000b) Collaborative information environments to support knowledge construction by communities, *AI & Society*, 14, pp. 1-27. Available at: <http://www.cs.colorado.edu/~gerry/publications/journals/ai&society/>.
- Stahl, G. (2000c) A model of collaborative knowledge-building, In: Proceedings of *International Conference of the Learning Sciences (ICLS 2000)*, Ann Arbor, MI.
- Stahl, G., dePaula, R., & the LSA Group (2000) Evolution of an LSA-based interactive environment for learning to write summaries, *Interactive Learning Environments*. Available at: <http://www.cs.colorado.edu/~gerry/publications/journals/ILE/ile.html>.
- Stahl, G. & Herrmann, T. (1999) Intertwining perspectives and negotiation, In: Proceedings of *International Conference on Supporting Group Work (Group '99)*, Phoenix, Arizona. Available at: <http://www.cs.colorado.edu/~gerry/publications/conferences/1999/group99/>.
- Stahl, G. & Hoadley, C. (2000) workshop: Strategies for sustaining interaction in online discussion forums and virtual communities, In: Proceedings of *Annual Conference of the American Educational Research Association (AERA 2000)*, New Orleans, Louisiana. Available at: <http://www.cs.colorado.edu/~gerry/publications/conferences/2000/aera2000/aera.html>.
- Stahl, G., Koschmann, T., & Scardamalia, M. (1999) workshop: Collaborating on the design and assessment of knowledge-building environments in the 2000's, In: Proceedings of *Proceedings of Computer Support for Collaborative Learning (CSCL '99)*, Stanford, California. Available at: www.cs.colorado.edu/~gerry/publications/conferences/1999/csc199/csc199_workshop.html.

Major Recent Grants (last 3 Years)

- 1997-2000: "Allowing Learners to be Articulate: Incorporating Automated Text Evaluation into Collaborative Software Environments" (primary author and primary software developer; PIs: Gerhard Fischer, Walter Kintsch and Thomas Landauer) \$678,239; Sponsor: James S. McDonnell Foundation
- 1997-2000: "Conceptual Frameworks and Computational Support for Organizational Memories and Organizational Learning" (co-PI with Gerhard Fischer and Jonathan Ostwald), \$725,000; Sponsor: NSF
- 1999-2000: "Interoperability among Knowledge Building Environments" (PI) \$9,124; Sponsor: Center for Innovative Learning Technology / SRI
- 1998- 1999: "Collaborative Web-Based Tools for Learning to Integrate Scientific Results into Social Policy" (co-PI with Ray Habermann) \$89,338; Sponsor: NSF

Biographical Sketch of Jose Rafael Lopez Islas

Director of Research and Educational Technology

Sistema ITESM-Universidad Virtual
Direccion de Investigacion y Tecnologia Educativa
Sucursal de Correos J
64849 Monterrey, N.L. Mexico

(01-528) 328-4109 (phone & fax)
jrlopez@campus.ruv.itesm.mx

Education

- 2000 **The University of Texas at Austin**
Ph.D. in Communication Technology and Policy (expected 2000)
- 1992 **Oklahoma State University**
M.S. in Mass Communication
- 1982 **Instituto Tecnológico de Monterrey**
B.S. in Communication Science

Professional Experience

- 1998-present **Director of Research and Educational Technology**
Universidad Virtual
Instituto Tecnológico de Monterrey
- 1985-present **Associate Professor of Communication**
Campus Monterrey
Instituto Tecnológico de Monterrey
- 1985-1990 **Director Communication Undergraduate Program**
Campus Monterrey
Instituto Tecnológico de Monterrey
- 1990-1992 **Graduate Research Assistant**
Oklahoma State University
College of Arts and Sciences
- 1994-1997 **Research Associate**
The University of Texas at Austin
National Television Violence Study
- 1982-1985 **Public Relations Manager**
UNESCO-OAS Center of Adult Literacy for Latin America

Related Papers:

Lopez, J.R. (1999) *Collaborative construction of knowledge through Computer Mediated Conferencing*. The University of Texas System Annual Telecommunications and Information Technology Conference. Brownsville, TX, August 11-13.

Biographical Sketch of Randy Cox

Director of Engineering, Lotus Development

Professional Experience

- Aug 1999-Present** **Director of Engineering**, Lotus Development, Redwood City, CA
- Jan 1992- Aug 1999** **Engineering Management**, Learning Business, Macromedia, Redwood City, CA
- 1997-1999 **VP of Engineering**, Interactive Learning Division of Macromedia
- Guided product strategy and engineering management of three product lines for Macromedia's learning business
 - Authorware
 - Pathware - acquired from Solis Corp
 - Dreamweaver CourseBuilder, formerly known as Attain Objects
- 1998 **Inventor and Software Engineer**
- Attain Objects for Dreamweaver
 - Attain Objects/CourseBuilder is now the #1 unit volume tool for building interactive learning applications.
 - Attain Objects was the first commercially available set of interactive DHTML and Javascript objects available for the learning marketplace.
- 1994-1997 **Sr. Director of Engineering**, Authorware
- Authorware is the undisputed market leader for building learning applications with high fidelity multimedia content
- 1996 **Headed up an Advanced and Common technology development group**
- Temporary keeper of the "Xtras" extension technology and direction
- 1992-1994 **Engineering Project Manager and Sr. Software Engineer**, Authorware
- Led Macintosh and Windows engineering teams.
- Jan 1989-Jan 1992** **Sr. Engineer and Project Manager**, Pillar Corporation, Foster City, CA
- Specialized in cross-platform object oriented development frameworks in early days of the object oriented "revolution".
 - Pillar Corporation's FYPlan, now a part of Hyperion Solutions/Arbor Software, is an enterprise financial planning application. As one of the first engineers in the company I was a key architect and implementer of this revolutionary groupware enterprise budgeting application.
- June '85 - Jan '89** **Sr./Software Engineer**, Software Publishing Corporation, Mountain View, CA
- Sr. Engineer on Harvard Graphics specializing in object oriented application frameworks
 - Sr. Engineer on Harvard Project Manager
 - I wrote calculation engine, large parts of the UI, development aids and tools, and was the lead product designer and architect.
 - Integration engineer on prototypes of project management apps with CAE - Cadre - Providence, RI.
- June '84- June '85** **Staff Software Engineer**, Harvard Software, Littleton, MA
- Software Engineer on Harvard Project Manager
 - Lead Engineer on product never released to do Decision Analysis Modeling.
 - Only engineer transferred to Software Publishing when acquired.

Education

June '84

BS in Chemical Engineering

minor in Petroleum Refining

emphasis in Computer Science

Colorado School of Mines

- Sr. Design project was a batch distillation simulation of hazardous waste. Work was accomplished on an IBM PC in Turbo Pascal for a hazardous waste company based in Commerce City, CO.
- Computer Science emphasis at Colorado State University
- Numerical Methods emphasis at Colorado School of Mines

Budget for University of Colorado

Personnel

PI - 6 cal mos.	40,400.00
fringe	<u>9,600.00</u>
Total Personnel	50,000.00

Workshops

Space rental	(3 x 2 days x \$500)	3,000.00
Travel	(3 x 5 people x \$500)	7,500.00
Per Diem	(3 x 5 x 2 days x \$70)	2,100.00
Administrative Support		2,400.00
Supplies & Equipment		<u>3,000.00</u>
Total Workshop		18,000.00

Total Budget	68,000.00
---------------------	-----------

Budget for Monterrey Tech

Personnel

PI - 9 cal mos.	35,000.00
Fringe	<u>15,000.00</u>
Total Personnel	50,000.00

Total Budget	<u>50,000.00</u>
---------------------	------------------

Budget for Marist College

Personnel

Total Personnel	50,000.00
------------------------	-----------

Total Budget	<u>50,000.00</u>
---------------------	------------------