

Robert A. Morris
Professor Emeritus of Computer Science
The University of Massachusetts at Boston

Member, IT Staff, Filtered-Push Project. Harvard University Herbaria

Education

Ph.D., Mathematics, Cornell University, 1970

M.A., Mathematics, Cornell University, 1967

B.A., Mathematics, Reed College, 1965

Positions

07/01/12- present, Computer Science Consultant on NSF grant #1147266, "BCSP: Collaborative Research: ABI Development: Exploring Taxon Concepts (ETC) through analyzing fine-grained semantic markup of descriptive literature .

07/01/2010 -06/31/2013; 01/01/2014– present IT Staff Harvard University Herbaria

University of Massachusetts –Boston

05/2010 – present Emeritus Professor of Computer Science

7/1/2009-present, retired, but remain director of the Biodiversity Informatics Lab

2001-6/30/2009 Professor of Computer Science (departments separated)

2006-2009, CoPI UMASS-Boston Center For the Study of Coastal Sensor Networks

1987-2001 Professor of Mathematics and Computer Science

1978-1986 Associate Professor of Mathematics and Computer Science

Previous Positions

2011-2013, Informatics Consultant to Military Suicide Research Consortium, Florida State University.

1989 (Fall Quarter) Visiting Scholar, Eye Research Laboratories, University of Chicago

1975-1978 Associate Professor of Mathematics, Univ. of Oklahoma

1973-1975 Member, School of Mathematics, The Institute For Advanced Study, Princeton

1971-1975 Assistant Professor of Mathematics, State University of New York at Albany

1969-1971 Instructor of Mathematics, State University of New York at Albany

Grants

2009-2012, Subcontract PI, "Fine-Grained Semantic Markup of Descriptive Data for Knowledge", NSF award to the University of Arizona, Hong Cui PI. UMB subcontract \$153,266, NSF 0849982
Fine-Grained Semantic Markup of Descriptive Data for Knowledge Applications in Biodiversity Domains.

2007-2009 Subcontract PI, "Filtered Push: Community knowledge and quality control in Biodiversity Informatics: A model for more efficient data capture via a distributed Herbarium network." NSF# 0646266 \$150,000 subcontract to Harvard University Herbarium, James Macklin, PI.

2004-2007 PI, "Electronic Field Guides: Building Partnerships and Informatics for Species Identification and Biodiversity Monitoring", NSF 0416835, with Robert Stevenson (Biology) CoPI, \$1,066,668

2004-2006, PI, "SEI(BIO)+II: Metadata-rich image databases for biodiversity applications", with Robert Stevenson (Biology) CoPI, NSF 0430769, \$300,000

2004-2008 Co-PI ITR/IM(CISE): "Extracting and Applying Scientific Data Imbedded in Web-Distributed

- Digital Texts from the Literature of Biological Systematics” NSF 113329, PI Thomas Moritz (Amer Museum of Nat Hist), Subcontract to American Museum of Natural History \$76,865
- 2004-2007 CoPI, “Developing a New Infrastructure for Dynamic Access to Multi-institutional Biodiversity Data, NSF 0345400, to NatureServe; PI on Subcontract to NatureServe \$202,209
- 2001-2004 PI “Electronic Field Guides for Auditory Neuroscience”, subcontract from Boston University on EarLab, NIH Human Brain Project, \$120,000
- 2001-2004 NSF-DBI-0111540, PI, “Electronic Field Guides: Leveraging Biodiversity Data with the Web and Mobile Tools”, NSF-DBI-0111540 with Robert Stevenson, Department of Biology CoPI., \$600,000
- 2001-2004, PI “(ITR:Bio)Biodiversity Data Discovery and Integration”, NSF DBI-0113058 with Robert Stevenson, Department of Biology, CoPI, \$497,000
- 2001-2002 CoPI “Biodiversity and Ecosystem Informatics - BDEI - Planning a Community Science Approach to Biodiversity Monitoring: Extending the Spatial and Temporal Scales”
NSF DBI 0131927 Robert Stevenson, PI, \$49,801
- 2000-2001, Principal Investigator, “Biological Databases”, University of Kansas Museum of Natural History Biodiversity Research Center, subcontract on NSF KDI project, \$36,500
- 1998-2001, Co-PI with Robert Stevenson, Department of Biology, PI, Electronic Field Guide: An Object Oriented WWW Database to Identify Species & Record Ecological Observations”, National Science Foundation Grant DBI-9808462
- 1998-2002 Consortium Investigator. “Low Vision Reading and Typeface Variables”, SUNY Research Foundation, in consortium with SUNY College of Optometry, Dean Yager, PI funded by NIH. \$188,525
- 1994- Principal Investigator (With George Lukas), Evaluation of Interleaf Software Tools for Internet Distributed Hypertext Publishing, preparation of documents for a public interest document server, funded by Interleaf, Inc. with UMB-CS Software Engineering Research Laboratory.
- 1993-94 Awarded \$10,000 from University NIH Biological Sciences Research Grant for support of human vision and digital typography research
- 1988-1990 Principal Investigator, NSF Grant IRI 87-15960
- 1985-1988. Principal Investigator, NSF Grant DCR-85-03154
- 1976-77. Principal Investigator, NSF Grant MCS76-05859
- 1975-76. Principal Investigator, NSF Grant MPS75-07619
- 1973-74. Principal Investigator, NSF Grant P034003-1
- 1972-73. Principal Investigator, NSF Grant P034003

Related Experience

- 06/01/2009-present; Associate, Harvard University Herbaria
- 2010 Convenor and lead author of Recommendations for the Use of Knowledge Organisation Systems by GBIF http://links.gbif.org/gbif_kos_whitepaper_v1.pdf
- 2009-present, Convener, TDWG/GBIF Multimedia Resources Task Group (MRTG) producing multimedia metadata draft standard for proposal to TDWG. http://species-id.net/wiki/Audubon_Core
- 2009 Codeveloper for plazi.org of Species Profile Model (SPM) service harvested by EoL
- 1997-date director, Biodiversity Informatics Lab, CS Department, UMASS-Boston. <http://bdei.cs.umb.edu>
- 2008-present, Member, Board of Directors, plazi.org
- 2001- Member, Taxonomic Data Working Group committee on Structured Descriptive Data (SDD)
- 2000- Volunteer IT Advisor, Library of the American Museum of Natural History
- 1989-1996, Consultant, Interleaf, Inc.

1982-1989, Senior Software Engineer, Interleaf Inc. (leave of absence from UMASS 1982-84, half time in both organizations thereafter)

1982 research at IBM Cambridge Scientific Center on text processing software

1981 Member, American Mathematical Society TEX development team and TEX User's Group Steering Committee.

Publications

COMPUTER SCIENCE AND BIODIVERSITY INFORMATICS PUBLICATIONS

Morris RA, Dou L, Hanken J, Kelly M, Lowery DB, et al. (2013) Semantic Annotation of Mutable Data. PLoS ONE 8(11): e76093. doi:10.1371/journal.pone.0076093

Robert A. Morris, Vijay Barve, Mihail Carausu, Vishwas Chavan, José Cuadra, Chris Freeland, Gregor Hagedorn, Patrick Leary, Dimitry Mozzherin, Annette Olson, Gregory Riccardi, Ivan Teage and Greg Whitbread, "Discovery and Publishing of Primary Biodiversity Data associated with Multimedia Resources: The Audubon Core Strategies and Approaches", Vol 8, No 2 (2013)

Morris, P.J, Hanken, J., Kelly, M., Lowery, D., Ludäscher, B., Macklin, J.A., Morris, R.A., Song, T. Semantic Matching of Interests to Annotations With SPARQL queries on reasoned triples. TDWG 2013 Annual Conference. #335 <https://mbgserv18.mobot.org/ocs/index.php/tdwg/2013/paper/view/335>

1.Ludäscher, B., Missier, P., Lowery, D.B. Song, T., Kelly, M., Koehler, S., Macklin, J.A. Morris, P.J., Morris, R.A. Hanken, J. Provenance in Scientific Workflows: Challenges and Opportunities for Biodiversity Informatics. TDWG2013 Annual Conference. #333. <https://mbgserv18.mobot.org/ocs/index.php/tdwg/2013/paper/view/333>

Macklin, J.A., Hanken, J., Kelly, M., Koehler, S., Lowery, D.B., Ludäscher, B., Morris, P.J., Morris, R.A., Song, T. Improving Natural Science Collections Data through Quality Control for Research using Workflows Embedded in a FilteredPush network TDWG 2013 Annual Conference. #356. <https://mbgserv18.mobot.org/ocs/index.php/tdwg/2013/paper/view/356>

Morris, P.J., E. Gilbert, J. Hanken, M. Kelly, S. Koehler, D. Lowery, B. Ludäscher, J.A. Macklin, R.A. Morris, T. Song. 2013. Expanding the scope of collections databases without schema modifications: Using annotations, rules, and semantic web technologies to add a open world layer to natural science collections data. SPNHC 2013. Program book and abstracts for the 28th annual meeting of the Society for the Preservation of Natural History Collections. p.33.

Morris, P.J., J. A. Macklin, J. Hanken, M. Kelly, S. Koehler, D. Lowery, B. Ludäscher, R.A. Morris, T. Song. 2013. Improving Natural Science Collections data through quality control for research using Kepler workflows embedded in a FilteredPush network. SPNHC 2013. Program book and abstracts for the 28th annual meeting of the Society for the Preservation of Natural History Collections. p.33. Roadmap for demonstration.

L. Dou, G. Cao, P.J. Morris, R.A. Morris, B. Ludäscher, J.A. Macklin, J. Hanken, "Kurator: A Kepler Package for Data Curation Workflows." *Procedia Computer Science*, volume 9, pp. 1614-1619, 2012. doi:10.1016/j.procs.2012.04.177.

Hagedorn G, Mietchen D, Morris R, Agosti D, Penev L, Berendsohn W, Hobern D (2011) Creative Commons licenses and the non-commercial condition: Implications for the re-use of biodiversity information. *ZooKeys* 150: 127-149. doi: 10.3897/zookeys.150.2189

Penev L, Lyal C, Weitzman A, Morse D, King D, Sautter G, Georgiev T, Morris R, Catapano T, Agosti D (2011) XML schemas and mark-up practices of taxonomic literature. *ZooKeys* 150: 89-116. doi: 10.3897/zookeys.150.2213

- Hilmar Lapp, Robert A Morris, Terry Catapano, Donald Hobern, Norman Morrison "Organizing our knowledge of biodiversity", *Bulletin of the American Society for Information Science and Technology* 37(4) pp 38-42, 2011
- Penev L, Agosti D, Georgiev T, Catapano T, Miller J, Blagoderov V, Roberts D, Smith V, Brake I, Rycroft S, Scott B, Johnson N, Morris R, Sautter G, Chavan V, Robertson T, Remsen D, Stoev P, Parr C, Knapp S, Kress W, Thompson C, Erwin T (2010) Semantic tagging of and semantic enhancements to systematics papers: ZooKeys working examples. *ZooKeys* 50: 1-16. doi: 10.3897/zookeys.50.538
- Matt Calder, Robert A. Morris, and Francesco Peri, "Machine reasoning about anomalous sensor data", *Ecological Informatics* Volume 5, Issue 1, January 2010, Pages 9-18, Special Issue: Advances in environmental information management
- Gupta, Deepank, Bob Morris, Terry Catapano, and Guido Sautter, 2009, A New Approach towards Bibliographic Reference Identification, Parsing and Inline Citation Matching, in *Contemporary Computing Communications in Computer and Information Science* Volume 40, 2009, pp 93-102 http://dx.doi.org/10.1007/978-3-642-03547-0_10, Springer, Berlin
- Wang Z., H. Dong, M. Kelly, J.A. Macklin, P.J. Morris, R.A. Morris. 2009. Filtered-Push: A Map-Reduce Platform for Collaborative Taxonomic Data Management. *Computer Science and Information Engineering*, 2009 WRI World Congress on. 3:731-735 doi: 10.1109/CSIE.2009.948
- Thau, D., Morris, B., White, S. "Contemporary Challenges in Ambient Data Integration for Biodiversity Informatics", in Proceedings of the Confederated International Workshops and Posters on On the Move to Meaningful Internet Systems: ADI, CAMS, EI2N, ISDE, IWSSA, MONET, OnToContent, ODIS, ORM, OTM Academy, SWWS, SEMELS, Beyond SAWSDL, and COMBEK 2009 OTM 2009 Workshops, 59-68. Springer Lecture Notes in Computer Science vol 5872, DOI 10.1007/978-3-642-05290-3_14
- Zhimin Wang, Hui Dong, Maureen Kelly, James A. Macklin, Paul J. Morris, Robert A. Morris, "Filtered-Push: A Map-Reduce Platform for Collaborative Taxonomic Data Management", 2009 WRI World Congress on. 3:731-735 doi: 10.1109/CSIE.2009.948
- Robert A. Morris, Jacob K. Asiedu, William Haber, Fred SaintOurs, Robert D. Stevenson and Hua Tang, "Database-backed decision trees with application to biological informatics", *Jour. Intelligent Information Systems*, p25-38. , *Journal of Intelligent Information Systems* Volume 29 , Issue 1 (August2007) DOI 10.1007/s10844-006-0029-5
- Robert A. Morris, Robert D. Stevenson and William Haber, "Architecture of Electronic Field Guides", *Jour. Intelligent Information Systems*, pp. 97-110; Volume 29 , Issue 1 (August 2007). DOI10.1007/s10844-006-0033-9
- Hui Dong, Zhimin Wang, Robert A. Morris, Douglas Sellers, "Schema-Driven Security Filter Generation For Abstract. Distributed Data Integration", *Proceedings of HotWeb 2006, the First IEEE Workshop on Hot Topics in Web Systems and Technology.*, p. 1, vol. , (2006). DOI 10.1109/HOTWEB.2006.355270
- Hui Dong, Zhimin Wang Robert A. Morris, and Jun Huang, "Ontology-based Peer Exchange Network(OPEN)", Proceedings of the 2007 International Symposium on Collaborative Technologies and Systems, p. 191, vol. , (2007).
- Ecoinformatics*, Encyclopedia of Biodiversity, Simon Levin editor, Elsevier, 2007, pp. 1-7.

- Morris, R.A. "Image Metadata Standards and Practices" and "Colour Management", Chapters in *Digital Imaging of Biological Type Specimens*, C.L. Haeueser, A. Steiner, J.O. Holstein, and M. Scoble (eds), pp. 41-55. European Network for Biodiversity Information, Stuttgart, 2006.
- R. D. Stevenson, William A. Haber, and Robert A. Morris, Electronic Field Guides and User Communities in the Eco-informatics Revolution; *Conservation Ecology*, 2003. vol7
<http://www.ecologyandsociety.org/vol7/iss1/art3/main.html>
- R.A. Morris, M. Passell & R.D. Stevenson, "A Software Engineering Perspective on Developing Electronic Field Guides: Lessons Learned For Bioinformatics", Abstract #779, p. 197, XXII International Congress of Entomology, Iguassu Brazil, 2000, invited symposium participant. (R.A. Morris presenting.)
- R.D. Stevenson, F. SaintOurs, R.A. Morris, M. Passell & W.A. Haber, "Developing Electronic Field Guides: First Results Using Costa Rican Butterflies and Massachusetts Aquatic Macroinvertebrates", Abstract #791, p. 200, XXII International Congress of Entomology, Iguassu Brazil, 2000
- Robert A. Morris, Mathew Passell, Jun Wan, Robert D. Stevenson and William Haber, "Engineering considerations for biodiversity software", *Towards a global biological information infrastructure Challenges, opportunities, synergies, and the role of entomology* Edited by: H. Saarenmaa and E. S. Nielsen, European Environment Agency Technical Report #70, 2001, pp. 49-59,
http://reports.eea.eu.int/technical_report_2001_70/en/Technical%20Report%2070%20web.pdf
- Robert A. Morris, Roger D. Hersch, Alexander Coimbra, "Legibility of Condensed Perceptually-Tuned Grayscale Fonts", *Lecture Notes In Computer Science*; Vol. 1375
 Proceedings of the 7th International Conference on Electronic Publishing, Held Jointly with the 4th International Conference on Raster Imaging and Digital Typography: Electronic Publishing, Artistic Imaging, and Digital Typography, pp 281 – 293, Springer-Verlag London, UK 1998
- E. Blachman, C. Meyer and R. Morris, "The UMB Intelligent ICE Markup Assistant", in *Comparing English Worldwide*, Sidney Greenbaum, Ed., Oxford University Press, 1996, pp. 54-64
- "A Constraint-based editor for linguistics scholars", with Edward Blachman, and Charles Meyer, to appear, *Electronic Publishing—Origination, Dissemination and Design*, 6(4), 349-360. (Proceedings of the 1994 Conference on Electronic Publishing, Darmstadt, 1993), John Wiley & Sons.1993
- "Can you see whose speech is overlapping", with Charles Meyer and Edward Blachman, *Visible Language* 28(2), 110-133, 1994
- Robert A. Morris, "Fundamentals of Computer Image Processing", *Microscopic and Spectroscopic Imaging of the Chemical State*, Michael D. Morris, editor, Marcel Dekker, New York, 1993, pp. 109-130.
- "Towards quantification of the effects of typographic variation on readability", with Karl Berry and Kathryn Hargreave. *Digest of Technical Papers, Volume XXIV, SID-93*, Seattle, Washington, May 18-20, 1993, Special Session on Digital Typography and Legibility, pp. 64-67. Society for Information Display, 1993
- "Classification of digital typefaces using spectral signatures", *Pattern Recognition*, 25(8), pp. 869-876, 1992
- "A markup assistant for linguistic scholars", with Charles Meyer and Ed Blachman, software demonstration and presentation to 13th ICAME Conference, Nijmegen, June 1992

“Measuring how typeface variation and typographic scaling affects readability at small sizes”, with Karl Berry, Kathryn Hargreaves, and Dimitrios Liarkopis”, *Proceedings of the IS&T’s Seventh International Congress on Advances in Non-impact Printing*, Portland, OR, October 1991. Society for Imaging Science and Technology

Proceedings of the Second International Workshop on Raster Image Processing and Digital Typography, edited with Jacques Andre, Cambridge University Press, 1991

“An extensible, object oriented system for active documents”, with Paul M. English, Ethan Jacobson, Kimbo B. Mundy, Stephen D. Pelletier, Thomas A. Polucci and H. David Scarbro, *Proceedings of EP90 Conference on Electronic Publishing*, Gaithersburg, MD, 1990, published by Cambridge University Press, Cambridge, 1990, pp. 263-276

“Rendering Digital Type: A historical and economic view of technology”, *The Computer Journal*, 32(6), 1989, pp. 524-531

“The role of phase in the spectra of type”, with Guozhen Duan, *Electronic Publishing*, 2(1), pp. 47-59, April 1989

“An unorthodox approach to the teaching of undergraduate software engineering”, *Computing Systems*, vol. 1(4), pp. 405-419, Fall 1988

“Image Processing Aspects of Type”, invited address, in *Proceedings of EP88 Conference on Electronic Publishing*, Nice, 1988, published by Cambridge University Press, Cambridge, pp. 139-155, 1988

“The UMASS-Boston Simplified Graphics Package”, 1987 Academic Microcomputer Conference, Indiana University - Purdue University at Indianapolis, 1987. pp. 83–93. Indianapolis, April 20–27, 1987. (Also available as *UMASS/Boston Computer Science Technical Report No. 3/86*)

UMB-SGP User’s Manual, with Richard E. Hamm, *UMASS/Boston Computer Science Technical Report*, No. 2/86

“The Interleaf User Interface”, *Protext III, Proceedings of the Third International Conference on Text Processing Systems, October 1986*, Boole Press, Dublin, 1987, J.J.H. Miller, ed., pp. 20-29

“Is What You See Enough To Get? A Description of the Interleaf Publishing Software”, *Proceedings of ProText II*, Boole Press, Dublin, 1985, J.J.H. Miller, ed., pp. 56-81

“Page Description Languages”, in *Short Course on Text Processing*, Boole Press, Dublin, 1985, J.J.H. Miller, ed., pp. 56-66

“Workstation Requirements for Electronic Publishing” in *Short Course on Text Processing*, Boole Press, Dublin, 1985, J.J.H. Miller, ed., pp. 67-85

“Recursion and Side Effects in Pascal”, jointly with J. Perchik, *Byte*, vol. 6 #6 (May 1981), pp. 316-324

“Comparison of Some High Level Programming Languages”, *Byte*, February 1980

“An Overview of TEX”, published in the *Proceedings of Technical Documentation Workshop II*, Graphics Computer Communication Association, 1979

READING AND HUMAN VISION PUBLICATIONS

Robert A. Morris, Kathy Aquilante, Dean Yager, Charles Bigelow “Serifs slow RSVP reading at very small sizes, but don’t matter at larger sizes”, *SID 2002, Digest of Technical Papers, 2002.*, San Jose, CA. Society for Information Display. Pp. 244-247

- Aquilante, K., D. Yager, et al. (2001). "Low vision patients with age-related maculopathy read RSVP faster when word duration varies according to word length." Optometry and vision science : official publication of the American Academy of Optometry **78**: 290-296.
- Aquilante, K., D. Yager, et al. (2000). Can visual acuity predict the size of text that low vision readers need to read at maximum rates? Vision rehabilitation. Assessment, intervention and outcomes. C. Stuen, A. Arditi, A. Horowitz et al. Lisse, Swets & Zeitlinger: 288-292.
- Kathy Aquilante, Dean Yager and Robert A. Morris, "Repeatability of Reading Rate Measurements with MNREAD, RSVP, and SCROLL text for low vision subjects with central visual field loss and age-matched normals," submitted to *Optometry and Vision Science*
- (Aquilante, Yager et al. 2001) Kathy Aquilante, Dean Yager and Robert A. Morris, "Low vision patients with Age-related Maculopathy read RSVP faster when word duration varies according to word length," submitted to *Optometry and Vision Science*
- K. Aquilante, H.J. Wyatt, D. Yager, and R.A. Morris, "Normal Subjects Reading RSVP Text Slowly Make Saccades," *Inves. Opth. And Vis. Sci.*, 41(4), p. S434, March 2000. Poster Session at ARVO 2000.
- Aquilante K, Yager D, Morris RA "Are low vision patients with central visual field loss more sensitive to changes in luminance when reading than are age-matched normals?" in *Vision Science and Its Applications*, Vol. 1 OSA Technical Digest Series (Optical Society of America, Washington DC, 2000) pp 25-28.
- Kathy Aquilante, Dean Yager, and Robert Morris, Luminance Effects on Reading Rate with a video display: Normal and low vision subjects; *Investigative Ophthalmology and Visual Science, ARVO 1999*.
- Kathy Aquilante, Dean Yager, and Robert Morris, Does RSVP reading take practice to reach maximum reading rates? *Vision Science and its Applications*, Optical Society of America, 1998.
- Kathy Aquilante, Dean Yager, and Robert Morris, "Reading Rates for MNREAD and RSVP Text Presentation with a Video Projection System in Patients With Central Field Loss", *Investigative Ophthalmology and Visual Science*, vol. 39(4), 1998, p. S176 (ARVO 1998, #837-B760)
- Dean Yager, Kathy Aquilante, and Robert Morris, Comparison of Reading Rates With RSVP and an Untested Method— 'FLASHCARD'—in Normally Sighted Subjects", *Investigative Ophthalmology and Visual Science*, vol. 39(4), 1998, p. S177 (ARVO 1998, #841-B764)
- Kathy Aquilante, Dean Yager, and Robert Morris, "How big must letters be for patients with central field loss to read RSVP text at their maximum rate?", *Vision Science and Its Applications, Santa Fe, NM 1998*, annual symposium of the Optical Society of America, pp. 88-91
- Contrast Reduction Accounts for Phase Noise, Association for Research in Vision and Ophthalmology, 1995, *Invest. Opth. and Visual Sci.* 36(4), page S463, 1995. ARVO 1995
- "Effects of phase noise on a recognition task", poster session, 1994 annual meeting of the Association for Research in Vision and Ophthalmology
- "Effects of masking on spatial frequency discrimination", with Hugh R. Wilson, presented, annual meeting of the Optical Society of America, 1990

MATHEMATICS PUBLICATIONS

- Hopf Algebras and Combinatorics*, editor, American Mathematical Society, 1982
- A Jacobian Criterion for Smoothness, jointly with Stuart Wang, *Journal of Algebra*, 69(2), 1981, pp. 483-486
- Frobenius Endomorphisms in Umbral Calculus, *MIT Studies in Applied Math.*, 62, 1980, 85-92

- Reciprocity Isomorphisms for Separable Field Extensions, *Rocky Mountain J. Math.*, 9, (4), 1979, pp. 707-719
- Derivations of Witt Vectors, with Applications to K_2 of Truncated Polynomial Rings and Laurent Series, J. *Pure and Applied Algebra*, 18, 1980, pp 91-96
- Ring Theory II, Proceedings of the Second Oklahoma Conference*, ed. with B. R. McDonald, Dekker, 1977
- Curves on Formal Groups, with B. Pareigis, *Trans. A.M.S.*, 233, 1977, pp. 113-129
- Representing Co-Semi-Simple Hopf Algebras, *Houston J. Math.*, 3 No. 1., 1977, pp. 113-129
- Formal Groups and Hopf Algebras over Discrete Rings, with B. Pareigis, *Trans. A.M.S.*, 197, 1974, pp. 113-129
- Cohomology of Inseparable Field Extensions, *Illinois J. Math*, 17(4), 1973, pp. 571-578
- Formal Groups Over Discrete Rings, with B. Pareigis, *Bull. A.M.S.*, 79(2), 1973, pp. 449-453
- The Inflation Restriction Theorem for Amitsur Cohomology, *Pac. J. Math.* 41(3), 1972, pp. 791-797
- On the Brauer Group of \mathbb{Z} , *Pac. J. Math.* 39(3), 1971, pp. 619-630
- Reciprocity Isomorphisms of Class Field Theory for Separable Field Extensions, Ph.D. Thesis, Cornell University, 1970
- Entry Points to the Fibonacci Series, Computer generated tables, jointly with D. Lind and L. Shapiro; The Fibonacci Association, 1965

Professional societies

Association for Computing Machinery
IEEE Computer Society

Professional Service

- Leader of group producing the White Paper *Recommendations for the Use of Knowledge Organisation Systems* by GBIF, Terry Catapano, Donald Hobern, Hilmar Lapp, Robert A Morris, Norman Morrison, Natasha Noy, Mark Schildhauer, David Thau, http://links.gbif.org/gbif_kos_whitepaper_v1.pdf
- Participating in World Wide Web Consortium Community Group on Open Annotation of digital resources.
- Convenor of GBIF/TDWG working group producing proposed Audubon Core standard for biodiversity multi-media metadata
- Extensive participation about XML in the Subgroup on Descriptive Data of the Taxonomic Data Working Group of IUBS;
- Invited Participant, NSF Workshop in Observation Ontology, Santa Barbara, 2007.
- Invited Participant, GBIF Workshop on Species Profile Model ontology, 2007.
- Panelist and reviewer, NSF Biology Directorate, Division of Biological Infrastructure
- Reviewer for Oxford University Press of *Spikes, Decisions and Actions, an Introduction to Dynamical Systems for Neuroscientists*, by Hugh R. Wilson
- Member, editorial board, *Electronic Publishing, Organization, Dissemination, and Design*, scholarly journal published by John Wiley & Son
- Software reviewer, *IEEE Computer Magazine*.
- Member, Program Committees, EP97 and RIDT97, international Electronic Publishing conference and conference on Raster Imaging and Digital Typography, St. Malo, 1997
- Member, Program Committees, EP94 and RIDT94, international Electronic Publishing conference and conference on Raster Imaging and Digital Typography, Darmstadt, 1994

Member, Program Committee, EP92, international electronic publishing conference, Lausanne, 1992
Chair, Second International Workshop in Raster Imaging and Digital Typography, RIDT-91, jointly sponsored by UMASS/Boston and the IEEE Computer Society, Boston October 1991
Member, Organizing Committee, EP90, international electronic publishing conference, Washington, D.C., October 1990
Director or Co-director, UMASS-Boston Computer Science Lab, 1978-present
Member, Program Committee, ACM Document Processing Conference, Santa Fe, N.M. December 1988
Member, Organizing Committee, EP88, international electronic publishing conference, Nice, April 1988
Member, Organizing Committee, ProText IV international text processing conference, Boston, October 1987
Founding Secretary, TeX Users Group, 1979
Reviewer, Mathematical Reviews Contributed many reviews, including reviews of several major books, 1970-80
Proposal reviewer, National Science Foundation Mathematical Sciences Division. Have reviewed proposals from scholars at Rutgers, Illinois, Tennessee, Ohio State, 1972-78