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EDUCATION:

B.S. University of Maine, Surveying Engineering, 1980.
M.S. The Johns Hopkins University, Computer Science, 1986.

PROFESSIONAL EXPERIENCE:

Senior Engineer, Deep Submergence Laboratory, Dept. of Applied Ocean Physics & Engineering, Woods Hole Oceanographic Institution, 2000-present.

Research Engineer, Deep Submergence Laboratory, Dept. of Applied Ocean Physics & Engineering, Woods Hole Oceanographic Institution, 1990-2000.

Adjunct Research Engineer, Institute for Exploration, Division of the Sea Research Foundation, 1999- 2004.

Consultant, Navigation Processing, Imagery Collection, Data Processing, Software Engineering, 1989-present.

Senior Engineer, Ocean Engineering Program, The Johns Hopkins University, Applied Physics Laboratory, 1986-1990.

Associate Engineer, FBM Navigation Group, The Johns Hopkins University, Applied Physics Laboratory, 1983-1986.

Scientist, Imagery Exploitation Division, Autometric, Inc., Falls Church, VA 1981-1983.

Surveyor, Western Geophysical Corp., Dhahran, Saudi Arabia, 1980-1981.

AWARDS:

Selected as The Outstanding Maine Engineering Graduate of 1980.

PROFESSIONAL AFFILIATIONS:

Member, Tau Beta Pi

RESEARCH INTERESTS:

Exploitation of remotely sensed imagery and navigation data, Geomatics, Underwater Vehicle control and operation, software

PROFESSIONAL ACTIVITIES:

WHOI:

Founding Member, Technical Staff Committee
Thesis Committee for Nicholas Macfarlane
Retirement Task Force
Access to the Sea Committee
Search Committee, Director of Marine Operations
Data Committee
Staff Committee

Outside WHOI:

Invited participant/Team leader, Comparative Assessment of Visual Survey Tools,
a NOAA Workshop, June 2015

SUPERVISION AT WHOI:

Supervised Steve Gegg 1991-1994, 1997-2009
Supervised summer student, 2011, 2014

CRUISE PARTICIPATION:

1983 USS Florida, SSBN 728 Demonstration and Shakedown Operations
1984 USS John C. Calhoun, SSBN 653 Demonstration and Shakedown Operations
1985 USS Mariano Vallejo, SSBN 658 Demonstration and Shakedown Operations
1986 USS Georgia, SSBN 729 Demonstration and Shakedown Operations
1989 Tests of Towed Survey Vehicle, San Diego and Carr Inlet
1990 Jason Project with the Jason ROV, Survey of the Hamilton and Scourge, Lake Ontario
1990 Survey with Jason ROV and DSL-120 side scan, DSVSS Laney Chouest, Hood Canal
1991 Crest Expedition, Survey of the Juan de Fuca Ridge with the Jason ROV and the DSL120 side-scan, DSVSS Laney Chouest
1992 ARSRP Reconnaissance Program, Survey of the Kane Fracture Zone R/V Maurice Ewing, Hawaii HMR-1 Side Scan Sonar
1993 Jason Project with Jason ROV, DSVSS Laney Chouest, Sea of Cortez
1993 ARSRP High Resolution Survey (Mid Atlantic Ridge) with Jason ROV, DSL-120, R/V Knorr
1994 Survey with DSL-120 and Argo II of the TAG Mound, Mid Atlantic Ridge, R/V Knorr
1996 Jason Project with NR-1, Florida Marine Sanctuary, DSVSS Carolyn Chouest
1996 Lucky Strike Exploration (LUSTRE 96) with DSL-120, Argo II, Jason ROV, R/V Knorr
1996 Jason/Medea, ABE expedition to the Juan de Fuca Ridge, R/V T.G. Thompson
1997 Jason/Medea, Argo II, DSL-120 Survey of the MV Derbyshire Philippine Sea, R/V T.G. Thompson
1998 Jason/Medea, Jason Project IX, Sea of Cortez, R/V Atlantis
1998 Jason/Medea, Mid Ocean Ridge mapping, Juan de Fuca Ridge, R/V T.G. Thompson

1999 Jason/Medea. DSL-120, Survey of Phoenician shipwrecks, Mediterranean Sea,
M/V Northern Horizon

1999 Jason/Medea, Mid Ocean Ridge mapping, Juan de Fuca Ridge, R/V T.G. Thompson

1999 NR-1 Survey of EgyptAir 990 wreckage, DSVSS Carolyn Chouest

2000 Jason/Medea, Mid Ocean Ridge mapping, Juan de Fuca Ridge, R/V T.G. Thompson

2000 Jason/Medea, Carbonate Studies, Eel River Margin, R/V T.G. Thompson

2001 Jason/Medea, Mid Ocean Ridge mapping, Juan de Fuca Ridge, R/V T.G. Thompson

2001 DSL120A Field Trials, Okinawa to Papua New Guinea, R/V Melville

2002 Jason 2/Medea, Sea Trials, R/V Atlantis

2002 SeaBed AUV operations on George's Bank, F/V Kathy Marie

2002 Jason 2/Medea, Mid Ocean Ridge mapping, Juan de Fuca Ridge, R/V Atlantis

2003 Habcam sea trials/test, R/V Oceanus

2003 Isis ROV Sea Trials, Bahamas, R/V Atlantis

2003 Marianas Fore Arc: DSL120A and Jason II, R/V Thomas Thompson

2003 Black Sea Archaeological Expedition: Hercules ROV, R/V Knorr

2004 Mountains of the Sea, Hercules ROV , R/V Ron Brown

2004 H2O Recovery: Hawaii to Alaska, Jason II, R/V Revelle

2005 Lost City, Hercules ROV, R/V Ron Brown

2005 Visions05, Juan de Fuca, Jason 2, R/V Thomas Thompson

2006 Black Sea Expedition, Hercules, ROV R/V Endeavour

2006 Habcam Operations, F/V Kathy Marie

2006 Kilo Moana/Jason feasibility cruise, R/V Kilo Moana

2007 AGAVE Test Cruise, Arctic Ocean, Towed Vehicle Camper, Icebreaker Oden

2007 Alvin Engineering Trials, San Diego, R/V Atlantis

2007 Jason/Medea, Juan de Hawaii, R/V Kilo Moana

2008 Alvin Engineering Trials, R/V Atlantis—Alvin dive

2008 Jason Engineering Trials, R/V Atlantis

2008 Mid-Atlantic Ridge, Jason, R/V Revelle

2009 Alvin cruise to the East Pacific Rise and Guaymas Basin, R/V Atlantis

2009 Jason 2, Rota Hydrothermal/volcanic site, R/V Thompson

2009 Habcam, F/V Kathy Marie, off New Bedford

2010 HROV Nereus cruise to Cayman Rise, R/V Cape Hatteras

2010 Jason 2, Juan de Fuca, R/V Thompson

2011 Hercules/Argus, E/V Nautilus, Black Sea

2012 ROV Jason, Cayman Rise, R/V Atlantis

2012 Habcam V4, Sea Trials and Northeast Scallop Survey R/V Hugh Sharpe

2012 Recovery of Turkish Fighter Pilot Remains, Eastern Mediterranean, Argus/Hercules, E/V Nautilus

2013 HROV Nereus cruise to Cayman Rise, R/V Falkor

2013 Shipwreck Survey, E/V Nautilus and ROV Hercules

2013 Trials of Alvin Observation and Assistance Vehicle, R/V Atlantis

2013 Alvin Sea Trials, R/V Atlantis

2014 Sentry FSM Cruise, R/V Ka`imikai-O-Kanaloa

2014 Alvin Science Verification Cruise, R/V Atlantis

2014 ROV Jason, Axial Hydrothermal Site, R/V Thompson

2014 ROV Jason, Hawaii Survey of Chemical Munitions, R/V Kilo Moana
2015 ROV Jason, Survey of New Volcano, R/V Revelle
2015 ROV Jason engineering tests, R/V Thompson
2016 ROV Jason Rebuild Sea Trials, R/V Sikuliaq
2016 Alvin Observation Vehicle/El Faro Survey, R/V Atlantis
2016 Hercules/Argus Engineering Cruise, E/V Nautilus
2016 Science Verification Cruise, R/V Sally Ride, Jason

PAPERS IN REFERREED JOURNALS AND BOOKS:

Howland, Jonathan C. "Video Mosaic", in Delgado, James, *Encyclopaedia of Underwater and Maritime Archaeology*, British Museum Press, 1997, 1 page.

Louis L Whitcomb, **Jonathan Howland**, David Smallwood, Dana Yoerger, and Tim Thiel. A New Control System for the Next Generation of US and UK Deep Submergence Oceanographic ROVs. *Proceedings of the 1st IFAC Workshop on Guidance and Control of Underwater Vehicles*, GCUV '03, 9-11 April 2003, Newport, South Wales, UK

Singh, H., **Howland, J.**, Pizarro, O, Large Area Photomosaicking Underwater" , *IEEE Journal of Oceanic Engineering*, pp. 872-886, vol 29, no 3, 2004.

V.L. Ferrini, D.J. Fornari, T.M. Shank, J.C. Kinsey, S.A. Soule, S.M. Carbotte, M.A. Tivey, L.L. Whitcomb, D.R. Yoerger, and **J. Howland**. Sub-meter bathymetric mapping of the East Pacific Rise crest at 9 °50'N linking volcanic and hydrothermal processes. *Geochemistry, Geophysics, Geosystems*, 8, Q01006, 2007.

Newman, J., T. Gregory, and **J. Howland**, Chapter 2, The Development of Towed Optical and Acoustical Vehicle Systems and Remotely Operated Vehicles in Support of Archaeological Oceanography, published in *Archaeological Oceanography*, Princeton University Press, 2008, 15 pages.

J.C Kinsey, Q. Yang , and **J.C. Howland**. Nonlinear Dynamic Model-Based State Estimators for Underwater Navigation of Remotely Operated Vehicles. *IEEE Transactions on Control Systems Technology*. 22(5), pp.1845-1854, 2014.

Contribution: I worked with James in reconfiguring the Jason code and data collection systems, including prototype navigation systems, and in development and accomplishment of the Test Plan.

Nicholas B. Macfarlane, **Jonathan C. Howland**, Frants H. Jensen, and Peter L. Tyack, A 3D Stereo Camera System for Precisely Positioning Animals in Space and Time, *Behavioral Ecology and Sociobiology*, February, 2015, 9 pages

Contribution: I led the technical development of the system, trained my co-authors in software use and camera calibration, wrote all of the photogrammetric portions of the paper, performed the error analyses, and participated in the writing of the paper.

OTHER PUBLICATIONS:

Howland, J.C. and Jourdan, D.W., "The Effect of GPS Availability on Submarine Renavigation," in Proceedings of the Institute of Navigation 1991 Annual Technical Meeting, The Institute of Navigation, Washington, DC, June 1991, pp 217-219.

Howland, J.C., Marra, M., Potter, D.F. and Stewart, W.K., "Near-Real-Time GIS in Deep-Ocean Exploration," in Proceedings of the ASPRS/ACSM/RT 92 Convention, The American Society of Photogrammetry and Remote Sensing and the American Congress on Surveying and Mapping, Washington, DC, August 1992, pp. 428-435.

Tucholke, B.E., Kleinrock, M.C., Stewart, W.K., Lin, J., Goff, J., Jaroslow, G., Brooks, B., Lemmond, P., **Howland, J.**, Marra, M., Reed, T., Edwards, M., Fricke, J.R. and Herzfeld, U., "Geological and Geophysical Survey of the Mid Atlantic Ridge Flank at 25° 25' to 27° 10'," EOS Transactions of the American Geophysical Union, Vol. 73, 1992.

Bowen, A., Fornari, D., **Howland, J.** and Walden, B., "The Woods Hole Oceanographic Institution's Remotely-Operated and Towed Vehicle Facilities for Deep Ocean Research, Operated for UNOLS & the U.S. Deep Sea Science Community, Information and Technical Specifications," Version 1.0, July 22, 1993.

Sulanowska, M.M., Humphris, S.E., **Howland, J.C.** and Kleinrock, M.C., "Detailed Analysis of the Surface Morphology of the Active TAG Hydrothermal Mound by Mosaicking of Digital Images," EOS, Transactions of the American Geophysical Union, vol. 77, p. 768, 1996.

Kleinrock, M.C., Humphris, S.E., and the Deep-TAG Team (Shaw, P., Bowen, A., Crook, T., Davis, C., Elder, R., Gleason, D., Goff, J., Goldstein, L., Handley, W., **Howland, J.**, Hussenoeder, S., Koga, K., Lerner, S., Nakamura, K., Rashid, M., Reiser Wetzels, L., Sellers, W., Sulanowska, M., Van Dover, C. and Whitcomb, L.) 2. Detailed Structure and Morphology of the Tag Active Hydrothermal Mound and Its Geotectonic Environment, Proceedings of the Ocean Drilling Program, Initial Reports, Vol. 158, pp. 15-21, 1996.

Lerner, S., **Howland, J.**, Humphris, S. and Lange, W., "Interactive Inspection and Analysis of Multi-Sensor Data from the TAG Hydrothermal Vent Site," EOS, Transactions of the American Geophysical Union, vol. 77, p. 768, 1996.

Bachmayer, R., Humphris, S., Fornari, D.J., Van Dover, C.L., **Howland, J.C.**, Bowen, A.D., Elder, R.L., Crook, T., Gleason, D.E., Sellers, W.J. and Lerner, S., "Oceanographic Research Using Remotely Operated Underwater Robotic Vehicles: Exploration of Hydrothermal Vent Sites on the Mid-Atlantic Ridge At 37° North 32° West," Marine Technology Society Journal, Vol. 32, No. 3, pp. 37-47, Fall 1998.

Howland, J.C., "Imagery Collection and Mosaicking, Derbyshire Survey 1997," Proceedings MTS/Ocean Community Conference '98, Baltimore, Maryland, Vol. 2, pp. 1104-1108, November 1998.

Singh, H., **Howland, J.**, Yoerger, D. and Whitcomb, L., “Quantitative Photomosaicking of Underwater Imagery,” Proceedings Oceans '98, IEEE/OES Conference, Nice, France, Vol. 1, pp. 263-266, September/October 1998.

Howland, J.C., Singh, H., Marra, M. and Potter, D., “Digital Mosaicking of Underwater Imagery,” Sea Technology, pp. 65-69, June 1999.

Howland, J., “Digital Data Logging and Processing Derbyshire Survey, 1997,” Woods Hole Oceanographic Institution Technical Report, WHOI-99-08, July 1999.

Singh, H., Weyer, F., **Howland, J.**, Duester, A., Yoerger, D., Bradley, A., “Quantitative Stereo Imaging from the Autonomous Benthic Explorer (ABE),” Proceedings of the Oceans '99 MTS/IEEE Conference, Vol. 1, pp. 52-57, Seattle, Washington, September 1999.

Whitcomb, L., Yoerger, D., Singh, H. and **Howland, J.**, “Advances in Underwater Robotic Vehicles for Deep Ocean Exploration: Navigation, Control, and Survey Operations,” Proceedings of the Ninth International Symposium of Robotics Research (ISRR'99), Snowbird, Utah, October 1999.

Howland, J.C. and Lerner, S., “Electronic Still Camera Processing and Mosaicking,” Woods Hole Oceanographic Institution Technical Report, WHOI-99-17, December 23, 1999.

Howland, J.C. and Singh, H., “Simulation of the Deep Sea Mosaicking Process,” Proceedings Oceans '2000, Providence, Rhode Island, Vol. 2, pp.1353-1357, September 2000.

Singh, H., Pizarro, O., Duester, A. and **Howland, J.C.**, “Optical Imaging from the ABE AUV,” Sea Technology, pp. 39-43, April 2000.

Eustice, R., Singh, H. and **Howland, J.**, “Image Registration Underwater for Fluid Flow Measurements and Mosaicking,” Proceedings of Oceans 2000, Providence, Rhode Island, Vol. 3, pp. 1529-1534, September 2000.

Gilbert, L.A., H.P. Johnson, D.R. Yoerger, A.D. Bowen, **J.C. Howland**, and S.A. Lerner, “High resolution bathymetry of the axial valley, Endeavour Segment, northern Juan de Fuca Ridge,” EOS Transactions, AGU, 81, 2000.

Johnson, H. Paul, Susan Hautala, Maurice Tivey, Chris Jones, Janet Voight, Matthew Pruis, Irene Garcia-Berdeal, Lisa Gilbert, Tor Bjorklund, William Fredericks, **Jonathan Howland**, et al, “Survey Studies Hydrothermal Circulation on the Northern Juan de Fuca Ridge, EOS vol. 83 Number 18, 2002

Robert Elder, Andrew D. Bowen, Matthew Heintz, Matthew Naiman, Christopher Taylor, William Sellers, **Jonathan C. Howland**, and Louis L. Whitcomb. Jason 2: A Review of

Capabilities. In EOS Transactions of the American Geophysical Union 2003 Fall Meeting Supplement, 84(46) Abstract OS32A-0226, San Francisco, December 2003.

Howland, J. and Stephen Gegg, “Analyses of the F/V Gaul Data”, WHOI Technical Memorandum WHOI – 2003-001

D.A. Mindell, H. Singh, D. Yoerger, L. Whitcomb, **J. Howland**, "Precision mapping and imaging of underwater sites at Skerki Bank using Robotic vehicles," in A.M. McCann and J.P. Oleson, eds., Deep-water Shipwrecks off Skerki Bank: the 1997 Survey, Journal of Roman Archaeology, Suppl. Series, pp 25-30, no 58, 2004.

Gallager, S., S. Tiwari, H. Singh, **J. Howland**, N. Vine, R. Taylor, and P. Rago. 2005. "High Resolution Underwater Imaging for Characterization of Habitat." In Special Session on Using Video Technology for Fisheries Applications, American Fisheries Society, 135th Annual Meeting, Anchorage, AK, September 2005.

Gallager, SM, H Singh, S Tiwari, **J Howland**, P Rago, W Overholtz, R Taylor and N Vine. High resolution underwater imaging and image processing for identifying essential fish habitat. Report of the National Marine Fisheries Service Workshop on Underwater Video analysis. DA Somerton and CT Glendill (eds) NOAA Technical Memorandum NMFS-F/SPO-68. pp. 44-54., 2005

Richard Taylor, **Jonathan Howland**, Hanu Singh, Andrew Girard, Paul Rago, Dvora Hart, Sanjay Tiwari, Scott Gallager, “High Resolution Underwater Imaging and Image Processing for Characterizing Essential Fish Habitat”, presented at ASLO, February, 2006

Howland, J.; Gallager, S.; Singh, H.; Girard, A.; Abrams, L.; Griner, C.; Taylor, R.; Vine, N., “Development of a Towed Survey System for Deployment by the Fishing Industry,” OCEANS 2006 , Sept. 2006. doi: 10.1109/OCEANS.2006.307098.

Howland, J.; Farr, N.; Singh, H., “Field Tests of a New Camera/LED Strobe System” OCEANS 2006 , Sept. 2006. doi: 10.1109/OCEANS.2006.307142.

J.C. Kinsey, L.L. Whitcomb, D.R. Yoerger, **J.C. Howland**, V.L. Ferrini, and Ø. Hegrenæs. New navigation post-processing tools for oceanographic submersibles. In Eos Trans. AGU, 87(52), Fall Meet. Suppl., 2006. Abstract OS33A-1678.

Bowen, A., Yoerger, D., Taylor, C., McCabe, R., **Howland, J.**, Gomez-Ibanez, D., Kinsey, J., Heintz, M., McDonald, G., Peters, D., Fletcher, B., Young, C., Buescher, J., Whitcomb, L., Martin, S., Webster, S., Jakuba, M. (2008). The Nereus Hybrid Underwater Robotic Vehicle for Global Ocean Science Operations to 11,000 m Depth. In Proceedings of IEEE/MTS Oceans 2008, Quebec, September 15-18, 2008, pp. 1- 10.

Scott Gallager, York, A, **Howland, J**, Taylor, R, Vine, N, Prasad, L., Swaminagayan, S, mayer, L., Rzhhanov, Y, Rosencranz, G, Hart, D., Rago, P., “Development of Advanced Technologies for Surveying Sea Scallops and Other Benthic Organisms”, Joint Airborne LIDAR Bathymetry Technical Center of Expertise Coastal Mapping and Charting Workshop, 2008

Taylor R., NH Vine, AD York, S Lerner, D Hart, **J Howland**, L Prashad, L Mayer, and SM Gallagher, “Evolution of a Benthic Imaging System from a Simple Towed Camera to an Automated Habitat Characterization System ” presented at IEEE Oceans 2008.

A. Bowen, D. R. Yoerger, C. Taylor, R. McCabe, **J. Howland**, D. Gomez-Ibanez, J. C. Kinsey, M. Heintz, G. McDonald, D. B. Peters, B. Fletcher, C. Young, J. Buescher, L. L. Whitcomb, S. C. Martin, S. E. Webster, and M. V. Jakuba. “The Nereus hybrid underwater robotic vehicle” *Underwater Technology: The International Journal of the Society for Underwater Technology*, 28(3):79–89, 2009.

Bowen, A.D., D.R. Yoerger, C. Taylor, R. McCabe, **J. Howland**, D. Gomez-Ibanez, J.C. Kinsey, M. Heintz, G. McDonald, D.B. Peters, J. Bailey, E. Bors, T. Shank, L.L. Whitcomb, S.C. Martin, S.E. Webster, M.V. Jakuba, B. Fletcher, C. Young, J. Buescher, P. Fryer, S. Hulme, Field Trials of the Nereus Hybrid Underwater Robotic Vehicle in the Challenger Deep of the Mariana Trench, *Proceedings Oceans 2009, IEEE/MTS*, October 2009.

Louis L. Whitcomb, Michael V. Jakuba, James C. Kinsey, Stephen C. Martin, Sarah E. Webster, **Jonathan C. Howland**, Chris L. Taylor, Daniel Gomez-Ibanez, Dana R. Yoerger. “Navigation and Control of the Nereus Hybrid Underwater Vehicle for Global Ocean Science to 10,903 m Depth: Preliminary Results.” *Proceedings of the 2010 IEEE International Conference on Robotics and Automation*. IEEE (2010).

Daniel Gómez-Ibañez, C. L. Taylor, M. C. Heintz, **J. C. Howland**, D. R. Yoerger, A. D. Bowen, L. L. Whitcomb. “Energy Management for the Nereus Hybrid Underwater Vehicle,” *Proceedings of the 2010 MTS/IEEE Oceans Conference* (2010), pp 1-9.

Jonathan Howland, Macfarlane, N, and Tyack, P., “Precise Positioning of Marine Mammals Using Stereo Photogrammetry,” *Proceedings of the 2012 MTS/IEEE Oceans Conference*, 2012.

Nicholas Macfarlane, **Howland, J**, Hentsen, F, Verborgh, P., Gauffier, P., de Stephanis, R., Hutchinson, B., and Tyack, P., “Quantitative Estimates of Group Cohesion Using a Novel Stereophotogrammetric Geocoding System”, 20th Biennial Conference on the Biology of Marine Mammals, 2013.

Contribution: I was the technical lead in development of the system, and wrote all of the system descriptions and analytics other than those related to Marine Mammal behavior.

L.L Whitcomb, M.V. Jakuba, C.R. German, A. D. Bowen, D.R Yoerger, J.C. Kinsey, L.A. Mayer, C.J. McFarland, S. Suman, J. Bailey, C. Judge, S. Elliot, D. Gomez-Ibanez, C.L. Taylor, C. Machado, **J.C. Howland**, C.L. Kaiser, M. Heintz, C. Pontbriand, L. O’Hara, G. McDonald, and A. Boetius. Preliminary Polar Sea Trials of Nereid-UI: A Remotely Operated Underwater Vehicle for Oceanographic Access Under Ice. Fall 2014 AGU Meeting

Contribution: I developed the prototype pilot interface for this vehicle, and worked on the software architecture.

Jonathan Howland, M. Jakuba, J. Kinsey, M. Skowronski, L. Whitcomb, “Design and Implementation of a New Control System for HOV ALVIN”, Proceedings of the 13th Manned Underwater Vehicles Symposium, Underwater Intervention, 2016. 11pp.

Jonathan Howland, “Upgrades to the Nautilus/Hercules Software Systems”, in New Frontiers in Ocean Exploration: The E/V *Nautilus*, NOAA Ship *Okeanos Explorer*, and R/V *Falkor* 2016 field season. *Oceanography* 30(1), supplement, p. 14

PRESENTATIONS AT MEETINGS AND INVITED LECTURES:

(in addition to those associated with the above proceedings)

Howland, J., Computing in the Jason ROV Program, presented to the New England Chapter of the Association of Computing Machinery, Boston, Massachusetts, February 1994.

Howland, J., Stewart, W.K. and Maffei, A.R., "Collaboration of Shipboard and Shore-Based Researchers Using a Shipboard LAN Connected to the Internet," Poster presented at the Fall AGU Meeting, San Francisco, California, December 1995.

Singh, H., **Howland, J.**, Duester, A., Bradley, A. and Yoerger, D., "Quantitative Stereo Imaging from the Autonomous Benthic Explorer (ABE)," presented at the Symposium on Autonomous Underwater Vehicle Technology, Monterey, California, 1996.

Howland, Jonathan, “Shore Based 3-D Visualization of At-Sea Operations”, Invited presentation at a USGS/WHOI Geographic Visualization Workshop, November, 2006

Howland, Jonathan, “User Interfaces for Enhancing Video Content”, invited presentation at 2016 Workshop on Establishing Community Standards for Underwater Video Acquisition, Tagging, Archiving, and Access. Also Breakout Group Leader on Current Needs, Challenges, and Opportunities