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*Non-academic Work Experience:*

President and Principal Consultant, **HLN Consulting, LLC**, Palm Desert, CA, 1997 - present

Created HLN in 1997, responding to a need for technology specialists with content experience who are able to bring independent judgment to bear on technology projects. Focusing on the health care market, and public health in particular, we specialize in a wide variety of technology planning, consulting, and research.

HLN views a successful effort as one that can balance technology, organization/politics, and resource allocation; projects are approached with an eye to creating this balance. HLN Consulting, LLC utilizes a structured and document-driven development methodology that engages the client in thoughtful dialogue from requirements definition, to specification preparation, to ultimate execution. Clients include state and local government, and non-profit organizations.

Interim Vice President for Health Information Exchange Services, **Vermont Information Technology Leaders, Inc.**, Montpelier, VT, 2008 – 2009

Responsible for the design, development, delivery, and support of technical services for Vermont's statewide Regional Health Information Organization.

Consultant, **Center for Applied Research**, Philadelphia, PA, 1997 - 2002

Actively involved in research projects for the Center, mostly focusing on technology-assisted collaboration and organizational design.

**University of Pennsylvania**, Philadelphia, PA, 1983 - 2002

*Final Position: Senior Fellow*

Over fifteen years progressive experience in general university administration and management of technology. Seven years were spent with the Office of the Dean of the Wharton School (through August 1990); the remainder with the central Division of Information Systems and Computing where responsibilities included strategic planning for technology, management of network services for the campus (including electronic mail, world wide web, authentication systems), and technical architecture development. Final position was senior technology advisor to the Vice Provost for Computing (Penn's Chief Information Officer).

*Academic Work Experience:*

Instructor, **University of California San Diego (UCSD) Extension School**, 2011 - 2017

Course coordinator for *Concepts in Healthcare Information Technologies I and II* in HIT Certificate Program

Research Associate, **Kay Center for e-Health Research, Claremont Graduate University**, 2009 - 2011

Involved in the research agenda of the Center, including project proposal development and execution.

Senior Fellow, **Leonard Davis Institute for Health Economics**, 1994 - 2005

Research Associate, **Leonard Davis Institute for Health Economics**, 1994 - 1997

Principal investigator on New Jersey Comprehensive Immunization Program sub-contract from the University of Medicine and Dentistry of New Jersey on a Robert Wood Johnson Foundation grant. Technical advisor on other Institute projects.

Research Fellow, **Institute for Research on Higher Education**, 1988 - 1993

Perform financial modeling and policy analysis on a variety of student aid and finance projects. Actively involved in research agenda of the Institute.

Lecturer, **Department of Decision Sciences, The Wharton School**, 1984 - 1987

Teach introductory laboratory course in computer science for undergraduates using Apple Macintosh personal computer.

*Sponsored Research:*

Senior investigator and technical director on the Philadelphia Interactive Business Network, a \$600,000 matching grant program funded by the National Telecommunications and Information Administration (NTIA) to The Enterprise Center, Phila., PA.

Senior investigator on the Remote Dental Consultation Project, sponsored by the National Library of Medicine, to develop and prototype a remote clinical consultation system (School of Dental Medicine, University of Pennsylvania).

Principal investigator on New Jersey Comprehensive Immunization Program, a \$1.28 million sub-contract from the University of Medicine and Dentistry of New Jersey on a Robert Wood Johnson Foundation grant.

Principal investigator on Statewide Immunization Information System, a \$335,000 continuation of the above contract funded by the Jersey Department of Health and Senior Services and the Centers for Disease Control and Prevention.

*Awards and Honors:*

**Commissioner's Award, New Jersey Department of Health and Senior Services**, "in recognition of creativity, perseverance, and foresight in the development of a Nationally Recognized Statewide Immunization Information System." Awarded at the Annual Conference of State and Local Health Officers of New Jersey, Princeton, NJ, October 9, 1996.

Appointed **Fellow, Healthcare Information and Management Systems Society (FHIMSS)**, 2008.

**2018 Volunteer Service Award, American Immunization Registry Association (AIRA)**: "Noam Arzt has been nominated and selected for this award for his service as an AIRA volunteer in the IIS community. Since AIRA's founding in 2012, he has served on 14 committees or workgroups, including the Technical committee, the Urban/Cities Committee, and the Data Exchange Steering Committee and currently serves on the SISC, ESC, and JDI Advisory Workgroup. Noam's passion and commitment to the IIS community and to public health are also reflected in the open source release of Immunization Calculation Engine (ICE) and a data quality tool developed by HLN."

Appointed **Fellow, American Medical Informatics Association (FAMIA)**, 2018.

*Book:*

*The Business of Higher Education: The American University and Its Banking Function*. New York: Garland, (1995).

*Articles:*

with Christopher Shull and Daniel Updegrove, *Blood and Guts on the Trail to Distributed Computing*, CAUSE/EFFECT, 18(3), Fall 1995.

with Susan M. Salkowitz, *Technology Strategies for a State Immunization Information System*, American Journal of Preventive Medicine supplement on All Kids Count, 13(2), April, 1997.

with Daryl Chertcoff, *Web Security Solutions: Central Authentication for Locally Developed Applications*, CAUSE/EFFECT, 22(3), Fall 1999.

*Rising to the Challenge: Strategies for the New Healthcare Enterprise*, Journal of Healthcare Information Management, 17(3), Summer 2003.

*Information Security Strategies for Healthcare: Part 1*, Journal of Healthcare Information Management, 18(2), Spring 2004.

*Information Security Strategies for Healthcare: Part 11*, Journal of Healthcare Information Management, 18(3), Summer 2004.

*Information Security Strategies for Healthcare – Defining the Roadmap: Part 3*, Journal of Healthcare Information Management, 18(4), Fall 2004.

with Vikki Papadouka, et al, *Integrating the New York Citywide Immunization Registry and the Childhood Blood Lead Registry*, Journal of Public Health Management and Practice, Nov 2004 Supplement.

*The New Alphabet Soup*, Journal of Healthcare Information Management, 19(3), Summer 2005.

*The New Alphabet Soup: Models of Data Integration, Part 1*, Journal of Healthcare Information Management, 20(1), Winter 2005.

*The New Alphabet Soup: Models of Data Integration, Part 2*, Journal of Healthcare Information Management, 20(2), Spring 2006.

*The New Alphabet Soup: Models of Application Integration*, Journal of Healthcare Information Management, 20(3), Summer 2006.

*Strategies for Person Data Matching and De-duplication*, Journal of Healthcare Information Management, 21(3), Summer 2007.

with Michael Berry, *Privacy Consents and HIE: How IHE's Basic Patient Privacy Consents Profile Helps Manage Privacy in HIE*, Journal of AHIMA, (79)4, April 2008.

*Service-Oriented Architecture in Public Health: Interoperability Case Studies*, Journal of Health Information Management, 24(2), Spring 2010.

*Clinical Summaries and Meaningful Use: A Primer*, Journal of Healthcare Information Management, 25(1), Winter 2011.

with Michael Suralik, et al., *The Immunization Calculation Engine: Open Source Clinical Decision Support for Immunizations*, Journal of Healthcare Information Management, 27(3), Summer 2013.

with Emily Emerson, Sripriya Rajamani, and Katie McGee, *Consumer Access to Immunization Information Systems: Public Health and Patient Empowerment*, Journal of Healthcare Information Management, 28(1), Winter 2014.

with Rick Edwards, *HIMSS HIE in Practice Blog Series: Access to Public Health Registries*, March 19, 2015.

*The Interoperability of Things*, Journal of Healthcare Information Management, 29(4), Fall 2015.

*Fighting Information Blocking in the Emerging Learning Health System*, Journal of Healthcare Information Management, 29(4), Fall 2015.

*Clinical Decision Support for Immunizations (CDSi): A Comprehensive, Collaborative Strategy*, Biomedical Informatics Insights, Suppl. 2, October 2016.

*Is There a National Strategy Emerging for Patient Matching in the US?*, Medical Research Archives, 5(4), April 2017.

*Book Review:*

with Daniel Updegrave, *Five Books on Computer Security*, CAUSE/EFFECT, 14(4), Winter 1991.

*White Papers:*

with contributions by Susan M. Salkowitz, *Evolution of Public Health Information Systems: Enterprise-wide Approaches*, July 2007.

*Guide to Immunization-related Electronic Data Exchange*, May 2008.

*Effective On-line Collaboration*, May 2008.

*Future Information Capabilities for Public Health*, in conjunction with the Joint Public Health Informatics Taskforce (JPHIT), September 2013.

*Towards a National IIS Strategy: Options for Developing a National Immunization Information System Architecture*, November 2013.

*IIS and HIE: Is there a Future Together?*, November 2013.

*IIS and HIE: Web Services Strategies*, February 2014.

Berry, Mike and Noam H. Arzt, et al, *Decision Support for Data Segmentation (DS2): Technical and Architectural Considerations*, May 2014.

*IIS and EHR Feature Overlap*, Revised April 2018.

*The Case for Payer Participation in Health Information Exchange*, New York eHealth Collaborative (NYeC), April 2018.

*Conference Papers:*

with M. Katie McGee, *Desktop Technology Frontier: Deploying an Office of NeXT Workstations as the Administrator's Workstation of the Future*, **Proceedings of the 1992 CAUSE Annual Conference**, Dallas, Texas, December 1992.

with Robin Beck, Janet Gordon, and Linda May, *Architecture and Reengineering: A Partnership for Change at the University of Pennsylvania*, **Proceedings of the 1993 CAUSE Annual Conference**, San Diego, CA, December 1993.

with Ira Winston, *Designing and Implementing a Network Architecture Before it Becomes Obsolete*, **Proceedings of the 1994 CAUSE Annual Conference**, Orlando, FL, December 1994.

with Robin Beck, Janet Gordon, and Linda May, *Chasing the Boulder Down the Hill: Reengineering and Architecture at the University of Pennsylvania*, **Proceedings of the 1994 CAUSE Annual Conference**, Orlando, FL, December 1994.

with Dan Updegrave, *Looking to the Year 2000: Alternatives in Campus Data Networking*, **Proceedings of the 1995 CAUSE Annual Conference**, New Orleans, LA, November 1995.

with David Millar and Bill Ramirez, *Assessing Risk: Developing a Client/Server Security Architecture*, **Proceedings of the 1995 CAUSE Annual Conference**, New Orleans, LA, December 1995.

with Linda May, *Managing Collaborative Efforts on the Web*, **Proceedings of the 1996 CAUSE Annual Conference**, San Francisco, CA, December 1996.

With Linda May, Mario Moussa, and Lynn Oppenheim, *Tasting as You Cook: Penn Restructures Computing Services*, **Proceedings of the 1996 CAUSE Annual Conference**, San Francisco, CA, December 1996.

*Web Security Solutions: Implementing a Web Security Module to Support Secure, Authenticated Applications*, **Proceedings of the 1998 CAUSE Annual Conference**, Seattle, Washington, December 1998.

#### *Other Presentations:*

*Penn's Project Cornerstone: Building a Principles-based Systems Architecture in Conjunction with Business Reengineering*, IngresWorld 93, Santa Clara, CA, May 1993.

with Chris Shull and Dan Updegrave, *Distributed Computing at Penn: Observations from the Not-so-bleeding Edge*, CAUSE Northeast Regional Conference, Philadelphia, PA, June 1995.

*State Immunization Information System (SIIS) Developer's Workshop: System Security Functions Presentation*, Centers for Disease Control and Prevention, Atlanta, GA, August, 1995.

*Electronic Laboratory Surveillance: System Security Functions Presentation*, Centers for Disease Control and Prevention, Atlanta, GA, February, 1996.

*Internet 101: An Overview of Internet Resources and Functionality*, Delaware Valley Healthcare Information and Management Systems Society (DVHIMSS), Philadelphia, PA, April, 1996.

*Campus Data Networking Architecture: A Process As Well as a Product*, QUESTnet 96, Townsville, Australia, July 1996.

*ResNet: Student Residence Networking at the University of Pennsylvania*, QUESTnet 96, Townsville, Australia, July 1996.

*INPHO On the Internet: A Wide-area Network Solution?*, 2<sup>nd</sup> National CDC INPHO Conference, Atlanta, GA, September, 1996.

with Susan M. Salkowitz, *Promoting the Internet in Public Health: New Jersey's Experience*, American Public Health Association (APHA) 124<sup>th</sup> Annual Meeting, New York City, November 18, 1996.

*Security and Deployment Challenges of Hospital Access to Registries Through the Internet*, "All Kids Count" Annual Meeting, San Diego, California, April 3, 1997.

with Susan M. Salkowitz, Poster Session entitled *Lessons Learned About Data Standards and Quality Assurance From Pilot Immunization Registry*, 31<sup>st</sup> National Immunization Conference, Detroit, MI, May 21, 1997.

with Susan M. Salkowitz, Participation in *Developer's Demonstrations of Advances in Registry Technology*, 31<sup>st</sup> National Immunization Conference, Detroit, MI, May 21, 1997.

*The Current State of Web Privacy, Confidentiality, and Security*, American Public Health Association (APHA) 125<sup>th</sup> Annual Meeting, Indianapolis, IN, November 12, 1997.

*Standards for Web Browser Security*, "All Kids Count" Annual Meeting, New Orleans, LA, April 8, 1998.

with Susan M. Salkowitz, *The Final Chapter: Managing the Technical, Financial and Political Complexities of Immunization Registry Deployment and Sustainability*, 32<sup>nd</sup> National Immunization Conference, Atlanta, GA, July 21, 1998.

with Susan M. Salkowitz and Ruth Gubernick, *A Collaborative Approach to Systems Design for a Community-based Maternal/Child Agency Operating in a Managed Care Environment*, American Public Health Association (APHA) 126<sup>th</sup> Annual Meeting, Washington, DC, November 17, 1998.

with Susan M. Salkowitz, *Reassessing Your Registry Direction: Strategies for Moving Forward with Registry Projects*, "All Kids Count" Annual Meeting, St. Paul, MN, April 28, 1999.

*Web Security Solutions*, CUMREC99, San Antonio, TX, May 11, 1999.

with Susan M. Salkowitz, *Registry Project Assessment Cookbook*, 33<sup>rd</sup> National Immunization Conference, Atlanta, GA, June 23, 1999.

with Ruth Gubernick and Amy Wishner, *Web-based Immunization Education*, 33<sup>rd</sup> National Immunization Conference, Atlanta, GA, June 23, 1999.

with Ruth Gubernick, Susan M. Salkowitz, and JoAnne Fischer, *Successfully Using Technology to Help Community Health Advocates Ensure Quality Care in a Changing Health Care Environment*, Healthy Mothers/Health Babies National Conference, Seattle, WA, August 3, 1999.

with Ruth Gubernick, Susan M. Salkowitz, and JoAnne Fischer, *A Case Study in Addressing Maternal and Child Health Data Quality Assurance, Reporting, and Research Requirements in a Changing Health Care Environment*, American Public Health Association (APHA) 127<sup>th</sup> Annual Meeting, Chicago, IL, November 9, 1999.

*Web Architectures and Security*, All Kids Count World Wide Web and Immunization Registries Conference, Ontario, CA, February 24, 2000.

with Susan M. Salkowitz, *Registry Crystal Ball: Challenges for the Future*, 2000 Immunization Registry Conference, Newport, RI, March 28, 2000.

with Denice Stewart and M. Katie McGee, *Remote Dental Consultation System*, American Association of Dental Schools Annual Meeting "TechniFair 2000," Washington, DC, April 2, 2000.

*Bridging the Digital Divide: Building Organizational Capacity*, Bridging the Digital Divide Conference, The Enterprise Center, Philadelphia, PA, April 19, 2000.

with Amy Metroka and Susan Salkowitz, *The New York City CIR: A Registry in the Process of Re-inventing Itself*, 34<sup>th</sup> National Immunization Conference, Washington, DC, July 7, 2000.

with Vikki Papadouka and Deborah Walker, *The Development of a New Tool for Data Quality Improvement and Use of an Immunization Registry in the 21st Century*, 34<sup>th</sup> National Immunization Conference, Washington, DC, July 7, 2000.

with Susan Salkowitz, *To Web or Not to Web: Technical and Policy Considerations for the Web as an Application Deployment Environment*, Public Health Informatics and Distance Learning Conference, New Orleans, LA, August 10, 2000.

with Martha Rome and Ruth Gubernick, *New Software Tools for Recall in an Immunization Registry*, Public Health Informatics and Distance Learning Conference, New Orleans, LA, August 10, 2000.

with Susan Salkowitz, *Internet Technology in Public Health: Enhancing Practice, Enabling Achievement*, Pennsylvania Public Health Association Annual Meeting, Harrisburg, PA, October 10, 2000.

with Ruth Gubernick, Susan M. Salkowitz, and JoAnne Fischer, *Use of an Information System at a Community-based Maternal Care Agency to Help Pregnant Women Successfully Manage the*



*Impacts of Social Policy Change*, American Public Health Association (APHA) 128th Annual Meeting, Boston, MA, November 13, 2000.

with Ayesha Gill and Susan M. Salkowitz, *Challenges and Responses in Immunization Programs: California Strategies to Extend Registries to All Communities in the State*, American Public Health Association (APHA) 128<sup>th</sup> Annual Meeting, Boston, MA, November 13, 2000.

with Martha Rome, *Using Immunization Registry Data to Support Medicaid Managed Care Services*, The 5th Annual Congress on Managed Medicaid and Medicare (NMHCC), Washington, DC, January 22, 2001.

with Diane Fraiter, *Extending the Life of a Registry: Connecticut's ICES Reporting System*, 35th National Immunization Conference, Atlanta, GA, June 1, 2001.

*Web Enablement: Considerations and Issues for Immunization Registries*, Pre-conference Workshop, 2001 Immunization Registry Conference, Little Rock, AK, July 8, 2001.

with Diane Fraiter, *Connecticut's Immunization Registry Reporting System*, 2001 Immunization Registry Conference, Little Rock, AK, July 9, 2001.

with Deborah Walker, *Challenges in System Integration in Public Health*, American Public Health Association (APHA) 129th Annual Meeting, Atlanta, GA, October 24, 2001.

with Deborah Walker, *Disaster Recovery of the New York Citywide Immunization Registry After the World Trade Center Tragedy*, 36th National Immunization Conference, Denver, CO, April 30, 2002.

*Low-bandwidth Registry Communications*, 16<sup>th</sup> CA SIIIS Statewide Meeting, San Diego, CA, October 15, 2002.

with Amy Zimmerman, *Technology Assessment: Moving Rhode Island's KIDSNET Forward*, 2002 Immunization Registry Conference, Philadelphia, PA, October 28, 2002.

with John Schaaf, et al, *Developing Regional Registry Software: Lessons from California*, 2002 Immunization Registry Conference, Philadelphia, PA, October 28, 2002.

with Robyn Davis, *Immunization Registry Support for Bio-terrorism Preparedness: Los Angeles*, American Immunization Registry Association Annual Meeting, Philadelphia, PA, October 28, 2002.

with Amy Metroka, *Implementing a HIPAA Compliant Electronic File Transfer Application for Reporting to the NY Citywide Immunization Registry*, 2002 Immunization Registry Conference, Philadelphia, PA, October 29, 2002.

with Angel Aponte, *Internet Interfaces: Provider Access to Confidential Patient Information - A Survey of 11 Jurisdictions*, 2002 Immunization Registry Conference, Philadelphia, PA, October 29, 2002.

with Amy Zimmerman, *Planning for Change: Technology Assessment of Rhode Island's KIDSNET*, 37<sup>th</sup> National Immunization Conference, Chicago, IL, March 17, 2003.

with Susan Salkowitz, *Registry Assessment Methodologies: Experience Across Three Projects*, 37<sup>th</sup> National Immunization Conference, Chicago, IL, March 17, 2003.

*Role of Alternative Networks in Registry Telecommunications*, 37<sup>th</sup> National Immunization Conference, Chicago, IL, March 17, 2003.

with Susan Salkowitz, *Electronic Medical Records and Registries: Challenges and Opportunities*, 18th CA SIIS Statewide Meeting, Oakland, CA, October 15, 2003.

*Conceptual Data Flow Model Between PHIN Systems*, 38<sup>th</sup> National Immunization Conference, Nashville, TN, May 13, 2004.

with Susan Salkowitz, *Registry Integration with Electronic Medical Records*, 38<sup>th</sup> National Immunization Conference, Nashville, TN, May 13, 2004.

with Michael Berry, *Expanding the Options for Immunization Data Collection with Personal Digital Assistants*, 38<sup>th</sup> National Immunization Conference, Nashville, TN, May 13, 2004.

with Susan Salkowitz, *EHR Update: Integrating Immunization Registries with Electronic Medical Records*, 2004 Immunization Registry Conference, Atlanta, GA, October 18, 2004.

*Positioning IIS Within EHR: Ask Not What EHR Can Do for You, Ask What You can Do for EHR*, 2004 Immunization Registry Conference, Atlanta, GA, October 19, 2004.

with Susan Salkowitz, *Public Health Systems Integration in Support of Emergency Preparedness*, American Public Health Association (APHA) 132nd Annual Meeting, Washington, DC, November 8, 2004.

with Angel Aponte, et al, *Evolution of Data Exchange with New York Citywide Immunization Registry: From Paper to Electronic Messaging*, 39th National Immunization Conference, Washington, DC, March 24, 2005.

*Using Electronic Medical Records: National and Local Perspectives*, 3rd Annual Awards of Excellence in Immunization Practices & Conference, Pasadena, CA, May 12, 2005.

*Frameworks and Models for Integration, Connecting Communities for Better Health* Conference, Washington, DC, May 26, 2005.

with Michael Berry, *Models for Regional Health Information Organization (RHIO) Systems: Ensuring Public Health's Role*, American Public Health Association (APHA) 133rd Annual Meeting, Philadelphia, PA, December 13, 2005.

with Michael Berry, *RHIO Models and Public Health: How Do You Determine the Best Approach?*, American Public Health Association (APHA) 134th Annual Meeting, Boston, MA, November 8, 2006.

*How Can IIS Remain Relevant in the New World of Health Information Exchange?* 41st National Immunization Conference, Kansas City, Mo, March 6, 2007.

*Revitalizing Public Health Data Systems in the New World of Health Information Exchange*, Fourth Health Information Technology Summit, Washington, DC, March 30, 2007.

*Immunization Information System Interoperability*, 42<sup>nd</sup> National Immunization Conference, American Immunization Registry Association Pre-conference Workshop, Atlanta, GA, March 16, 2008.

*Public Health Systems Interoperability*, 2008 American Medical Informatics Association Spring Congress, Phoenix, AZ, May 29, 2008.

with Michael Berry, *Planning for PHIN Certification: A Small State's Experience*, 2008 Public Health Information Network (PHIN) Conference, Atlanta, GA, August 26, 2008.

*From Integration to Interoperability: The Role of Public Health Systems in the Emerging World of Health Information Exchange*, American Public Health Association (APHA) 136th Annual Meeting, San Diego, CA, October 27, 2008.

*Architecture for Person Matching and De-duplication*, American Public Health Association (APHA) 136th Annual Meeting, San Diego, CA, October 29, 2008.

*HITSP Real World Sites: Health Information Exchanges - Vermont Information Technology Leaders*, Health Information Technology Standards Panel Webinar Series, July 9, 2009.

with Anna Orlova et al, *Business Case for Public Health Participation in Health Information Technology (HIT) Standardization*. 2009 Public Health Information Network (PHIN) Conference, Atlanta, GA, September 2, 2009.

*Service-oriented Architecture: Immunization Information System Case Studies*. 44<sup>th</sup> National Immunization Conference, Atlanta, GA, April 21, 2010.

*Public Health and Support for Meaningful Use in Health Information Exchange*, HIMSS Virtual Conference and Expo, June 10, 2010.

*Service-Oriented Architecture: Enabling Data Sharing Between Immunization Information Systems and Clinical Care*, American Public Health Association (APHA) 138th Annual Meeting, Denver, CO, November 10, 2010.

with Amy Metroka, et al, *Meaningful Use and Immunization Information Systems: A Case Study*, 45<sup>th</sup> National Immunization Conference, Washington, DC, March 30, 2011.

with Amy Zimmerman and Laura Rappleye, *Public Health Meaningful Use: Views from the Field*, Healthcare Information and Management Systems Society (HIMSS) Chapter Health Information Exchange (HIE) Liaison Roundtable Education Webinar, May 19, 2011.

with Kristen Forney, et al, *Case Study on Meaningful Use and Public Health: Immunization Information Systems in New York City*, 2011 Public Health Informatics Conference, Atlanta, GA, August 24, 2011.

*Health Information Exchange and Directory Services: Public Health's Role*, American Public Health Association (APHA) 139th Annual Meeting, Washington, DC, October 31, 2011.

with Anna Orlova, et al, *Towards Health IT Standards Adoption: A Web-based Resource of Health IT Applications and Projects in Public Health*, American Public Health Association (APHA) 139th Annual Meeting, Washington, DC, October 31, 2011.

*Roundtable: Health Information Exchange Standards and Their Implications for Public Health*, American Public Health Association (APHA) 140th Annual Meeting, San Francisco, CA, October 30, 2012.

*Meaningful Use, Public Health & Transport Standards: Strategies and Tactics*, Meaningful Use Public Health Forum & CDC Nationwide Call, March 21, 2013.

with Emily Emerson, et al, *Consumer Access to Immunization Information Systems: Approach/Options Considered by Minnesota*, American Immunization Registry Association (AIRA) 2013 National Meeting, Denver, CO, October 7, 2013.

with Danielle Reader-Jolley, *Building Effective IIS-HIE Relationships: Findings from a Nationwide Telephone Survey*, American Immunization Registry Association (AIRA) 2013 National Meeting, Denver, CO, October 8, 2013.

*Interoperability With IIS: Can It Be Extended to Schools?*, American Immunization Registry Association (AIRA) 2013 National Meeting, Denver, CO, October 9, 2013.

with John Stinn, *Planning for Consumer Access to Immunization Information Systems: A Multi-state Effort*, 2014 Public Health Informatics Conference, Atlanta, GA, April 30, 2014.

*Clinical Decision Support for Immunization*, American Immunization Registry Association (AIRA) Regional Meeting, Lansing, MI, August 22, 2014.

*IIS and HIEs: Is There a Future Together?*, 2014 AHIMA Convention & Exhibit, San Diego, CA, October 1, 2014.

*Immunization Calculation Engine (ICE): An Open Source Clinical Decision Support System for Integration with Health Information Systems*, 30<sup>th</sup> VistA Community Meeting, Sacramento, CA, January 16, 2015.

*Towards a National IIS Strategy: Options for Developing a National IIS Architecture*, American Immunization Registry Association (AIRA) 2015 National Meeting, New Orleans, LA, April 21, 2015.

with Bill Brand, *IIS Past, Present, and Future: A Conversation and a Discussion*, American Immunization Registry Association (AIRA) 2015 National Meeting, New Orleans, LA, April 21, 2015.

*Options for IIS and EHR Feature Overlap*, American Immunization Registry Association (AIRA) 2015 National Meeting, New Orleans, LA, April 21, 2015.

with James Daniel, *Connecting Health and Care for the Nation: A Shared Nationwide Interoperability Roadmap and What It Means for IIS*, American Immunization Registry Association (AIRA) 2015 National Meeting, New Orleans, LA, April 22, 2015.

*An Open Source Quality Assurance Tool for HL7 v2 Syndromic Surveillance Messages*, ISDS 2015, December 9, 2015.

*Open Source and IIS*, American Immunization Registry Association (AIRA) Regional Meeting, San Diego, CA, October 16, 2015.

*Open Source Revealed: How the IIS Community Can Benefit From Being an Open Source Community*, American Immunization Registry Association (AIRA) 2016 National Meeting, Seattle, WA, April 6, 2016.

with Bill Brand, *“Keeping up” in a Turbulent Environment: Successful Strategies for IIS Sustainability*, American Immunization Registry Association (AIRA) 2016 National Meeting, Seattle, WA, April 6, 2016.

with Daryl Chertcoff, *Clinical Decision Support for Public Health Surveillance: Three Open Source Examples*, Council of State and Territorial Epidemiologists (CSTE) Annual Conference, Anchorage, AK, June 21, 2016.

*Current Approaches to Patient Matching: Will We Ever Get Anywhere?* 2016 Public Health Informatics Conference, Atlanta, GA, August 22, 2016.

*How Can Public Health Benefit From Being an Open Source Community?* 2016 Public Health Informatics Conference, Atlanta, GA, August 22, 2016.

with Daryl Chertcoff, *A Common Open Source Clinical Decision Support Administration Tool for Public Health*, 2016 Public Health Informatics Conference, Atlanta, GA, August 24, 2016.

*Service-oriented Architecture: A Public Health Perspective*, 14<sup>th</sup> Healthcare Services Platform Consortium (HSPC) Meeting, New Orleans, LA, March 27, 2017.

*Open Source Primer: What Public Health Needs to Know*, American Medical Informatics Association Webinar Series, June 13, 2017.

*Clinical Decision Support Tools for Public Health*, 2017 Netsmart Public Health Summit, Overland Park, KS August 3, 2017.

*Advancing Electronic Case Reporting (eCR) to Enable Public Health Disease Control and Emergency Response: Defining a Long-term Public Health Clinical Decision support (CDS) Strategy*, American Medical Informatics Association (AMIA) 2017 Annual Symposium, Washington, DC: November 8, 2017.

with Stuart Myerburg and Angel Aponte, *CDS for Immunizations (CDSi): A Community and Standards-based Approach*, Patient-Centered Clinical Decision Support Learning Network, January 18, 2018.

with Bill Brand, *IIS Past, Present, and Future: A Conversation and a Discussion*, American Immunization Registry Association (AIRA) 2018 National Meeting, Salt Lake City, UT, August 15, 2018.

*Cloud-Based Solutions: A Good Option for Hosting CDS for Immunizations*, American Immunization Registry Association (AIRA) 2018 National Meeting, Salt Lake City, UT, August 15, 2018.

with Michael Berry, *ICE: An Open Source Option for Immunization Forecasting*, American Immunization Registry Association (AIRA) 2018 National Meeting, Salt Lake City, UT, August 16, 2018.

*Case Study for Cloud Computing Solutions in Public Health*, 2018 CDC Public Health Informatics Conference, Atlanta, GA, August 21, 2018.

with Stuart Myerburg and Angel Aponte, *Clinical Decision Support for Immunizations as a Community-drive, Standards-based Activity*, 2018 CDC Public Health Informatics Conference, Atlanta, GA, August 22, 2018.

*The Changing Face of Interoperability and its Impact on Public Health*, 2018 CDC Public Health Informatics Conference, Atlanta, GA, August 23, 2018.

*Government Testimony:*

Expert Testimony, National Vaccine Advisory Committee and National Immunization Program, Centers for Disease Control and Prevention *Initiative on Immunization Registries*, Public Meeting on Resource Issues Related to State and Community-based Immunization Registries, Washington, D.C., May 13, 1998.

Response to Request for Information, "Development and Adoption of a National Health Information Network," Department of Health and Human Services, Office of the National Coordinator for Health Information Technology, January 18, 2005.

*Advisory/Professional Committees:*

*Current Participation:*

Child Health Work Group (formerly Pediatric Data Standards Special Interest Group), Health Level 7 (HL7), as of Spring 2005

Electronic Health Record Technical Committee (EHR TC), Health Level 7 (HL7), as of Spring 2005

Pediatric Health Informatics & Technology Special Interest Group, Health Care Information and Management Systems Society (HIMSS), as of Spring 2007

Small & Independent Consultant Special Interest Group, Health Care Information and Management Systems Society (HIMSS), as of Spring 2007

American Immunization Registry Association (AIRA) Standards and Interoperability Steering Committee, as of February 2011

HIE/Interoperability & HIE Toolkit Taskforce, Health Care Information and Management Systems Society (HIMSS), as of Summer 2011

Meaningful Use (Promoting Interoperability) Public Health Reporting Requirements Task Force, as of January 2013

American Immunization Registry Association (AIRA) Education Steering Committee, as of June 2013

Joint Public Health Informatics Taskforce (JPHIT), as of August 2014

Public Health Informatics Workgroup Executive Committee, American Medical Informatics Association (AMIA), as of July 2016

Medicaid and Public Health Community of Practice, Office of the National Coordinator for Health Information Technology (ONC), in collaboration with Centers for Disease Control & Prevention (CDC), as of August 2016

American Immunization Registry Association (AIRA) Joint Development & Implementation (JDI) Workgroup, as of July 2015, and related subgroups:

JDI Grantee Developed IIS User Group, as of March 2015

JDI Communications Workgroup, as of March 2017

JDI DQA Governance Group, as of October 2017

Electronic Case Reporting (eCR) Implementation Group, Digital Bridge Project, as of July 2018

Technical Guidance for Interoperability Work Group, Health Care Information and Management Systems Society (HIMSS), as of August 2018

*Past Participation:*

Standards Advisory Work Group, Health Care Information and Management Systems Society (HIMSS), August 2016 – March 2018

Immunization Open Source Project Group, Open Source Electronic Health Record Alliance (OSEHRA), March 2015 – March 2018

Office of the National Coordinator for Health Information Technology (ONC) Trusted Exchange Framework Task Force, February – March 2018

Meaningful Use Open Source Project Group, Open Source Electronic Health Record Alliance (OSEHRA), November 2015 – December 2018

American Immunization Registry Association (AIRA) Joint Development & Implementation (JDI) WIR User Group, April 2015 – December 2017

Identity Management Task Force, Health Care Information and Management Systems Society (HIMSS), March 2014 – August 2017

Office of the National Coordinator for Health Information Technology Health Information Technology (ONC) Policy Committee (HITPC)/Health Information Technology Standards Committee (HITSC) Public Health Task Force, December 2016 – March 2017

Standards & Interoperability (S&I) Framework Data Access Framework (DAF) Work Group, as of July 2013 – March 2017

HIE inPractice Taskforce, Health Care Information and Management Systems Society (HIMSS), November 2015 – June 2016

Patient Identity Integrity Work Group, Health Care Information and Management Systems Society (HIMSS), February 2012 – June 2016



Computer Technology Advisory Committee, Ben Franklin Technology Partners of Southeastern Pennsylvania, Fall 1996 – Fall 2001

American Immunization Registry Association (AIRA) Technical Committee, Spring 2002 - Spring 2003

American Immunization Registry Association (AIRA) Emergency Preparedness and Response Committee, Fall 2002 – Summer 2005

American Immunization Registry Association (AIRA) Urban/Cities Committee, Winter 2004 – Fall 2005

Electronic Health Record (EHR) Deployment Task Force, Healthcare Information and Management Systems Society (HIMSS), Summer 2004 - Spring 2005

Healthcare Information Technology Standards Panel (HITSP) Use Case Committee, Fall 2005.

Healthcare Information Technology Standards Panel (HITSP) Technical Committees, Winter 2006 – Winter 2010

Healthcare Information Technology Standards Panel (HITSP), March 2007 – Winter 2010

California Health and Human Services (CHHS) Health IT Research and New Technologies Workgroup, May 2009 – August 2009

*Connections* Community of Practice, Winter 2001 – March 2010.

California Health and Human Services (CHHS) Health Information Exchange Finance Workgroup, December 2009 – April 2010

Committee on Immunization Registry Standards for Electronic Transactions (CIRSET), now the American Immunization Registry Association (AIRA) Messaging Work Group, Spring 2000 – Summer 2010

American Immunization Registry Association (AIRA) Transport Layer Work Group, Spring 2005 – Summer 2010

American Immunization Registry Association (AIRA) Data Definitions Work Group, Spring 2005 – Summer 2010

Healthcare Information Exchange Portfolio Task Force (formerly HIE Guide Workgroup), Health Care Information and Management Systems Society (HIMSS), Spring 2009 – Spring 2010.

American Immunization Registry Association (AIRA) Data Exchange Steering Committee, Spring 2005 – Fall 2010

Centers for Disease Control and Prevention, Immunization Information System Minimum Functional Standards Update Project, January 2011 – May 2011

Healthcare Information Exchange Committee, Health Care Information and Management Systems Society (HIMSS), July 2009 – June 2011

Direct Project Implementation Group, April 2010 – December 2011

Co-Chairperson, Public Health Data Standards Consortium Communication and Outreach Committee, Fall 2006 – Spring 2012

Treasurer, Public Health Data Standards Consortium (PHDSC), Fall 2007 – Summer 2012

American Medical Informatics Association (AMIA) Public Health Informatics Executive Committee, November 2010 – October 2012

Centers for Disease Control and Prevention (CDC), National Center for Immunization and Respiratory Diseases (NCIRD) Immunization Information System (IIS) Blue Ribbon Panel, Spring 2013

Standards & Interoperability (S&I) Public Health Reporting Initiative (PHRI), August 2011 – May 2014

Standards & Interoperability (S&I) Public Health Tiger Team, June 2013 – September 2015

Peer Reviewer, *American Journal of Preventive Medicine*, *Journal of Healthcare Information Management* (also contributing author), and *Pediatrics*

Electronic Case Reporting (eCR) Technical Implementation Task Force, Digital Bridge Project, March 2017 – June 2018

*Professional Affiliations:*

Member, American Public Health Association

Member, American Medical Informatics Association

Fellow, Healthcare Information and Management Systems Society

Member, Open Source Electronic Health Record Alliance (OSEHRA)

Member, Southern California Public Health Association

Pioneer Member, The Internet Society

*Education:*

**UNIVERSITY OF PENNSYLVANIA**, Ph.D. in Higher Education Administration, August 1993.

Course work includes study in higher education at the Graduate School of Education, and organization and strategy at the Wharton School.

Dissertation title: *Financial Frontier: The American University and its Banking Function*

**GRADUATE SCHOOL OF EDUCATION**, University of Pennsylvania, Master of Science in Education, August 1987.

Course work Includes: Strategic Planning in Higher Education, Methods of Institutional Research, Introduction to American Higher Education, Academic Information Systems, Managing People, Instructional Processes in Higher Education, Power and the Educational Process

**THE WHARTON SCHOOL**, University of Pennsylvania, Bachelor of Science in Economics, May 1983.

Concentrations in Management Information Systems, and Personnel Administration and Labor Relations. Record of high academic achievement. Dean's List 1982-83.

## Summary of Consulting Engagements

### *Ongoing Consulting Engagements (month begun)*

**Centers for Disease Control and Prevention (10/14):** In conjunction with the Council of State and Territorial Epidemiologists (CSTE), HLN is developing the Reportable Condition Knowledge Management System (RCKMS), clinical decision support component of the national electronic case reporting project.

**Connecticut Department of Health (9/17):** Initially in conjunction with the Public Health Informatics Institute (PHII), support for migration planning of the Immunization Information System to a new platform.

**Denver Public Health (4/14):** Assistance in using Open Source Immunization Calculation Engine (ICE) vaccine evaluation and forecasting web service for data analysis.

**Department of Health and Human Service, Office of the Chief Technology Officer (11/18):** Support the Interjurisdictional Provider Organizational Exchange and Quality Measures Project.

**New York City Department of Health and Mental Hygiene (9/98):** Project director for ongoing development and support of Citywide Immunization Registry and related systems.

**New York City Department of Health and Mental Hygiene (2/17):** Project director for creation of Epi-MPI to facilitate matching of patient records across research data sets.

**Pfizer (7/17):** National advisory structure and maintenance of Open Source Immunization Calculation Engine (ICE) vaccine evaluation and forecasting web service and tools.

**Public Health Informatics Institute/Centers for Disease Control and Prevention (7/17):** Participate in various projects related to provision of technical assistance to Immunization Information System projects.

**Rhode Island Department of Health (3/02):** Project director for ongoing development and support of KIDSNET integrated child health information system.

### *Selected Consulting Engagements Now Completed*

**California Department of Public Health (9/16 – 12/17):** In conjunction with the Public Health Informatics Institute (PHII), support for interoperability planning and operations for CAIR 2.0.

**CAQH (6/12 – 12/12):** Researching various provider directory information sources and data structures to inform CAQH's Universal Provider Datasource initiative.

**Centers for Disease Control and Prevention (9/13 – 6/17):** Assist with Immunization Information Systems (IIS) strategic plan support, including ongoing environmental scan development, for National

Center for Immunization and Respiratory Diseases (NCIRD).

**Centers for Disease Control and Prevention (11/14 – 9/15):** Assist with analysis of Immunization Information System policy barriers and opportunities.

**Centers for Disease Control and Prevention (3/15 – 7/15):** In conjunctions with the Association of State and Territorial Health Officers (ASTHO), HLN developed a proof-of-concept quality assurance tool for Meaningful Use syndromic surveillance data submission.

**Centers for Disease Control and Prevention (11/13 – 9/15):** Assisted with analysis of EHR system Immunization Information System-centric certification.

**City and County of San Francisco Department of Public Health (6/10 – 6/11):** Project director for documentation and development of client-centered data warehouse.

**Delaware Health Information Network (7/12 – 1/14):** Strategic consulting on HIE issues.

**Illinois Office of Health Information Technology (3/12 – 6/13):** Assessed OHIT's current and future needs for its HIE to support consent policy and access control and to work together to select a technical architecture. Phase II was a software development project which created a prototype/reference implementation of the design selected in Phase I.

**International Society for Disease Surveillance (9/10 – 1/11; 10/11-9/12):** Project director for development of short and long-term strategy for Meaningful Use and syndromic surveillance for emergency department and urgent care settings, and for inpatient and ambulatory clinical care EHR data.

**Minnesota Department of Health, Office of Health Information Technology (10/10 – 4/11):** Reviewed state HIE plan and advise on technical architecture.

**Minnesota Department of Health (2/13 – 7/13):** Strategy and planning related to consumer/patient access to Minnesota Immunization Information Connection (MIIC).

**Minnesota Department of Health, Office of Health Information Technology (6/13 – 1/14):** State HIE strategic planning.

**National Association of County & City Health Officials (3/14 – 6/14):** Use case development for the Public Health Community Platform (PHCP) project.

**New York eHealth Collaborative (2/16 – 4/16):** Developed white paper making the case for payer participation in HIE.

**NORC at the University of Chicago (7/10 – 10/11):** Subject matter expert on Meaningful Use in Public Health project.

**Office of the National Coordinator for Health Information Technology (10/09 – 9/13):** Subject matter

expert on State-level Health Information Exchange Cooperative Agreement Program. Worked with many states on HIE technical planning, including AL, HI, IA, LA, MN, RI, American Samoa and consortium of Southern states.

**Office of the National Coordinator for Health Information Technology (8/13 – 1/14):** Strategy and planning related to consumer/patient access to Immunization Information Systems.

**Office of the National Coordinator for Health Information Technology (4/14):** Environmental scans on HIE governance and HIE query standards.

**Office of the National Coordinator for Health Information Technology (7/14 – 4/15):** Supported ONC in developing an Interoperability Roadmap that outlines goals, focus areas, outcomes and milestones from FY14 to FY24.

**Oklahoma State Department of Health (3/15 – 6/16):** In conjunction with the Public Health Informatics Institute (PHII), testing and deployment support for the Oklahoma State Immunization Information System (OSIIS).

**Oregon Health Authority, Center for Public Health Practice (3/17 – 12/17):** Study and recommend options for a school compliance system for immunization reporting.

**Public Health Informatics Institute (1/10):** Reviewed and commented on article related to immunization information systems and HIE published by PHII.

**Public Health Informatics Institute (11/11 – 8/13):** Served as senior advisor on project to align immunization information systems with national health information technology directions and priorities. Assist with study of Immunization Information System-Health Information Exchange interaction. Development of white paper and issue briefs on future public health information technology capabilities.

**Public Health Informatics Institute (4/16 – 6/16):** Provide technical assistance to the Informatics Academy regarding online learning modules for the Immunization Information System (IIS) community.

**RTI International (3/11 – 7/11):** Subject matter expert on ONC-funded project to facilitate cross-border health information exchange in the Northern Midwest. Working with Minnesota.

**RTI International (11/10 – 2/12):** Subject matter expert on ONC-funded project to facilitate cross-border health information exchange for disaster preparedness in the Southeast and Gulf states representing Alabama and Louisiana.

**San Mateo County (CA) Information Services Division (1/08 – 4/09; 11/12-3/13):** Directed Applicable Client Records Search (ACRS) project focused on creating a comprehensive plan for client data consolidation and reporting.

**University of California, San Diego, Beacon Community Project (12/10 – 5/12):** Acting as independent reviewer of project technical direction and plans, and assisting in procurement and technical

evaluation.

**University of Hawai'i, Beacon Community Project (10/10 – 12/10):** Acted as independent reviewer of project technical direction and plans.

**University of Illinois (10/10 – 3/14):** Provided technical expertise and knowledge of important technical standards and tools to Strategic Healthcare IT Advanced Research Projects on Security (SHARPS); extension of IL HIE consent policy prototype.

**University of Pennsylvania (11/07):** Conducted an information technology organizational review for the Division of Facilities and Real Estate Services.

**Utah Department of Health (11/06 – 12/06):** Led a detailed assessment of the Utah State Immunization Information System (USIIS).

**Vermont Department of Health (4/08):** Conducted information technology organizational review.

**Vermont Information Technology Leaders, Inc. (11/05 – 7/09):** Variety of projects related to State chronic disease management systems and health information exchange planning and management, including organizational review (4/08).

**Veterans Health Administration (5/16 – 3/18):** Project director for implementation support for ICE Open Source Immunization Forecasting software into VistA.

**Washington State Department of Health (6/06 – 7/06):** Led project to train staff on person matching system concepts, and to develop plan to integrate matching software into existing systems.