OMB No. 0925-0001/0002 (Rev. 08/12 Approved Through 8/31/2015)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.  
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NAME: Silverstein, Jonathan Charles

eRA COMMONS USER NAME (credential, e.g., agency login): JCSilverstein

POSITION TITLE: Chief Research Informatics Officer and Professor, Department of Biomedical Informatics

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

| INSTITUTION AND LOCATION | DEGREE  *(if applicable)* | Completion Date  MM/YYYY | FIELD OF STUDY |
| --- | --- | --- | --- |
| University of Illinois at Urbana-Champaign | BS | 1983-1986 | Microbiology |
| Washington University Medical School, St. Louis | MD | 1986-1990 | Medicine/Surgery |
| Washington University Informatics Lab, St. Louis |  | 1990-1991 | Informatics |
| Rush-Presbyterian-St. Luke’s, Chicago |  | 1991-1996 | Surgery Residency |
| Harvard School of Public Health, Boston | MS | 1996-1998 | Clinical Epidemiology |

# A. Personal Statement

In addition to seven years experience as an academic attending surgeon (no longer in practice), and formal training in public health, I have expertise in: electronic health record deployment and maintenance (for University of Illinois using Cerner and University of Chicago and NorthShore University HealthSystem using Epic); inter-institutional science collaboration leadership as scientific director of the Chicago Biomedical Consortium (a ten-year $50M effort); serving as PI for Federal peer-reviewed research in advanced biomedical computing infrastructures, stereoscopic visualization and research testbeds for more than 10 years; being an application service provider for web-based systems (mostly in surgical case systems and data management systems); and serving on Board’s of the National Library of Medicine. Most recently, in my roles as Vice President for Biomedical Research Informatics at NorthShore and Chief Medical Informatics Officer at Tempus, and now as Chief Research Informatics Officer at Pittsburgh, I am providing the requisite experience and ensuring access and use of extraordinary data assets and capabilities in information technology while collaborating across applied research projects using phone sensor technologies, genomics, and secondary use of electronic health record data focused on enhancing research, clinician cognition, and learning health systems.

1. Panko W, Silverstein JC, Lincoln T. Technologies for extracting the full value from electronic patient records. Proc Hawaii International Conf on System Sci; IEEE Computer Society Jan 1999.
2. Silverstein JC, Parsad NM, Tsirline V. Automatic perceptual color map generation for realistic volume visualization. J Biomed Inform. 2008;41(6):927–935.
3. Kaspar M, Parsad NM, Silverstein JC. An optimized web-based approach for collaborative stereoscopic medical visualization. Journal of the American Medical Informatics Association. 2013 Apr 10;20(3):535–43.
4. Gitelis ME, Kaczynski A, Shear T, Deshur M, Beig M, Sefa M, Silverstein J, Ujiki M. Increasing compliance with the World Health Organization Surgical Safety Checklist-a regional health system’s experience. American Journal of Surgery. 2016 Aug 16; PMID: 27692671

# B. Positions and Honors

**Positions and Employment**

1996-2001 Assistant Professor, Dept. of Surgery, University of Illinois at Chicago (UIC)

1996-2001 Assistant Professor, School of Biomedical and Health Information Sciences, UIC

1997-1999 Adjunct Appointment, Graduate School of Library and Information Science, UI-Urbana

1998-2001 Co-Director, UIC Virtual Reality in Medicine Laboratory (VRMedLab)

1999,2000-01 Adjunct Appointments, Dept. of Bioengineering and Dept. of Radiology, UIC

2001-2007 Assistant Professor, Department of Surgery, The University of Chicago (UC)

2001-2008 Director, Center for Clinical Information, The University of Chicago Hospitals

2002-2011 Scientific Director, Chicago Biomedical Consortium

2003-2011 Senior Fellow, Computation Institute of University of Chicago and Argonne Natl. Lab. (CI)

2006-2011 Associate Director, Computation Institute (CI)

2007-2011 Associate Professor, Departments of Surgery, Radiology, and the Collegiate Division

Biological Sciences Division, University of Chicago

2011-2016 Vice President and Head, Center for Biomedical Research Informatics (CBRI)

Research Institute, NorthShore University HealthSystem  
2011-2016 Davis Family Chair of Informatics

2012-2016 Research Associate (Professor of Surgery), University of Chicago Pritzker School of Medicine

2016-2017 Chief Medical Informatics Officer, Kanter Health Foundation

2016-2017 Chief Medical Informatics Officer, Tempus

2017-current Chief Research Informatics Officer

(Visiting) Professor, Department of Biomedical Informatics

University of Pittsburgh School of Medicine

**Selected Experience and Professional Memberships (excludes teaching, Hospital committees, panels)**

1989- Member, Americal Medical Informatics Association (AMIA)

1995-2003 Member, American Medical Association, Illinois State Medical Society and Chicago Medical

1997- Certified, American Board of Surgery

1997-2001 Physician advisor to Cerner Corporation for Physician Order Entry

1997-2003 Creator and Manager web-based Resident Case Log system (used by 5 universities)

1998-2003 Member, Association for Academic Surgery, Illinois Surgical, and Chicago Surgical

1998, 2002 Special Emphasis Panel Reviewer for National Library of Medicine, NIH

1999- Fellow, American College of Surgeons and Member, Association for Surgical Education

1999-2001 Creator and Manager UIC Division of General Surgery clinical database

2000-2006 Member, Regents Committee on Informatics, American College of Surgeons

2002-2006 Member, Biomedical Library and Informatics Review Committee, NLM/NIH

2003-2009 Member, Association of Medical Directors of Information Systems

2003-2006 Member (Chair FY06), Board of Computing Activities and Services, University of Chicago

2003-2011 Reviewer: NASA Peer Review, Artificial Intel in Med, Future Gen Comp Sys, Clinical Anatomy,

JBI, IJCARS, JAMIA, PLOS Medicine, MedNet, AMIA Symposium, NEJM

2004-2008 Director, Biomedical Informatics Core, University of Chicago Biological Sciences Division

2006- Member, Board of Scientific Counselors, Lister Hill Center, National Library of Medicine/NIH

2007 Member, AMIA Symposium Scientific Program Committee

2007 Member, NIH Roadmap National Centers for Biomedical Computing Program Review

2007- Fellow, American College of Medical Informatics

**Selected Honors**

1996 Resident Teacher of the Year, Department of Surgery, Rush-Presbyterian-St. Luke's

1999 Jerry and Thelma Stergios Award for Excellence in Basic Science, UIC Dept. of Surgery

2001 Class Act Award, University of Illinois at Chicago Medical Center

2002 Most Outstanding Faculty Poster Presentation, Charles B. Huggins Research Conference, The University of Chicago Department of Surgery

2004,2005 Top Five Poster Prize, Midwest Clinical Conference of Chicago Medical Society

2006 Finalist, CityLIGHTS Award, Illinois I.T. Association (ITA)

# C. Contribution to Science

1. In volume visualization for surgical applications, and radiology generally, grayscale is used because of unpredictable characteristics of pseudo colored images. We focused on identifying an automated way of generating visualization that would retain the characteristics of grayscale of continuous perceptual brightness while enabling the addition of color for any purpose. We discovered a method for combining generic field data and an arbitrary map of the data to a set of colors (e.g. red=very hot, orange=hot, yellow=warm, green=comfortable, blue=cold, purple=very cold - or in our case Air, Lung, Fat, Tissue, Bone from CT scans, each a particular color) and applying perceptual contrast theory to adjust the colors for display of the data to be perceptually correct across a continuous spectrum, and in so doing gain the contrast-enhancement typical of grayscale images without losing the color. This is likely applicable across many fields as a fundamental discovery in rendering/visualization. Mixing perceptual and base color in arbitrary ratios and a generic realistic color algorithm for CT is also described. This work is patent pending by the University of Chicago. Dr. Silverstein was the funded PI on this work, drove requirements and ultimately determined the algorithm after many related attempts, contributed to and directed writing, contributed to validating realism of base color map.

1. Silverstein JC, Parsad NM, Tsirline V. Automatic perceptual color map generation for realistic volume visualization. J Biomed Inform. 2008;41(6):927–935.

2. The use of virtual reality in surgical applications is an area in which we have made a number of contributions and for which Dr. Silverstein is best known. Each of these publications were done by students, staff, and colleagues in Dr. Silverstein’s lab under his NIH funding. These discoveries were used by Dr. Silverstein to solely teach anatomy to undergraduate students for six years in a course called immersive virtual anatomy.

1. Silverstein JC, Dech F, Edison M, Jurek P, Helton WS, Espat NJ. Virtual Reality: Immersive Hepatic Surgery Educational Environment (IHSEE). Surgery. 2002 Aug;132(2):274-7.
2. Dobson HD, Pearl RK, Orsay CP, Rasmussen M, Evenhouse R, Ai Z, Blew G, Dech F, Edison MI, Silverstein JC, Abcarian H. Virtual Reality: new method of teaching anorectal and pelvic floor anatomy. Dis Colon Rectum 2003 Mar; 46(3):349-52.
3. Silverstein JC, Dech F. Precisely Exploring Medical Models and Volumes in Collaborative Virtual Reality. Presence: Teleoperators & Virtual Environments (MIT Press) 2005 Feb; 14(1):47-59.
4. Kaspar M, Parsad NM, Silverstein JC. An optimized web-based approach for collaborative stereoscopic medical visualization. Journal of the American Medical Informatics Association. 2013 Apr 10;20(3):535–43.

3. Surgical education. In addition to our work in use of virtual reality for surgical education, we have developed a novel quality-improvement based approach toward surgical education and evaluation of operating room performance.. We demonstrated it was feasible to implement in a leading academic medical center and that it could be used to track performance improvement and rank surgical residents. This system was deployed at five different academic medical centers. This work was done by oncology fellow Paul Roach under Dr. Silverstein’s intimate direction on these projects.

1. Silverstein JC, Shenoy A, Rice CL. Web-based entry, validation, and reporting of resident operative experience. Current Surgery. 1999 March/April;56(3):161-4.
2. Roach PB, Roggin KK, Selkov Jr, E, Posner MC, Silverstein JC. The Use of a Novel, Web-based Educational Platform Facilitates Intraoperative Training in a Surgical Oncology Fellowship Program. Ann Surg Onc. 2009;16(5):1100-07.
3. Roach, Paul B.; Silverstein, JC. Training fellows and core competency: "Making quality certain". Journal of Surgical Oncology. 2009;99(2):83-4.
4. Roach PB, Roggin KK, Selkov G Jr, Posner MC, Silverstein JC. Continuous, data-rich appraisal of surgical trainees’ operative abilities: A novel approach for measuring performance and providing feedback. J Surg Educ. 2009 Sep-Oct;66(5):255-63.

4. Outcomes research. Dr. Silverstein has collaborated in many clinical outcomes research applications. These four included highlight work over two decades.

1. Millikan KW, Silverstein J, Hart V, Blair K, Bines S, Roberts J, Doolas A. A 15-Year Review of Esophagectomy for Carcinoma of the Esophagus and Cardia. Arch Surg. 1995 Jun; 130(6):617-24.
2. Millikan KW, Deziel D, Silverstein JC, Kanjo T, Christein J, Doolas A, Prinz R. Prognostic factors associated with resectable adenocarcinoma of the head of the pancreas. Am Surg. 1999 Jul;65(7):618-24.
3. Shen Y, Silverstein JC, Roth S. In-hospital complications and mortality after elective spinal fusion surgery in the united states: a study of the nationwide inpatient sample from 2001 to 2005. Journal of neurosurgical anesthesiology 2009;21(1):21–30.
4. Cohn JA, Wang CE, Lakeman JC, Silverstein JC, Brendler CB, Novakovic KR, McGuire MS, Helfand BT. Primary care physician PSA screening practices before and after the final U.S. Preventive Services Task Force recommendation. Urol Oncol. 2014 Jan;32(1):41.e23–30.

5. General informatics. Dr. Silverstein has contributed to many general informatics advances, four of which are identified here. These are projects in which novel secondary use of healthcare data was made.

1. Panko W, Silverstein JC, Lincoln T. Technologies for extracting the full value from electronic patient records. Proceedings of the Hawaii International Conference on System Sciences (HICSS-32). IEEE. 1999 Jan;32:1-9.
2. Erberich SG, Silverstein JC, Chervenak A, Schuler R, Nelson M, Kesselman C. Globus MEDICUS - Federation of DICOM Medical Imaging Devices into Healthcare Grids. Stud Health Technol Inform. 2007;126:269-278.
3. Wang X, Liu L, Fackenthal J, Cummings S, Olopade OI, Hope K, Silverstein JC, Olopade OI. Translational integrity and continuity: Personalized biomedical data integration. Journal of Biomedical Informatics 2009 Feb.;42(1):100–112.
4. Maraganore DM, Frigerio R, Kazmi N, Meyers SL, Sefa M, Walters SA, Silverstein JC. Quality improvement and practice-based research in neurology using the electronic medical record. Neurol Clin Pract. 2015 Oct;5(5):419–429. PMCID: PMC4634157
5. Cheng Q, Juen J, Bellam S, Fulara N, Close D, Silverstein JC, Schatz B. Predicting Pulmonary Function from Phone Sensors. Telemed J E Health [Internet]. 2017 Mar 16; Available from: http://dx.doi.org/10.1089/tmj.2017.0008 PMID: 28300524

## Complete List of Published Work in MyBibliography (65 peer-reviewed articles): <https://www.ncbi.nlm.nih.gov/sites/myncbi/1vsMqqMOojIkO/bibliography/50820398/public/?sort=date&direction=descending>

# D. Research Support

**Completed Research Support (last three years only)**

PCORI PCORNET CDRN (Mazany, Chicago Community Trust) 01/01/2014-6/30/2018

**CAPriCORN: Chicago Area Patient Centered Clinical Outcomes Research Network**

Goal: This is unprecedented collaboration across a diverse group of healthcare institutions, including private, county, state hospitals and health systems, a consortium of Federally Qualified Health Centers, and two Veterans Administration Hospitals (e.g. NorthShore, UChicago, NWU, Rush, UIC, Loyola, Cook County, Alliance).

Role: Site PI

1C1CMS331033-01-00 (Meltzer, U. of Chicago) 07/01/2012-06/30/2015

DHHS/CMMS

**Integrated Inpatient/Outpatient Care for Patients at High Risk of Hospitalization**

Goal: The major goal of this project is test whether the costs and outcomes of patients at high risk of hospitalization can be improved by providers who focus their practice on patients at high risk of hospitalization and care for them in both the inpatient and outpatient setting.

Role: Site PI

EH14-304 (Silverstein) 01/01/2015 - 9/30/2015

Baxter Healthcare Corporation

**Automation of CT Measurement of Lean Body Mass**

Goal: The major goals of this project are to build and demonstrate automated measurement of lean body mass.

90RC0020/01 (PI – Abel Kho, Northwestern University) 02/08/2010-02/07/2015

DHHS/Office of the National Coordinator for health Information Technology

**Chicago HIT Regional Extension Center (ARRA)**

Goal: The purpose of this proposal is to furnish assistance, defined as education, outreach, and technical assistance, to help providers in their geographic service areas select, successfully implement, and meaningfully use certified EHR technology to improve the quality and value of health care.

Role: Site PI

Chicago Biomedical Consortium (CBC) (Morimoto, Silverstein, and Russell are PIs)

Searle Funds of the Chicago Community Trust

**Chicago Biomedical Consortium**  01/01/2006 – 12/31/2015

**Innovative Cryo-STEM for Element-Specific Imaging of Cells and Tissues** 06/01/2009 – 05/30/2011

Goal: The mission of the Chicago Biomedical Consortium is to stimulate collaboration among scientists at Northwestern University, the University of Chicago, and the University of Illinois at Chicago that will transform research at the frontiers of biomedicine.

Role: PI for both the Consortium itself and the Cryo-STEM Sub-award and other minor subawards