

## **BRIAN T. DENTON**

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### **Education**

Ph.D., 2001, Department of Management Science/Systems, McMaster University, Hamilton, ON, Canada

M.Sc., 1996, Department of Physics and Astronomy, York University, Toronto, ON, Canada

B.Sc., 1994, Joint Physics and Chemistry Honors, Department of Physics, McMaster University, Hamilton, ON, Canada (Summa Cum Laude)

### **Professional Experience**

August 2012 – Present, Industrial and Operations Engineering (IOE), University of Michigan, Ann Arbor, MI

- Stephen M. Pollock Collegiate Professor (2021 – Present)
- Department Chair (2018 – Present)
- Professor, IOE (2016 – Present)
- Professor (by courtesy), Department of Urology (2016—Present)
- Member, Cancer Center, Michigan Medicine (2016 – Present)
- Member, Institute for Healthcare Policy and Innovation (2012 – Present)
- Associate Professor, IOE (2012 – 2016)
- Associate Professor (by courtesy), Department of Urology (2014 – 2016)

August 2007 – 2012, Edward P. Fitts Department of Industrial and Systems Engineering, NC State University, Raleigh, NC

- Associate Professor (2010 – 2012)
- Assistant Professor (2007 – 2010)
- Fellow, Cecil C. Sheps Research Center, UNC (2007 – 2017)

July 2005 – 2007, Department of Health Science Research, Mayo Clinic, Rochester, MN

- Senior Associate Consultant (2005 – 2007)
- Assistant Professor (2005 – 2007)

February 2001 – June 2005, IBM, Burlington, VT

- Senior Engineer (2003 – 2005)
- Advisory Engineer (2001 – 2003)
- Member, Patent Review Board, IBM Technology Group (2003 – 2005)

## **Research Areas**

- Optimization – Stochastic programming, integer programming, Markov decision processes
- Stochastic Systems – Discrete event simulation, Monte-Carlo simulation
- Data Analytics – Machine learning, predictive modeling
- Healthcare – Health policy, disease modeling, medical decision making, healthcare delivery and operations management
- Supply Chain Management – Global supply chain logistics, scheduling of manufacturing systems

## **Scholarly and Professional Honors**

2022 IISE Fellow

2021 INFORMS Advanced Analytics Award, Third Place

2019 INFORMS Fellow

2018 Michigan Institute for Clinical and Translational Research (MICHR) Distinguished Research Mentor Award

2018 INFORMS Student Chapter Graduate Course Teacher of the Year

2017 Best Paper Award, IISE Transactions on Healthcare Systems Engineering, Second Place

2017 New England Journal of Medicine SPRINT Data Analysis Challenge, Third Place

2017 INFORMS Public Sector Operations Research Section Best Paper Prize, Second Place

2017 Industrial Engineering and Operations Management Society Distinguished Educator Award

2016 University of Michigan College of Engineering Distinguished Professor Award

2016 University of Michigan Industrial and Operations Engineering Department Award

2015 Jon R. and Beverly S. Holt Award for Teaching Excellence, University of Michigan

2015 INFORMS Student Chapter Graduate Course Teacher of the Year, Runner Up

2014 INFORMS Public Sector Operations Research Section Best Paper Prize, Honorable Mention

2012 INFORMS Daniel H. Wagner Prize for Excellence in Operations Research Practice, Finalist

2010 INFORMS Service Section Best Paper Award, First Prize

2010 Top 10 most-downloaded papers in IIE Transactions from 2005 - 2010

2009 National Science Foundation CAREER Award

2007 IBM Systems and Technology Group "Top 10% Patent Award," U.S. Patent 7,103,436 (awarded for IBM patents deemed to be among the 10% most valuable for the year)

2005 INFORMS Daniel H. Wagner Prize for Excellence in Operations Research Practice, First Prize

2005 Institute for Industrial Engineers Outstanding Publication Award, 2005 and IIE Transactions on Scheduling and Logistics Best Paper Award for 2003-2004

2004 IBM Systems and Technology Group "Top 10% Patent Award," U.S. Patent 6,584,370

2000 First Prize, Canadian Operational Research Society Doctoral Student Paper Competition

## **Elected Positions in Professional Societies**

2016 President-Elect (2016), President (2017) and Past-President (2018), INFORMS

2012 Secretary and Executive Board Member, INFORMS (2012-2015)

2010 Member, INFORMS Subdivisions Council (2010-2011)

2009 Chair, INFORMS Health Applications Section

2008 Vice Chair, INFORMS Health Applications Section

2006 Secretary and Newsletter Editor, INFORMS Health Applications Section

2005 Council Member, INFORMS Chapter for the Practice of Management Science (2005--2009)

## **Industrial Consulting Activities**

Bayer, Inc., St. Louis, MO, 2020

University of North Carolina Hospital, Chapel Hill, NC (2010-2011)

Duke University Medical Center, Durham, NC (2009-2010)

Fletcher Allen Health Care, Burlington, VT (2004--2005)

Analog Devices, Inc., Boston, MA (with IBM) (2004--2005)

Hitachi Inc., San Jose, CA (with IBM) (2003--2005)

Dofasco Inc., Hamilton, ON, Canada (1998--2000)

City of Hamilton, Municipal Government, Hamilton, ON, Canada

## **Teaching and Mentoring**

### **Undergraduate Courses Taught**

Deterministic Models in Industrial Engineering (ISE361, NC State University); Discover IOE (IOE101, University of Michigan)

### **Graduate Courses Taught**

Dynamic Programming (IOE512, University of Michigan); Scheduling (IOE543, University of Michigan); Dynamic Programming (OR709, NC State University); Introduction to Operations Research (OR501, NC State University); Stochastic Programming (ISE789B, NC State University); Optimization in Medicine (ISE789, NC State University); Introduction to Health Systems Engineering (HSR5150, Mayo Clinic)

Course (enrollment)	Semester	Individual Rating	College Avg.
IOE491 (31)	Fall 2020	4.80	4.70
IOE512 (32)	Fall 2017	4.76	4.47
IOE512 (31)	Fall 2016	4.70	4.45
IOE543 (41)	Spring 2016	4.69	4.47
IOE512 (31)	Fall 2015	4.70	4.45

IOE543 (28)	Spring 2015	4.50	4.42
IOE512 (32)	Fall 2014	4.45	4.41
IOE543 (23)	Spring 2014	4.81	4.41
IOE512 (28)	Fall 2013	4.82	4.39
IOE543 (28)	Spring 2012	4.53	4.40
ISE709 (13)	Spring 2012	4.77	4.53
ISE789 (10)	Spring 2011	4.62	4.50
ISE361 (22 )	Fall 2011	4.38	4.23
ISE361 (33 )	Fall 2010	4.55	3.99
ISE789B (13)	Spring 2010	4.36	4.51
ISE789 (12)	Spring 2010	4.55	4.45
ISE361 (32 )	Spring 2010	4.23	4.08
ISE361 (33 )	Fall 2009	4.38	4.05
ISE789B (8)	Spring 2009	4.39	4.27
OR501 (16)	Fall 2008	4.57	4.43
OR501-DL (7)	Fall 2008	4.54	4.43
OR501 (5)	Spring 2008	NA	NA

Note: All evaluations are based on a 5-point scale; `NA" indicates no formal evaluation complete.

### **Undergraduate Research Project Advising**

2020 Undergraduate Research Experience, Harry Wang, "User Elicited Estimation of Objective Function Coefficients Using Machine Learning," Learning, Optimization, and Data Science (LOD) Conference Proceedings (Fall 2019, Winter 2020)

2019 Undergraduate Research Experience, Charmee Kamdar, "Development of Open-Source Software for Solution of Multi-model Markov Decision Processes," (Fall 2019)

2019 Undergraduate Research Experience (Sponsor: National Science Foundation), Harry Wang, "Development of Open-Source Software for Solution of Multi-model Markov Decision Processes," (Winter 2019)

2018 Undergraduate Research Experience (Sponsor: National Science Foundation), Vinny Ahluwalia, "Methods for Solving Infinite Horizon Markov Decision Processes," Finalist for the INFORMS Undergraduate Research Prize (Summer 2019, Fall 2019)

2018 Undergraduate Research Experience (Sponsor: National Science Foundation), Charmee Kamdar, Vinny Ahluwalia, "Decomposition Methods for Robust Optimization of Markov Decision Processes in the Context of Model Uncertainty," Published in *IJSE Transactions* (Summer 2018, Fall 2018, Winter 2019)

2017 Undergraduate Research Experience (Sponsor: U.S. Department of Veterans Affairs), Deanna Hadley, Danielle Kessler, Ryan Krueger, "Cardiovascular Disease Simulation and Decision Support System," (Fall 2017, Winter 2018)

2017 Undergraduate Research Experience (Sponsor: Michigan Urological Surgery Improvement Collaborative): Minmin Zhang, "Concurrent Optimization of Discrimination and Calibration of Predictive Models," (Fall 2017, Winter 2018)

2017 Undergraduate Research Experience (Sponsor: Michigan Urological Surgery Improvement Collaborative): Bo Qu, Anyu Lu, "Predictive Analytics for Assessing Surgical Outcomes," (Summer 2017, Fall 2017)

2016 Undergraduate Research Experience (Sponsor: National Science Foundation): Marcus Segedin, "Simulation of Multi-Biomarker Protocols for Early Detection of Prostate Cancer," (Fall 2016, Winter 2017, Fall 2017)

2016 Undergraduate Research Experience (Sponsor: Department of Urology): Zian Chen, Fan Yang, Jiachen Wang, "Hidden Markov Models for Estimation of Prostate Cancer Progression in Men Receiving Active Surveillance," (Summer 2016, Fall 2016, Winter 2017, Presentation at Society of Urologic Oncology, Austin TX, November 2016, Journal Publication in *Cancer*).

2015 Undergraduate Research Experience (Sponsor: VA): Jiachen Wang "Statistical Modeling of Longitudinal Data to Simulate Cardiovascular Risk Progression in Patients Over Time," (Fall 2015, Spring 2016)

2014 Undergraduate Research Experience (Sponsor: Department of Urology): Maria Correa, "Validation of Clinical Models for Prediction of Bone Metastases and Positive Lymph Nodes," (Summer 2014, Oral Presentation at INFORMS Annual Meeting, San Francisco, 2014)

2014 Undergraduate Research Experience (Sponsor: NSF): Jianyu Liu, "Predictive Models for Active Surveillance of Men with Low-Risk Prostate Cancer," (Spring 2014 - Spring 2015, Journal Publication in *Urology*)

2013 Undergraduate Research Experience: Rachel Risko (Sponsor: Department of Urology), "Optimal Design of CT Scan Guidelines for Prostate Cancer Staging" (Fall 2013, Spring 2014, Journal Publication in *Urology*)

2011 Undergraduate Research Experience (Sponsor: NSF): Dean Pixton, "Planning and Scheduling of Chemotherapy Infusion Centers" (Fall 2011, Spring 2012)

2011 Undergraduate Research Experience (Sponsor: NSF): Jessica Woo, "Simulation Modeling of Cholesterol and Blood Pressure Control Policies for Patients with Type 2 Diabetes" (Spring 2011)

2011 Undergraduate Research Experience (Sponsor: NSF): Michael Murr, "Estimating the Cost of No-shows in an Outpatient Procedure Center" (Spring 2011, Journal Publication in *Medical Decision Making*)

2010 Undergraduate Research Experience: (Sponsor: NSF): David Chermak, "Performance Improvement of Outpatient Endoscopy Suites" (Summer 2010)

2010 Senior Design Project -- ISE498 (Sponsor: Mayo Clinic): Celia Chang, Erika Weikert, "Staffing of In Room Providers for Surgery" (Spring 2010)

2009 Senior Design Project -- ISE498 (Sponsor: UNC Hospital): Jillian Johnson, Jonathan Woodall, "Analysis of Endoscopy Suites at University of North Carolina Hospitals" (Fall 2009)

2009 Undergraduate Research Experience: Mathew (Seth) Placke, Freshman Park Scholar, "Optimal Location of Nerve Agent Chem-Packs in North Carolina" (Fall 2008 -- Spring 2009, Poster Presentation at North Carolina Public Health Association Conference, Asheville, NC, September 2009)

2008 Senior Design Project -- ISE498 (Sponsor: Massachusetts General Hospital): Alex Carter, Rob Squires, "A Simulation Model to Evaluate the Effect of New System Interventions for an Urgent Care Clinic," (Poster Presentation at Society for General Internal Medicine Annual Meeting, May 2009)

2008 Senior Design Project -- ISE498 (Sponsor: UNC Family Medicine Clinic): Matthew Diering, Kylie Goodell, Drew Johnson, "A Simulation Model for Analysis of Patient Flow Through UNC Family Medicine Clinic," (Spring 2008)

2008 Senior Design Project -- ISE498 (Sponsor: Mayo Clinic, Rochester, MN): Zack Adams, Kristin Moore, Ashley Wampler, "Surgery Scheduling Decision Support System," (1<sup>st</sup> Place, IIE Society for Health Systems Student Paper Award, Chicago, IL, 2009) (Spring 2008)

2008 Undergraduate Research Experience: Zack Wilson, "Optimization of Patient Access to Health Services," (Spring 2008)

2007 Senior Design Project -- ISE498 (Sponsor: UNC Hospital): Bruce Dunn and Luke Wilson, "NCSU Robotic Surgery Evaluation Project," (Fall 2007)

### **Graduate Student Advising**

Name of Student	Degree	Role	Date Graduated
Kevin Smith	Ph.D. (IOE, UM)	Co-Chair	2024 (Anticipated)
Daniel Felipe Otero Leon	Ph.D. (IOE, UM)	Co-Chair	2023 (Anticipated)
Erkin Otles	Ph.D. (IOE, UM )	Chair	2022 (Anticipated)
Weiyu Li	Ph.D. (IOE, UM )	Chair	2021
Lauren Steimle	Ph.D (IOE, UM )	Chair	2019
Selin Merdan	Ph.D (IOE, UM )	Chair	2018

Zheng Zhang	Ph.D. (Jiao Tong)	Co-Advisor	2016
Maya Bam	Ph.D (IOE, UM)	Co-Chair	2017
Christine Barnett	Ph.D (IOE, UM)	Chair	2017
Daniel Underwood	Ph. D. (ISE, NCSU)	Co-Chair	2015
Yuanhui Zhang	Ph.D (OR, NCSU)	Chair	2014
Alex Gose	Ph.D (OR, NCSU)	Chair	2013
Bjorn Berg	Ph.D (ISE, NCSU)	Chair	2012
Jennifer Mason	Ph.D (ISE, NCSU)	Chair	2012
Yuan Zhang	Ph.D. (OR, NCSU)	Chair	2011
Ayca Erdogan	Ph.D. (OR, NCSU)	Chair	2011
Jingyu Zhang	Ph.D. (OR, NCSU)	Chair	2010
Serhat Gul	Ph.D. (ISE, ASU)	Co-chair	2010
Mary Minor	M.Sc. (ISE, NCSU)	Chair	2012
Jonathan Woodall	M.Sc. (ISE, NCSU)	Chair	2011
Daniel Underwood	M.Sc. (OR, NCSU)	Chair	2010
Lindsay Moomaw	M.Sc. (ISE, NCSU)	Chair	2010
Jennifer Mason	M.Sc. (OR, NCSU)	Chair	2009
Yan Deng	Ph.D. (IOE, Michigan)	Member	2016
Boxiao Chen	Ph.D. (IOE, Michigan)	Member	2016
Aleida Braaksma	Ph.D. (U. Twente)	Member	2015
Mike Harvey	Ph.D. (Public Health, UM)	Member	2015
Pooyan Kazemian	Ph.D. (IOE, UM)	Member	2013
Elliot Lee	Ph.D. (IOE, UM)	Member	2013
Hamed Yarmand	Ph.D. (ISE, NCSU)	Member	2012
Emine Yaylali	Ph.D. (ISE, NCSU)	Member	2012
Sakine Batun	Ph.D. (ISE, Pittsburgh)	Member	2011
Camillo Mancia	Ph.D. (ISE, Lehigh)	Member	2011
Qingwei Jin	Ph.D. (OR, NCSU)	Member	2011
Zhe Lui	Ph.D. (OR, NCSU)	Member	2009
Krishna Jarugumilli	M.Sc. (ISE, NCSU)	Member	2011
Kinley Taylor	M.Sc. (ISE, NCSU)	Member	2011
Sharolyn Winter	M.Sc. (OR, NCSU)	Member	2009
Fati Irdem	M.Sc. (ISE, NCSU)	Member	2009
Baris Kacar	M.Sc. (ISE, NCSU)	Member	2009

### **Postdoctoral Fellow Advising**

Zheng Zhang, Department of Industrial and Operations Engineering, University of Michigan (2017 -- 2019)

Hari Balasubramanian, Department of Health Science Research, Mayo Clinic (2005-2007)



## Academic Scholarship

### Refereed Journal Articles (Advised Graduate Students and Post-Docs in Bold, Undergraduate Students Underline)

- 1) **Steimle, L.**, Ahluwalia, V., Kamdar, C., Denton, B.T., "Decomposition Methods for Solving Multi-model Markov Decision Processes," *IIE Transactions* (in press), 2021
- 2) **Steimle, L.**, Kauffman, D., Denton, B.T., "Multi-model Markov Decision Processes: A New Method for Mitigating Parameter Ambiguity," *IIE Transactions* (in press), 2021
- 3) **Otles, Erkin**, Denton, B.T., **Merdan, S.**, Zhang, B., Singh, K. "Predicting Pathologic Outcomes of Radical Prostatectomy," *Journal of Urology* (in press), 2021
- 4) **Merdan, S.**, **Barnett, C.**, Denton, B.T., Montie, J., Miller, D., "Data Analytics for Optimal Detection of Metastatic Prostate Cancer," *Operations Research* (in press), 2020.
- 5) **Li, W.**, Denton, B.T., Nieboer, D., Carroll, P.R., Roobol, M.J., Morgan, T.M., Movember Foundation's Global Action Plan Prostate Cancer Active Surveillance (GAP3) consortium, "Comparison of Biopsy Under-sampling and Annual Progression Using Hidden Markov Models to Learn from Prostate Cancer Active Surveillance Studies," *Cancer Medicine* 9(24); 9611-9619, 2020.
- 6) Ahluwalia, V., **Steimle, L.**, Denton, B.T., "Policy-based branch-and-bound for infinite-horizon Multi-model Markov decision processes." *Computers and Operations Research*, 126, p. 10510, 2020.
- 7) **Bam, M.**, **Zhang, Z.**, Denton, B.T., Duck, M., Van Oyen, M. Planning Models for Skills-sensitive Surgical Nurse Staffing: A Case Study at a Large Academic Medical Center. *IIE Transactions*, 10(4), 277-293, 2020.
- 8) Inadomi, M., Singh, K., Qi, J., Dunn, R., Linsell, S., Denton, B.T., Hurley, P., Kleer, E., Montie, J., Ghani, K., "Collaborative (MUSIC) Prospective Monitoring of Imaging Guideline Adherence by Physicians in a Surgical Collaborative: Comparison of Statistical Process Control Methods for Detecting Outlying Performance," *BMC Medical Informatics and Decision Making*, 20(89), 2020.
- 9) **Zheng, Z.**, Denton, B.T., Xie, X., "Branch-and-Price for Stochastic Bin Packing," *INFORMS Journal on Computing*, 10(4), 277-293, 2019.
- 10) Davenport, M.S., Montgomery, J.S., Kunju, L.P., Siddiqui, J., Shanka, P.R., Rajendiran, T., Shao, X., Lee, E., **Barnett, C.**, Denton, B. and Piert, M., "18F-choline PET/mpMRI for Detection of Clinically Significant Prostate Cancer: Part 1. Improved Risk Stratification for MRI-guided Transrectal Prostate Biopsies." *Journal of Nuclear Medicine*, 61(3), 337-343, 2019.
- 11) **Barnett, C.**, Davenport, M.S., Montgomery, J.S., Kunju, L.P., Denton, B.T., Piert, M., 18F-choline PET/mpMRI for Detection of Significant Prostate Cancer: Part 2.

Cost-Effectiveness Analysis, *Journal of Nuclear Medicine*, 60(12), 1705-1712, 2019.

- 12) Kimiz, S., Qi, J., Babitz, S.K., Linsell, S., Denton, B.T., Singh, K., Auffengerg, G., "Grade Groups Provide Improved Predictions of Pathological and Early Oncologic Outcomes Compared with Gleason Score Risk Groups," *Journal of Urology*, 201 (2), 278-283, 2019.
- 13) **Zheng Zhang**, Modi, P.K., Shahinian, V., Herrel, L.A., Dupree, J.M., Yan, P. Denton, B.T., "Active surveillance vs. Immediate Treatment: Which Has a Greater Financial Incentive for Urologists?," *Urology Practice*, 7(3), 82-187, 2019.
- 14) Auffenberg, G. B., Ghani, K. R., Ramani, S., Usoro, E., Denton, B., Rogers, C., Rogers, C., Stockton, B., Miller, D.C., Singh, K. "askMUSIC: Leveraging a Clinical Registry to Develop a New Machine Learning Model to Inform Patients of Prostate Cancer Treatments Chosen by Similar Men," *European Urology*, 75(6), 901-907, 2019.
- 15) **Zhang, Y., Mason, J.E.**, Wu, H., Wilson, J., Denton, B.T., " Probabilistic sensitivity analysis on Markov models with uncertain transition probabilities: an application in evaluating treatment decisions for type 2 diabetes," *Health Care Management Science*, 22(1), 34-52, 2019.
- 16) **Zheng, Z.**, Denton, B.T., Xie, X., "Appointment Scheduling and the Effects of Customer Congestion on Service," *IIE Transactions*, 51(10), 1075-1090, 2018.
- 17) Denton, B. T. "Optimization of Sequential Decision Making for Chronic Diseases: From Data to Decisions." In Recent Advances in Optimization and Modeling of Contemporary Problems (pp. 316-348), *INFORMS Tutorials*, 2018.
- 18) Prasad, S.R., Maturen, K.E., George, A.K., Borza, T., Ellimoottil, C., Montgomery, J.S., Wei, J.T., Denton, B.T., Davenport, M.S. "Temporary health impact of prostate MRI and transrectal prostate biopsy in active surveillance prostate cancer patients Original Research Manuscript," *Journal of the American College of Radiology*, 16(10), 1385-1392, 2018.
- 19) Auffenberg, G.B., Ghani, K.R., Ramani, S., Usoro, E., Denton, B.T., Rogers, C., Stockton, B., Miller, D.C., Singh, K. "askMUSIC: Leveraging a Clinical Registry to Develop a New Machine Learning Model to Inform Patients of Prostate Cancer Treatments Chosen by Similar Men." *European Urology*, 75(6), 901-907, 2018.
- 20) Harvey, M. J., Denton, B. T., Prosser, L. A., Hutton, D. W. "Determining the optimal strategy for the live-attenuated herpes zoster vaccine in adults." *Vaccine*, 36(41), 6237-6247, 2018.
- 21) Deng, Y., Shen, S., Denton, B.T., "Chance-Constrained Surgery Planning Under Uncertain or Ambiguous Surgery Durations," *INFORMS Journal on Computing*, 31(3), 559-575, 2018.
- 22) **Von Achen, P.**, Hayward, R.H., Norton, E., Denton, B.T., Ellimoottil, C., "The Challenge of Measuring Surgeon Spending for Payment Policies," *Annals of Surgery*, 268(6), 903-907, 2018.

- 23) **Barnett, C.L.**, Davenport, M., Montgomery, J., Wei, J., Montie, J., Denton, B.T., "Cost-Effectiveness of Magnetic Resonance Imaging and Targeted Fusion Biopsy for Early Detection of Prostate Cancer," *British Journal of Urology International*, 122, 50-58, 2018.
- 24) **Berg, B.**, Denton, B.T., "Fast Online Approximations for Scheduling of Outpatient Procedure Centers," *INFORMS Journal on Computing*, 29(4), 631-644, 2017
- 25) **Barnett, C.**, Auffenberg, G., Cheng, Z., Yang, F., Wang, J., Wei, J., Miller, D., Montie, Mamawala, M., Denton, B.T., "Optimizing Active Surveillance Strategies to Balance Competing Goals of Early Detection of Grade Progression with Minimizing Harm from Biopsies," *Cancer*, 124(4), 698-705, 2017.
- 26) Basu, S., Sussman, J.B., Rigdon, J., **Steimle L.**, Denton, B.T., Hayward, R.A., "Improved Targeting of Intensive Blood Pressure Treatment: Derivation and Validation of Risk Scores for Benefit and Harm," *PLOS Medicine* 14(10), e1002410, 2017.
- 27) **Mason, J., Denton, B.T.**, Smith, S. Shah, N., "Using Electronic Health Records to Monitor and Improve Adherence to Medication," *IISE Transactions* (in press), 2017. (2017 2nd Place Best Journal Article for IISE Transactions on Healthcare Systems Engineering).
- 28) **Bam, M.**, Denton, B.T., Van Oyen, M., Owen, M.E., "Surgery Scheduling with Recovery Resources," *IISE Transactions*, 49(10), 942-955, 2017.
- 29) **Barnett, C.L.**, Tomlins, S.A., Underwood, **D.J.**, Morgan, T.M., Montie, J.E., Wei, J.T., Denton, B.T., "Two-Stage Biomarker Protocols for Improving the Precision of Early Detection of Prostate Cancer," *Medical Decision Making*, 37(7), 815-826, 2017.
- 30) Capan, M, Khojandi, A., Denton, B.T., Williams, K., Ayer, T., Chhatwal, J., Kurt, M., Lobo, J., Roberts, M., Zaric, G., Zhang, S., Schwartz, S.J., "From Data to Improved Decisions: Operations Research in Healthcare Delivery," *Medical Decision Making*, 37(8), 849-859, 2017.
- 31) Gopalakrishna, A., Fantony, J.J., Owusu, R., Foo, W., Dash, R., Denton, B.T., Inman, B., "Anticipatory Positive Urine Tests for Bladder Cancer," *Annals of Surgical Oncology*, 24(6), 1747-1753, 2017.
- 32) Auffenberg, G., **Merdan, S.**, Miller, D.C., Karandeep, S., Stockton, B.R., Ghani, K.R., Denton, B.T., "Evaluation of Prostate Cancer Risk Calculators for Shared-Decision Making Across Diverse Urology Practices in Michigan," *Urology*, 104, 137-142, 2017.
- 33) **Gose, A.**, Denton, B.T., "Sequential Bounding Methods for Two-Stage Stochastic Programs," *INFORMS Journal on Computing*, 28(2), 351-369, 2016.
- 34) Hurley, P., Dhir, A., Gao, Y., Drabik, B., Lim, K., Curry, J., Womble, P.R., Linsell, S.M., Brachulis, A., Sexton, D.W., Ghani, K.R., Denton, B.T., Miller, D.C., Montie, J.E. "A State-wide Intervention Improves Appropriate Imaging in Localized Prostate," *Urology*, 197(5), 1222-1228, 2016.

- 35) Castaing, J., Cohn, A., Denton, B.T., "A Stochastic Programming Approach to Reduce Patient Wait Times and Overtime in an Outpatient Infusion Center," *IIE Transactions on Healthcare Systems Engineering*, 6(3), 111-125, 2016.
- 36) Price, S., Golden, B., Wasil, E., Denton, B.T., "Operations Research Models and Methods in the Screening, Detection, and Treatment of Prostate Cancer: A Categorized, Annotated Bibliography," *Operations Research for Health Care*, 8, 9-21, 2016.
- 37) Liu, J., Womble, P.R., Merdan, S., Miller, D.C., Montie, J.E., Denton, B.T., "Factors Influencing Selection of Active Surveillance for Localized Prostate Cancer," *Urology*, 86(5), 901-905, 2015.
- 38) **Gul, S.**, Denton, B.T., Fowler, J., "A Multi-Stage Stochastic Integer Programming Model for Surgery Planning," *INFORMS Journal on Computing*, 27(4), 755-772, 2015.
- 39) **Erdogan, A.**, Denton, B.T., **Gose, A.** "On-line Appointment Sequencing and Scheduling," *IIE Transactions*, 47, 1267-1286, 2015.
- 40) **Merdan, S.**, Tomlins, S.A., , **Barnett, C.L.**, **Underwood, D.J.**, Morgan, T.M., Montie, J.E., Wei, J.T., Denton, B.T., "Assessment of Long Term Outcomes Associated with Urinary Prostate Cancer Antigen 3 and TMPRSS2:ERG Gene Fusion at Repeat Biopsy," *Cancer*, 122(22), 4071-4079, 2015.
- 41) McCoy, R.G., **Zhang, Y.**, Denton, B.T., Mason, J., Montori, V.M., Smith, S.A., Shah, N., "Trends in Treatment Intensification of Type 2 Diabetes," *Journal of Managed Care*, 21(5), e288-e296, 2015.
- 42) Wang, C.T., Milne, R.J., Fordyce, K., Denton, B.T., "Incorporating Contractual Arrangements in Production Planning," *Computers & Operations Research*, 53, 353-363, 2015.
- 43) Risko, R., **Merdan, S.**, Womble, P.R., Montie, J., **Barnett, C.**, Ye, Z., Linsell, S., Miller, D., Denton, B.T., "Clinical Predictors and Recommendations for Staging CT Scan Among Men with Prostate Cancer," *Urology*, 84, 1329-1334, 2014.
- 44) **Merdan, S.**, Womble, P.R., Miller, D., **Barnett, C.**, Ye, Z., Linsell, S., Montie, J., Denton, B.T., "Toward Better Use of Bone Scans Among Men with Early-Stage Prostate Cancer," *Urology*, 84, 793-798, 2014.
- 45) Milne, R.J., White, T., Denton, B.T., "Patents -- A Growing Source of Analytics Methods," *Interfaces*, 45(3), 271-277, 2014.
- 46) **Berg, B.** Denton, B.T., Erdogan, A., Todd Huschka, Rohleder, T. "Optimal Overbooking Strategies for Outpatient Procedure Centers," *Computers & Operations Research*, 50, 24-37, 2014.
- 47) **Zhang, Y.**, McCoy, R.G., **Mason, J.**, Smith, S.A., Shah, N., Denton, B.T., "Second-line agents for glycemic control for type 2 diabetes: are newer agents better?," *Diabetes Care*, 37:5, 1338-1345, 2014.

- 48) Yarmand, H., Ivy, J., Denton, B.T., Loyd, A., "Optimal Two-Phase Vaccine Allocation to Geographically Different Regions under Uncertainty," *European Journal of Operational Research*, 233(1), 208-219, 2014.
- 49) **Mason, J.**, Denton, B.T., Shah, N., Smith, S., "Optimizing the Simultaneous Management of Cholesterol and Blood Pressure Treatment Guidelines for Patients with Type 2 Diabetes," *European Journal of Operational Research*, 233: 727-738, 2013.
- 50) **Erdogan, S.A.**, Denton, B.T., "Dynamic Appointment Scheduling with Uncertain Demand," *INFORMS Journal on Computing*, 25(1): 116-132, 2013.
- 51) **Woodall, J.**, Gosselin, T., Boswell, A., Murr, M., Denton, B.T., "Improving Patient Access to Chemotherapy Treatment at Duke Cancer Institute," *Interfaces*, 43(5), 449-461, 2013. (Finalist for 2012 INFORMS Daniel H. Wagner Prize).
- 52) **Zhang, Y.**, Denton, B.T., Nielson, M., "Comparison of Screening Strategies for Low-Risk Bladder Cancer Patients," *Medical Decision Making*, 33: 198-214, 2013.
- 53) **Berg, B.**, Murr, M., Chermak, D., Woodall, J., Pignone, M., Sandler, R., Denton, B.T. "Estimating the Cost of No-shows and Evaluation the Effects of Mitigation Strategies," *Medical Decision Making*, 33: 976-985, 2013.
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- 57) **Mason, J.**, Denton, B.T., "Decision Maker Perspectives on the Optimal Time to Initiate Treatment," *IBM Journal on Research and Development*, 56(5): 1-12, 2012.
- 58) **Zhang, J.**, Denton, B.T., Balasubramanian, H., Inman, B., Shah, N., "Estimating the True Value of PSA Tests for Prostate Cancer Detection," *Medical Decision Making*, 32(2): 337-349, 2012.
- 59) Inman, B., Zhang, J., Shah, N., Denton, B.T., "An Evaluation of the Dynamic Changes in PSA Occurring in a Population-Based Cohort of Men Over Time," *British Journal of Urology International*, 110(3): 375-381, 2012.
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- 62) Denton, B.T., Oguzhan, A., Holder, A., Lee, E., "Open Challenges in Medical Decision Making," *IIE Transactions on Healthcare Engineering*, 1(3): 161-167, 2011.
- 63) **Gul, S.**, Denton, B.T., Huschka, T., Fowler, J.R., "Bi-criteria Evaluation of an Outpatient Surgery Clinic via Simulation," *Production and Operations Management: Special Issue on Health Care Management*, 20(3): 406-417, 2011.
- 64) Shah, N.D., Mason, J., Kurt, M., Denton, B.T., Huschka, T.R., Smith, S.A., "Comparative Effectiveness of Guidelines for the Management of Hyperlipidemia and Hypertension for Type 2 Diabetes Patients," *PLOS ONE*, 6(1): 1-8, 2011.
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- 66) Denton, B.T., Miller, A., **Balasubramanian, H.**, Huschka, T. "Optimal Allocation of Surgery Blocks to Operating Rooms Under Uncertainty," *Operations Research*, 58(4): 802-816, 2010.
- 67) **Balasubramanian, H.**, Banerjee, R., Naessens, J.M., Denton, B.T., Wood, D.L., "Improving Clinical Access and Continuity through Physician Panel Redesign," *Journal of General Internal Medicine*, 25(1): 1109-1115, 2010.
- 68) **Berg, B.**, Denton, B.T., Nelson, H., Balasubramanian, H., Rahman, A., Bailey, A., Lindor, K., "A Computer Simulation Model to Evaluate Operational Performance of a Colonoscopy Suite," *Medical Decision Making*, 30(3): 380-387, 2010 (NC State Press Release posted on Science Daily and other news services).
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- 75) Denton, B.T. and Gupta D., 2003, "A Sequential Bounding Approach for Optimal Appointment Scheduling," *IIE Transactions*, 35: 1003-1016 (2005 Outstanding IIE Publication Award 2005, and feature article in IIE Magazine, November 2003).
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### Conference Proceedings

- 1) **Otero-Leon, D. F.**, Li, W., Lavieri, M. S., Denton, B. T., Sussman, J. B., & Hayward, R. (2021, December). Using longitudinal health records to simulate the impact of national treatment guidelines for cardiovascular disease. In *2021 Winter Simulation Conference (WSC)* (pp. 1-12). IEEE.
- 2) **Steimle, L.N.**, Kaufman, D.L., Denton, B.T., "Multi-model Markov Decision Processes: A New Method for Mitigating Parameter Ambiguity." Healthcare Special Interest Group of the Manufacturing and Service Operations Management Conference, Houston, TX. 2018.
- 3) **Merdan, S.**, Ghani, K., Denton, B.T., "Integrating Machine Learning and Optimization Methods for Imaging of Patients with Prostate Cancer," *Proceedings of Machine Learning Research*; 85:1–17, 2018.
- 4) **Berg, B.** Denton, B.T., **Erdogan, A.**, Todd Huschka, Thomas Rohleder, "Optimal Overbooking Strategies for Outpatient Procedure Centers," NSF Grantees Conference, CMMI Division, Atlanta, GA, 2010.
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- 6) Huschka, T., Denton, B.T., Narr, B., Thompson, A., "Using Simulation in the Implementation of an Outpatient Procedure Center," *Winter Simulation Conference Proceedings*, Miami, FL, 2008.
- 7) **Iser, J.H.**, Denton, B.T., King, R.E., "Heuristics for Balancing Operating Room and Post-Anesthesia Resources Under Uncertainty," *Winter Simulation Conference Proceedings*, Miami, FL, 2008.

- 8) Huschka, T., Denton, B.T., Gul, S., Fowler, J.R., "Bi-criteria Evaluation of an Outpatient Surgery Clinic via Simulation," Winter Simulation Conference Proceedings, Washington, D.C., 2007.
- 9) **Balasubramanian, H.**, Banerjee, R., Gregg, M., Denton, B.T., "Improving Primary Care Access Using Simulation Optimization," Winter Simulation Conference Proceedings, Washington, D.C., 2007.
- 10) Denton, B.T., Rahman, A, Nelson, H., Bailey, A, "Simulation of a Multiple Operating Room Surgical Suite," Winter Simulation Conference Proceedings, Monterey, CA, 2006.
- 11) Denton, B.T. and Gupta D., "Optimization of Appointment Based Service Systems," MSOM Conference Proceedings, Ann Arbor, MI, 2000.

## Books

- 1) Denton, B.T. (Ed.), "Handbook of Healthcare Operations Management: Methods and Applications," International Series in Operations Research and Management Science, 2013, Volume 84, Springer, New York. <http://www.springer.com/978-1-4614-5884-5> (more than 25,000 chapter downloads since publication).

## Book Chapters

- 1) **Zhang, J.**, Denton, B.T., "Partially Observable Markov Decision Processes for Prostate Cancer Screening, Surveillance, and Treatment: A Budgeted Sampling Approximation, Wiley: Decision Analytics and Optimization in Disease Prevention and Treatment, (in press) 2017.
- 2) **Steimle, L.N.**, Denton, B.T., "Markov Decision Processes for Screening and Treatment of Chronic Diseases," Springer Handbook on Markov Decision Processes in Practice, 2017.
- 3) **Berg, B.**, Denton, B.T., "Appointment Scheduling in Outpatient Procedure Centers," Springer Handbook of Healthcare System Scheduling, 2012.
- 4) **Zhang, J., Mason, J.**, Denton, B.T., "Applications of Operations Research to the Prevention, Detection, and Treatment of Disease," Wiley Encyclopedia of Operations Research and Management Science, 2011.
- 5) Rohleder, T., Huschka, T., Denton, B.T., "Using Simulation to Design and Improve an Outpatient Procedure Center," Management Engineering for Effective Healthcare Delivery: Principles and Applications, IGI Global Publishers, 2010.
- 6) **Erdogan, S.A.**, Denton, B.T., "Surgery Planning and Scheduling: A Literature Review," submitted to Encyclopedia of Operations Research and Management Science, Wiley, 2010.



- 7) **Balasubramanian, H.**, Denton, B.T., "Optimizing Panel Design for Primary Care Practices," Handbook of Health Care Delivery Systems, edited by Yih, Y., CRC Press, 2009.
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## Other Articles

- 1) Denton, B.T., "The Lack of Diversity in Engineering is Like a Disease (But There is a Cure)," Op. Ed., *The Hill*, 2021
- 2) Denton, B.T., "Trumps Restrictions on Chinese Students Stifle American Companies, Universities and Innovation," Op. Ed., *The Hill*, 2020
- 3) **Zhang, Y., Steimle, L.** Denton, B.T., "Robust Markov Decision Processes for Medical Treatment Decisions, *Optimization Online*, 2018
- 4) Denton, B.T., "Diversity, Equity and Inclusion," INFORMS President's Desk Column, *OR/MS Today*, 2017.
- 5) Denton, B.T., "A Rose by Any Other Name...," INFORMS President's Desk Column, *OR/MS Today*, 2017.
- 6) Denton, B.T., "Publications: The Good, The Bad, and The Ugly," INFORMS President's Desk Column, *OR/MS Today*, 2017.
- 7) Denton, B.T., "Return on Investment from (Operations) Research," INFORMS President's Desk Column, *OR/MS Today*, 2017.
- 8) Denton, B.T., "Global Engagement by INFORMS and Our Members," INFORMS President's Desk Column, *OR/MS Today*, 2017.
- 9) Denton, B.T., "State of INFORMS," INFORMS President's Desk Column, *OR/MS Today*, 2017.
- 10) Denton, B.T., "INFORMS Elections - What is Approval Voting?," *OR/MS Today*, 41(4), 18-19, 2014.
- 11) Fowler, J.W., Benneyan, J.C., Carayon, P., Denton, B.T., Keskinocak, P., Runger, G.C., "Introduction to a New Journal for Healthcare Systems Engineering," *IIE Transactions on Healthcare Systems Engineering*, 1-5, 2010.
- 12) Denton, B.T., Verter, C., "OR in Healthcare," *OR/MS Today*, 37(5), 2010.

## Patents

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- 2) Denton, B.T., Huyn, C.K., Tandel, S.S., Voldman, S.H., "Optimized Scheduling Based on Sensitivity Data," U.S. Patent 8,301,288, 2012.
- 3) Denton B.T., Milne R.J., "Method for Simultaneously Considering Customer Requests and Commit Dates," U.S. Patent, 8,234,144, 2012 (Note: patent split from 7,584,113).
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- 5) Degbotse, A., Denton, B. and Milne, R.J., "Approximating Cycle Times within Material Flow Networks," U.S. Patent 8,185,420, 2012.
- 6) Chang, C., Denton, B.T., Hegde, S., Milne, R.J., Smith, S., Wang, C., and Smith, S., "Method of Planning Production for Complimentary Demands", U.S. Patent, 8,140,372, 2012.
- 7) Burda, R., Degbotse, A., Denton, B., Fordyce, K., Milne, R.J., "Method of Release and Product Flow Management for a Manufacturing Facility," U.S. Patent 8,165,704, 2012 (Note: patent split from 7,477,958).
- 8) Denton, B.T., Forrest, J., Milne, R.J., "Method for Considering Hierarchical Preemptive Demand Priorities," U.S. Patent 7,966,214, 2011.
- 9) Denton, B., Milne, R.J., and Orzell, R.A., "Method for Purchase Order Rescheduling in a Linear Program," U.S. Patent 7,966,208, 2011.
- 10) Burda, R., Degbotse, A., Denton, B., Fordyce, K., Hegde, S., Milne, R.J., Shikalgar, S., and Zuo, G. "Method and System for Intelligent Automated Reticle Management," U.S. Patent 7,953,507, 2011 (note: patent split with U.S. Patent 7,206,652).
- 11) Denton, B.T., Milne, R.J., Wang, C., "Method for Fair-sharing Limited Resources Between Multiple Customers," U.S. Patent 7,937, 475, 2011 (note: patent split with U.S. Patent 7,383,337).
- 12) Denton, B.T., Elmer, B., Milne, R.J., "Method, Apparatus and Computer Program for Organizing Hierarchical Information," U.S. Patent 7,885,958, 2011.
- 13) Denton, B.T., Ervolina, T., Milne, R.J., Orzell, R.A., Raychaudhuri, S., "System for and Method of Supply Chain Interpolation," U.S. Patent Application, 7,738,984, 2010.
- 14) Denton, B.T., Milne, R.J., Nahar, R., Pleszkoch, M., Sharma, V., "Method, System, and Program Product for Determining Objective Function Coefficients of a Mathematical Programming Model," U.S. Patent 7,689,592, 30, 2010.
- 15) Denton, B.T. and Fordyce, K., Milne, R.J., "Method for Autonomic Control of an Automated Manufacturing System," U.S. Patent 7,349,741, 2008 (Note: patent split from 7,349,751).
- 16) Denton B.T., Milne R.J., "Method for Simultaneously Considering Customer Requests and Commit Dates," U.S. Patent, 7,584,113, 2009.

- 17) Burda, R., Degbotse, A., Denton, B.T., Fordyce, K., Milne, R.J., "Method of Release and Product Flow Management for a Manufacturing Facility," U.S. Patent 7,477,958, 2009.
- 18) Denton, B.T., Milne, R.J., Wang, C., "Method for Fair-sharing Limited Resources Between Multiple Customers," U.S. Patent 7,383,337, 2008.
- 19) Burda, R., Degbotse, A., Denton, B., Fordyce, K., Milne, R.J., and Williamson, E., "Method, system, and computer program product for controlling the flow of material in a manufacturing facility using extended zone of control," U.S. Patent 7,305,276, 2007.
- 20) Denton, B.T., Forrest, J., and Milne, R.J., "Method for Sizing Production Lot Starts Within a Linear System Programming Environment," U.S. Patent, 7,292,904, 2007.
- 21) Burda, R., Degbotse, A., Denton, B.T., Fordyce, K., Milne, R.J., "Method, System, and Computer Program for Improved Flow of Development Lots in a Manufacturing Facility," U.S. Patent, 7,239,930, 2007.
- 22) Burda, R., Degbotse, A., Denton, B.T., Fordyce, K., Milne, R.J., Shikalgar, S., Zuo, G., "A Method and System for Intelligent Automated Reticle Management," U.S. Patent 7,206,652, 2007.
- 23) Coppola, K., Denton, B., Mackay, G., and Milne, R.J., "Method, system, and storage medium for integrating rework operations into an advanced planning process," U.S. Patent 7,200,454, 2007.
- 24) Denton, B.T., Fordyce, K., and Milne, R.J., "Method for Autonomic Control of an Automated Manufacturing System," U.S. Patent 7,151,972, December, 2006.
- 25) Denton B.T., Milne, R.J., Orzell, R.A., Vajjala, S., Ward, J., "A Method for Optimizing Foundry Capacity," U.S. Patent 7,103,436, 2006.
- 26) Denton, B.T., Fordyce, K., Milne, R.J., "System and Method for Batch Scheduling of Lots Based on Flow Time and Number of Batches," U.S. Patent 7,043,322, 2006.
- 27) Denton B.T., Milne, R.J., "Method for Optimizing Material Substitutions within a Supply Chain," U.S. Patent 6,983,190, 2006.
- 28) Denton, B.T., Orzell, R.A., and Hegde, S., "A Method for Calculating Level Codes to Account for Capacities," U.S. Patent, 6,584,370, 2003.

### **Invited Seminars and Plenary Presentations**

- 1) "Predictive Models to Improve Imaging Decisions for Patients with Prostate Cancer," INFORMS Practice Chapter (Webinar), 2021
- 2) "Dealing with Model Uncertainty in Markov Decision Processes for Chronic Diseases," Southern Methodist University (Webinar), 2021

- 3) "Predictive Models to Improve Imaging Decisions for Patients with Prostate Cancer," Johns Hopkins, Baltimore, MD, (Webinar), 2020
- 4) "Dealing with Model Uncertainty in Markov Decision Processes for Chronic Diseases," University of Texas, Austin, 2020
- 5) "Predictive Models to Improve Imaging Decisions for Patients with Prostate Cancer," University of Ottawa, Ottawa, ON, 2019
- 6) "Predictive Models to Improve Imaging Decisions for Patients with Prostate Cancer," University of Ottawa, Ottawa, ON, 2019
- 7) "Dealing with Model Uncertainty in Markov Decision Processes for Chronic Diseases," Cornell, Ithaca, 2019
- 8) "Optimization of Sequential Decision Making: From Data to Decisions," INFORMS Health Applications Society Distinguished Scholar Lecture, INFORMS Annual Meeting, Phoenix, AZ, 2018.
- 9) "Robust Optimal Control for Medical Treatment Decisions—An Application to Type 2 Diabetes," University of Florida, Gainesville, 2018.
- 10) "Optimization in Medicine: Past, Present, and Future," Plenary, INFORMS Healthcare Conference, Rotterdam, Netherlands, 2017.
- 11) "Sequential Decision Making in Medicine: MDPs, POMDPs, and Beyond," Tutorial, Healthcare Operations Research Summer School, University of Twente, Enschede, Netherlands, 2017.
- 12) "Using Longitudinal Data to Build Natural History Models," INFORMS Healthcare Conference, Rotterdam, Netherlands, 2017.
- 13) "Optimization in Medicine," Symposium on Big Data, Health and Statistics, Plenary, University of Michigan, Ann Arbor, 2017.
- 14) "Stochastic Optimization for Scheduling in Healthcare Delivery Systems," Plenary, Optimization Days, Montreal, CA, 2017.
- 15) "Careers in Operations Research and Analytics," Panel Member, MIT, 2017.
- 16) "Robust Optimal Control for Medical Treatment Decisions—An Application to Type 2 Diabetes," Georgia Tech, GA, 2016.
- 17) "Markov Decision Processes for Chronic Diseases," Modeling Health and Economic Outcomes Research, University of Michigan, 2016.
- 18) "Using Markov Models to Estimate the Impact of New Prostate Cancer Biomarkers," Cancer Surveillance and Outcomes Research Seminar, University of Michigan, 2016
- 19) "Optimization of Healthcare Delivery," Industrial Engineering and Operations Management Society, Rabat, Morocco, Plenary, 2017.
- 20) "Optimal Planning and Scheduling in Healthcare Delivery Systems," Jiao Tong University, Shanghai, China, International Workshop on Healthcare Services and Hospitality Operations Management, Plenary Speaker, 2015.

- 21)Purdue University, "Optimal Design of Biomarker-Based Screening Strategies for Early Detection of Prostate Cancer," October, 2015.
- 22)"Online Scheduling for Outpatient Procedure Centers," University of Twente, Netherlands, 2015.
- 23)"Using Markov Models to Evaluate the Impact of Genetic Biomarkers on Prostate Cancer Screening," University of Michigan, Hematology and Oncology Seminar, 2015.
- 24)"Optimal Design of Biomarker-Based Screening Strategies for Early Detection of Prostate Cancer," University of Texas, Austin, 2015.
- 25)"Optimal Design of Biomarker-Based Screening Strategies for Early Detection of Prostate Cancer," University of California, Berkeley, 2014.
- 26)"Operations Research in Medicine: Past, Present, and Future," University of Michigan, U-M Center for Healthcare Engineering and Patient Safety (CHEPS), 2014.
- 27)"Online Scheduling of Outpatient Procedure Centers,' University of Buffalo, 2014.
- 28)"Operations Research in Medicine: Past, Present, and Future," INFORMS Michigan Chapter Meeting, Plenary, 2014.
- 29)"Online Scheduling of Outpatient Procedure Centers", Wayne State University, 2013.
- 30)"Online Scheduling of Outpatient Procedure Centers," University of Maryland, 2013.
- 31)"Online Scheduling of Outpatient Procedure Centers," McGill University, 2013.
- 32)"Optimization of Planning and Scheduling of Health Care Delivery Systems," Conference on Modeling and Optimization: Theory and Applications (MOPTA), Plenary, 2013
- 33)"Stochastic Optimization Models and Methods for Optimization of Surgery Delivery Systems," Tsukuba University, Japan, 2013
- 34)"Optimization of On-line Appointment Scheduling," University of Southern California, Department of Industrial Engineering, 2013
- 35)"Stochastic Optimization of Surgery Delivery Systems," Tsinghua University, Department of Industrial Engineering, 2012.
- 36)"Optimal Design of Prostate Cancer Screening Policies," University of Michigan, Department of Urology Health Services Research Seminar, 2012.
- 37)"Optimal Design of Prostate Cancer Screening Policies," University of Michigan, U-M Center for Healthcare Engineering and Patient Safety (CHEPS), 2012.
- 38)"Optimal Design of Prostate Cancer Screening Policies," Mayo Clinic, Division of Healthcare Policy and Research, 2012
- 39)"Optimization of Online Appointment Scheduling," Texas A& M University, 2012.

- 40) "Optimization of Online Appointment Scheduling," University of Michigan, 2012.
- 41) "Optimization of Online Appointment Scheduling," Duke University, 2012.
- 42) "Partially Observable Markov Decision Processes for Prostate Cancer Screening," Georgia Institute of Technology, 2012.
- 43) "Optimization of Scheduling for Appointment Based Healthcare Delivery Systems," University of Ottawa, Ottawa, ON, 2011.
- 44) "What's Good for Healthcare is Good for the Economy", North Carolina State Emerging Issues Forum, Panel Member, Raleigh, NC, 2011.
- 45) "Optimal Timing of Medical Treatment Decisions for Type 2 Diabetes," University of Ottawa, Ottawa, ON, 2009.
- 46) "Optimal Timing of Medical Treatment Decisions for Type 2 Diabetes," University of Waterloo, Waterloo, ON, 2009.
- 47) "Optimal Timing of Medical Treatment Decisions for Type 2 Diabetes," University of Toronto, Toronto, ON, 2009.
- 48) "Design and Operation of Surgery Delivery Systems," Fields Institute, Toronto, ON, 2009.
- 49) "Design and Operation of Surgery Delivery Systems," University of Michigan, Ann Arbor, MI, 2009.
- 50) "Design and Operation of Surgery Delivery Systems," University of British Columbia, Vancouver, BC, 2009.
- 51) "Design and Operation of Surgery Delivery Systems," IBM, Thomas J. Watson Research Center, Yorktown Heights, NY, 2008.
- 52) "Simulation and Optimization Models for Staffing and Scheduling a Colonoscopy Practice," University of North Carolina, Chapel Hill, NC, Cecil C. Sheps Center for Health Services Research, 2008.
- 53) "Systems Engineering Methods for Improving Patient Access to Health Care," Mayo Clinic, Rochester, MN, 2008.
- 54) "Optimization of Health Care Delivery Systems," SAS, Cary NC, 2008.
- 55) "Optimization of the Design and Operation of Surgery Delivery Systems," Northeastern University, Boston, MA, 2008.
- 56) "Optimization of the Design and Operation of Surgery Delivery Systems," Lehigh University, Allentown, PA, 2008.
- 57) "A Markov Decision Process Approach to Optimize Statin Start Time for Patients with Type 2 Diabetes," University of North Carolina, Chapel Hill, NC, Cecil C. Sheps Center for Health Services Research, 2007.
- 58) "Optimization of Surgery Delivery Systems," University of Cincinnati, Cincinnati, OH, Department of Operations Management, 2007.

- 59) "Optimization of the Design and Operation of Surgery Delivery Systems," University of North Carolina, Chapel Hill, NC, Department of Statistics and Operations Research, 2007.
- 60) "Optimization of Health Care Delivery and Medical Decision Making," University of Wisconsin, Madison, WI, Department of Industrial \ Systems Engineering, 2007.
- 61) "Optimization of Appointment Based Service Systems," University of Pittsburgh, Pittsburgh, PA, Department of Industrial Engineering, 2007.
- 62) "Optimization of Appointment Based Service Systems," University of Toronto, Toronto, ON, Department of Industrial Engineering, 2007.
- 63) "A Markov Decision Process Approach to Optimize Statin Start Time for Patients with Type 2 Diabetes," University of Western Ontario, London, ON, 2006.
- 64) "Optimization of Health Care Delivery and Medical Decision Making," University of Western Ontario, London, ON, Management Science Department Seminar, 2006.
- 65) "Optimization of Appointment Based Service Systems," University of Wisconsin, Madison, WI, Department of Industrial \ Systems Engineering, 2006.
- 66) "Optimization of Appointment Based Service Systems," University of South Florida, Tampa, FL, Department of Industrial \ Systems Engineering, 2006.
- 67) "Operations Research Methods for Health Systems Engineering," Mayo Clinic Systems \ Procedures Departmental Seminar, Rochester, MN, 2006.
- 68) "Supply Chain Optimization in the Semiconductor Manufacturing Industry," Texas A\ M, College Station, TX, Department of Industrial and Systems Engineering, 2004.
- 69) "Optimizing IBM's Semiconductor Supply Chain," University of Minnesota Departmental Seminar, Minneapolis, MN, 2004.
- 70) "Semiconductor Supply Chain Optimization," Rensselaer Polytechnic Institute (RPI), Albany, NY, May 2003.

### **Editorship and Journal Review Assignments**

Associate Editor, *INFORMS Journal on Optimization*, (2017 --)

Associate Editor, *Service Science* (2016 -- 2019)

Associate Editor, *Operations Research* (2015 - 2019)

Editorial Board Member, *Optimization and Engineering* (2013 -- 2018)

Department Editor (Medical Decision Making), *IIE Transactions on Healthcare Systems Engineering* (2009 -- 2015)

Associate Editor, *M&SOM* (2012 -- 2015)

Editorial Board Member, *Health Systems* (2011 -- 2015)

Editor, *Handbook on Healthcare Operations Management*, Springer (2013)

Editorial Board Member, *Medical Decision Making* (2009-2012)

Recognized as a *Medical Decision Making* "Top Reviewer" for 2010

Associate Editor, *MSOM*, Special Issue: Applications of Healthcare Operations Management (2011)

Associate Editor, *Production and Operations Management*, Special Issue: Health Care Operations Management (2009)

Associate Editor, *IIE Transactions* -- Focus Issue on Operations Engineering and Analysis (2008, 2009)

Associate Editor, *IIE Transactions* -- Focus Issue on Scheduling and Logistics (2007)

Associate Editor, Canadian Journal of Administrative Sciences, Operations and Decision Sciences Division (2006 -- 2009)

Contributing Editor, *Interfaces*, Practice Abstracts (2005 -- 2012)

### **Funded Research Project Record**

2021 Hollenbeck, B., (PI), Shahinian, V. (Co-PI), Denton, B.T. (Co-I), Sales, A. (Co-I) National Institutes of Health, R01 - CA - 269367 – 01, April 1, 2022 – March 30, 2027, \$2,862, 067 (Co-I Denton Share: \$341,742).

Description: This project will examine payment reform and potential incentive mechanisms using simulation and stochastic optimization models to design alternative payment models. In the prostate cancer active surveillance context, such models could ensure payments to urologists adequately incentivize surveillance, while tying reimbursement to meeting quality performance measure targets that ensure its appropriate use and implementation. Constructed properly, alternative payment models align financial incentives for both payers and providers, reduce unwarranted variation in use of surveillance, and shift more men to appropriate use of surveillance for favorable-risk prostate cancer.



2020 Hayward, R. (PI), Sussman, J. (Co-I), Lavieri, M. (Co-I), Denton, B.T. (Co-I), VA Center for Clinical Management Research (CCMR), VA-IPA 20, September 1, 2019 - August 31 2021.

Description: The goal of this project is to build stochastic optimization models for healthy patients to optimize decision about medical treatment for prevention of cardiovascular disease. A stochastic model of the progression of major risk factors, like cholesterol and blood pressure, will be used to design individualized policies for whether and when to initiate cholesterol and blood pressure-lowering medications in a way that balances the benefits in terms of risk reduction and the potential sides of medications. These questions will be examined from the perspective patient health, quality of life, and cost to health systems.

2020 Hollingsworth, J. (PI), Norton, E. (Co-I), Denton, B.T. (Co-I), National Institutes of Health, "Real-World Effectiveness of Preventive Pharmacological Therapy for Patients with Kidney Stones." R01DK121709, April 1, 2020 - March 31, 2025, \$626,445.

Description: The goal of this proposal is to use observational data to study the effectiveness of treatments intended to reduce the risk of kidney stones. This will involve the development of predictive models was estimating patient risk and stochastic models for understanding how adherence to treatment options may change over time. These models will help urologists to improve treatment recommendations for patients on the basis of individual risk factors.

2018 Shankar, P (PI), Borza, T. (Co-I), Davenport, M (Co-I), Denton, B.T. (Co-I), George, A. (Co-I), Maturen, J.E.(Co-I), Wei, J. (Co-I), Society of Abdominal Radiology – Howard S. Stern Research Grant, "Temporary Health Disutility of Prostate MRI and Transrectal Prostate Biopsy in Active Surveillance Prostate Cancer Patients." March 3, 2018- March, 2020. \$15,000 (Direct costs)

Description: The goal of this project is to use patient surveys to estimate the disutility of procedures like prostate biopsy and MRI to estimate patient harm to patients undergoing active surveillance for prostate cancer and use these results to optimize decisions about how frequently to biopsy patients.

2018 Denton, B.T., (PI), Wiens, J., Peers Inc., "Intelligent Learning to Optimize Decisions to Increase the Likelihood of Return to Work," January 1, 2018 - December 21, 2019, \$255, 503.

Description: The purpose of this project is to develop a prescriptive modeling framework for supporting case manager decision making in the context of occupational therapy. The modeling framework will draw from sequential learning and optimization methods that have a track-record of successfully improving decision making in many contexts. Data for training the learning algorithms will be stream-based longitudinal data that is obtained incrementally over time as patients progress through the decision-making process.

2017 Denton, B.T. (PI), Taylor, J., Shahinian, V., Wei, J.T., University of Michigan Cancer Center Big Data Award, "Data Science Models and Methods for Improving Active Surveillance in Prostate Cancer, April 1, 2017 - March 31, 2019, \$50,000.

Description: This internal University of Michigan award from the Cancer Center provides funding for a collaborative study by investigators in Industrial and Operations Engineering, Biostatistics and Urology to study latent Markov models based on observational data from a series of international studies of active surveillance in prostate cancer. The ultimate goal is to develop approaches for estimating stochastic model parameters from observational data and use these models as the basis for optimization of the design of personalized active surveillance strategies.

2015 Greg Aufenberg (Project Owner), Denton, B.T., Karandeep Singh, University of Michigan M-Cubed Initiative, "Integration of a Learning Prostate Cancer Risk Prediction Tool into the Electronic Medical Record," June 1, 2016 - May 31, 2017, \$60,000.

Description: This internal University of Michigan award provides funding for a collaborative study by investigators in Urology, Industrial and Operations Engineering, and Learning Health Science, to develop and implement predictive models, based on machine learning methods, to improve decision making for men at risk of prostate cancer.

2015 Denton, B.T. (PI), Wei, J.T. (Co-I, University of Michigan, Department of Urology), National Science Foundation, "Optimal Design of Biomarker-Based Screening Strategies for Early Detection of Chronic Diseases," September, 2015 - August 31, 2017, \$200,000.

Description: The aim of this project is to create stochastic programming models and partially observable Markov decision processes that integrate screening, diagnosis, and treatment decisions over the complete lifecycle of chronic disease to optimize population screening. New data-driven models will be created for the optimal design of (a) one-time composite screening tests; (b) personalized dynamic protocols for screening over a patient's lifetime to optimally balance the competing goals of early disease detection and minimal cost and harm from screening. Theoretical properties that provide insight into optimal screening strategies will be analyzed and used to design efficient algorithms and approximation methods for solving these problems.

2015 Denton, B.T. (PI), Shah, N. (Mayo Clinic), National Science Foundation, "Optimization of Individualized Medical Treatment for Improved Population Health," September 1, 2015 -- August 31, 2018, \$375,000.

Description: The research objective of this proposal is to develop new robust dynamic programming methods for the optimal design of personalized treatment policies for patients with chronic diseases. Algorithmic methods will be developed for computing

optimal and approximate (near optimal) treatment guidelines in the presence of uncertainty about a patient's future health status and adherence to medication. The emphasis of this proposal is on ways to mitigate uncertainty in the underlying disease progression using methods from robust optimization.

2013 Denton, B.T. (PI), Tomlins, S., Wei, J.T., University of Michigan M-Cubed Initiative, "Measuring the Costs and Benefits of New Biomarkers for Prostate Cancer Detection," Sept 1, 2013 - May 31, 2014, \$60,000.

Description: This internal University of Michigan award provides funding for the study of optimal design of screening strategies for prostate cancer that use new genetic biomarkers for high-grade cancer detection.

2011 Mason, J (PI), Denton, B.T. (Faculty Mentor and Doctoral Advisor), Agency for Healthcare Research and Quality (AHRQ), R36 Dissertation Award, "Optimal Design of Guidelines for Preventive Treatment to Manage Risk of Cardiovascular Disease," Sept 1, 2011 - August 31, 2012, \$35,363.

Description: This doctoral dissertation award provided funding for PhD Student Jennifer Mason to complete her doctoral research on the use of Approximate Dynamic Programming methods for optimal control of treatment decision for managing cholesterol and blood pressure in patients with type 2 diabetes.

2011 Denton, B.T. (PI), UNC Hospital, "Optimization of Patient Scheduling at the UNC Cancer Hospital," Sept 1, 2011 - August 31, 2012, \$36,000.

Description: The objective of this research project is to investigate optimization models for improving patient access at the UNC Cancer Center. The emphasis is on improving patient flow and reducing expected waiting time at the chemotherapy treatment center.

2011 Denton, B.T. (PI), UNC Lineberger Comprehensive Cancer Center, "Evaluation of Bladder Cancer Surveillance Policies," January 1, 2010 - January 2, 2012, \$36,000.

Description: The objective of this research project is to use partially observable Markov decision process (POMDP) models to investigate the optimal design of cystoscopy-based surveillance policies for the early detection of recurrence of bladder cancer. Published best practices will be compared to optimal policies generated from the POMDP model to estimate the potential for simultaneously improving detection rate and lowering the total cost of surveillance.

2010 Denton, B.T. (PI), Duke Medicine, "Simulation Modeling of Cancer Center Operations," August 17, 2010 - August 16, 2011, \$46,000.

Description: The objective of this research project is to develop and validate a discrete event simulation model for a large cancer center to improve patient access to care and

practice efficiency. The simulation model will be used to answer questions related to daily scheduling and medium to long-range planning, including staffing and capacity management decisions.

2010 Denton, B.T. (PI), National Science Foundation Research Experience for Undergraduates, "Robust Heuristics for Scheduling an Endoscopy Suite in the Presence of Urgent Inpatients and No-shows," August, 2010 -- August, 2011, \$6,000.

Description: The purpose of this research experience for undergrad students is to develop fast and reliable heuristics for scheduling of outpatient procedure centers in the presence of uncertainty in urgent add-on patients, and no-shows. University of North Carolina will form the test bed for this research project. An undergraduate team co-advised by a PhD student will design and analyze heuristics. This study will also help quantify the cost of uncertainty associated with no-shows in the outpatient procedure center setting.

2010 Uzsoy, R. (PI), Denton, B.T. (Co-I), Kempf, K. (Co-I, Intel), National Science Foundation, "Next Generation Algorithms for Planning Production and Inventories with Uncertain Demand and Congestion," September 1, 2010 -- August 31, 2014, \$480, 095.

Description: The research objective of this project is to develop new insights into the influence of supply and demand uncertainty and ways to mitigate their effects in the context of multiproduct, multistage production systems. The research team will develop new stochastic integer programming models, and new decomposition based approximation methods for solving these computationally challenging problems.

2010 Denton, B.T. (PI), Shah, N. (Mayo Clinic), Smith, S. (Mayo Clinic), National Science Foundation, "Optimization of Medical Treatment Decisions for Type 2 Diabetes," September 1, 2010 -- August 31, 2014, \$330,000.

Description: The research objective of this proposal is to develop new stochastic dynamic models and solution methodologies to study the design of optimal treatment plans for type 2 diabetes. The research will begin by investigating models for the management of cardiovascular risk using common drug treatment options such as cholesterol and blood pressure-lowering medication. Algorithmic methods will be developed for computing optimal and approximate (near optimal) treatment guidelines in the presence of uncertainty about a patient's future health status. Our models will consider multiple perspectives including a patient's quality adjusted lifespan, the costs of treatment, and the cost of diabetes related complications to the health system.

2009 Denton, B.T. (PI), National Science Foundation Research Experience for Undergraduates, "A Decision Support System for Robust Design of Schedules," August, 2009 -- August, 2010, \$12,000.

Description: The purpose of this research experience for undergrad students is to develop fast and reliable heuristics for developing robust schedules for an endoscopy suite. University of North Carolina will form the test bed for this research project. An undergraduate student team co-advised by a PhD student will develop a prototype decision support system for designing schedules, and evaluating operational policy decisions.

2009 Schaefer, A. (PI), Maillart, L., Prokopyev, O., Denton, B.T. (Consultant), Veterans Affairs, Veterans Engineering Research Center, "Optimization of Screening and Treatment Delivery Systems for Chronic Diseases," August, 2009 -- October 2011, \$66,894.

Description: The research objective of this subcontract with the University of Pittsburgh is to develop optimization models for surgery planning and scheduling in the VA health system. The research focus will be on stochastic integer programming models and methods that can be used to achieve computational advantages to solve large-scale model instances for various surgical groups at the VA.

2009 Denton, B.T. (PI), National Science Foundation Career Award, "Optimization of Screening and Treatment Delivery Systems for Chronic Diseases," January 1, 2009 – January 1, 2015, \$400,000.

Description: The research objective of this Faculty Early Career Development (CAREER) project is to develop new operations research (OR) models and methods to advance the science of health care delivery for life-threatening chronic diseases such as cancer, diabetes, and cardiovascular disease. Chronic disease screening and medical treatment decisions combine large state spaces that define patient health characteristics, such as clinical risk factors and medication histories, with uncertainty in future health outcomes due to differences among patients in genetic, environmental, and other factors. Decisions about treatment and screening take place over long periods (sometimes decades) under constraints due to medication conflicts. As a result, the stochastic and sequential decision-making process gives rise to computational optimization problems that are often unsolvable with state-of-the-art algorithms and computing resources. However, these problems have promising structural properties that can be exploited to achieve meaningful theoretical insights and computationally tractable stochastic optimization methods. Advancing the understanding of chronic care delivery has the potential to improve the quality of life for a large and growing proportion of the U.S. population. The translation of discoveries based on this research has the potential to improve the efficiency and effectiveness of national screening and treatment policies.

2008 Ivy, J. (PI), Denton, B.T. (Co-I), Uzsoy, R.(Co-I), Roberts, S. (Co-I), Centers for Disease Control, "Engineering the North Carolina Health Alert Network," September 30, 2009 – September 2013, \$1,583,859.

Description: Despite the continuous efforts to improve emergency preparedness and response, large-scale demonstrate the need for improved emergency preparation, alert, and response systems within a state and beyond. Considering the dynamic and unpredictable circumstances under which emergency systems must operate, there is a growing interest among researchers and public health stakeholders to measure the capacity and efficiency of these system. The goals of this proposal include developing optimization and simulation models to support the design and operation of Health Alert Networks to ensure efficient, effective response and sustainable public health preparedness and service.

2008 Denton, B.T. (PI), "Optimization of Cardiovascular Treatment Decisions for Patients with Type 2 Diabetes," NC State University FRPD Individual Program, July 1, 2008 -- June 30, 2009, \$6000.

Description: According to the American Diabetes Association, there are more than 20 million children and adults in the United States who have diabetes. Of the affected population, approximately 90% have type 2 diabetes. Currently, several risk models exist to predict the probability of complications related to type 2 diabetes; however, there has been limited investigation of how to use these models to make optimal treatment decisions. Our proposal seeks to bridge this gap by furthering the basic knowledge of how to prevent complications related to cardiovascular disease for patients with type 2 diabetes. We will develop new mathematical models and new solution methodologies to study the design of optimal treatment plans for cholesterol and blood pressure control. Our models will consider multiple criteria including a patient's quality-adjusted lifespan, the costs of treatment, and the cost of diabetes-related complications to the health system.

2008 Shah, N. (PI), Denton, B.T. (Co-PI, NCSU Site PI), Smith, S., Ho, M., "Optimizing Prevention and Health Care for the Complex Patient," Agency for Health Care Research and Quality (AHRQ), August 1, 2008 -- July 31, 2010, \$300,000 (Co-PI Denton Share: \$164,830).

Description: Patients with type 2 diabetes are a growing population of complex patients with complicated treatment regimens and a high number of comorbid conditions. There has been an increasing emphasis on evaluating provider performance for evidence-based diabetes care. However, these measures assume one-size-fits-all, and do not account for changing needs and preferences of the patients with age, disease state, and comorbidities. Thus, it is often difficult for primary care clinicians to prioritize interventions for diabetes patients that would be sensitive to patient preferences and at the same time respond to external quality measurement requirements. Over the next two years, we will bridge this gap by advancing knowledge regarding the optimal treatment of diabetes as measured by the patient's quality-adjusted lifespan, adherence to treatment, the costs of treatment, and cost of diabetes-related complications to the health system. Specifically, we will focus on developing mathematical models to

determine the optimal time for initiating and intensifying treatment to manage diabetes, hypertension, and hyperlipidemia.

2008 Roberts, S. (PI), Denton, B.T., Ivy, J., Uzsoy, R., National Science Foundation, "Healthcare Engineering and Health Services Research: Building Bridges, Breaking Barriers," April 2008 -- August 2008, \$39,426.

Description: The objective of this project is to bring together nationally recognized researchers from healthcare engineering and health services research for a symposium to educate each other as to their work and potential for collaboration and to discuss actionable mechanisms for collaboration. The workshop was held in Raleigh, NC on April 6-8, 2008. NSF funds were used to support travel by doctoral students and researchers traveling from out of state, as well as faculty time to prepare the formal report for publication and dissemination.

2007 Denton, B.T. (PI), Balasubramanian, H., Banerjee, R., Mayo Foundation, "Improving the Efficiency of Primary Care Access Using Simulation Optimization," June 2007-- May 31 2008, \$9,735.

Description: The purpose of this grant is to investigate the use of simulation-optimization methods to improve the design and operation of primary care clinics. We will develop new models of patient access that explicitly account for uncertainty in patient demand for access, with a focus on the optimal design of physician panels, staffing, provider team design, and policies for managing patient access.

2006 Denton, B.T. (PI and Project Leader), Fowler, J (PI), and Schaefer, A (PI), National Science Foundation, "Collaborative Proposal: Optimization of the Design and Operation of Surgery Delivery Systems," September 2006 - September 2009, Total: \$330,559 (PI Denton Share: \$89,999).

Description: This grant aims to improve the design and operation of surgery delivery systems. There are four primary research goals. First, we will develop new optimization models and solution methodologies for determining the optimal investment and configuration of surgical resources under uncertainty. Second, we will construct advance scheduling systems that allocate surgeries in a multi-OR setting. Third, we will develop robust real-time scheduling systems that consider the impact of unanticipated events on initial schedules. Fourth, we will develop a sophisticated discrete-event simulation model to evaluate the models described above and compare them to existing policies.

2006 Denton, B.T. (PI), Shah, N., Smith, S., Bryant, S., Mayo Foundation, "Optimization of Diabetes Treatment Decisions," June 2006 – May 31, 2007, \$9,560.

Description: Diabetes is recognized as one of the leading causes of mortality and morbidity in the United States with an estimated cost burden in the U.S. of \$132 billion in direct and indirect costs in the United States. The underlying goal of this proposal is twofold. First, we will leverage existing patient medical records at Mayo Clinic to provide new dynamic risk models for diabetes. Second, we will use the dynamic models we develop the groundwork to initiate a long-term research program into optimization of health care delivery decisions for treating diabetes patients.

2006 Denton B.T. (PI), Mayo Foundation, "Development of an Operations Research Course Mayo Clinic Clinical Research Training Program," May 2006 -- May 2007, \$10,000.

Description: The purpose of this grant is to fund the development of a new course to be offered in the Mayo Clinic graduate school on operations research and systems engineering-based methods for optimization of health care delivery and medical decision making.

## **Service**

### **University Service**

2021 Robotics Department Formation Planning Committee, College of Engineering, University of Michigan.

2020 Continuity of Education Committee, College of Engineering, University of Michigan.

2020 Development Future Planning Committee, College of Engineering, University of Michigan.

2019 – Present Precision Health Faculty Advisory Committee, University of Michigan.

2017 Member, Faculty Launch Committee (Biomedical Engineering).

2017 Member, University of Michigan, Department of Industrial and Operations Engineering Department Chair Search Committee.

2016 Chair, University of Michigan, Department of Industrial and Operations Engineering Faculty Search Committee.

2015 Chair, University of Michigan, Department of Industrial and Operations Engineering Promotion and Tenure Committee.

2015 Chair, University of Michigan, Department of Industrial and Operations Engineering Faculty Search Committee.



2015 Member, University of Michigan, Department of Industrial and Operations Engineering, Department Committee.

2015 Member, University of Michigan, Department of Industrial and Operations Engineering, Wilson Prize Committee.

2015 Member, University of Michigan, Department of Industrial and Operations Engineering, Lecturer Renewal Review.

2015 Member, Faculty Launch Committee (Industrial and Operations Engineering)

2015 Chair, University of Michigan, Department of Industrial and Operations Engineering, Ad Hoc Committee for Redesign of the PhD Program Evaluation Process.

2014 Co-Chair, University of Michigan, Department of Industrial and Operations Engineering Faculty Search Committee.

2014 Freshman Advisor, University of Michigan, Department of Industrial and Operations Engineering.

2014 Seminar Organizer (Spring Semester), University of Michigan, Department of Industrial and Operations Engineering.

2014 Member, University of Michigan, Department of Industrial and Operations Engineering Reappointment Committee.

2014 Member, University of Michigan, Department of Industrial and Operations Engineering Launch Committee.

2013 Member, University of Michigan, College of Engineering, Scholastic Standing Committee.

2013 Member, University of Michigan, Department of Industrial and Operations Engineering, Department Committee.

2013 Member, University of Michigan, Department of Industrial and Operations Engineering, Faculty Search Committee.

2013 Chair, University of Michigan, Department of Industrial and Operations Engineering, Ad Hoc Research Committee.

2012 Member, University of Michigan, Department of Industrial and Operations Engineering, Wilson Prize Committee.

2012 Member, University of Michigan, Department of Industrial and Operations Engineering, Graduate Program Committee (2012-2014).

2012 Chair, University of Michigan, Department of Industrial and Operations Engineering Reappointment Committee.

2012 Judge, University of Michigan Engineering Research Symposium Poster Competition.

2011 Member, North Carolina State University Operations Research Program, Faculty Search Committee.

2010 Member, North Carolina State University Operations Research Program, Faculty Search Committee.

2010 Engineering Open House Faculty Representative, North Carolina State University.

2009 North Carolina State University, NSF CAREER Proposal Advice Panel.

2008 Member, NC State Operations Research Program, Admissions Committee (2008 - 2012).

2007 Member, Edward P. Fitts Department of Industrial & Systems Engineering Search Committee for the A. Doug Allison Distinguished Professor of Health Systems Engineering Chair.

2007 Organizer, Mayo Clinic Seminar Series on Health Systems Engineering (2007 -- 2008).

2005 Member, Mayo Clinic, Patient Access Committee (2005--2006).

2004 Member, IBM Intellectual Property and Patent Review Board (2004 -- 2005).

### **Service to Professional Societies**

2021 Committee Member, INFORMS Board Nominating Committee.

2021 Committee Member, Sanjay and Panna Mehrotra Research Excellence Award.

2020 Committee Member, INFORMS Executive Director Search Committee.

2019 Committee Member, INFORMS Policy on Revocation of Fellow's Status Committee.

2016 President-Elect (2016), President (2017) and Past-President (2018) of INFORMS.

2015 European Operational Research Society Session Organizer, 2015 Euro Meeting, Glasgow, Scotland.

2015 Committee Member, INFORMS Poster Prize Competition, 2015 INFORMS Annual Meeting, Philadelphia, PA.

2015 Committee Member, INFORMS Health Applications Society Student Prize Competition.

2015 Institute of Medicine Workshop Reviewer, "Engineering Optimal Health Care Scheduling: Perspectives for the Nation."

2013 International Program Committee Member, Annual Conference of the EURO Working Group on Operational Research Applied to Health Services (ORAHS), Istanbul, Turkey

2013 Organizing Committee Member, INFORMS Healthcare Conference, Chicago, IL.

2013 Committee Member, INFORMS Health Applications Society Student Prize Competition.

2012 National Advisory Council for I-PrACTISE (Improving Primary Care Through Industrial and Systems Engineering), University of Wisconsin.

2012 Member, Advisory Board, Center for Healthcare Engineering and Patient Safety, University of Michigan (2012 -- ).

2012 Secretary and Executive Board Member, INFORMS (2012-2015).

2011 Program Chair, INFORMS Annual Meeting, Charlotte, NC.

2011 Cluster Chair, INFORMS Healthcare Conference, Montreal, Canada.

2011 Grant Proposal Reviewer, Michael Smith Foundation, Canada.

2010 External Grant Reviewer, Austrian Science Fund.

2010 Elected Member, INFORMS Subdivisions Council.

2009 Invited Participant and Area Leader (Finance and Quantitative Decision Making), AHRQ/NSF Industrial & Systems Engineering Healthcare Workshop, Washington, D.C.

2009 External Grant Reviewer, Netherlands Organization for Health Research and Development (ZonMw), Dutch Ministry of Health.

2009 External Grant Reviewer, Health Services Research Competitive Research Grant, Ministry of Health Singapore.

2009 Session Chair, INFORMS Computing Society Conference, Charleston, SC.

2009 International Committee, ORAHS Conference, Leuven, Belgium.

2008 International Committee, ORAHS Conference, Toronto, Canada.

2008 INFORMS Health Applications Sponsored Cluster Chair, INFORMS Annual Meeting, DC.

2007 External reviewer for Research Chair at University of Ottawa, ON, Canada.

2007 Health Care Practice Track Co-Chair, INFORMS Practice Meeting Organizing Committee, Vancouver, BC.

2007 Member, INFORMS Professional Recognition Committee.

2007 Member, INFORMS Journal Review Committee.

2007 Plenary Chair, INFORMS Annual Meeting, Franz Edelman Award Winner Reprise (2007,2008).

2007 Session Chair, INFORMS Annual Meeting, "Optimization of Medical Decisions," Pittsburgh, PA.

2007 Grant Review Panel Member, Mayo Foundation, Quality Innovations Development Award.

2006 Grant Review Panel Member, National Science Foundation (2006, 2010, 2011, 2012).

2006 Advisory Council Member, INFORMS Business Analytics Conference Organizing Committee, Baltimore (2006, 2007, 2008).

2006 INFORMS Franz Edelman Award Committee Chair (2006-2008).

2006 External Grant Reviewer, Mathematics of Information Technology and Complex Systems Network of Centers of Excellence (MITACS-NCE), Canada (2006, 2009).

2005 Presentation Selection Committee Member, INFORMS Business Analytics Conference, Palm Springs, CA.

2005 CPMS Sponsored Cluster Chair, INFORMS Annual Meeting, San Francisco, CA.

2005 Invited Cluster Chair, INFORMS Annual Meeting, San Francisco, CA.

2005 Participant, Health Care Systems Engineering Workshop, Sponsored by NSF, Arlington, VA.

2004 Session Chair, "Applications of OR to Semiconductor Manufacturing," INFORMS Annual Meeting, Denver, CO.

2004 Session Chair, INFORMS Business Analytics Conference, Cambridge, MA.

2003 Participant, IBM Mentoring Program (2003 -- 2005).

2003 Graduate Student Project Evaluation Panel, Dartmouth College, Hanover, NH.

2002 INFORMS Franz Edelman Prize Committee Member: Verifier, Finalist Selection Committee, and Finalist Team Coach (2002--2004).