Impact Statement, Brian Denton, October 12, 2020

Brian Denton received his Ph.D. in 2000 from McMaster University in Canada. He began his career working for IBM where he led research and development efforts to create software to optimize the match between material supply, manufacturing capacity, and customer demand for technology components, including semiconductor devices and data storage devices, in complex multi-location global enterprise systems. His work at IBM culminated in 25 patents on new methods that were implemented in IBM's Technology Group's enterprise planning systems and subsequently commercialized and sold to other manufacturers. This work was recognized by internal awards at IBM and the Daniel H. Wagner Prize for Excellence in Operations Research Practice from the Institute for Operations Research and Management Science (INFORMS).

In 2005, Brian became a Senior Associate Consultant and Assistant Professor at Mayo Clinic where he started his research on stochastic optimization models and algorithms for improving healthcare delivery decisions. His work at Mayo Clinic, and subsequently at North Carolina State University, led to the development and implementation of optimization methods for improving patient access and reducing the cost to several critical parts of the healthcare system including surgical care delivery, outpatient procedure centers, and cancer centers. His discoveries in this context have included new principles for how to organize decision making in these complex systems to mitigate uncertainty that arises in healthcare delivery, including patient demand, physician and staff workload, and patient and physician behavior that leads to no-shows and rescheduling. This work led to a body of published work on methods for improving healthcare delivery and case studies of implementation of these methods at Mayo Clinic, University of North Carolina Hospitals, Duke Medicine, and Michigan Medicine.

In 2012 Brian joined the University of Michigan where he is a Professor in the College of Engineering and in the School of Medicine. His work has focused on engineering-based approaches to improve early detection and treatment of chronic diseases with an emphasis on cancer, cardiovascular disease, and type 2 diabetes. Brian leads a research group and a team of collaborators, including medical doctors and health scientists, to study ways to use data sources such as electronic health records and claims data to improve chronic care delivery. This stream of research has led to new data driven approaches to understand disease risk factors, how diseases progress over time, and how to personalize care delivery processes that account for individual patient risk factors and preferences. Methodological advances stemming from this work have enabled the use of large observational datasets to improve clinical decision making. Discoveries from this line of research have helped to quantify the tradeoff between the benefits and harms of using new technologies for disease screening, surveillance, and treatment. Some of this work has been implemented across the State of Michigan resulting in a documented increase in the accuracy of diagnosis of cancer while at the same time eliminating harmful and costly medical procedures.

Overall, Brian's work has spanned several contexts including global manufacturing systems, health service systems, and disease prevention and management. His philosophy throughout his career has been to embed himself and his research team in these contexts, using a combination of engineering and data science methods, combined with deep contextual knowledge, to create mathematical models and methods for scientific inquiry, discovery of new engineering principles, and implementation of these principles to demonstrate their ability to achieve measurable impact through process improvements. He has also taken on leadership activities to influence the field of Operations Research including serving as Chair of the Health Applications Section of INFORMS, Secretary of the INFORMS Board of Directors and President of INFORMS.