Main research interest (DSC/e related)

The Internet of Things and low-energy sensors enable full transparency of supply chains: we know of each item its location and condition real-time, resulting in an immense amount of real-time data. Ever-increasing computing power enables us to exploit this data to improve responsiveness, efficiency and sustainability of future supply chains. New encryption technologies and anonymous hosting ensure data privacy. This opens possibilities for unprecedented close collaboration between companies in B2B supply chains and between companies and consumers in B2C supply chains.

Optimization of supply chains starts with detailed knowledge of market characteristics and demand signals. Efficient and effective response to demand signals requires transparency of product availability over time. Based on this transparency supply chain management can be linked to both the customer journey (all events / touchpoints related to a customer order) and the product/service journey (all events narrowing down the decision space available to match the supply chain content with future sales). Given the events constituting the customer and product journeys, the supply chain and its markets are permanently in a transient state. This requires fundamentally new methods for determining optimal decisions. Data-driven methods are the foundation for optimization.

Scientific staff (DSC/e related)

Approximately half of the OPAC group is focusing on data driven research. Key involved staff:

Prof. Ton de Kok  
Data-driven supply chain optimization and management

Dr. Zumbul Atan  
Data-driven supply chain optimization and management

Dr. Karel van Donselaar  
Data-driven optimization of retail operations

Dr. Willem van Jaarsveld  
Data-driven planning and control of supply chains

Dr. Alp Akcay  
Data-driven Optimization of Operations

Dr. Nevin Mutlu  
Data-driven revenue management

Dr. Sarah Gelper (ITEM group)  
Quantitative marketing research and statistics

Furthermore 6 PhDs and 1 PD are working on various Data Science projects.

Success stories

Between 2000 and 2010 research on SCM has generated close to 1 billion € additional profit to companies involved in research projects. This number is based on publications in journals and newspapers.

Big Data “avant-la-lettre” has been the basis of these projects. Collaboration with industry has continued and expanded.

Examples of SCM projects are:

- Support in the design and implementation of master planning at ASML.
- Design and implementation of collaborative planning in the semiconductor industry.
- Application of system dynamics to predict cyclical sales patterns in process industry demand.

Project examples

- Complexity in High-Tech Supply Chains NWO, with ASML, Philips, Hilti, VDL, Océ
  Decentralized control of high-tech supply chains.
- European Supply Chain Forum with 25 multinational companies, e.g. Nike, DHL, Heineken, Bayer, Shell.
  Platform for knowledge exchange on supply chain management and supply chain innovation.
Data science is an **interdisciplinary field** that uses a variety of techniques to **create value** based on extracting knowledge and insights from **available data**. Data science is applied everywhere: in business, health, industry, finance, government, education, and also in scientific research.

The Data Science Center Eindhoven (**DSC/e**) is **TU/e**’s response to these challenges and possibilities. By bringing top scientists and students from over thirty research groups from different **TU/e** departments together on specific topics, we can tackle the most challenging scientific and societal challenges. All involved groups made a **one-page description** of their main research interests and the involved staff with their key expertise, like the one you’re holding now.

### Mathematics and Computer Science
- Algorithms
- Applied Geometric Algorithms
- Architecture of Information Systems
- Data Mining
- Mathematical Image Analysis
- Probability
- Security of Embedded Systems
- Software Engineering & Technology
- Statistics
- Stochastic Operations Research
- System Architecture & Networking
- Visualization
- Web Engineering

### Electrical Engineering
- Cognitive Internet of Things
- Control Systems
- Electrical Energy Systems
- Signal Processing Systems

### Built Environment
- Building Lighting
- Information Systems in the Built Environment
- Real Estate Management & Urban Planning
- Urbanism and Urban Architecture

### Industrial Engineering & Innovation Sciences
- Human Technology Interaction
- Information Systems
- Innovation, Technology Entrepreneurship & Marketing
- OPAC: Freight Transport & Logistics
- OPAC: Maintenance & Manufacturing
- OPAC: Supply chain management
- Philosophy & Ethics

### Biomedical Engineering
- Cardiovascular Biomechanics
- Computational Biology
- Medical Image Analysis