Helis Academy

Interreg Vlaanderen-Nederland
Europees Fonds voor Regionale Ontwikkeling

Virtual trainings on Data Analysis and Stewardship

In the context of the Helis Academy, and as part of its data analysis and stewardship program, Eindhoven University of Technology (TU/e) provide a series of virtual training sessions for (aspiring) professionals in the Life Sciences & Health sector.

What we offer

About the program

Recent developments in various information and communication technologies have led to many new opportunities in the Life Sciences & Health (LSH) sector. To benefit from these developments and fully grasp these new opportunities, professionals (researchers as well as practitioners) working in this sector should further develop their digital skills, especially those with respect to concerning data science.

In the context of the Helis Academy, and as part of its data analysis and stewardship program, Eindhoven University of Technology (TU/e) and its partners provide a series of training sessions for (aspiring) professionals in the LSH sector on various methods, techniques, tools and best-practices related to data science, including *Statistics*, *Data Mining using (automated) Machine Learning*, *Data-Aware Process Mining*, *Deep Learning using Convolutional Neural Networks* and *Visual Analytics*.

Our trainings

These online programs, designed by TU/e and its partners, equips you with knowledge needed to transform your career. Through an engaging mix of introductions to key concepts and technologies, business insights and examples, you'll explore the reality of data science technologies today and how they can be harnessed to support your work. Focusing on key data science technologies, such as machine learning, the program helps you understand to implications of these new technologies for the future of the LSH sector.

Theses online programs is unique as it provides ample opportunity for you to interact with experts of TU/e as well as with the experienced experts from industry and to get new insights first-hand from them. We provide the opportunity to get insights on theory, current practice in industry and expected possible future practice in industry within just one day, right from behind your own PC.

Additionally, before the sessions we provide personal technical assistance on getting software up and running on your own PC and during the session we provide Dutch language support.

Audience

These trainings are aimed at employers of science and engineering professionals (researchers and practitioners) working in industry performing R&D and technological innovation aimed at the development of (enabling systems for developing) products, components, systems, services, processes, best-practices, etc. for improving specific applications in the Life Sciences & Health sector.

Concept

Pilot on generic awareness program for LSH sector consisting of a series of 1-day sessions that will be scheduled over a period of weeks and that can be attended independently:

For each of the pilots we will have four specific parts, each presented by different matter experts, potentially in collaboration with different (HELIS Academy) partners:

a. “theory” part – Lecture

b. “applications” part – Examples

c. “hands-on” practical part – Practice by participants

d. “industry” part – Practice by guest speakers

Process

Each of the mentioned programs will be discussed, if and when necessary modified, and approved by the Advisory Board. When approved, the programs will be

1. described,
2. publicly announced (by means of Eventbrite),
3. executed, and finally
4. evaluated by the participants (by means of Monkey Survey).

If and when the outcome of the evaluation by the participants is such that the program needs to be modified, it will be modified and a new Pilot will be scheduled and executed after which the evaluations will be compared to determine whether the modifications have been sufficiently successful.

Career Academy

MyFuture provides an overview of the activities, organized by TU/e affiliated parties, that best suit students’ needs and ambitions. They can select all types of activities, ranging from skills workshops to company visits to study trips.

MyFuture Activities are career orientational activities which a TU/e student can attend. This is a mandatory component within all TU/e's bachelor’s programs. So, after the Review Committee approval, **TU/e students can obtain MyFuture Activities points by participating in our training events.**

The Review Committee of Career Academy decided that **we can hand out MyFuture Activities** on the 1-day trainings developed.

1. Training on (automated) machine learning for Life Sciences & Health

1.1. Date: July 16, 2020

1.2. Participants: 15 participants from BE and NL (24 participants in total)

1.3. What will you learn?!

At the end of the training, you should be able to identify and explain the key concepts of (automated) machine learning, to outline its use in practice, to use one or more relevant techniques and tools in LSH context using minimal guidance, to apply these to your own work with limited guidance, identify and assess the benefits of (automated) machine learning for a sustained career in the LSH sector, and to identify and describe gaps in your competence profile.

1.4. Schedule

09:00 - 09:30 Introduction to the event by ir. Harold Weffers, PDEng (TU/e)
09:30 - 11:00 Introduction to (automated) machine learning by dr. Joaquin Vanschoren (TU/e)
11:00 - 12:00 Guided examples of practical applications of (automated) machine learning in the Life Sciences & Health context by Rita Marques Neves, M.Sc. (TU/e)
12:00 - 13:00 Break
13:00 - 14:00 Practical hands-on examples of (automated) machine learning in the Life Sciences & Health context by participants supported by Rita Marques Neves, M.Sc. (TU/e)
14:00 – 15:00 Examples of (automated) machine learning in industry by dr. ir. Bram Cappers (AnalyzeData)

15:00 – 16:00 Present and Future state-of-the-art of machine learning in industry by dr. Toon Weyens and Paola Jaramillo (MathWorks)
16:00 Closing

2. Training on deep learning for Life Sciences & Health

2.1. Date: October 13, 2020

2.2. Participants: 27 participants (from BE and NL)

2.3. What will you learn?!

At the end of the training, you should be able to understand:

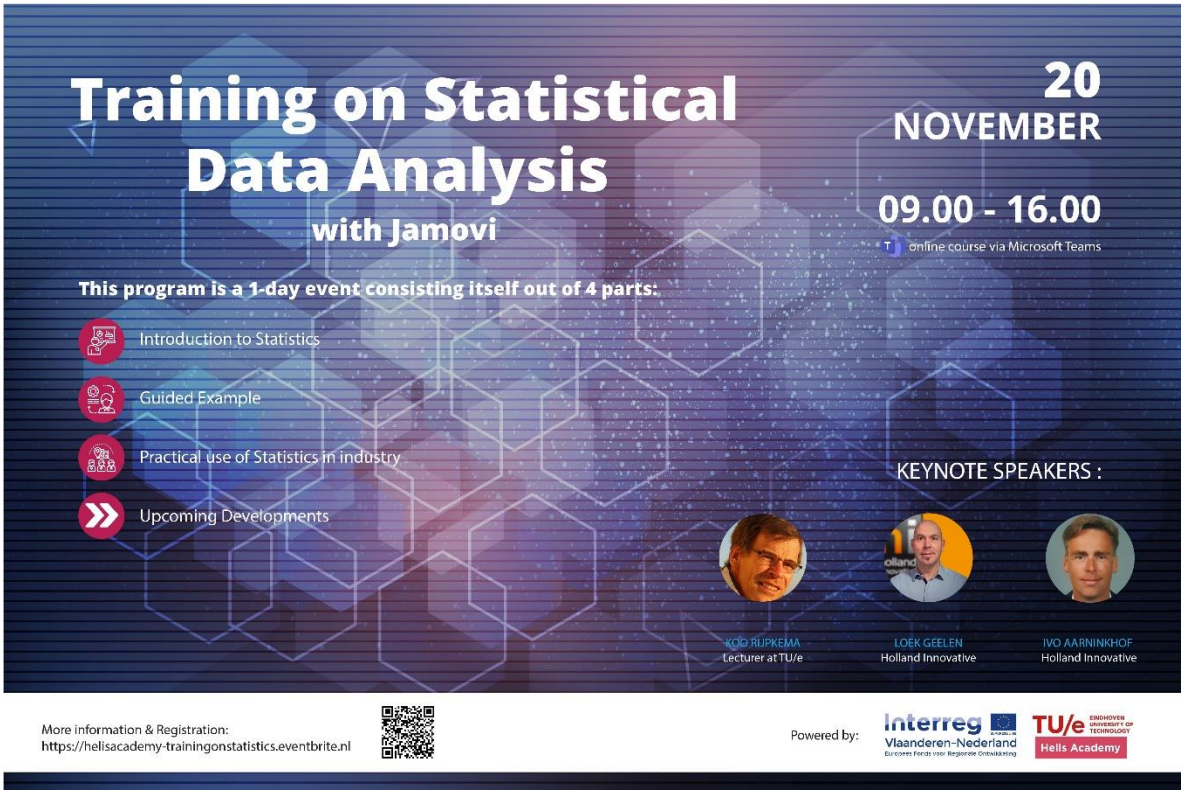
- How to develop a Machine Learning problem formulation
- How to design and train Machine Learning models for high dimensional data (Signals with spatial correlation such as images, and temporal correlation such as sequences)
- How to develop applications using deep neural network models for classification, regression, and retrieval of high dimensional data.

2.4. Schedule

09:00 - 09:30 Introduction to the event by ir. Harold Weffers, PDEng (TU/e)
09:30 - 11:00 Introduction to deep learning by dr. Vlado Menkovski (TU/e)
11:00 - 12:00 Guided examples of practical applications of deep learning in the Life Sciences & Health context by dr. Vlado Menkovski and dr. Dragan Bosnacki (TU/e).
12:00 - 13:00 Break

13:00 - 14:00 Practical hands-on examples of deep learning in the Life Sciences & Health context by participants
14:00 – 16:00 Present and Future state-of-the-art of deep learning in industry by dr. Julia Hoerner and Paola Jaramillo (MathWorks)
16:00 Closing

3. Training on Statistical Data Analysis with Jamovi



3.1. Date: November 20, 2020

3.2. Participants: 9 participants from BE and NL (16 participants in total)

3.3. What will you learn?!

This online training will demonstrate how the use of modern, free and open statistical software like Jamovi can bridge the gap between researchers and statisticians. Principles and trends in data analysis to detect differences between treatments and to model relations between variables are reviewed, covering subjects like Data Exploration, Testing & Estimation and Regression Model Building. With Jamovi it is demonstrated how to enter data, perform the analyses presented and discuss results in detail. At the end of the day participants should be able to perform basic data analysis with Jamovi independently and discuss and report the results obtained in an adequate way.

3.4. Prerequisites

Background in a specific discipline is not required. Some familiarity with basic statistical techniques such as testing, estimation and regression modelling is desirable. Participants are invited to install Jamovi on their own laptop to participate in the guided examples discussed! Information on the installation of Jamovi is available from https://www.jamovi.org.

3.5. Schedule

09:00 - 09:30 Introduction to the event by ir. Harold Weffers, PDEng (TU/e)
09:30 - 10:30 Statistical Data Analysis with Jamovi: Principles, Trends and Modern Tools by dr. Koo Rijpkema (TU/e)
10:30 - 12:00 Statistical Data Analysis in Action: Detecting Differences and Building Models with Jamovi by dr. Koo Rijpkema (TU/e)
12:00 - 13:00 Break
13:00 - 14:30 Statistical Data Analysis in Action: Detecting Differences and Building Models with Jamovi by dr. Koo Rijpkema (TU/e)
14:30 – 16:00 Medical Statistics applied into practice by dr. Loek Geelen and dr. Ivo Aarninkhof (Holland Innovative)
16:00 Closing

4. Training on Deep Learning for Life Sciences & Health

4.1. Date: November 25, 2020

4.2. Participants: 18 participants from BE and NL (32 participants in total)

4.3. What will you learn?!

At the end of the training, you should be able to understand basic principles of machine learning and deep learning. Selected examples of applications for medical image analysis will also be discussed.

4.4. Schedule

09:00 - 09:30 Introduction to the event by ir. Harold Weffers, PDEng (TU/e)
09:30 - 12:00 Introduction to deep learning by dr. Mitko Veta (TU/e)
12:00 - 13:00 Break
13:00 - 14:00 Hands-on of practical applications of deep learning by dr. Mitko Veta (TU/e)
14:00 – 15:00 IBM and AI in Healthcare and Life Sciences by dr. Nicky Hekster (IBM)
15:00 – 16:00 AI for Healthcare, breast cancer as a case study by dr. Efrat Hexter (IBM)
16:00 Closing

5. Training on Visual Analytics for Life Sciences & Health

5.1. Date: December 1, 2020

5.2. Participants: 14 participants from BE and NL (21 participants in total)

5.3. Prerequisites

Background in a specific discipline is not required. Some familiarity with machine learning such as supervised and unsupervised methods. Basic algorithmic and programming skills.

5.4. Schedule

09:00 - 09:30 Introduction to the event by ir. Harold Weffers, PDEng (TU/e)
09:30 - 11:30 Introduction to visual analytics by dr. Anna Vilanova (TU/e)
11:30 - 12:30 Guided examples of practical applications of visual analytics in the Life Sciences & Health context by dr. ir. Bram Cappers (AnalyzeData)
12:30 - 13:30 Break
13:30 - 14:30 Guided examples of practical applications of visual analytics in the Life Sciences & Health context by dr. ir. Bram Cappers (AnalyzeData)
14:30 – 16:00 Examples of data visualization in industry by dr. Tom de Krom and dr. Jan-Kees-Buenen (SynerScope)
16:00 Closing

6. Training on Data-Aware Process Mining for Life Sciences & Health

6.1. Date: January 26, 2021

6.2. Participants: 14 participants from BE and NL (20 participants in total)

6.3. What will you learn?!

At the end of the training, you should be able to: using history data, understand how to see a process from different perspectives; identify data-related features that influence the process; encode process-related features in different ways to be used by machine learning/data analysis techniques; and translate the new insights gained into domain-related recommendations.

6.4. Schedule

09:00 - 09:30 Introduction to the event by ir. Harold Weffers, PDEng (TU/e)
09:30 - 11:30 Introduction to Process Mining by dr. Renata Medeiros de Carvalho (TU/e)
11:30 - 12:30 Guided examples of practical applications of Statistics and Process mining in the Life Sciences & Health context by Jolanda Luime (Maxima MC)
12:30 - 13:30 Break
13:30 - 14:30 Guided examples of practical applications of Statistics and Process mining in the Life Sciences & Health context by Jolanda Luime (Maxima MC)
14:30 - 16:00 Examples of Process Mining in industry by Anne Rozinat (Fluxicon)
16:00 Closing

7. Training on Deep Learning for Life Sciences & Health – 2nd edition

7.1. Date: June 10, 2021

7.2. Participants: 11 participants from BE and NL (24 participants in total)

7.3. What will you learn?!

At the end of the training, you should be able to understand basic principles of machine learning and deep learning. Selected examples of applications for medical image analysis will also be discussed.

7.4. Schedule

09:00 - 09:30 Introduction to the event by ir. Harold Weffers, PDEng (TU/e)
09:30 - 10:30 IBM and AI in Healthcare and Life Sciences by dr. Nicky Hekster (IBM)
10:30 - 11:30 AI for Healthcare, breast cancer as a case study by dr. Efrat Hexter (IBM)
11:30 - 12:30 Break
12:30 - 15:00 Introduction to deep learning by dr. Mitko Veta (TU/e)
15:00 - 16:00 Hands-on of practical applications of deep learning by dr. Mitko Veta (TU/e)
16:00 Closing

WHO WILL YOU LEARN FROM

1. Training on (automated) Machine Learning for Life Sciences & Health

- dr. Joaquin Vanschoren (TU/e) is assistant professor on Data Mining at the TU/e Department of Mathematics and Computer Science. His research focuses on the progressive automation of machine learning. He founded and leads OpenML.org, an open science platform allowing scientists to share datasets and train many machine learning models from many software tools in a frictionless yet principled way. It also organizes all results online, providing detailed insight into the performance of machine learning techniques, and allowing a more scientific, data-driven approach to building new machine learning systems. Subsequently, he uses this knowledge to create automatic machine learning (AutoML) techniques that learn from these experiments to help people build better models, faster, or automate the process entirely.

- Rita Marques Neves, M.Sc. (TU/e) is a researcher at the TU/e Department of Mathematics and Computer Science working on various parts of the Helis Academy project. She received her M.Sc. degree in Biomedical Engineering in 2016 at the University of Coimbra, Portugal. Prior to her current position, she has worked in different areas related to nuclear medicine and basic scientific research during her placement in iCBR (Coimbra Institute for Clinical and Biomedical Research, Portugal) for three years.

- dr. ir. Bram Cappers (AnalyzeData) is co-founder of the startup AnalyzeData and postdoctoral researcher at Eindhoven University of Technology. In 2018 he finished his Ph.D. in the area of data visualization and cybersecurity where he developed new software to visually detect patterns and anomalies in large event collections. Outside security the software has been used in various domains including the workflow analysis of patient treatments in a hospital. He has won numerous awards in the area of data science and presented his technology at prestigious events such as BlackHat USA 2018, Innovation for Health 2018, and Still Hacking Anyway 2017.

- dr. Toon Weyens is an Application Engineer at MathWorks in Eindhoven, Netherlands. He supports innovative companies in automation and machinery, automotive, and aerospace industries by helping them use MathWorks software to analyze data, develop algorithms, create mathematical models, and scale to run on clusters, GPUs, and clouds. Prior to joining MathWorks, Toon was a postdoctoral researcher at the ITER Organization. He holds a M.Sc. degree in energy engineering from the University of Leuven, a M.Sc. degree in nuclear fusion science and technology from the Universidad Carlos III in Madrid, and a Ph.D. degree in applied physics from Eindhoven University of Technology.

- Paola Jaramillo is a Senior Application Engineer at MathWorks in Eindhoven, Netherlands. She specializes in signal and image processing, computer vision, and machine learning. Her primary interests are sensor data analytics and autonomous systems. Prior to joining the MathWorks in 2016, she worked for five years as a researcher on the fields of machine learning and signal processing for intelligent lighting systems at Eindhoven University of Technology in the

Netherlands. Paola holds a master's degree in Electronic Engineering from Politecnico di Torino in Italy and carried out a six-month internship in the area of Structural Health Monitoring at IBM Zurich Research Laboratories in Switzerland.

2. Training on Deep Learning for Life Sciences & Health

- dr. Vlado Menkovski (TU/e) is assistant professor at the TU/e Department of Mathematics and Computer Science. He is part of the Data Mining group and his interests lie in the field of Machine Learning, Deep Learning and its applications to Natural Sciences.

- dr. Dragan Bosnacki (TU/e) is assistant professor at the TU/e Department of Biomedical Engineering. His current main research interests are in (Big) Data and Health, and modeling of High Intensity Focused Ultrasound (HIFU) for cancer therapies. His previous work includes algorithms for reconstruction of biological networks and various applications of formal verification techniques in biology and medicine.

- dr. Julia Hoerner studied Mechatronics & Microsystem Engineering at the Applied Science University in Heilbronn, Germany. She has a vast industrial experience working as a Technical Project Manager. She completed her master's degree in Renewable Energy at the University of Dundee and received a PhD in Offshore Wind Energy from the University of Hull. After a couple of postdoctoral positions at the University of Reading and Strathclyde University, she is now working at MathWorks, Cambridge as a Deep Learning Academic Liaison Manager. Julia is a lifelong learner and firmly believes that education and inclusion transforms lives.

- dr. Paola Jaramillo is a Senior Application Engineer at MathWorks in Eindhoven, Netherlands. She specializes in signal and image processing, computer vision, and machine learning. Her primary interests are sensor data analytics and autonomous systems. Prior to joining the MathWorks in 2016, she worked for five years as a researcher on the fields of machine learning and signal processing for intelligent lighting systems at Eindhoven University of Technology in the Netherlands. Paola holds a master's degree in Electronic Engineering from Politecnico di Torino in Italy and carried out a six-month internship in the area of Structural Health Monitoring at IBM Zurich Research Laboratories in Switzerland.

3. Training on Statistical Data Analysis with Jamovi

- dr. Koo Rijpkema (TU/e) is a senior lecturer at the Eindhoven University of Technology. He has a background in applied statistics and engineering, holding a PhD degree in Statistical Physics. His drive is to get students and researchers inspired by modern methods for research data analysis. His main interests are in the fields of Engineering Statistics, Design of Experiments and Predictive Modeling, with a special focus on the responsible use of modern statistical software, such as R, R Studio and Jamovi, that are now widely available.

- dr. Ivo Aarninkhof is acting as Managing Director of Holland Innovative and has 20+ years of executive management experience as board executive and board member, started and managed several high-tech / med-tech companies and held senior management positions for Philips in Europe as well as in China. Aarninkhof is board member of the Dutch employers' organisation in the technology industry and a member of the Supervisory Board of "Academy Het Dorp". Aarninkhof holds a MSc. degree from the University.

- dr. Loek Geelen is an experienced Six Sigma Black Belt. Worked as SSBB-project manager for several international companies and succesfully used Six Sigma methodology for multiple quality improvement- and cost reduction programs. Geelen is currently trainer and Product/Process Specialist within Holland Innovative.

4. Training on Deep Learning for Life Sciences & Health

- dr. Mitko Veta (TU/e) is assistant professor of Medical Image Analysis at the department of Biomedical Engineering with an independent research line on development and application of deep learning methods for medical images. He leads a research team consisting of five PhD candidates and several MSc students. The focus of the research group is on histopathology image analysis and aims to develop automatic, quantitative algorithms that will increase the reproducibility and accuracy of medical imaging reporting and reduce the workload of clinicians. The obtained knowledge can be applied to better treatment planning for patients and reduction of healthcare costs. Dr. Mitko Veta performs multi-disciplinary research in close collaboration with the Department of Pathology at the University Medi-cal Center, Utrecht, The Netherlands.

- dr. Nicky Hekster (IBM) now works in a pan-European role for IBM Watson Health, after serving more than decade as the Technical Leader for Healthcare & Life Sciences at IBM Benelux and in addition as an IBM Watson Ambassador. He concentrates on business development, solution conception, architectural design and validation, resolving different challenges in healthcare and life sciences with data, AI and cloud. In addition to eHealth and Big Data, he is an expert in AI and the application of IBM's Watson technology to the entire ecosystem of healthcare: health, healthcare and life sciences, governments, insurers, pharmacy, etc.. He is inspired by the difference technology can make to improve cure and care. From 2010 to 2014 he was chairman of IHE The Netherlands (Integrating the Healthcare Enterprise), in which capacity he contributed to the coordinated use of Healthcare ICT standards in the Netherlands for regional and national exchange of medical information. He is currently a member of the OIZ standardization working group, the interest group of Dutch ICT companies in healthcare. Nicky regularly acts as a guest lecturer at universities and is a sought-after speaker or chairman at national and international conferences and master classes. He is an executive professor at the TIAS School for Business and Society, responsible for the track Business Analytics and Artificial Intelligence. He studied mathematics and physics at the University of Amsterdam, where he obtained his PhD in pure mathematics.

- dr. Efrat Hexter (IBM) manages a Medical Imaging Analytics research team at IBM, focusing on using and developing AI to improve healthcare. She also has experience as a Watson solution Architect, helped companies in building AI applications using Watson technologies. Efrat has 20 years of experience in software development, spanning various fields, from gaming to location-based applications and data management and analytics.

5. Training on Visual Analytics for Life Sciences & Health

- Prof. dr. Anna Vilanova (TU/e) is full professor in visual analytics at the TU/e Department of Mathematics and Computer Science. She is also associated to the Electrical Engineering Department within the Signal Processing Systems at TU/e. She is leading a research group in the subject of visual analytics and multivalued image analysis and visualization, focusing on Visual Analytics for high dimensional data. She focuses on Biomedical applications, Diffusion Weighted Imaging and 4D Flow. She is member of relevant conference IPC and associate editor of relevant journals in visualization and visual analytics (e.g., IEEE Visualization, EG- IEEE VGTC-EuroVis, Computer Graphics Forum). She was member of the steering committee of IEEE VGTC EuroVis since 2014 -2018. She is elected member of the EUROGRAPHICS (EG) executive committee since 2015 and vice president of EUROGRAPHICS since 2019. She also became EG Fellow in 2019.

- dr. ir. Bram Cappers (AnalyzeData) is co-founder of the startup AnalyzeData and postdoctoral researcher at Eindhoven University of Technology. In 2018 he finished his Ph.D. in the area of data visualization and cybersecurity where he developed new software to visually detect patterns and anomalies in large event collections. Outside security the software has been used in various domains including the workflow analysis of patient treatments in a hospital. He has won numerous awards in the area of data science and presented his technology at prestigious events such as BlackHat USA 2018, Innovation for Health 2018, and Still Hacking Anyway 2017.

- dr. Jan-Kees Buenen (SynerScope) has strong executive experience in multiple international packaging companies. Holding commercial leadership roles at European and Global level he pushed working with data throughout his enterprise career. From the early nineties, he led multiple initiatives for BI, Budgeting Systems, Production forecasting & Logistics, CRM, EDI, Intranet and Extranet, Self-Billing and supply chain tracing and modeling. He was part of management teams that transformed manufacturing through SPC (statistical process control) and Visual Management to help push autonomous manufacturing teams to a next level.

- dr. Tom de Krom (SynerScope) holds a Master in Applied Physics from the Delft University of Technology, he has had his fair share of encounters with complex problems and a large amount of data. He has been using rare techniques such as muon-spectroscopy and knows how to deal with challenges for which there are no known solutions yet. During his internship as a financial analyst at one of the largest Dutch insurance companies, his interest in software engineering, data analysis and data-driven businesses was further developed. Combining his passions with his capabilities, Tom is determined to enhance clients' data-driven decisions as a SynerScope's solution engineer.

6. Training on Data-Aware Process Mining for Life Sciences & Health

- dr. Renata Medeiros de Carvalho (TU/e) is assistant professor at Eindhoven University of Technology. Her research interests are focused on, but not limited to, business process management, discover and improvement. Especially, she works in the domain of flexible business processes, and how it can enrich business process models with domain-specific knowledge. Renata is interested in both pragmatic issues of modeling convenience and how flexibility is represented and/or can be detected through recorded data. Currently, her research is focused mainly in the domain of healthcare.

- dr. Jolanda Luime (Maxima Medisch Centrum) is Data&Analytics Officer at Maxima MC, a general hospital in the South-East Part of the Netherlands, as well as an epidemiologist at the department of Rheumatology at ErasmusMC. In Maxima MC she facilitates the hospital to get data-driven by getting strategies and policies in place to improve data availability, data analytics and improve data quality. One way of doing that is by showing what data is available in the hospital and how you can use it to improve business and care processes. In the current example, she will take you with her on the way to decrease workload for nurses in the hospital in the ‘Happy Nurse’ project as many of you probably learned in the Covid-19 Pandemic that nurses are a scarce resource.

- dr. Anne Rozinat (Fluxicon) is a software engineer and obtained her PhD cum laude in the area of process mining (Eindhoven University of Technology). She is also a co-founder of Fluxicon, a process mining software company. Anne has more than fifteen years of experience with process mining. She organizes the annual process mining practitioner conference 'Process Mining Camp' and regularly writes about process mining at the Fluxicon blog and in the Process Mining Book.