The foundation Stichting Study Tour Industria (SSTI) annually organizes the International Research Project. The International Research Project consists of two parts: the research projects and the study tour. The research projects will be conducted prior to the study tour and are based on a predetermined theme. After finishing these projects, the study tour takes place. The study tour is organized around the same predetermined theme. During the tour, companies and universities in the country of destination will be visited.

The International Research project is an initiative of students of the department of Industrial Engineering & Innovation Sciences at Eindhoven University of Technology. Students of the Master programs Operations Management and Logistics, Innovation Management, Data Science and Entrepreneurship, and Manufacturing Systems Engineering are allowed to participate. The participants will conduct the mentioned research projects. For the participants, the International Research Project is a great opportunity to apply their academic knowledge within an international business setting. Furthermore, IRP provides students the opportunity to gain in-depth knowledge about a subject of research that suits their interests and education.

The International Research Project 2020 will visit Japan, Malaysia and Singapore. The theme of the International Research Project is Data-Driven Business: Build the future.
This brochure provides information for companies that are interested in the International Research Project. After a word written by the Rector Magnificus, this brochure provides more information regarding the theme and countries. Then, participation options are elaborated. Finally, the capabilities of the students involved are described and our Board of Recommendation is presented. Contact details are listed at the end of this brochure.

In this brochure we aim to provide a clear overview of the set up and scope of the International Research Project. Together with all the students involved, we are looking forward to welcome your company as a participant in the International Research Project 2020, and we hope for a pleasant and educational cooperation.

On behalf of the SSTI,

Maud Vorstenbosch
Coordinator Contract Research
International Research Project 2020
“This innovative SSTI study tour is a perfect example of how our students expand their technical, geographical and cultural horizons, and work on concrete solutions in a business environment”
Nowadays, we live in a data driven society. It’s an inescapable fact. Through countless apps on our phones, our surfing behavior on the internet, or having to fill in many government or commercial datasets, we all leave our digital footprints for others to be utilized. It is through the accumulation of data that many modern day business giants have emerged, notably Amazon, Google, Facebook, Uber and Airbnb. That big data is big business is nothing new. Everybody is jumping on the bandwagon nowadays, hoping to score successfully with new edgy business models based on smart use of big data.

I believe that our students can play an important role in these developments. In our curriculum, we provide all our future engineers with in-depth knowledge and expertise in a specific discipline, combined with necessary skills to transform their knowledge into successful innovations. We call it the T-shaped engineer. At TU/e, our data scientists and our dedicated data and business masters are among the best in the world. Our graduates are well known and sought after by future employers. But only being excellent in your own field of expertise is not enough to really succeed.

According to the 2019 global employer survey of QS, the most important skills employers are looking for are not just excellence in one specific discipline. No, they instead mention complex problem-solving skills, the ability to work in a team and communication skills. At TU/e, we increasingly work to educate our students in these areas. It is therefore that I fully endorse this International Research Project of the Study Association for Industrial Engineers, Industria. Their Challenge Based approach is perfectly aligned with our approach, and will greatly benefit participating and sponsoring industries.

I wish all the participants good fortune and many new insights in their fascinating study tour to Japan, Malaysia and Singapore.

Prof.dr.ir. F.P.T. (Frank) Baaijens
Rector Magnificus
Eindhoven University of Technology
Data-Driven Business
Build the future
Data-driven business

Data and analytics capabilities have gained a lot of attention in recent years. The amount of available data has grown exponentially, more advanced algorithms have been developed and computational power and storage have consistently improved. The convergence of these trends has caused the rapid technology advances and business disruptions that are continuously taking place.

Industries are already shaken up by data and analytics, and the effects will only become more apparent as adoption reaches critical mass. An even bigger wave of change is impending on the horizon as deep learning reaches maturity, giving machines extraordinary capabilities to think, problem-solve, and understand language. Organizations that are able to utilize these capabilities effectively will be able to create significant value and differentiate themselves, while others will find themselves increasingly at a disadvantage.

Data has become a critical corporate asset. It comes from the web, phones, sensors, payment systems, cameras, and a huge array of other sources – and its value is tied to its ultimate use. While data itself will become increasingly commoditized, value is likely to accrue to the owners of scarce data, to players that aggregate data in unique ways, and especially to providers of valuable analytics.

Many questions arise in this era of doing business in a new kind of way. What to do with all this available data? How to create organizational value from it? How can this data enable us to make faster and more evidence-based decisions? And how to attract and retain the right talent, since not only data scientists but also business translators are needed to combine savvy data with functional expertise?

It can thus be easily seen that turning a business full of data into a data-driven business is an idea that appears to be very difficult to pull off in practice. There are multiple ways in which organizations can be driven by data. More specifically, there are companies that are completely data-driven, others that use data to drive a more conventional business, and thirdly companies that use data to optimize or increase their business. These businesses can be classified into 3 different data-driven businesses, namely:

- Fully Data-Driven Business
- Data-Infused Business
- Data-Informed Business
The different data-driven businesses entail the following:

- **Fully Data-Driven Business**
  A fully data-driven business is a business that is completely based on transforming information into monetizable assets. Out of this data, they create their revenue. Perfect examples of such successful companies are Airbnb, eBay, and Facebook. However, being a fully data-driven business also brings along challenges. An example of such a challenge may be which data to collect, from which questions could arise such as ‘Could and should we use all the collected data?’ and ‘What tools or methods should we use to support the wide range of analytical needs to transform this data into useful information?’ Furthermore, dilemmas concerning privacy policies may arise in these kinds of companies.

- **Data-Infused Business**
  The second data-driven business is the data-infused business. This is a business that can manage and sell an inventory of products. Furthermore, it manages the end-to-end sales process, but uses information to push marketing to increase sales. Good examples of companies with a data-infused business are Netflix and Amazon. Amazon, just like Uber, relies on outsourcing delivery to independent drivers who use a similar marketplace application. A data-infused business uses data to improve efficiency and gain an advantage over their competitors. But how should data then be used to outperform these competitors? What are the needs of the customers and how can this data be used to find a forecasting technique?

“Data are just summaries of thousands of stories – tell a few of those stories to help make the data meaningful.” — Chip & Dan Heath

- New York Times Bestselling Authors
that is most suitable to the needs? These are important questions for companies with a data-infused business.

**Data Informed Business**
The farmost major part of the world’s companies are data-informed businesses. These businesses are the more conventional businesses that are still trying to adapt new information and data management technologies to fit their existing business models, with which they want to improve their overall competitiveness. These companies recognize that there is a need for improved data management, but they often do not know where to start. What is the ultimate goal of collecting data? What data to collect to reach this goal and how to collect it? These are questions many of these companies are struggling with nowadays.

In a data-driven business, actionable information for all critical decisions should be accessible when and where needed. The opportunities for better and smarter businesses through optimal use of data are as clear as are the challenges. The time to build the future is now.
DESTINATION

TOKYO
OSAKA
KYOTO
KUALA LUMPUR
SINGAPORE
This year the International Research Project will head to the beautiful Asia. The study tour will start in Tokyo. The second and third stop will be Kyoto and Osaka respectively. After visiting Japan, we will make a flight to Kuala Lumpur. Thereafter, we will fly to our final destination, which is Singapore. During this study tour we will visit several companies that have a connection to the theme ‘Data-driven Business’. Besides companies, visits to a number of universities and consulates are on the schedule of this study tour.

The goal of the study tour is to observe and explore how the ‘Data-driven Business’ evolves in these destinations. Each city is chosen based on its fascinating culture and interesting economy, companies, and universities. The diversity in activities (economy and culture) during the trip makes this study tour an educative journey.

Once this knowledge has been obtained, we can use it to complement the research findings of the project we conducted in the Netherlands.
The research projects are work assignments that will be executed by our participating students. The assignments will have a business-related framework and are carried out at companies that have something to do with the theme of Data-Driven Business. With help of these research projects, the International Research Project 2020 will be financed.

Research projects can be carried out between November 2019 and June 2020. The students will work several hours a week on the project (the exact amount of time will be agreed upon later). When the project is too large for one student, it is possible to have more students working on one project. Each student is available for 100 hours per project, and the costs are €3,000,- per student.
The top 5 reasons why your company should do a research assignment for the International Research Project 2020 are as follows:

► 100 Hours of research conducted by master students and supervised by experienced researchers of the department of Industrial Engineering & Innovation Sciences at Eindhoven University of Technology.

► A research project related to the concept of Data-Driven Business is a good opportunity to become acquainted with this challenging business topic and the accompanying options for your organization.

► An invitation for a masterclass about several topics related to the theme Data-Driven Business. All participating companies and students will be invited. (note: all participating students are selected based on study results and motivation, and belong to the best Industrial Engineering students).

► An invitation for the end-event where results of the study trip will be presented.

► Excellent company exposure opportunities through the website of Industria and social media.
Some research examples master students can do within a timeframe of 100 hours:

- **Business network analysis**  
The complexity of the network of relationships in which the firm is embedded can be brought to the surface.

- **Benchmark analysis**  
Comparison of the application of the intelligent automation concept to other companies.

- **Market research**  
Investigation regarding the value of customer needs for your company.

- **Process improvement**  
Identification of process improvement opportunities by conducting a scan of the process (e.g. identification of non-value adding activities).

- **Risk management**  
Identification of the risks in your business environment.

Of course any other ideas for research projects within Industrial Engineering are welcome as well. Companies that recently have been involved in the IRP include for example Dow, Maastricht UMC, NS, Vanderlande and VodafoneZiggo. On the next page, some research examples are given.
In the past years, students who participated in the International Research Project did various research projects. Below some research examples are shown. Company names have not been listed due to privacy concerns.

► One company in the high-tech industry experienced troubles with their sales and operations tool, as employees have to write every month a report. The assignment was to design a tool that automatically checked and processed files. The monthly report can then be generated automatically.

► A chemical company had a need for a consistent sourcing model for plant maintenance stops (‘turnarounds’). Their production plants are divers, as well as their requirements for outsourced services during, after, and in preparation for these stops. The assignment was to define the substantially different maintenance stop types. Secondly, the student developed a purchasing price model per maintenance stop type.

► A transportation company observed the information demand from its customers is increasing rapidly. At this moment the company is automating its information supply, in order to supply information to its clients more accurately and rapidly, like locations of trucks and expected delivery times. The assignment started with a literature study to examine how other transportation companies inform their clients and how this information is useful internally. Furthermore, the company liked to develop a unique selling point in a few years and work more efficiently using their own data.

► A medical institute uses SAP system to store all kinds of parameters, like number of surgeries and average waiting times of clients. However, doctors find it difficult to extract these parameters from the system. The assignment was discuss with different stakeholders and built a dashboard in Excel, which indicates the required parameters and is easy to use for all stakeholders.
The students involved in this project are students of the Master’s program ‘Operations Management and Logistics’, ‘Innovation Management’, ‘Data Science and Entrepreneurship’, or ‘Manufacturing Systems Engineering’. All students have knowledge in Industrial Engineering, but also capabilities specific to their Master’s program. These capabilities will be discussed on the next page.

The majority of the selected students completed their Bachelor of Industrial Engineering at Eindhoven University of Technology. Topics the students covered during their Bachelor’s program include accounting, goods flow management, human performance management, stock control, organization science and information systems. The students of Industrial Engineering are focused on making improvements in companies and are ready to apply the methods and tools they have learned during their courses. The study program at Eindhoven University of Technology regularly involves group assignments. These group assignments enable students to train their analytical skills, their social skills and their presentation and cooperation skills.
OPERATIONS MANAGEMENT AND LOGISTICS
Operations Management & Logistics is a multidisciplinary field that covers such disciplines as supply chain management, manufacturing systems, information systems, business process management, human performance management, health care engineering, transportation, reliability engineering, maintenance, and operational finance. The program trains student in quantitative analyses. In all courses, the theory is related to existing research and students are shown how to apply theory in practice. For example, an alternative design of a control concept for a supply chain or a workflow process in an insurance company are investigated. They also learn how efficiency improvement or cost reduction can be obtained by advanced concepts.

INNOVATION MANAGEMENT
Innovation Management studies the management of innovation processes and develops theories, tools and techniques to make businesses more innovative. Key aspects of this discipline are knowledge management, strategic alliances, entrepreneurship, new product development, supplier partnerships, marketing management, quality management and technology management. Students learn how to use the knowledge that they gain in carrying out research into innovation management and in industrial applications. They also learn how to analyze the current innovative performance of a company, explain it in terms of quality, cost and time, and improve this performance by re-engineering innovation processes.

DATA SCIENCE AND ENTREPRENEURSHIP
The Master’s program Data Science and Entrepreneurship is a joint master by Tilburg University and Eindhoven University of Technology. This program brings data science into effective use in business. Data science aims at deriving actionable insights from large amounts of data, such as theories and methods for data integration, data cleaning, data mining, process mining and business analytics. Entrepreneurial expertise of these students involves the successful development of new business models and entrepreneurial ventures by exploiting new algorithms, models, theories, tools, and project solutions including data entrepreneurship, defining business models, fueling creativity and fostering open innovation.

MANUFACTURING SYSTEMS ENGINEERING
Because of digitization and automation, the manufacturing industry is now rapidly changing. The whole chain of products, machines, factories, warehouses and customers, or the Internet of Things, is able to share and exchange information. To fully exploit this network of information for more effective and efficient production, the Manufacturing Systems Engineering Master program provides students with knowledge of the whole chain: from the technology inside the machine up to the level of supply chains. The program offers this combination of technological knowledge of high-tech production systems and knowledge of production processes and supply chains, and shows how to apply this knowledge effectively at both system and network level.
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