

# COMPANY BROCHURE



## INTERNATIONAL RESEARCH PROJECT

2021



# INTRODUCTION



The foundation Stichting Study Tour Industria (SSTI) annually organizes the International Research Project (IRP). 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 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 2021 will visit Beijing, Taipei, Hong Kong and Shenzhen. The theme of the International Research Project is Connecting worlds: where new opportunities arrise. However, if we will not be able to travel outside of the EU due to COVID-19, a trip within Europe

is planned. This trip will visit Copenhagen, Stockholm, Oslo and Iceland.

This brochure provides information for companies that are interested in the International Research Project. 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 2021, and we hope for a pleasant and educational cooperation.

On behalf of the SSTI,

Simone van der Velden  
Coordinator Contract Research  
International Research Project 2021



# A WORD BY RECTOR MAGNIFICUS



"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"

We live in a data driven and globalized world where borders don't have the same significance they used to have. Information can be shared with all parts of the world with a simple click, through countless apps on our phones. Due to the accumulation of data, many modern-day business giants have emerged, like for instance Amazon, Apple, Google, Facebook and Microsoft.

That big data is big business is nothing new. Devices, states, and people are becoming more intensively connected. In this era many aspects regarding connectivity come together to form one large system: An Interconnected Globe. In the process of continuously making new connections and relations, new and exciting challenges appear. The theme of this year's IRP: "Connecting Worlds; where new opportunities arise", has a good fit to the current business activities around the world.

I believe that our students can play an important role in this theme. In our curriculum, we provide 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 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. They also need to have 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. Regardless of whether this tour will visit Asia or Europe

A handwritten signature in blue ink, appearing to read "F.P.T. Baaijens".

Prof.dr.ir. F.P.T. (Frank) Baaijens  
Rector Magnificus  
Eindhoven University of Technology

THEME

# Connecting worlds

## where new opportunities arise

## ► Connectivity

Devices, states, and people are becoming more intensively connected. In this era of globalization, Data, Logistics, and Community come together to form one large system: An Interconnected Globe. In the process of making new connections and relations every day, opportunities arise. To explore those opportunities the theme of this year IRP is "Connecting Worlds; where new opportunities arise".

In today's digital age, information is bringing change to every corner in the world. Connectivity is the medium through which all information is exchanged. Connectivity enables communication amongst people, it exchanges information between people and machines, and it allows machines to recognize and engage with each other. Connectivity is, in essence, the world's nervous system, and it is extending across the world to the point where it will soon be ubiquitous. From developed countries to underdeveloped regions; from individuals to enterprises; connectivity can offer unprecedented possibilities.

With the arrival of the digital economy, the demands placed on connectivity across the world now cover the entire spectrum of Maslow's hierarchy of needs – from basic physiological needs to safety needs, esteem needs, and ultimately self-actualization. For those of us who live in big cities and are totally familiar with a digital lifestyle, even a few hours of disconnection from the Internet can leave us ill at ease. For those trapped in dangerous, life-threatening situations,

connection to the outside world means the hope of survival. For those who are living away from their families, connectivity allows them to stay close to their loved ones. And for those living in poverty, connecting is like adding a new organ of sense, one that can "see" more opportunities and pathways to a better life. But as the world grows bigger and we spread further, technology is what keeps the world small.

The notion of "connectivity" generally refers to developments in the fields of transportation and communication. But in the context of the current global health crisis, connecting with each other across physical and social distances has become a source of increasing interest and concern.

There are multiple ways in which people, organizations, and countries can be connected and driven by data. Connectivity can be classified into the following 5 components:

- ▶ Digital connects
- ▶ Artificial intelligence connects
- ▶ Information technology connects
- ▶ Logistics connects
- ▶ Human connects

# THEME

The different components of connectivity entail the following:

## ► Digital connects

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 been improved. The convergence of these trends has caused the rapid technology advances and business disruptions that are continuously taking place. These large amounts of data give us the ability to create an increasingly connected world. As technology continues to bridge people together, its positive impact on people is visible everywhere. In our streets, in our classrooms, in businesses and in our communities.

**“Connectivity is, in essence, the world’s nervous system, and it is extending across the world to the point where it will soon be ubiquitous.” -**

Huawei

## ► Artificial intelligence connects

Artificial intelligence (AI) is everywhere. For example, a robot in a factory, an autonomous car, Google's AI-powered predictions and face recognition. AI makes it possible for machines to learn from experience, adjust to new inputs and perform human-like tasks. Using AI technologies, computers can be trained to accomplish specific tasks by processing large amounts of data and recognizing patterns in the data. As the number of sensors, of mobile devices and of interconnected systems increases, so does the proliferation of AI. If we are connected, intelligent software is present in every step that we take.

## ► Information technology connects

Information technology (IT) is the use of computers to store, retrieve, transmit, and manipulate data or information. IT is closely connected with globalization. Recently, the technology in the areas of telecommunication, computers and internet have been changing rapidly. Telephones and mobiles enable people to instantly communicate in different areas. Meanwhile internet, specifically social media, allows one to share information across the world at almost negligible cost. These technologies transcend borders, making it more accessible to more people. With the proliferation of devices and ever-increasing connectivity more people are able to take advantage of digital learning opportunities and the chance to connect, communicate and collaborate.

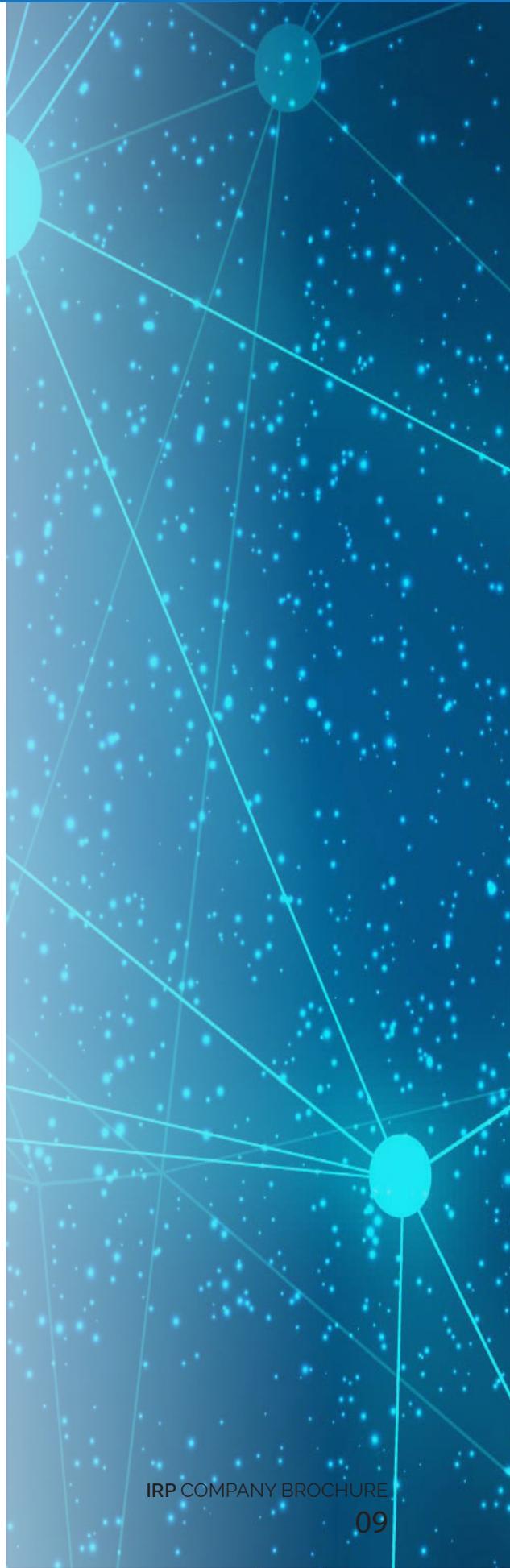
### ► Logistics connects

Supply chains are becoming increasingly internationally oriented. To anticipate this development, China decided to invest massively in infrastructure with its Belt and Road initiative. Likewise, logistics is an important part of the Dutch economy. Partly through the Port of Rotterdam and Schiphol Airport. With logistics being the Dutch strong suit, collaboration on this front between the Netherlands and China will be of key importance to prepare for a strong future.

### ► Human connects

Connectivity is not just about machines and sensors. Connectivity is a fundamental human need. People lie at the heart of this technology - designed to extend their dreams, enhance their quality of life, and transform their communication possibilities. As 5G is deployed first in the world's leading cities, we'll see a staggering leap in the connectedness of gadgets, processors, street lights, doors, manufacturing systems, mail and package delivery, medical devices, cars and scooters - everything will be connected in an internet of things tapestry.

COVID-19 has accelerated this already existing trend, changing how we will live. It creates new priorities in our lives; change how frequently and deeply we connect with friends, family and associates; it will change how we see each other and will create opportunities to fix some of yesterday's wrongs.



# DESTINATION

A: BEIJING - TAIPEI - HONG KONG -  
SHENZHEN

B: COPENHAGEN - STOCKHOLM -  
OSLO - ICELAND



# INTERNATIONAL RESEARCH PROJECT 2021

This year the International Research Project will head to the beautiful Asia. The study tour will start in Beijing and the second stop will be in Taipei, Taiwan. For our third and fourth destination we will head back to mainland China: Hong Kong and Shenzhen respectively. However, if due to COVID-19 we will not be able to travel outside of Europe the following cities will be visited. The trip will start in Copenhagen. Next Stockholm and Oslo will be visited. Thereafter, we will fly to our final destination, which is Iceland. During this study tour we will visit several companies that have a connection to the theme 'Connecting Worlds: where new opportunities arise'. 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 businesses evolve 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.



# PARTICIPATION

► 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 Connecting Worlds. With help of these research projects, the International Research Project 2021 will be financed.

► Research projects can be carried out between November 2020 and June 2021. 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.

# ADVANTAGES OF RESEARCH BY THE IRP

The top 5 reasons why your company should do a research assignment for the International Research Project 2021 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 Connectivity 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 Connecting Worlds. All participating companies and students will be invited. Since the masterclass of IRP 2020 was canceled due to COVID-19, the students and companies of IRP 2020 will also be present in the masterclass of 2021 (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.

# RESEARCH EXAMPLES



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 a report every month. 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 to discuss with different stakeholders and built a dashboard in Excel, which indicates the required parameters and is easy to use for all stakeholders.

# CAPABILITIES

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.

# BOARD OF RECOMMENDATION

The IRP 2021 is supported by the following people:



F.A. (Frans) van Houten  
President and Chairman of the Executive Committee  
Royal Philips



P. (Paul) van Nunen  
Director of Brainport Eindhoven  
Brainport Development



E. (Erik) van Wunnik  
Director Product Development  
DSV Solutions Nederland BV



Prof. dr. ir. F.P.T. (Frank) Baaijens  
Rector Magnificus  
Eindhoven University of Technology



Prof. dr. A.G. (Ton) de Kok  
Innovation Director European Supply Chain Forum (ESCF)  
Eindhoven University of Technology



Prof. dr. T. (Tom) van Woensel  
Program Chair of the Bachelor Industrial Engineering  
Eindhoven University of Technology



Prof. dr. ir. P.W.P.J. (Paul) Grefen  
Research Director School of Industrial Engineering  
Eindhoven University of Technology

# ORGANIZATION

The following executive committee is responsible for the organization of the IRP 2021:



Romy Olislagers  
Chairman  
[chairman.irp@industria.tue.nl](mailto:chairman.irp@industria.tue.nl)



Colette van Happen  
Financial Manager  
[financial.irp@industria.tue.nl](mailto:financial.irp@industria.tue.nl)



Simone van der Velden  
Coordinator Contract Research  
[contracting.irp@industria.tue.nl](mailto:contracting.irp@industria.tue.nl)



Brian Willem  
Coordinator External Relations & Program  
[external.irp@industria.tue.nl](mailto:external.irp@industria.tue.nl)



Matthijs Wolf  
Coordinator Culture, Accommodation & Transportation  
[c.a.t.irp@industria.tue.nl](mailto:c.a.t.irp@industria.tue.nl)

# CONTACT INFORMATION

Eindhoven University of Technology  
P.O. box 513, Atlas 2.238  
5600 MB Eindhoven

Phone: +31 (0)6 - 44 31 59 24  
E-mail: [contracting.irp@industria.tue.nl](mailto:contracting.irp@industria.tue.nl)  
Website: [industria.tue.nl/irp](http://industria.tue.nl/irp)

