



**4TU.**Centre for Engineering Education

Honours Programme TU Delft Study Tour Report  
8 - 23 July 2019

# Industry 4.0 in Asia

Seoul & Busan

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# Introduction

Dear reader,

Before you, lies the report of the study trip of the Honours Programme Delft to South Korea in 2019. The goal of this study trip was threefold: to learn (a) to what extent innovation is integrated into education and how it is used to improve it, (b) what major technological developments are embraced by Korean companies, and (c) how the engineering culture in South Korea differs from the engineering culture in the Netherlands.

To gain insight into these research questions, a delegation of 15 students that participated in the Honours Programme of Delft University of Technology travelled to South Korea. They visited, over the course of 2 weeks, several institutions that are at the forefront of the developments, including Samsung, Hyundai Heavy Industries, the Dutch embassy and the Korean Institute for Science and Technology.

This research was conducted in collaboration with Aldert Kamp, Director of Education at TU Delft Faculty of Aerospace Engineering, Academic Liaison for the Global E3 university consortium, and co-leader of the Dutch 4TU.Centre for Engineering Education. Aldert Kamp described in his book 'Engineering education in a rapidly changing world' how education hasn't kept up with the rapidly changing world we live in. Two previous study trips evaluated how this challenge is tackled in two other developed Asian countries.

Aim of these trips was to learn from the 'best practices' applied in those countries so that we better understand how we can tackle this challenge. The first study trip went to Japan in 2017. The second study trip went to Hong Kong (and China) in 2018. In this third study trip we visited South Korea, the last well-developed Eastern-Asian country.

During the kick-off of the trip, Aldert Kamp gave a presentation that prepared the students for their research and demonstrated some effective ways to create and answer their research questions for the trip. The students also received an introduction to the South Korean culture from a South Korea expert who told lots of interesting and astonishing stories about how things are different compared to the Netherlands.

We hope that this report will give you insight into the role of the tech-sector in South Korea, into Korean society and that you enjoy reading about our experiences as much as we enjoyed the study trip.

*Joost Verbraeken*  
*Tour Committee 2019*

# Table of contents

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<b>List of participants</b>	
<b>Introduction</b>	<b>1</b>
<b>Chapters</b>	
To what extent is innovation integrated into education and used to improve it?	3
What are the major technological developments that are embraced by Korean companies?	7
How does the engineering culture in South Korea differ from the engineering culture in the Netherlands?	11
Conclusion	15
<b>Daily Reports</b>	<b>19</b>
<b>Acknowledgements</b>	<b>33</b>

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# To what extent is innovation integrated into education and used to improve it?

By  
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## Introduction

The Korean education system seems to be facing several systemic issues. A few, as identified by Young-Hwa Kim, a researcher at the University of Pennsylvania, are: education aimed mainly at passing the entrance examination for college; poor public financial support for school education; education administration which focuses on central uniform control and administration; and uniformity of education programmes; though it should be noted that Young-Hwa Kim's findings were published in 1999.

Jeong-Kyu Lee, a behavioural scientist at the National University of Singapore, coins the term 'Education Fever', in reference to the heavy emphasis of education in Korean society, which he believes to be deeply rooted in the Confucius culture, a system of thought and behaviour originating in ancient China that emphasizes the importance of family and social harmony. While Lee states that this has helped the country prosper economically, it has also resulted in excessive expenditures on education, social disharmony between rich and poor, an academic and prestige-oriented society, and excessive pressures on college entrants.

Nevertheless, Korea's rapid development and success may imply that its education system is a model for other developing countries.

Jung Cheol Sin, an expert in didactic methods, makes a similar observation that educational development has been heavily influenced by Confucian traditions, which puts substantial emphasis on the importance of self-improvement. Sin also notices that the rapid economic development has resulted in a job market for college graduates and that economic growth and higher education mutually reinforce each other, which would partially explain the rapid economic growth of the area.

During our visit to South Korea, the aim was to identify to what extent these issues hold ground, based on information gathered during several interviews and during guided tours. Moreover, another question was to what extent the findings of Young-Hwa Kim are still relevant in the current climate of South Korea, which is remarkably different compared to 50 years ago.

The main aim is to understand how the Korean education system prepares individuals for and corresponds with the job market, which we believe to be an important metric for the effectiveness of an established education system. Finally, these observations are compared with the Dutch education system and the associated job perspectives, in an attempt to uncover intercultural differences related to education and employability.

## Method

Due to the limited time in South Korea, a mere 14 days in total, the scope of our methodology had to be limited. Interviews were believed to be amongst the most effective methods of pertaining information and thus chosen as the main data collection method. As the main focus was on the transition from education to the job market, we asked university students how prepared they believe themselves to be for the job market.

It should be noted that while we did have a basic framework for asking questions, we would not halt those being asked from going off on a tangent, which in turn led to other educational facets being highlighted. The main reason for allowing this is

that our limited understanding of Korean culture is currently primarily based on available reading material on the subject, which could result in imposing unanticipated biases onto the respondents.

We asked the following questions to the university students to learn how career-oriented the Korean universities are:

*What is your field of study? (And what year are you in?)*

*Why did you choose this particular field?*

*Are you currently searching for a job?*

*Do you feel prepared for the job market?*

The results are discussed below.

## Results

During the study trip, four engineering students of Seoul National University were interviewed in order to obtain detailed information about the education system of South Korea, based on their experiences and viewed from their personal perspective.

Firstly, it became clear that there was a distinct difference between high school education and university. While attending high school, students studied almost all day, including following extra classes in the evening as well as tutoring lessons, mostly stimulated by parents. The students mentioned that they felt obliged to get the best scores, partly due to the strong pressure exerted by their parents, which is very common in South Korea. In addition, there is a strong sense of social pressure among fellow students, considering that everyone is competing for the same limited number of university positions.

As such, getting into Seoul National University, one of the best universities in South Korea, was also very difficult for the students questioned here. According to the students, the workload during high school (about 10-12 hours) is significantly more compared to the hours made during an average day at university (about 8 hours). Furthermore, students report to experience an increased sense of freedom, which gives them more time for hobbies, sports and social activities beyond the classroom, which in part can be attributed to a decreased influence and strictness of their parents.

When we asked their opinion about the overall education system in South Korea, they mutually agreed that the study load, especially during high school, is too high, and that it is in need of future addressing. They think a lot of people would agree with their opinion, but they also realise that changing the current standards and values related to education is not an easy task. Strikingly, the South Korean students mentioned that they feel the Dutch high school education system is better organised and would be preferred over their own current educational system.

There are some essential differences between the South Korean and Dutch education system, which are important to take into account when placing these answers into context. For example, South Korean children do not have a lot of free time after school to discover the things they are passionate about, mostly because their education is a full-time obligation. Also, the curriculum at high school is predetermined. This implies that South Korean students do not have the option to choose the subjects they enjoy and that all students

are being taught the exact same subject matter. Therefore, in general, South Korean students choose their major based on their high school scores and their parents' occupations. They were never stimulated to identify their own preferences and they are still expected to study for occupations that are perceived as most prestigious.

This is usually not the case in the Netherlands. Dutch students have already chosen a certain orientation before going to university, thereby already specifying the field of study that they are most interested in. Dutch students are more stimulated to choose a major based on their interests and passions, rather than the social standards that are associated with certain fields of study.

During the Q&A session, we also asked the students their opinion about the job market and their expectations regarding the difficulty of finding a position in their field. They replied that what they learn at university is mostly theoretical knowledge, yet the hands-on experience is not addressed so much. To solve this, most students aspire to complete internships such that they can obtain more practical experience that is often valued by employers. Nevertheless, the students also indicate that they actually prefer to remain theoretically focused, which seems to stem from their South Korean cultural norms. Furthermore, they are convinced that getting a job as an engineering student is relatively easy. In particular, when compared to for example students from humanity studies considering that the South Korean job market is most likely to expand in the technology sector, resulting into more engineering jobs in the future. Due to the fact that these students did not have any work experience, they unfortunately could not tell us more about the transition from university to the job market.

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# What are the major technological developments that are embraced by Korean companies?

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## Introduction

Up to the 1950s, South Korea and its economy was known to be dependent of other countries. From the 1960s, after the Korean war had ended by military leadership, the economic situation of South Korea began to develop and resulted in what we now know as 'the miracle on the Han River'. The way South Korea handled its transition from a developing to a developed country, was by looking at and copying what other developed countries were doing at the time. That is also the case for technological developments. How South Korea copied these technologies and made them its own and which technologies were the most impactful, will be discussed in the following paragraphs.

## KIST

The Korea Institute of Science and Technology, or KIST for short, was established in 1966 as a research institute aiming to (further) develop technologies and share these with South Korean companies, to help the South Korean economy flourish. The ultimate goal of this effort was to foster the Korean miracle and becoming one of the best economies in the world within several decades. The exhibition halls of KIST show several of its technological achievements. Ranging from a robotic centaur to blood tests to facilitate drug detection during the Olympic games in Seoul of 1988. Most recently, researchers at KIST developed a 3D-television screen that was sold to Samsung. Currently Samsung is in the process of bringing such TVs to the market. For the future, KIST has set its sights on creating a second Korean 'M.I.R.A.C.L.E':

- **Material:** pioneer the era of next-generation materials and devices
- **Information:** lead the post-digital era
- **Robotics:** create a futuristic human/robot community
- **Agriculture:** lead to agricultural innovation
- **Carbon:** drive the post-climate change era
- **Life:** lead the bio/medical sector in today's super-ageing society
- **Environment:** create a sustainable 'green city'

## Fast Follower

South Korea really took a hit in the Korean war, leading to a non-existent economy. The country became very poor. Experts predicted that it would take South Korea at least until 2030 to recover to the level the economy had before the war started. However, the people of South Korea did what they do well, which is working hard. South Korea looked carefully at what the country needed, copied the technologies from other countries and frequently optimised these technologies so they functioned even better. For example, South Korea copied technology that allowed for producing tin cans, so that producers in the country could store their food better, and for longer periods. South Korea copied and produced many technologies that enabled people to do new things in a very direct way. The country became very skilled in copying technologies, strengthening its economy by levels never seen before.

In 50 years, it went from a third world country with a GDP of around \$1,000 to a first world country with a GDP of more than \$30,000. This level of growth is called the 'Korean Miracle' and the Koreans are very proud of what they have achieved. Currently, South Korea is on par with other rich countries, making it harder to apply the copying

strategy. It is why South Korea is now slowly learning to develop its own new products. Companies like Samsung and Hyundai are already doing this well.

## The fourth revolution in the industry

At present the world and South Korea are experiencing the fourth industrial revolution, a period where cyber-physical systems are integrated in almost all aspects of our life. Everyone is talking about the benefits, but also the risks of using high tech software such as Artificial Intelligence (AI) and the Internet of Things (IoT). These inventions can help people do their tasks more easily and tasks could even be completely taken over by robots.

AI can also be used in a variety of neat little gadgets, which are loved by almost all Koreans. This can clearly be seen by many products produced by Samsung such as face recognition, fingerprint scanners and smartwatches which are connected to your phone and can be used for sports sensors among other things. A guide in the Samsung Innovation Museum even showed the future plans for some of their products, revealing an even higher variety of IoT and AI gadgets which are incorporated in the products. These include, but are not limited to, cleaning robots, fridges connecting to your phone to update your grocery list and contact lenses containing displays to give you real time information about pretty much anything.

Hyundai also showed interest in IoT applications, e.g. in connecting your car with other machines in your home for all kind of applications. It is highly likely that Hyundai will follow the trend of the development of self-driving cars and starts incorporating AI algorithms in its cars to further improve driving comfort.

With all of this being said, Hyundai's production process showed a clear lack of IoT and AI applications. At Hyundai Heavy Industries shipyards almost all labour was still done by people, securing safety of every part of the construction. Of course, many different tools and machines are being used to make it possible to create these colossal ships, but by the looks of things, all machines were still controlled by people. This was different at Hyundai Motors, a big car factory located in Ulsan. Here almost all parts of the production process were semi-automated: Large conveyor belts moved all kinds of parts throughout the factory. The production process was then subdivided into many different steps, where every factory worker assembled one little piece of the total car.

Does this then mean that AI and IoT are not applicable for use in industry, but are only viable to use within the products themselves? This question is hard to answer, especially since Hyundai was not willing to give us too much information about it. It seems like there are many possibilities to apply those systems into production processes. For instance by connecting GPS sensors to transportation vehicles or using AI to compute smarter pathing to improve logistic efficiency.

However, there are many (possible) reasons that these techniques are not being applied. Most importantly, they cost money, many sensors need to be purchased and complicated software needs to be developed. The costs of this might not outweigh the increase in production efficiency. Also, since these inventions are quite new, they might not have been tested on a sufficient large scale yet to start implementing them. Of course, implementation will also take time, since using these new techniques will change the production process drastically. Possibly the old facilities are not even suitable for the use of these new technologies, and completely new facilities may have to be built.

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# How does the engineering culture in South Korea differ from the engineering culture in the Netherlands?

By  
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# Introduction

South Korea and the Netherlands are at opposite ends of the world. It should come as no surprise that South Korean people have a different culture, a different work ethic, than European people. Furthermore, their work ethic seems to work quite well considering the economic miracle that South Korea experienced over the last 50 years. In this chapter, we will take a look at how the South Korean culture in the professional engineering environment differs from the Dutch culture and what we can learn from these differences to potentially 'enhance' our own culture.

## Research methodology

During the study trip, we went to 9 different institutions. We found that three of them were particularly interesting to gain more insight into this topic. These institutions were asked about the Hofstede dimensions (<https://www.hofstede-insights.com/models/national-culture/>). The Hofstede dimensions were formulated by professor Geert Hofstede as a way to evaluate and compare cultures from all over the world. He differentiated between 6 dimensions, each of which represents an aspect of a culture, or in other words, an aspect of the collective programming of the mind that distinguishes the members of one group or category of people from others. The dimensions are measured on a relative scale, which means that cultures can only be used meaningfully by comparison. Therefore, we will compare every score of South Korea on the 6 Hofstede dimensions with the score of the Netherlands.

### H-dimension 1: Power Distance Index (PDI)

**The degree to which the less powerful members of a society accept and expect that power is distributed unequally**

South Korea scores extremely high on its PDI because its companies are generally very hierarchical. The boss gives directions and new ideas or suggestions from employees are not expected or appreciated. Age and years of service mostly determine the ranks, which reduces the innovation power of the company. The result of the hierarchy is a society where employees are exceptionally non-creative, which forces them to copy ideas from abroad (e.g. the technology of Samsung is largely copied from Japan). Many youngsters want to have an office job because of its status. This is why factory workers need to be attracted from South-Eastern Asia. This is in stark contrast to the previous generations, where the (grand)parents worked hard in the primary industries to rebuild the country after the Korean War (1950-1953). Within companies, there typically is a single strong leader that governs the organisation and his leadership is unquestioned. This is comparable with the despotism after the Korean War where President Park Chung-hee dictated the way in which the country should be rebuilt, a type of leadership that the population loved.

### H-dimension 2: Individualism (IDV)

**The preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families**

After the Korean War, the South Korean people felt really connected to their country and made a great effort to restore the country to its former glory. Everything was being done in the context of collectivism. This is still clearly present in today's society, as can be seen in international relations with for example Japan and China and also within companies. When you are an employee of Samsung, you become a 'part of Samsung' and everywhere you go you are expected to behave yourself as an exemplary Samsung

employee. The new generations are becoming more individualistic, more open to foreigners, and more eager to work at start-ups where they have much more freedom in terms of being themselves than at the major conglomerates in South Korea. Youngsters still do have a strong group feeling, as evidenced by the fact that students can always call alumni of a university to ask questions, get some coffee or collaborate in some way.

### **H-dimension 3: Masculinity (MAS)**

**The preference in society for achievement, heroism, assertiveness, and material rewards for success, in other words, the measure of competitiveness within organisations**

In South Korea, you need to have enjoyed a good education to get a good job. Every November, there is a national examination for all 18-year olds. The top 1.5% can go to one of the three best universities of South Korea, namely Seoul National University, Korea University and Yonsei University (International education Guide, 2019) and therefore all parents have their children follow many extra lessons outside of regular school in the evenings. These extra classes can start already when the child is just a toddler. This results in a competitive environment between children to become part of one of the top 1.5% and enter an excellent university (White, 2011).

After South Korean students finish the examination, the competitive environment is largely gone. But because the students had so little leisure time, they generally do not really know what they are passionate about and often end up with studies they do not like that much. Business is an extremely popular study, but it is also very popular for students to pursue the study of their parents. Students that do not belong to the top 1.5% of the examination, either go to a second-rang university or will go study abroad.

### **H-dimension 4: Uncertainty Avoidance Index (UAI)**

**The degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. Relates to the number of regulations and high-risk projects**

The Dutch ambassador in Korea stated that South Korean people are risk-averse. He said that the history of the big companies in South Korea shows that the South Koreans do not invent products. What they do is look at products that already exist, and then make improvements to them. As already said before, there is a strong hierarchy in South Korean companies, which results in less innovation and creativity. The type of leadership that seems to foster creativity most is transformational leadership, a type of leadership where organisations are flat, in which everyone is considered equal, and employees have a great deal of authority (Zhou, 2017). This is clearly not the way Korean companies work, which might explain the relatively low degree of creativity and the necessity for Korean companies to copy and improve the work of others, instead of inventing something new.

### **H-dimension 5: Long Term Orientation (LTO)**

**The degree to which companies prepare for the future by educating employees, changing the culture, and embracing change**

Embracing change has already been discussed earlier in this document. Unfortunately, most children decide upon their major not based on their passion or interests, but based on their parents' occupation and cultural norms. This might also be due to the fact that children lack time to explore their passions, and spend the vast majority of their time studying. Because there are not enough extracurricular activities people do not get to know themselves and end up in the wrong job.

## H-dimension 6: Indulgence (IND)

**The extent to which a society allows free gratification of basic and natural human drives related to enjoying life and having fun**

In South Korea, it is quite common (especially at large companies like Samsung, Hyundai and LG) to work from Monday till Saturday from eight till nine pm. According to OECD figures, in South Korea the work hours were 2113 per worker. For comparison, in the Netherlands it was 1419 hours per worker (OECD, 2016). So, most South Koreans work twenty-eight days a month, which makes the other two days a holiday. In 2014 the Labor Standard Act has been entered, it states that a workweek should be 40 hours and allows 12 hours of paid overtime and 16 hours on the weekends (Kiu Sik, 2014). Not everybody agreed with the introduction of the Labor Standard Act, some people were afraid that they would lose their bonus, which was just as big as their annual wage. Most youngsters did support the Act, they prefer to have a private life instead of working their whole life.

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# Conclusion





## Challenges faced in South Korea

South Korea has grown from one of world's poorest nations after the Korean War to one of the most prosperous and developed countries in the world, an impressive feat considering the relatively small time period in which this happened. Its economy and standard of living is still growing fast, but at the same time South Korea faces many challenges that hinder its progress.

Korean students experience a lot of stress because of the prestige-oriented culture. This does not necessarily have to be a problem, but students indicate that the workload is actually too high and needs to be addressed. Additionally, because they lack the time to develop a passion for something else than studying, they regularly end up studying something based on their parents' occupation or something that is well-regarded within the country. On a societal level, problems might arise because less-prestigious studies are so unpopular that there is a severe lack of students in those areas. In the future, South Korea expects to have a major shortage of for example haircutters, shop owners, or other simpler and less-prestigious jobs.

Korean companies are increasingly more innovative and more and more at the vanguard of new technologies. The global trend towards a digitally-connected society (i.e. Industry 4.0) can be observed at the car production facilities of Hyundai Motors where almost all parts of the production process were semi-automated. Advanced sensors were used in this case to monitor all steps in the production process to optimise the throughput. However, not in all companies Industry 4.0 techniques are integrated into the process. For example, Hyundai Heavy Industries manufactures its ships in a relatively 'old-fashioned' approach where the use of digital tools is very limited. Integrating Industry 4.0 methods to enhance the productivity of its companies is a challenge that not only South Korea, but also the rest of the world faces.

The culture in South Korea is very hierarchical and the leadership of the leaders is unquestioned. This is efficient and effective, but might lead to suboptimal outcomes when the leader makes a mistake. The Korean people are also quite risk averse, which is one of the reasons that they score very low on creativity (since new creative innovations have a considerable risk to fail). South Korean companies still manage to stand their ground in a very competitive corporate environment thanks to the considerable subsidies provided by the Korean government (which are among the highest in the world). However, a lack of creativity still hampers to growth of Korean companies and is a challenge that should be addressed, for example by allowing children more time to experiment with the unknown, rather than learning things that other people devised.

A major challenge that Korea will face in the next decades is the extremely low birth rate of less than 1 child per family. This will result in a severe aging of the population and it is questionable whether technology can keep up with replacing jobs that would have been done by young workers otherwise.

## Lessons for the Dutch that can be learned from Korea

Although South Korea faces numerous challenges, there are also several things that the Netherlands can learn from this country. The GDP of the Netherlands has been declining since the crisis of 2008 and still has not recovered. Also, South Korea was hit hard by the economic crisis, but managed to recover fast by incentivising people to work hard and giving generous subsidies to companies to innovate.

The focus on a strong economy is something that will definitely give South Korea an edge over the Netherlands in the future and it is quite likely that its economy will surpass the Dutch economy in the next decades. This is illustrated by the number of unicorns (start-ups worth more than 1 billion dollars) in South Korea which is 9, as compared to the number of unicorns in The Netherlands, which is 0.

In other words, while in the Netherlands every once in a while, a big company goes bankrupt, in South Korea these companies are easily replenished by new corporations. Specific lessons that the Netherlands can probably learn from South Korea include: a bigger focus on Industry 4.0 to streamline production processes, generous subsidies to boost economic development, or extending the average working hours to the European average or more.



# Daily Reports



## Day 1 **Journey** July 8th

**Joël Abrahams, Francien Fons**

After getting up early, we jumped onto the train to Brussels. During the trip, we mentally prepared ourselves for the 13 hour flight.

When we arrived at the airport, everything went fine. The transfer at Rome was tight, but we managed to make it, fortunately. Going to the terminal went considerably faster when you have a European passport we noticed, especially now that the check-in process is automated. In the airplane, everything was as expected. There was a small screen to watch videos, and some members of our group even managed to get some sleep.

## Day 2 **Arrival** July 9th

**Joël Abrahams, Francien Fons**

After we arrived at Seoul Incheon International Airport, we had to figure out how to get to our hostel. Fortunately, Seoul has an excellent subway system, so it was surprisingly easy to get to our place. To make communication a bit easier and much cheaper, we bought two 'WiFi eggs'. These are portable wifi stations that gave everyone has access to WiFi on the go. The rest of the day was mostly spent strolling around the city in small groups, getting to know the city, and by having a rest in the hotel. This day was our day to get used to the new time zone, the next days were going to be a lot more interesting!



## Day 3 **Embassy, Palaces, and Korean barbecue** July 10th

**Joost Verbraeken, Storm Lageveen**

On this day the programme actually started. We visited the Dutch embassy in Seoul in the morning where we received a great welcome. A nice and relaxed Dutch employee told a lot of wonderful stories about South Korea, for example about the extremely intensive education system in South Korea, what it is like to work in this country and how the country moved from one of the poorest countries to one of the richest countries in the world in only 50 years.

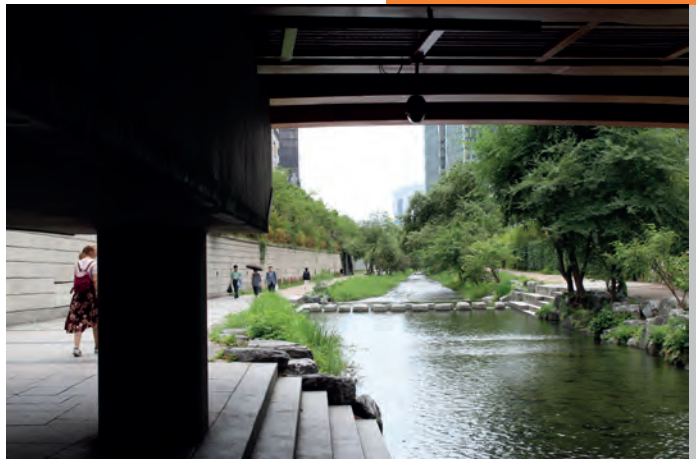
This was also a great opportunity to ask all sorts of questions relating to our research, which we naturally made use of eagerly. Some of the most remarkable things that came up here were remarks about the backlog in social/cultural developments compared to economic ones. For example, we were told about the taboo of cohabitation before marriage and the very traditional male-female relationships that still dominates in the country.

After a group photo was being taken at the embassy (with the royal couple in the background), we went looking for a place to have lunch. It became clear that we had to split up for lunch because our group was actually too large for a single restaurant; an exercise we had to repeat often during our trip.

In the afternoon we admired the old palaces of the city. Most of them have been completely renovated and therefore appear to be new. It was nice to have seen them but the three large palaces were a bit of a disappointment. Everything looked alike and the houses were built quite simply with wooden boards painted on the outside. The Hidden Palace Garden was a completely different story. We went on a Korean tour through the complex of which we obviously did not understand very much, but the garden was beautiful to see. You could walk along narrow paths through the hills, sheltered by all the trees that stood around it, with a picturesque temple, vast decorated pond, or stately building with many stairs and picturesque roofs regularly coming your way. These buildings were clearly really old and a kind of 'hidden gems' in the city of Seoul. A small detail that greatly improved the overall experience was the lack of tourists at every location. This ensured that every attraction could be appreciated in a very serene way, something that we had not expected in advance.

At the end of the afternoon, we had a drink in the new town hall. The old town hall stood directly in front of it but was made by the Japanese. The Koreans made their new city hall of glass in such a way that it looks like a wave that seems to flood the old city hall. With it, they want to symbolise that nowadays Korea is no less inferior to the country that had occupied Korean territory for a long time.

In the evening we barbecued in Korean style. In fact, it is what we would call gourmet, but with hardly any vegetables (the concept of 'vegetables' is moderately common in Korean cuisine) and without French bread or salads. Instead, everyone got very thin pieces of meat to put on the gourmet, a bowl of rice, and a few small side dishes. Those side dishes are very common in Korean restaurants. You have to cut the meat in half with a pair of scissors to make them into bite-sized pieces, an activity that we got a pretty good grip on after the staff was kind enough to show it a few times.





## Day 4 Genesis, Lotte World Tower July 11th

Ivo Janssen, Stijn van Weegberg

After the day had started well with some breakfast at the Paris Baguette, it was time to visit the spin-off part of Hyundai for luxury cars: Genesis. Although the showroom did not seem to be that pretty from the outside, a quick look at the inside proved differently. Beautiful car models, a special room to design your own Genesis model and even car masters who gave a nice tour and, to the surprise of everyone, knew a few words of Dutch. It quickly became apparent that the sales strategy of Genesis is all about the user experience. After a short discussion Stijn van Muijden, Kiet and Daniël even managed to get a test drive in one of the shiniest test models, which surely led to an unforgettable experience and new friendships with the car masters.



After Genesis, the group split up to get some lunch. After that, it was literally time for the highlight of the day: The Lotte World Tower, a huge 120+ floor skyscraper with a height of approximately 550 meters. While the group was waiting in the lobby for the tickets, payment confirmations are somehow always messed up, the group was greeted by Lolo, the mascot of Lotte Tower. It was a pink hybrid between an egg and a bird, which is as cute and astonishing as it sounds.

There was a beautiful view on the 120th floor to all directions and you could see almost all of Seoul. There was even a fascinating, but also terrifying glass floor with a nice view of the streets below. After strolling around for a little bit and a group picture, we went down again. Of course, a fluffy version of Lolo the mascot was picked up in the souvenir store.

Back down again, with solid ground beneath our feet (if you say so, when you are on floor -1), the group split up again. Most people were hungry and returned to the hostel, while others strolled in a luxury shopping mall.

The day ended with a good meal, a good time and a new-born hype about our new mascot. In an adventurous mood some people even ordered something new from the menu, gizzard which is some kind of chicken stomach muscle. It turned out to be the spiciest meal they had and even though it tasted quite nice, most of it was left behind after a few brave bites.



## Day 5 <sup>DMZ</sup> July 12th

Stijn van Muiden, Andy Zhang

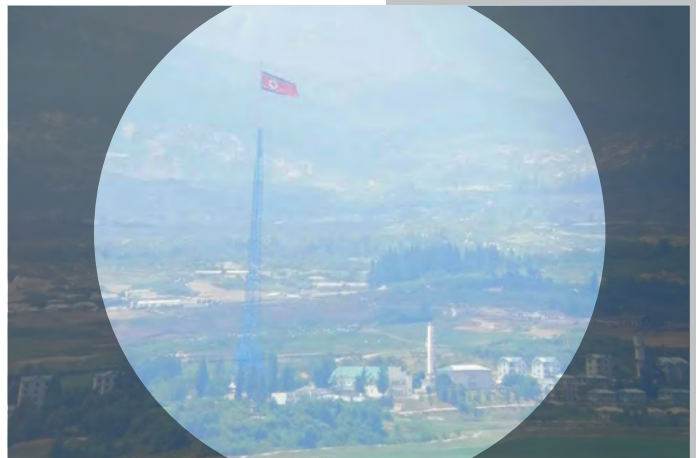
On Friday we went to the demilitarised zone (DMZ), which is located on the border between North and South Korea. We first went to the location where the last train that drove between the two Koreas was on display. The train was severely damaged due to the military conflict.

After that, we moved on to the Joint Security Area (JSA) visitors centre. The JSA is an area inside the DMZ right on the border, however, the visitors' centre is located just outside the DMZ, this is the place where the United Nations Command (UNC) is stationed. The UNC is in control of the JSA, and consist of military personal from all over the world, with the largest contributor being the United States. There we met with our guide: private Sierra of the UNC. Together with private Sierra, we went into the DMZ. For a large part, the DMZ is left untouched by humans, which makes it a great habitat for endangered species. After a fifteen-minute drive we entered the JSA.

There we went out of the bus and after a final safety instruction about showing respect to North Korea, we proceeded to the border. On the border the famous blue houses where the negotiations took place are located. Before entering the buildings right on the border, we took a walk to the famous 50-meter blue bridge that connected the North and South. On that bridge the first conversation between the current leaders of the Koreas took place. Then we walked back and entered the blue buildings on the border. Inside are the tables where conversations between the Koreas have taken place, and there we finally got the chance to set foot inside the most secretive country in the world: North Korea. After looking around and taking pictures we went back to the bus. We had a few moments of silence for lieutenant John who gave his live fleeing from communism and despotism to freedom and democracy.

After a delicious Korean lunch just outside the DMZ, we went to the Dora Observatory. From inside the observatory, we got a good view from North Korea, the big flag post and 'fake city' was clearly visible as well as the big fence bordering the DMZ from South Korea.

The second to last stop on the DMZ tour was a tunnel dug by North Korea to invade the South, this tunnel was prematurely discovered by the South thwarting



North Korea's invading plans. It was very clear that this tunnel was indeed made by the North. This could be concluded from three facts. The first one being the fact that the holes for putting dynamite into the granite were drilled in the direction of South Korea so clearly this was done from the North. The second proof was that the tunnel is higher in the South direction to make sure that the groundwater was flowing back into the North. Clearly this was done to make it harder for South Korea to discover the tunnel. The last definitive proof was that there was coal smeared along the tunnel walls while there was absolutely no coal in the ground. This was clearly a weak cover-up from the North to hide their true intentions.



The last stop of the day was at the most northern train station in South Korea. This is the last station before North Korea, the track used to be used for transportation between the Koreas.

It was an interesting day. It was a great experience to see the historic landmarks, but it was so commercialised for tourists (160.000 annually) that it felt very unreal. The whole day was full of propaganda from South Korea blaming North Korea for every bad thing that has happened along the DMZ.

## Day 6 Songdo July 13th

**Kiet Foeken, Myrthe Peet**

After having enjoyed a good time in the evening in a karaoke bar, we went relatively late on our excursion to a city an hour away from Seoul, called Songdo. Songdo offered surreal views over a completely newly built city and included a large park. During the trip in Songdo, the group was divided into two separate groups. The first group went on a touristic tour to a tall building to get a good overview over all the other high towers in Songdo, while the other group preferred to have an extensive lunch followed by a tour through the park and Songdo's mall. The evening was spent in our favourite pub called Bronx or in a shopping mall.



## Day 7 Hike July 14th

**Maricke Angenent, Jesse Kamp**

Today we went hiking in Bukhansan National Park, a park full of mountains north of Seoul. In this park multiple mountains can be climbed, ranging from easy climbs to advanced climbs. We, as confident, strong and adventure-seeking students decided to climb the highest point, Bukhansan Peak. One delegation of students left as early as 6:30 to conquer the mountain in colder weather. The rest joined the fight at 8:00.

### *Delegation 1 (6:30)*

After a (quite fast) climb of 2 hours with drinking lots of water, eating Snickers, spraying DEET and regretting decisions delegation 1 reached the top covered in sweat, tears and joy. We decided to take the Intermediate course but ended up climbing the Advanced course because we had no sense of direction. After reaching the top and enjoying the view for 1,5 hours we decided to go back, not knowing what was ahead of us. We wanted to take the Easy course down, but after walking for a while we wondered why we kept going up and down. After walking a kilometre we had not descended but climbed 1 meter in height.

Not willing to go back, we tried our best to find the fastest way down, ending up in a killing 2 hour descend which once again appeared to be an Advanced course. We then found a bus station and found out that we had reached the other end of the park and had entered a small village. After 4 transfers we reached our hostel again, longing for a shower and sleep.

### *Delegation 2 (8:00)*

Arriving closer and closer to the entrance of Bukhansan National Park, we were surrounded by an increasing number of well-prepared Koreans dressed from top to bottom in the most advanced sports clothes, accompanied by excessive backpacks full of the latest hiking equipment as well as stacks of snacks. Facing this, a feeling of insecurity crept on, especially regarding the difficulty of the hike ahead. Considering some of us were wearing pairs of jeans and normal sneakers, we felt slightly overwhelmed. Perhaps we really had underestimated the impact and difficulty of hiking this supposedly beautiful Korean landmark.

Nevertheless, we continued and soon enough entered the park and set out on the climb upwards. Starting with a relatively easy and paved road, we maintained quite a high pace and were all full of energy. Not long after, though, the path significantly changed and we no longer were walking on a simple, shallow slope. Instead, the coming 2 hours would consist of a continuous and very irregular set of stairs that left us panting, sweaty and longing for (even more) water. Having had some breaks along the way to catch a breath, enjoy the scenery and eat some squashed bananas, we made it to the final (constructed instead of rocky) stairs leading to the highest point of the mountain, where we ran into our fellow students that were already making their way down.

Reaching the summit was the best part of the hike, with views stretching far beyond Seoul. Of course, pictures were taken, as well as a well-deserved rest, before starting the descend. After all the stairs, we mutually decided to take the 'easy' route down, which took another couple of hours of walking but definitely provided some better scenery compared to the way up that consisted mostly of looking at our own feet and rocks.

Opposed to the first delegation, we, fortunately, reached the correct exit and were all happy to be seated in the bus and subway afterwards. After a long, but satisfying day we joined the others at the hostel, ready to rest and shower.



## Day 8 KIST and KDI July 15th

**Stephan Loor, Jesse Schevel**

Muscle pain was omnipresent, but curiosity and enthusiasm marked the moment of departure on this early morning. A subway too far away, too many stairs, and we headed for Korea Institute of Science and Technology (KIST).

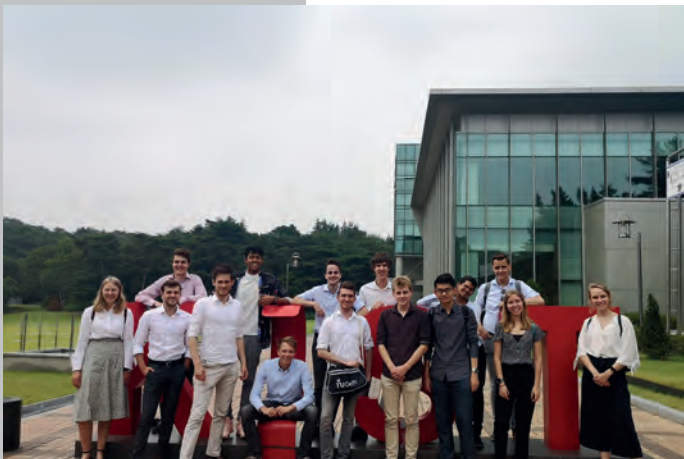
The day started with a tour of the Kistorium, the information centre of KIST, which showed the development of the institute and its research under the supervision of the communications consultant John. The institute is multidisciplinary and conducts research into applications in healthcare, robotics and 3D technology. For example, there was an oil

filter scoop, 3D television and an Alzheimer's blood test. The group then went for a traditional Korean lunch with the Korean supervisor in the canteen of the institute.

KIST, seen as the pearl of then-President Park Chung-hee, is one of the pillars of the 'Korean Miracle' of South Korea that turned the country from a war-stricken area in 1953 to the eleventh economy of the world today.

After lunch, the group went in the pouring rain to the Korean Development Institute (KDI), a national think tank that deals with government policy in the socio-economic field. We were welcomed with a short introduction game, a brainstorming about facts and questions concerning the economic development of (South) Korea. Then the group embarked on a tour of two exhibitions of the institute, one on the economic history and development of Korea since 1945 and one on the industrialisation of Korea.

Finally, the group received a lecture from professor Duol Kim, an economist at the University of Myongji, on the economic growth of Korea, in which the content of the exhibitions and the current challenges of South Korea were discussed in more detail. The day ended with a round of questions, a survey and some informal but educational discussions with the researchers at the institute. After an informative day, the group went back to the hostel to get ready for dinner.



## Day 9 SNU and Samsung July 16th

**Daniël van Gelder, Joël Abrahams**

Another early morning. We left at 8:30 for Seoul National University, where we were welcomed by three SNU students, all with engineering majors.

We first went on a short tour of a production hall called the IDEA factory which is similar to our own TU Delft Dreamhall, combined with yes!Delft but without any dream teams. Here students get to build and prototype their ideas, as well as start their own start-ups. After, we also had an opportunity to see their wave-pool. Lastly, we had a chance to ask the students questions about their time at university and secondary school, which gave us further insights into Korea's education system. We talked extensively about cultural differences and even learned how to count in Chinese!

Then we took a bus to the metro station to hurry towards Suwon to visit the Samsung Innovation Museum (SIM). This took us almost two hours (even though Joost was convinced this was possible in a meagre 1 hour) and we got there right on time. However, the guards at the gate would not let us pass through and forced us to take a detour around the complex through a parking garage to get to the museum. While the majority of the group decided to take taxis there, some students thought it wise to grab a mobike and cycle around the complex (legendary). Although it was an invigorating and careless ride, the students delayed the group by a half hour. When everyone finally arrived at the right place in the complex, the tour finally started. The group got an overview of the biggest technological impacts in the last three hundred years or so and Samsung's role in it. Also, an overview of Samsung's history and future vision was given. After the tour and after presents were exchanged the group split up, with one group staying in Suwon and another group heading back to Seoul to buy some souvenirs and get a late Chicken & Beer dinner.



## Day 10 **KAIST, train to Busan** July 17th

### Francien Fons, Joost Verbraeken

Halfway the study trip, we travelled from Seoul to Busan. We headed to the station early in the morning and arrived on time, so there was time to buy some breakfast and relax. Korean trains are amazing; there was air conditioning, lots of legroom and a nice view outside. Before we arrived at Busan, we made an intermediate stop at KAIST University in Daejeon. Sadly, it was really hot outside and we had to travel with our luggage all the way from the station to the campus of the university.

When we arrived at KAIST there was a bus waiting for us to show us the campus. The campus was modern and large, a perfectly comfortable place to study. After the bus tour, we got a tour about the history of KAIST university. KAIST proclaimed itself here to be the first and top science and technology university in Korea. It was established in 1971 by the Korean government to educate elite scientists and engineers committed to



industrialisation and economic growth in Korea. Since then KAIST has been a gateway, making advanced science and technology tangible for the Korean people. Among many decorations, KAIST has been awarded the title of Asia's Most Innovative University 2017 by Thomson Reuters. Afterwards, we got a third, and final, tour about promising medical high-tech innovations developed at KAIST. The bus ride back to the station was a bit chaotic. The bus was too small and we needed to order a few taxis to transport all our luggage.

In the late afternoon, we arrived at Busan where the hostel fortunately turned out to be right next to the station. The hostel was quite relaxed and comfortable, with a big eating room and another chill room with games, comics, and couches. The close proximity to both a supermarket and a McDonalds did not hurt the overall experience either. Although some may argue about the McDonalds part. That being said, the local neighbourhood was not that great to hang out in the evening. We discovered that it was situated in a district mainly targeting Russian sailors who anchored in the neighbouring ports. Unfortunately, this targeting did not happen in the most respectable and ethical manner possible. After we found a simple restaurant we discussed the day and made plans to spend the other days discovering the big shopping centre of Busan and visiting the major hotspots. After a lovely evening stroll along the river (where gates and walls were blocking the nice view, which was not so lovely), we went to bed.



## Day 11 Hyundai July 18th

**Storm Lageveen, Ivo Janssen**

The day started out quite chaotic, a bus was rented to visit Hyundai, but the level of English of the bus driver was not that good. He turned out to be a nice guy though and with some help from our fantastic hostel host, we managed to explain the full route to him. With all of his driving experience, he knew there would be a lot of time in between travelling, so he proposed a few places we could visit.

So this way we left on our journey with first stop Hyundai Heavy industries, a huge shipyard that produces some of the biggest cargo ships in the world. Once we arrived we were greeted by our tour guide who gave us a nice tour through the shipyard, showing us many of the steps in the huge process of building one of those massive vessels. Afterwards, we got a tour through the museum showing much of the history of Hyundai.

Since the visit to the other factory of Hyundai was planned later that afternoon, there was some time left for fun stuff. The driver knew the area very well and drove us to the top of a hill, from which we could see Busan and all of its docks and shipyards really well. There was even an observation tower, to get an even nicer view.

When leaving we managed to communicate with the bus driver that a place for having lunch would be nice, so he drove to a little restaurant, it was quite hard to explain what food we liked, but half an hour later we all got a nice meal of bibimbap, while the bus driver was enjoying his noodles.

On the way to Hyundai Motors there was still some time left, so we made one last stop at a little park where we had a look around and a few of us enjoyed themselves at the little playground that was there. Then it was finally time to continue with the serious business, Hyundai Motors. This huge car factory is as immense as you could imagine, with thousands of cars being produced every day and even more employees to make this happen, this place was almost an entire city on its own. Again we went on a guided tour over the terrain, driving past all fabrication buildings, followed by a tour through the place where the real magic happens: we were able to go inside one of the buildings and see several of the steps of the production process. The factory was filled with huge conveyor belts and all the employees were smoothly assembling the parts like they were building up their Lego sets.

Once we finished we drove all the way back to the hostel, which was quite far and after thanking our bus driver with a nice box of stroopwafels we went on finding a place to get dinner. A quick google search action showed a nice area in town to get some food only 2 metro stops away, so we decided to go there as a group and ended up in a Japanese restaurant. After enjoying our meals and beverages we continued on to scout through the city. Eventually we ended up on a nice plaza close to Busan tower, a place we would certainly check out in one of our other days in Busan. Here we enjoyed ourselves with a few beers and some bottles of soju, before heading back to the hostel.

## Day 12 **Busan shopping mall** July 19th

**Stijn van Weegberg, Stijn van Muiden**

After a fun night in the hostel, everyone awoke just before noon. While the prospect of the incoming typhoon was somewhat scary, everybody decided it was a good idea to go outside, armed with the umbrellas we received as a present at Korea Development Institute (KDI). Quickly demotivated as a result of the pouring rain and strong wind, the whole group went to the huge mall in Busan. This mall offered shops and restaurant vertically stretched out over 20 or so stories, with an amazing viewpoint on the roof.

After the mall, we headed to a nearby fish market. This fish market showed what Busan was famously known for: streets filled with stands where people were trying to sell live fish. Some of us actually tried eating freshly killed squid. It proved to be quite difficult with its tentacles still moving and sticking to anything it could find. There was no time for actually tasting the squid because you had to fanatically chew on the tentacle pieces to make sure that they would not get stuck to your throat. It was an odd experience.

Still recovering from this experience, the group went to another



district, Seomyeon, to eat some dinner after which everyone gathered at the hostel for another cosy evening, ending with a part of the group in a Korean nightclub.

## Day 13 **Surviving a typhoon** July 20th

**Andy Zhang, Kiet Foeken**

During our last days in South Korea a Typhoon hit the great peninsula of Korea. This resulted in lots of rain showers and strong wind gusts. A part of the group decided to go to a spa, while the others decided this was the perfect opportunity to test the gaming setup in the living room. The day ended by watching a movie together and packing the bags for the early trip to Seoul the next day.

## Day 14 **Train back to Seoul** July 21st

**Myrthe Peet, Maricke Angenent**



This day marked the start of a long journey back home to the Netherlands (for most of us). With everything packed and everyone gathered at the ground floor, we checked out from the hostel at 11 and made our way to the train station, reaching the station more than in time. The train journey consisted of a few hours of surprisingly comfortable seats, relaxing time (either sleeping or listening to music) and views across the countryside.

This last night in Korea, we would be staying in a guesthouse close to the airport, located more than an hour away from central Seoul. We arrived there in the afternoon and were greeted warmly (including hugs and patting of blond hair) by the guesthouse owner. On first sight, the rooms and common spaces

came across as very well organised and spacious, though it turned out that the beds were slightly tougher than most of our likings.

After settling in this new place, our group split up into two delegations. One of which decided to return to Seoul to spend the last night drinking a few beers in the proximity of our previous hostel and the others agreed upon eating and exploring the nearby neighbourhood. Some of us decided on a local, small Korean food stall to enjoy the Korean food for the last time, whereas others preferred to eat burgers at the local fast-food chain.

Having a long flight ahead the next day, we returned to the guesthouse rather early to catch some needed sleep and pack the bags.



## Day 15 All flight lead to Rome July 22nd

**Jesse Kamp, Stephan Loor**

Today marked the start of our 24+ hour journey home. With a breakfast consisting of toasted bread with butter and watching Korean TV, we started our journey towards Seoul airport. Here we found out how slow checking in luggage can be, and how much stress came with that since the clock was ticking. After a quick goodbye to Stijn and Maricke who went to other countries directly for their studies, we proceeded to the customs, which we luckily cleared very fast.

Because we had time left we went for some burgers but did not account for the 1 kilometre (!!!) walk from the burger joint to the gate. Of course, we had the gate at the furthest end of the airport. After some texting telling people to hurry up, everyone arrived on time at the gate. The flight went well and we arrived in Rome. Here we took the train to the city centre to check-in at our nice movie-themed hotel. In the evening we had real authentic Italian pasta, went to the colosseum and jumped back into bed, because the alarm would beep at 5:15 and we would be on our journey again at 6:00.



## Day 16 Return trip part 2 July 23rd

**Jesse Schevel, Daniël van Gelder**

After a short night's sleep, the group arose in order to continue their journey from Rome towards home. After a quick and efficient check-out from the hotel, the group took a train to Fiumicino Airport. Having their boarding passes ready, no check-in was required and security checks went seamlessly leaving the group with loads of time to kill at the airport. After boarding the plane, everyone was ready to leave and fly towards Brussels Zaventem.

After a smooth flight, the group gathered to wait for baggage which seemed to originate from Moscow, so the group waited, and waited and waited... Finally, everyone had their bags and the group left for the train station, saying goodbye to Ivo who was picked up by his parents at the airport. Unfortunately, due to a chaotic rush to catch a train, the group was split with some leaving early and others missing the train. After a long day of travelling, everyone arrived home safely and looked back on a wonderful trip through South Korea.





# Acknowledgements

On behalf of all participants of the HPD study trip 2019, we would like to thank everyone who worked hard to make this tour a success. First of all, a great thanks to Aldert Kamp who provided not only valuable feedback about the organisation of the tour, but also gave an interesting talk on the kick-off day about the engineer of the future and gave “meaning” to the tour by setting the theme: Industry 4.0. Prof. Peter Wieringa, HPD Dean and Vice Rector of the TU Delft gave lots of valuable feedback as well and provided us with the financial resources that were necessary to make the whole trip possible in the first place. A special thanks to Tjip and its CEO Dingeman Leijdens, who was so kind to provide us a great place to have our kick-off day and additionally gave an interesting talk about how Industry 4.0 manifests itself in a typical Dutch company (like Tjip).

As I’m writing this as QQ of the study trip committee I realise that perhaps the biggest acknowledgement belongs to members of this committee. Without their hard work and efforts this trip would never have been possible.

Joost Verbraeken

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## HPD Study Tour 2018-2019 Committee Members

Joël Abrahams  
Maricke Angenent  
Stijn van Muiden  
Kiet Foeken  
Ivo Janssen  
Joost Verbraeken



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