DISPUUT TRANSPORTKUNDE PANDORA

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A new staff member

Introducing: Jovana Jovanova

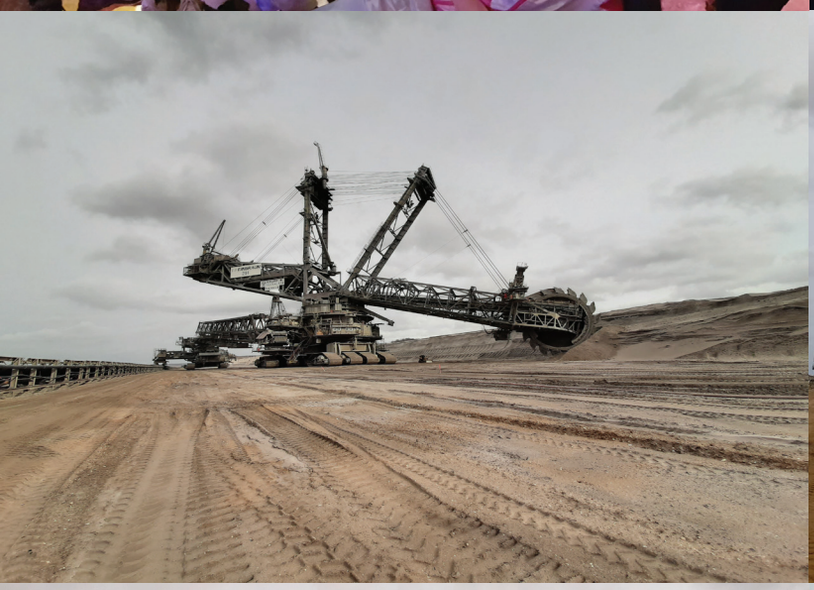
Dreamteam

Eco-runner

Coronavirus

“Pie Growing”, “Pie Sharing” or “Pie Shrinking”


Trianel
BESUCHER




EIMBRAUN

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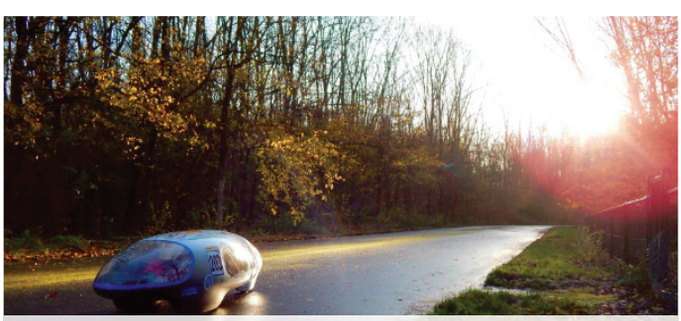

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FROM THE BOARD

By: The Board

President
Sabine Heijnen
voorzitter@transportkunde.nl

I am Sabine Heijnen, president of this year's board. During my bachelor's programme, Mechanical Engineering, I thought I was never going to do a master, because I prefer working over studying. During the last year of my bachelor I started looking for a job. Looking at the job requirements of the vacancies that looked interesting, I really did need a master's degree. So I started looking at the different master's programmes that the TU Delft offers. The master Mechanical Engineering with the track Multi-Machine Engineering or the master Management of Technology both seemed interesting. I even thought about doing a double master, but then I came to my senses and made a choice. In the future I would like to work in a harbour with big machines working together, moving objects everywhere, many boats coming in and out, so Multi-Machine Engineering fitted best in that prospect. And with the elective courses I can still fit in some MoT. I am very happy with the choice of continuing my studies with a master, and especially with choosing the MME track. I think we have a nice group of people in our class. Most of the courses we get, it is easy to get yourself motivated, because the matter is so interesting. The compagnies we visit and those visiting us all possess these fascinating projects and/or (big) machines, I am looking forward to start working in this field.

Secretary
Evan Tets
secretaris@transportkunde.nl

I'm Evan Tets and I'm from the heart of the Netherlands, at least geographically, that is, Dronten. Ever since I was six years old I said I wanted to be an engineer, even though at that age I had no idea what that meant, my parents just noticed I was better at math than I was at other courses and went with it. Even though the realisation of what an engineer actually does came much later the fascination never went away (it was however briefly accompanied by the desire to become a cook). This resulted in the choice for Delft being a relatively easy one, the harder choices came around when I actually had to pick a bachelor. Mechanical engineering seemed to be the overall best fit and i can now confidently say: it was. Keeping in line with that choice Multi Machine Engineering was a natural follow up.

Within the board of Transportkunde Pandora I hold the position of commissioner of internal affairs, being the first line of contact from the board is an enjoyable task because you get to come in contact with a lot of different people.

If you want to contact the board don't hesitate to message me!

Treasurer
Romeo van Adrichem
penningmeester@
transportkunde.nl

My name is Romeo van Adrichem and I have taken upon myself the function of treasurer of this year's board. I was born and raised in Delft, so I know this city by heart. As a young boy my parents took me to the days the TU Delft was open for the public, and I have been fascinated by physics and mechanical principles ever since. Throughout my bachelor Mechanical Engineering, which I started in 2015, I discovered that I in particular liked the interaction between machines and the general overview of entire mechanical systems. Therefore, the choice for Multi-Machine Engineering was quite an easy one. So far I can say I could not have made a better choice.

As treasurer it is my responsibility to ensure the association has sufficient means to facilitate all the great activities happening during the academic year. Since the Business tour is our biggest event happening during the year, especially cost wise, I also QQ that committee.

Commissioner of External Affairs
Eduard Jongkees
extern@transportkunde.nl

My name is Eduard Jongkees and this year I am commissioner of external affairs of Pandora. Thata means that I am responsible for the relationship between Pandora and our partners. This includes for example organising excursions and lunch lectures, taking care of advertisement and making agreements for the cooperation of the companies with Pandora.

Already a while back I landed in Delft and started my career with Civil Engineering. Eventually however, I found out that Mechanical Engineering was more my kind of business and therefore I switched. It took a few years but ultimately the choice for a masters arised. After an extensive research I decided to go for Multi-Machine Engineering. Not only the fancy name but also the wide range of topics makes that this master prepares you to achieve all your conceivable life goals. Until this very day I fully believe this was the right choice. That is not just studywise, but also because of my amazing fellow students and colleagues from whom I learn a lot and, not unimportant, enjoy working with.

In life I endeavor for a good balance between fulfilment and professionalism. Doing my hobbies and in the meantime looking for possibilities to make them profitable, both economically and ecologically. For my working life also I try to achieve this balance. Doing the job I like while making the world a better place to live.

Commissioner of Education
Julia Russell
onderwijs@transportkunde.nl

My name is Julia Russell and this year I am the commissioner of Education. I fulfill the function of being the connection between my fellow students and the University.

I was born and raised in Amsterdam. After living in the capital city for 18 years, I was ready to move to a somewhat smaller city and start my bachelor Mechanical engineering at Delft University of Technology. Multi-machine engineering was the next step. The world is globalizing more and more, this gives rise to transportational challenges. To face these challenges knowledge of logistics, supply chain and process optimization are of great importance. I think these topics are really interesting. That is why the master multi-machine engineering caught my attention.

Up until now I'm really enjoying the master as well as the being the commissioner of education.

FROM THE STAFF

By: Rudy Negenborn & Mark Duinkerken

Dear MME & TEL Students, Dear Alumni,

How small things can cause disruptions in our nowadays large-scale system operations. While at the time of writing this "From the staff" all was as usual about three weeks ago, at this moment the university is closed for students and onsite education, you as students are all studying from home, and we as staff are all working daily to prepare materials and assessment methods to support you a smooth continuation of your studies on large-scale mechanical (transport) systems and their interactions—all because of a virus that is so small, yet causes disruptions that cause world-wide issues, also in supply chains, transport and production environments. This illustrates clearly how interconnected the world we live in and operations and logistics in transport processes have become.

One year ago, we introduced the track Multi-Machine Engineering (MME) as the successor for the track Transport Engineering and Logistics. At this moment we can already conclude that this step was successful: we were able to better communicate the unique characteristics of our educational track to both prospective students and the industry that needs this type of engineers. One example that shows the value of the MME approach is the course 'Integration Project'. Here the different disciplines are used to address a multidisciplinary problem. Both technical and logistical challenges are met on an operational, tactical and strategical level. It is our goal to further develop this course, in which the various perspectives of practically all staff members can become involved. One of these staff members is new staff member Jovana Jovanova, who has recently started as new assistant professor in the area of Machine and Equipment Design. Next to that, there will be more opportunities for hiring new junior staff to contribute to education. If you graduated recently, or will graduate soon, and you are interested in an educational career at the TU Delft, so we can send you additional information.

At the same time, due to the current crisis, the development of online education is getting a boost. Whereas we already used online methods with class room lectures and instruction sessions in our so-called blended learning and flip-the-classroom activities, we are now rapidly moving all activities online. We are very much aware that this also does ask a change of your study style and getting used to new ways of interacting with the teacher and your fellow students. As staff, we are trying out new tools and features to support your learning experience in the best way. This does at times take some experimenting! Supervision of the projects in the second year, e.g., using Skype is now going smoothly; the first graduation presentations and defences have already taken place, including also family and friends as remote participants. For online lecturing, we are now finding out the functionalities of virtual class room tools like YouSeeU. Here, how to create interaction with you as students during such a lecture is one of the points of attention. As such, we do invite you to also in these times express to the teaching staff how you experience your learning and the activities and tools that we provide. Suggestions are welcome. And, when you participate in an online

lecture, do feel invited to try the ‘raise your hand’ and chat functionality—this is much appreciated by the staff and is a most important way in which we can keep aligning the explanations of concepts with your learning needs.

In order to grow further as a track we need the first year group of MME-students to act as our ambassadors and spread the word on our track! Especially now, when happenings like the master event cannot take place because due to the social distancing measures the experiences of the current students can inspire Bachelor students to seek further information on this track. Please forward them to us if they have questions to be answered.

We also kindly invite all former IO, PEL and TEL graduates to spread the word on multi-machine engineering. Like in your own education in the recent or not so recent past, we are still connecting Transport Technology with Logistic Engineering! Furthermore, if you are enthusiastic about university education and are able to represent the voice of industry you are welcome to participate in our ‘beroepenveldcommissie’, the industrial field committee that provides all mechanical engineering tracks at our faculty with feedback and inspires us to continuously improve our education.

It is a bit of a cliché, but we do try to see this period of turbulence also as an opportunity. Many of the educational tools and materials we are developing now will also be useful for coming years. This may be the start of supporting a ‘study from anywhere-anytime’ approach, where even more than before you get the freedom to choose when you want to engage in activities in your development towards becoming a Multi-Machine Engineer!

Best regards,

Rudy Negenborn & Mark Duinkerken

A NEW STAFF MEMBER

By: Matt Hepworth

INTRODUCING: Jovana Jovanova

I am Jovana Jovanova, the new assistant professor at the TEL section within the MTT Department. I started in January 2020 and my goal is to establish a MEGA SMART Structures and Systems research direction. Large scale design is exciting new area for me as it can be approached from different angles: large scale can consider size, but it can also consider the number of units and interactions. By introducing smart concepts, novel designs can result in better performing machinery, adaptive systems and modular integrated platforms. I am looking forward to working with students here at TU Delft, as well as with companies around in the Netherlands on designing MEGA SMART Structures and Systems in the Transport Engineering and Logistics sector. Originally I come from Skopje, North Macedonia and I was assistant professor in mechanical engineering and mechatronics at Ss Cyril and Methodius University in Skopje. I have also lived in Germany, Austria and USA for studying and research.

My interest in application driven design of multifunctional smart structures and systems has involved different activities ranging from advanced modelling techniques over exciting experimental testing to challenging prototyping. Multifunctional design includes smart materials and active components able to perform multiple functions through controlled combinations of structural property adjustments and dynamic behaviour modifications. Applications may vary from compliant mechanisms, medical instruments, deployable aerospace structures and metamaterial structures, to adaptive intelligent systems, soft robotics, bio-inspired design, origami designs, and vibration control.

It all started as I was working on the experimental setup for my MSc mechatronics project (Hardware-in-the-Loop Simulation of active damiping system) in Aachen, Germany and I got introduced to smart materials, in this case piezoelectric transducers. I continued exploring piezoelectric transducers for vibration control for my PhD and worked on an experimental setup for system identification and adaptive control algorithms at TU Wien in Austria. My interest in smart materials was supported with a Fulbright postdoc fellowship at Penn State University where I worked on functionally graded shape memory alloys for compliant mechanism design. Functional grading is enabled by direct deposition method for additive manufacturing of nickel titanium alloy. This also gave me the opportunity to expand my knowledge in Design for Additive Manufacturing (DfAM) and structures' programming (4D printing). Throughout the research projects I have also enjoyed working in international and multidisciplinary teams.

I continued exploring smart concepts in more broad sense focusing on mechatronic system design and multifunctionality. Multifunctional structures' and

systems' design takes in consideration variables from different properties of smart materials, embedded sensors, actuators and controllers. I have explored application driven design though analytical, experimental and FEA modelling. Different design optimisation algorithms were developed and applied for structures' and systems' design. The application driven optimal multifunctional design requires detailed and complex analyses of different domains interacting while integrated into a single system with controlled performance.

Upscaling the smart structures and systems concepts is my next research chapter. It will introduce challenges in modelling approaches, scalability, experimenting and prototyping. The MEGA SMART design will focus on sensor integration, actuation, advanced materials for adaptive applications in transport engineering.

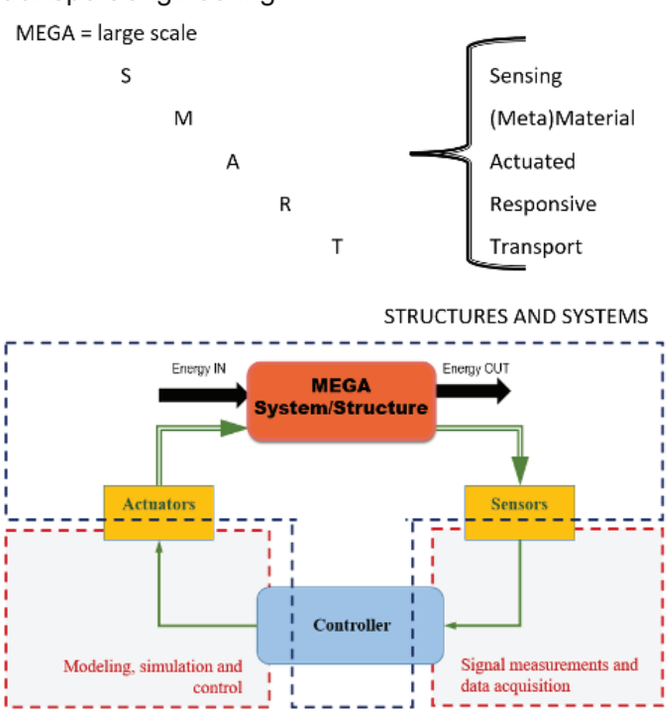


Figure: MEGA SMART Structures and System

The "smartness" is associated with:

- Sensing (sensor types, sensor integration, data acquisition and processing)
- Material (different materials in the design process, metamaterials, smart materials)
- Actuated (actuator types, actuator integration, actuator drives, distributed actuation)
- Responsive (sense the environment, process the information in controlled unit, actuate)
- Transport (transport engineering and technology applications, port terminals)

The MEGA structures and systems of the future will be designed using advanced techniques taking in consideration technological developments in design optimization, new materials, sensors and actuators, functionality, modularity and adaptability. I look forward to work, collaborate and contribute to the 3ME faculty, the MTT department and the TEL section group. I am excited to work with motivated students and technologically advanced industry in designing novel applications for MEGA SMART structures and systems.

BUSINESS TOUR

By: Romeo, QQ

Just moments before this article had to be submitted, the Corona crisis made it impossible to continue the Business Tour in the planned form. Currently the members are looking for alternatives, but because they still deserve credits for the amount of work they have put in so far, this is how they introduce themselves and showed their enthusiasm for the tour initially.

Introducing the BTC

The highlight of each academic year from the board's perspective is the Business Tour, a trip to a exotic country, where the attending students learn a lot about the differences in processes concerning all important directions of Multi Machine Engineering. Every year we try to find the most capable and enthusiastic students to organise this adventure, and it is my very honour to QQ these men, who are already showing great efforts to make this trip amazing. After a thorough selection procedure, which covered all continents, they came up with Singapore and Ho Chi Minh as the destinations, a choice which they will explain in their introduction. So dear engineers, hereby I present to you all, the Business Tour Committee!

Pieter

My name is Pieter de Groot and I am the chairman of this year's Business Tour Committee. I started with TEL/MME in February 2019 and choose the track because on one hand I enjoy to explore the inner workings of (large) machines and equipment used in the logistics process, but also I like to study the interaction of these machines with each other, propose improvements and to make the chain as a whole function more efficiently.

As a chairman of this year's BTC, I will use the experiences I had in the previous business tour to India past summer to make this year's business tour as unforgettable as last year's! We will be visiting both Singapore and Vietnam. This gives us the opportunity to discover the similarities and the differences in terms of operations and logistics of these two countries, but also in culture. Because besides visiting universities, companies and other institutions, there is also time to do some cultural activities and of course have lots of fun with fellow students!

Joost

Hi everyone, my name is Joost Wempe and I am the secretary of this year's BTC. I have chosen the study of MME because I love logistics and big machines. Big machines are nice because you really have the feeling you have actually built something. Not just some other small chip for your phone but an excavator able to collect 22 tons per scoop.

If I'm not studying I'm busy publishing my BEP, practicing rowing, field hockey, being in the gym or drinking a beer in some pub in Delft. I joined the committee because I love meeting and working together with new people. (However it turned out that I already knew 2 out of the 3 other board members, but nevertheless). Luckily I also love to organise trips for other people as I always organise small trips for my fraternity of Virgiel and I enjoy seeing how others appreciate it. This year we have decided to go to

Ho Chi Minh and Singapore. I sincerely hope that we can find out what the main difference is between the Netherlands, Singapore and Vietnam on how cargo is handled as well as the overall logistics of other factories. While we also have enough time to visit cultural highlights and other mind enhancing experiences in these beautiful countries.

Marcel

I am Marcel van Benten and I have the honour to be the treasurer of this year's Business Tour Committee! I started with the bachelor Mechanical Engineering in 2016 and now, 3,5 years later i am halfway through my first year of MME. I really enjoy this track and I really like to know all the details about big machines like an excavator and how to make all sorts of machines work together flawlessly.

Next to my study I like to go to the gym, have some beers with my friends and go to parties. I joined the committee because i already knew i wanted to go on the trip, nevertheless the destination and I thought there is no better opportunity to make the trip really awesome then actually organising the trip. Also, I wanted to learn some more about organising bigger events, such as this trip and especially the financial side, to make the ends meet for a big event like this. The destinations of this year are chosen because of the big differences in between and because they both have fascinating cultures and economics. In Vietnam the majority is done by manual labour while in Singapore automation is playing a big role. Singapore has one of the biggest container terminals in Asia and a lot of other businesses that are very interesting to visit. Ho Chi Minh City also has a big variety of businesses and is even more different from our western culture, which makes it such a great experience. I am sure this trip will be unforgettable!

Alex

My name is Alex Robinson and I am the Commissioner of External Relations. I am originally from Aalsmeer and started in 2016 with the bachelor mechanical engineering here in Delft and currently in my first year MME.

My hobbies are fitness, drinking beer in the sun, listening to music and going to festivals. The reason I am on the business tour committee is because I have always wanted to organize such a trip and it seems like a really nice experience in both organisational and educational perspective. Because I also really like to travel, this is also a good motivation to organize such an amazing trip, since it secures me a spot to see a whole new side of the world. Singapore and Ho Chi Minh City seem to be great places to go, both countries have a unique culture, while they are also opposite in many respects. Singapore is one of the most modern countries in the world, and Vietnam is still emerging, that is why we chose these destinations, and that is why I am sure the trip will be a great experience for everyone attending.

From left to Right, Marcel van Benten, Joost Wempe, Pieter de Groot & Alex Robinson

CORONAVIRUS

By: Dr. Wouter Beelaerts van Blokland

“Pie Growing”, “Pie Sharing” or “Pie Shrinking”; the vulnerability of global supply chains and networks and the need for End-to-End supply chain risk transparency.

After we had already received calamities from China in mid-January, Fiat Chrysler reported on February 6th that production in Europe would be jeopardized because Chinese factories had been shut down and parts could no longer be delivered. Producers such as Toyota and Honda had already halted production in China, followed by Hyundai in South Korea. On February 17, the Fiat Chrysler factory in Serbia was shut down. The European car manufacturers work with suppliers just 400-500 km away because of the JIT principle. JIT allows you to respond flexibly to market demand. The whole principle of Just-In-Time supply as I explain to my students is that the stock level for the Large Scale System Integrator OEMs and involved “first tier” (systems), “second tier” (sub systems) and “third tier” suppliers (components) can be minimized and thus the capital requirement throughout the chain. Another reason for working closely with suppliers is that the development risk and investments in the Design Engineering phase are spread over the chain. We also call this “Pie Sharing”, all parties benefit. And with “Pie Growing” (the cake is growing), the entire chain benefits from growth. But if the “Pie” no longer grows “Pie Shrinking”, and suppliers of e.g. components disappear from Europe to China, what are the consequences?

Brexit already showed the first development of supply chain disruption. Goods will be in transit for longer and more buffer stock will have to be maintained. English car factories were already hoarding last year. It indicates the effect of disruption of global supply chains. And not only the automotive has to do with it. An article in the Financieel Dagblad of 6 March reported to us under the heading “Port of Rotterdam is preparing for a major“ corona dip ”. In February, 20% fewer ships left from China to Europe, which has a huge effect on a chain of companies, from terminals and storage companies to service providers such as lashers. It is not only an effect of the closure of production locations in China, we are now faced with a drop in demand because consumers can no longer buy because they are quarantined or severely affected by their incomes. Are there also winners? These are the niche players such as the Seatrade company who only do refrigerated transport of fruits with refrigerated vessels and partly with refrigerated containers. (Trouw 09-03-2020). The demand for this form of transport of perishables such as Avocados and Kiwis is enormous and cross global, from New Zealand, Latin America, USA and Europe. The margins for services of refrigerated ships are rising because the reefer containers are stuck somewhere in Asia and there is therefore a shortage of this type of container. Due to the swine fever in China, large quantities of pork were shipped from Europe with refrigerated containers to China, then China went into Lock-down, leaving about 200,000 containers trapped, according to Seatrade. Those reefers are now somewhere because there is no return freight. Meanwhile, the fruits grow on the trees and they have to be harvested otherwise they are worth nothing and on the other hand there are the Supermarkets that are in high demand. In addition to the fact that traditional fruit is being

shipped in cooling vessels from Seatrade from Latin America and New Zealand to China and Europe, it is now also electronics, medicines and chemicals that are being shipped in refrigerated containers with refrigerated vessels. This increases the demand for refrigerated transport.

These are exceptional times due to the outlined disruptions, certainly with a drop in demand due to the Covid-19 crises. The question arises whether there are also underlying trends that can substantiate this? An important source of inspiration is the book "The World is Flat" by Thomas Friedman (2005). It is the first announcement of the "Platform Economy" which is dominated by digitization at organization, production, chain and personal level. This could create global supply chains that have facilitated a kind of hyper competition, with the result that production and development have leaked mainly from the USA and Europe to Asia, including the emergence of China and India (WTO, 2001). Apple, HP, CISCO, but also automotive companies work with contract manufacturers (CMF) and satellite factories such as BMW, Daimler and VW, which mostly serve local markets. Markets have grown rampantly over the past 15 years, also known as "Pie Growing" mentioned and if everyone grows along then there is also "Pie Sharing", which means taking advantage of growth by suppliers / producers. This growth was partly achieved due to nine important trends. These are;

1. Development and refinement of the World - Wide - Web which provided access and interconnection to millions of companies and billions of consumers.

2. Development of BAAN, ERP systems that facilitate the workflow in and between organizations.

3. Development of open source software such as Linux operating systems, Microsoft and Apple operating standards and application software. 4. Outsourcing of business activities and e-commerce.

5. Offshoring due to lower labor costs, lower taxes and other market entry-reducing conditions such as the lack of collective labor agreements and environmental legislation, etc. Meanwhile, GE has brought back the production of washing machines from China to the USA (re-shoring) a few years ago during the period of Barack Obama.

6. Supply chaining of "global Supply Chains" in which networks are created that optimize and facilitate the transport of goods between suppliers, retailers and consumers. 7. "In-shoring" facilitated by "third party logistics" such as UPS where Large Scale System Integrators were able to further focus on core competences and logistics service providers formed an essential link in the management of goods flows.

8. In-forming with the development of search engines including Google and Yahoo, which could lead to personalized services.

9. Development of the "Digital Platform Economy" in which "everyone" is connected by search engines facilitated by the new monopolists such as Apple, Facebook, Google, Amazon, Uber, AirBnB etc. This "Platform economy" also has disruption in itself of business models such as with Amazon, AirBnB and Uber. In Uber's case it turns out to be more "Pie Shrinking".

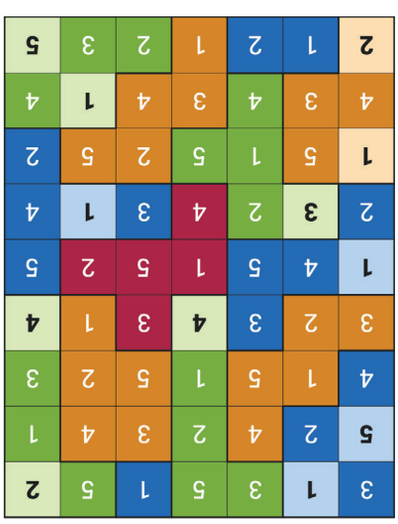
In addition, today we see the increasing power of autocrats, increasing nationalism, over-consumption and the need for energy transition and health risks from the Covid-19 virus. These developments have put us in a situation in which economic and market interdependence has grown enormously and as a result of which the world has become extremely sensitive and therefore vulnerable to supply chain disruptions. These arise from power and market imbalances, from dependencies and the use of other standards. If there is no longer "Pie Sharing" but "Pie Shrinking" where people no longer benefit from the global supply chain network and it is a "Zero Sum Business" where the profit of one means the loss for the other and experiencing it as such then results in disruption. You could say that the world should become less "Flat" but more "round" again. Now with the Covid-19 crises, the world appears to be a drifting mammoth tanker that does not appear to have partitions because we have optimized it.

What we can learn from this is that spreading supply chain risks by involving suppliers closer to home

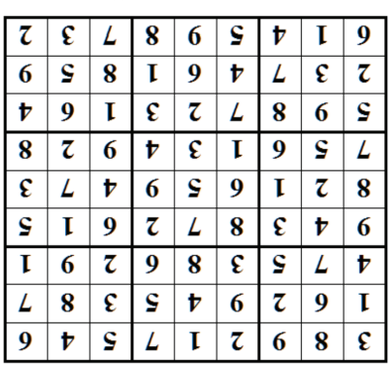
with shorter supply transport chains is desirable. This also applies to food. It costs quite a bit to get Avocados and Kiwis here also in terms of emissions. Fortunately, we are also increasingly going to get our food locally from the farmer or produce closer to the city. It also applies to the spread of health-safety risks by jointly developing medicines, for example within Europe. We seem to have become extremely dependent on suppliers in India and China for this. Do we want to be so dependent on India and China and the associated supply chain risks? Organon was abandoned for the benefit of the shareholders, but is being restored again, which is positive for the rebuilding of the knowledge infrastructure, employees and consumers. It is important to continue to develop own standards within Europe with regard to socio-economic issues such as collective agreements and digital communication. Have we not become too dependent on monopolists and countries that carry political, trade and social risks and are not so concerned with people and labor rights and can blackmail us. Global supply chains are thus exposed to geopolitical and health safety risks, as well as risks related to the labor market and labor law and risks to consumers. The Rijnlands collaborative model is the basis for protecting the community against these risks. It also means working together with other trading blocks, but under the conditions of “Pie Sharing” and not “Pie Shrinking”, i.e. on the basis of reciprocity with the aim of “End-to-End supply chain risk transparency” in accordance with the sustainability principle.

Puzzle solutions

Tectonic



Anti-knight sudoku



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RECENT ACTIVITIES

By: The Board

Before the COVID-19 outbreak, several activities were organized by the board, and next to the drinks of each period, some interesting activities, like lunch lectures and company visits have taken place, here a short overview.

Lunchlezing Royal Haskoning

On monday the 14th of October, Sander van den Brand from Royal Haskoning came to the TU to deliver a lunch lecture.

The engineering and project management consultancy has a lot to offer, not only throughout Europe but also worldwide. During the lunch lecture we were introduced to where the company operates as well as taking a closer look at some projects that had been conducted closer to home. At Royal Haskoning, all kinds of projects come through the door. From offshore wind farms to logistical revamps and transport planning, meaning no two jobs are quite the same. Due to the excellent overlap of our master and the projects at Royal Haskoning, a large number of the employees at the Rotterdam branch are graduated MME students and the career possibilities within the company for current students are excellent. Keep an eye out for upcoming vacancies and don't forget to check out their current graduation projects that are listed on our website

Excursion Royal Haskoning

On Thursday the 5th of december, an excursion took place in collaboration with independent international engineering and project management consultancy firm Royal Haskoning DHV.

The group of students who joined the excursion all met at noon at the central station in Delft, to commute a small ways away, to Rotterdam. When they all arrived everyone helped themselves to a nice cup of coffee and a presentation about the workings of the company was given.

After this the students received information about the case they would be working on. The case was about creating a transport route in rural Africa, to transport raw materials from the mine, which are located inland, to the sea, to be transported all over the world. There were several ways the raw material could be transported, and finding the optimal combination for different combinations of demands was a fun challenge. After the first round everyone was treated to some snacks to keep the energy up for the second. Then it was back to work for the students, as the demands had suddenly changed, a way to get used to real life scenarios according to Royal Haskoning. When everyone had given their final presentation the winning group was chosen and

all the members of that group received a certificate from the company complimenting them on the good job they did. After this it was time for drinks and snacks, which Royal Haskoning had kindly provided. It was a nice way for the students to, in a relaxed atmosphere, get to know the company a little better.

Germany trip

A little while ago a group of about 20 enthusiastic students went on the yearly Germany trip.

The trip started on Thursday the 20th of February morning at 9 AM, when we got on the bus and started driving to the first company, which was a power plant facility which cooperated with Eurosilo. We first got a presentation which showed how the construction of such a huge facility took place and how much power it could generate. After that we got a tour of the plant. Unfortunately it was not running at the time, but the shear size of everything was very impressive nevertheless. After our visit we got back on the bus to drive to Aken, where we would spend the night. Luckily for us it was carnival when we came to visit, so the whole city was filled with fun activities. After a night out on the town we had the morning off to all get a nice breakfast. With all bellies filled we got back on the bus for the second company visit, a brown coal mine. Again we first got a presentation about the company, after which we got a tour of the mine. The mine stretches for multiple square kilometers and is home to the largest vehicles in the world (in front of which we are posing in the picture). After this visit we had nothing left to do but go home and reflect on an amazing two days filled with lots of laughs and educational moments.

Lunch lecture TBA

27th of February, TBA visited us to give a lunch lecture about the inner workings of the company and the process they go through when a client approaches them with a problem.

TBA is a company that specialises in simplifying the operations of ports, terminals and warehouses, so that all of their clients can deliver to their respective customers safely and efficiently. They accomplish this goal by combining world-class, end-to-end, integrated software where they can simulate entire ports and terminals with professional consultancy solutions for the entire lifecycle of ports.

The students were very interested in what it is the employees do precisely and how the meetings with clients work. It was a very insightful lecture showing us a different side to port design than we are used to.

Concerning coming activities:

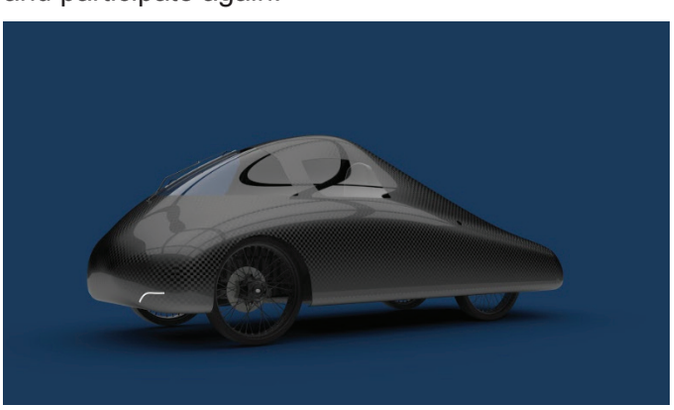
At the time of this writing, the situation concerning the pandemic seems to improve a little, we as the board hope to organise the majority of the activities that normally take place in the 3rd and 4th periode in the first semester of next academic year. We hope everyone stays safe and healthy, and that the activities will be even bigger successes than usual.

DREAMTEAM: ECO-RUNNER

By: Eco-Runner Team Delft 2019-2020

Last August the new Eco-Runner Team Delft has started working on the Eco-Runner X, a hydrogen-powered city car. By building an efficient hydrogen-powered vehicle we strive to contribute to a sustainable future. Hydrogen is already used as a fuel for cars, but many new techniques can still be developed to produce highly efficient cars.

In its first year, Eco-Runner Team Delft built the Eco-Runner 1. It was built in 2006 for a final bachelor project and the vehicle is the only Eco-Runner powered by petrol. The vehicle was built in a limited time and with limited resources, but it nonetheless achieved the team's goal of running 500 kilometers on one liter of petrol. Even with a non-functioning fuel injection system, which was the most important feature of the vehicle, the team was able to achieve a range of 557 kilometers per liter. This achievement encouraged the team to build a new Eco-Runner and participate again.



Eco-Runner X

The next year the team decided to participate in a different class of the Shell Eco-marathon, the Prototype class. Eco-Runner Team Delft wanted to accept an even more sustainable challenge and they decided to build a vehicle powered by hydrogen. This second vehicle was named the Eco-Runner H2. The Eco-Runner H2 participated in the 2007 edition of the Shell Eco-Marathon, where it achieved the Dutch fuel efficiency record with a range of 2282 km/L.

Eco-Runner 8

In the following years, work continued on an efficient hydrogen-powered city car. The efficiency of the vehicle has improved a lot over the years. For example, the engineers improved the aerodynamics and weight of the vehicle in order to drive increasingly economically. Due to the passion and drive of the students, Eco-Runner Team Delft has finished on the podium of the Shell Eco-marathon almost every year, with even a gold medal in 2015. The Eco-Runner has also won the "Vehicle Design Prototype Award" for the past two years, which is presented annually to the best-designed vehicle.

Eco-Runner Team Delft is currently building its tenth vehicle, the Eco-Runner X. After the successes in

the Prototype Class, it was decided this year to take on a new challenge. This year, the Eco-Runner will participate in the Urban Concept class. In this new class, there are more rules that the vehicles must comply with, making them much more similar to modern city cars. For example, the vehicles must have 4 wheels, wipers, front and rear lights and a tow bar. The interior of the car must also have luggage space and the driver must be able to sit upright.

Design Presentation of the Eco-Runner X

In addition to the new class introducing more requirements for the vehicle, the tactics of winning have also changed a lot this year. In the Prototype Class, the efficiency of the participating vehicles is tested on a circuit on which the cars have to travel a certain distance. In the Urban Concept Class, in addition, the vehicles have to stop several times to simulate driving in the city. This means that the Eco-Runner X must not only be efficient at a constant speed but also must be able to accelerate and brake efficiently.

Team members working on the production of the Eco-Runner X

All these new rules resulted in a completely different design for the Eco-Runner X this year. Where former teams could build on techniques used in the previous Eco-Runners, this year our engineers had to start from scratch. The engineers have done their utmost to design the most efficient hydrogen-powered city

Our driver preparing to drive the Eco-Runner 9 in the Shell Eco-marathon 2019

car possible. At the moment they are working on the production of the Eco-Runner X. How, where and against whom we will race this year is not clear yet. This, unfortunately, depends on the developments of the coronavirus. We will do everything we can to build the world's most efficient hydrogen-powered city car, to defeat any possible opponent we will meet!

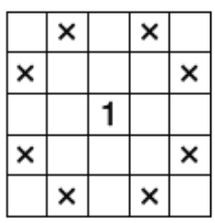
Eco-Runner Team Delft winning the Vehicle Design Prototype Award

Eco-Runner Team Delft 2019-2020

PUZZLES

Anti-knight sudoku

Place a digit from 1 to 9 into each of the empty cells so that each digit appears exactly once in each row, column and 3x3 outlined box. Additionally no two identical digits can be a chess knight's move away from each other (as shown in the diagram).



The solution can be found on page 16.

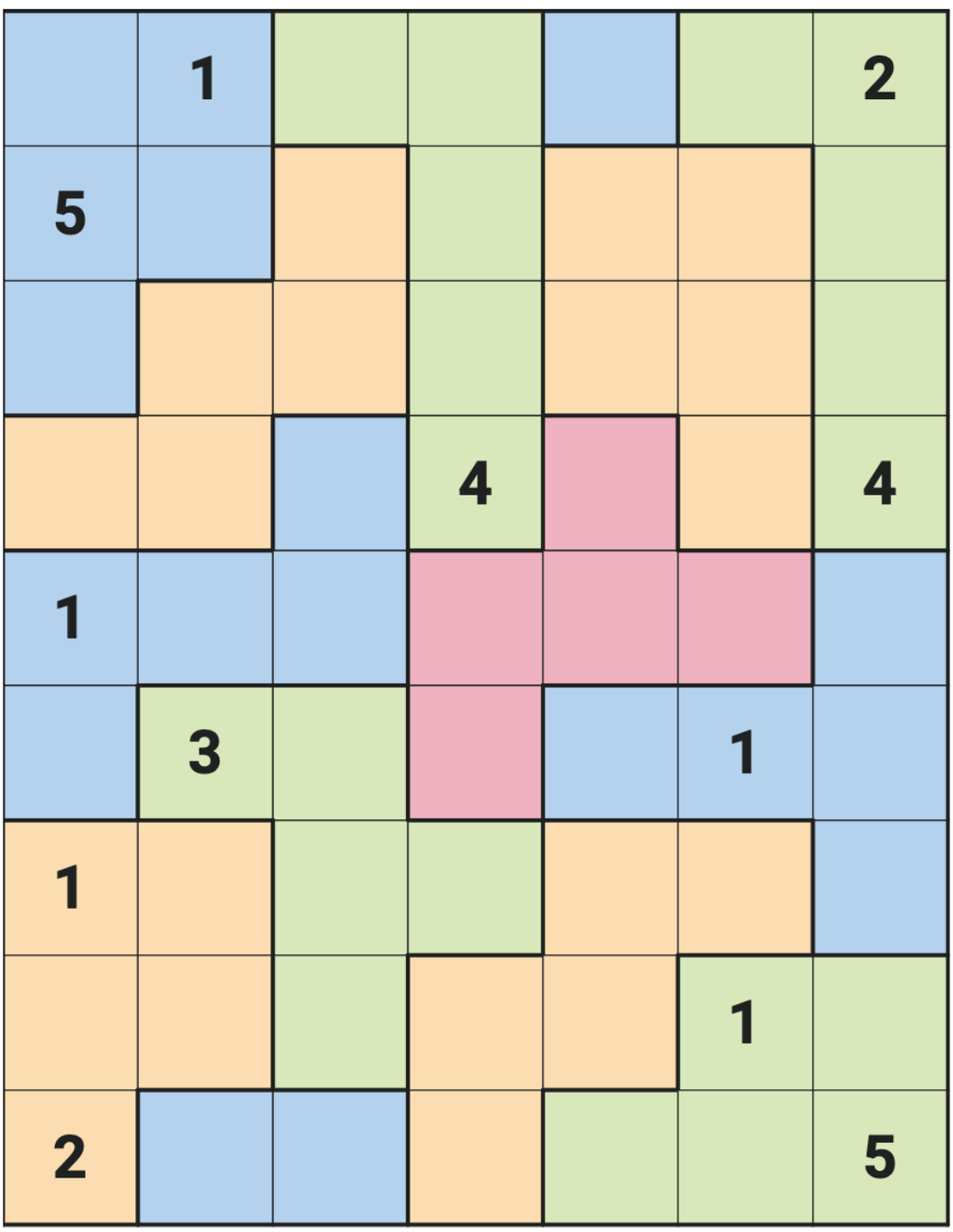
	8	9	2			5		
1				4				7
4				8		2		
			8			6		
		1				4		
		6			4			
		8		2				4
2				6				9
		4			8	7	3	

Tectonic

Each block of n cells must contain the digits 1,..,n just once.
So, a block of only one cell must have number 1.
A block of 2 cells contains cells with numbers 1,2.
A block with three cells: 1,2,3...etc.

The second rule is that adjacent cells may not have the same number.
Adjacent means horizontal, vertical or diagonal.
If a cell contains number 1 all other (3,5 or 8) surrounding cells cannot be 1.

The solution can be found on page 16.



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