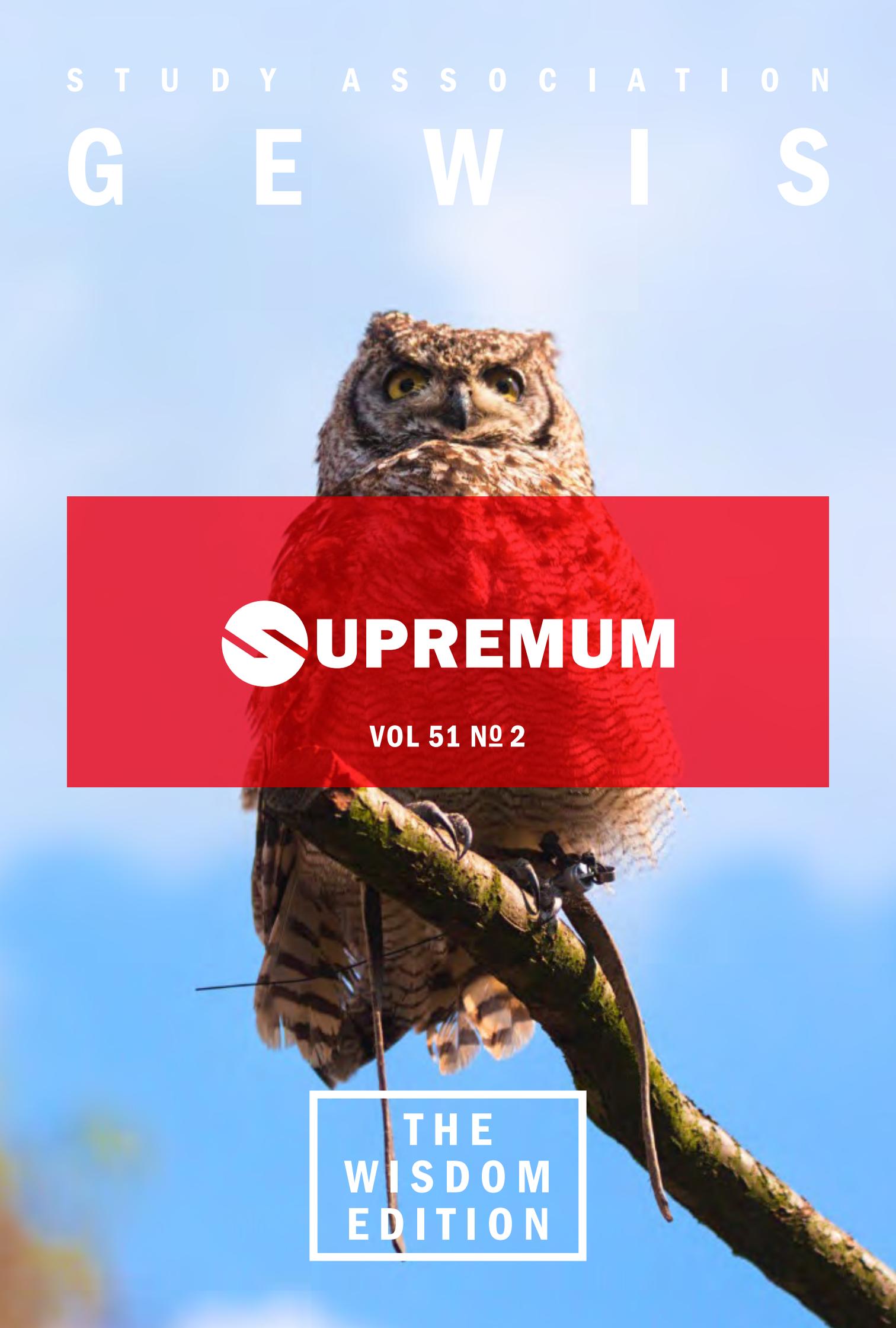


S T U D Y A S S O C I A T I O N

G E W I S



 **SUPREMUM**

VOL 51 Nº 2

THE
WISDOM
EDITION

EDITORIAL

EDITOR IN CHIEF Sjoerd van Heesbeen

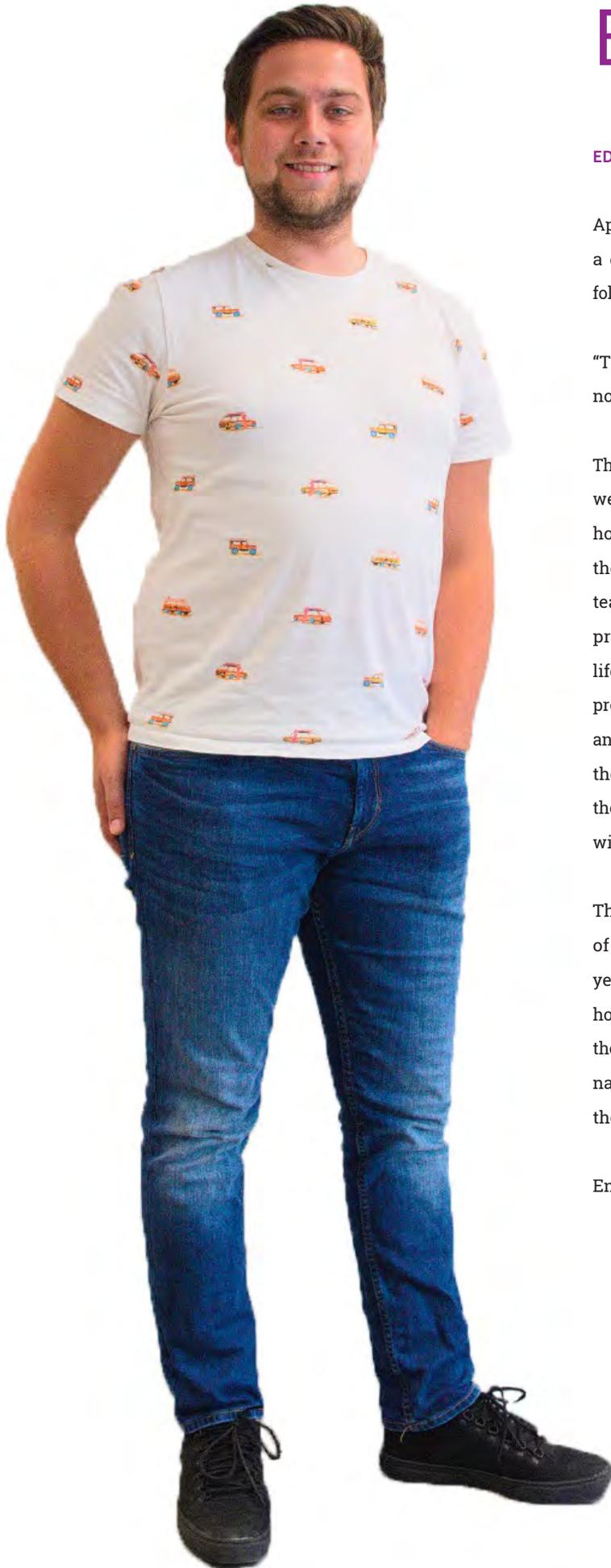
Apparently, it is tradition to start the Supremum with a quote. So let's continue this tradition with the following statement by the Greek philosopher Socrates:

"The only true wisdom is in knowing you know nothing."

The previous editions were about facts, what knowledge we have and what is really true. For me, wisdom is how you use these attributes. Our department thinks the same about this statement. In the beginning they teach us lots of theory and towards the end we get projects to actually implement the theory in real life situations. Furthermore, wisdom is the thinking process behind a decision, how you use the knowledge and the truth to find a solution to a problem. Sometimes the solution you think of is not the perfect one, but the thinking behind it can be right, which can be called wisdom.

This edition we will use the knowledge and truth of last editions to make a smooth end of this year. ATHENA will help us find some wisdom with a horoscope and the 38th board of GEWIS will introduce themselves. Now it is up to you to make a wise decision, namely reading the last magazine of the 51st year of the Supremum.

Enjoy reading how wise GEWIS can be!



CONTENTS

EDITORIAL	1
CHAIRMAN'S NOTE	3
EDUCATION FIRST	4
HOW TO WIN EXPEDITIE GEWIS	5
ACHMEA... KAN JE DAAR SNEAKERS AAN?	8
WHY MATH ISN'T FOOTBALL, BUT IT COULD BE	9
THE ITILITY ALIEN PUZZLE	10
WISDOM ABOUT YOUR FUTURE	11
"I CAN OFFER SOLUTIONS"	13
ESPORTS	14
ADVANCE WARS	15
MY OWN EULOGY	19
GALA	21
ATHENA	23
MEET DE KANDI'S	24
BECOME PART OF SUPREMUM!	28
AANSTUREN OP NANOMETERNIVEAU	29
STUDYING ABROAD	31
THE WISDOM OF THE UNKNOWN	34
DATAOPSLAG IN DE CLOUD	35
RAMMSTEIN'S LUCIFERIC 'RAMMSTEIN'	36
THE ERA OF 'THINGS' IS COMING AND THE INDUSTRY IS ENABLING IT	39





GEWIS

CHAIRMAN'S NOTE

This is already the last edition in which I write this article in my function as chairman. During my year as the chairman I obtained a lot of wisdom; about my function, my board members, the members, other associations and the department.

TEXT Illona Hoenderop

One of the most important tasks as the chairman is to keep the board together as individuals, but also as a team. Therefore, all the board members need to find a good balance between their life as a board member of GEWIS and their personal life. Because of the lack of time during your board year, it can be really difficult to find such a balance. Luckily, we can help each other to find this, however this boundary differs per person. As the chairman of my team, I experienced that my board members worked on different limits, but still were in control. The way I observed this in my team, made me develop my skills in recognizing and handling different kind of personalities.

“ ... my board members worked on different limits, but still were in control. ”

Besides my team, at our department there are a lot of different people I met, all with their own story and enthusiasm in an expertise. How to address such employees can differ a lot, as they are also just human with their own personality. One of my personal goals at the start of my board year was to know with which attitude and goal I needed to enter a conversation or meeting. While learning this, I have had my ups and downs; a logical but sometimes inconvenient process. Now, almost a year later I can say that I have obtained a kind of a feeling for those situations, which can be really useful for the rest of my life.

Professors differ of course a lot from my board

members, as I have a professional relationship with them. Companies can be even more professional; it is possible that I want to become an employee of one of them in a few years. The way companies work is not always comparable. I joined some company meetings, lunch lectures in the break, pizza lectures during the afternoon and even a company dinner. The way I was able to observe companies in these different settings gave me the possibility to get to know them and also learn how I should act in such a setting.

At last, we of course have our great members of the association. Without them it is impossible for the association to exist. I really appreciate all the members who took the time to have a talk and supported our board. What you give someone, is what you will get back. Therefore, it is really important to compliment and appreciate all the amazing volunteers we have in our association.

“ What you give someone, is what you will get back. ”

This was only a part of the wisdom I obtained in my board year. I am really thankful for the opportunity I received. It is something which cannot be taken away from you. Next year, I will continue with my master study and use all the obtained wisdom from this year as the chairman of this beautiful study association, GEWIS. No matter how much knowledge you initially have about something, you will always gain more of it if you get more acquainted with it.



EDUCATION FIRST!

The academic year 2018-2019 is nearly over. Many first-year students are doing their best to collect those final ECTS for their binding study recommendation or P-certificate. Many students are making a final sprint to finish their bachelor, so they will proudly receive their graduation certificate during MomenTUm. But also, a new GEWIS board will be running the association. Therefore, this will be the last Education First! written by me. In this article I will briefly look back on the past year of being the Educational Officer of GEWIS.

TEXT Thomas Wiepking

In my first Education First! article this academic year, I mentioned that giving feedback as a student is crucial to improve the quality of our education. It gave me joy to see that even first-year students have given feedback in large numbers, ranging from joining kringgesprekken to helping to redesign the USE base course of which the new setup is running now for the first time.

“ ... I was allowed to develop myself on a personal level in a way I did not expect before starting my board year. ”

This academic year, we tried a new method of collecting feedback from the master students Industrial and Applied Mathematics. Together with Alessandro Di Bucchianico, Sandra Bruin and Nele Driesmans we organized the very first feedback session for IAM students. Even though there was some room for improvement on the session itself, teachers have received very valuable feedback to improve their courses. Hence, we would like to continue such feedback sessions in the future because we all believe

these have an added value. Maybe such a feedback session can be applied to the computer science master's programs too.

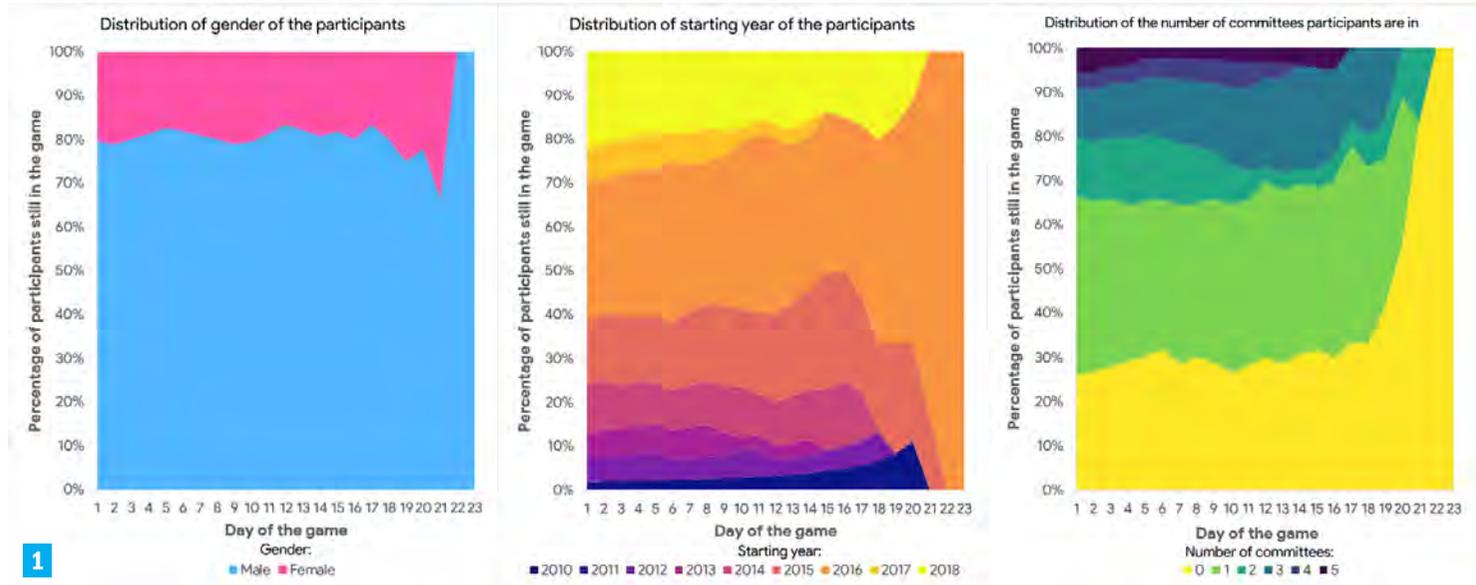
I have learnt that not only teachers are open to student's feedback, but the department management are too. During my board year I had many conversations with people of all types of functions within the university, ranging from the rector magnificus and chairman of the executive board to the dean of bachelor college and academic advisors. It is really nice to see that your feedback is acted upon on higher levels.

“ New challenges will always arise ... ”

I would like to thank you all, students and staff, for the good cooperation we have had this year. I have learnt a lot about the university, our educational system and (real-world) problem-solving. But next to that I was allowed to develop myself on a personal level in a way I did not expect before starting my board year. New challenges will always arise, and I have complete faith in my successor Bas to tackle them and continue making our education better than it used to be. I wish you all the best and hopefully I will see you around.

GEWIS





1

If it appears necessary to contact people about the game that are outside of the 100% trust zone, be sure to contact them anonymously. Use a different SIM card, so they won't be able to trace back that you are that weirdo that is motivated enough to contact them with convoluted voting plans. Yes, you definitely need two SIM cards to play this game.

STEP 2: INFORMATION IS EVERYTHING: KNOW YOUR OPPONENTS.

I'll say it again: information is everything. And you're in luck: if you've done everything from the previous step, you are already the person to take the game the most seriously of everyone involved. Nobody else in this game is hiding this information as obsessively as you are, so it's up for grabs. Don't know all the participants? There's a list of everyone participating in the event, which will allow you to look up all members. Not only can you find pictures of them – which allow you to link a face to unfamiliar names – you can also find a list of their committee memberships. If like me you have no idea which participants are close friends or are likely to collaborate with one another, this is a great start to find out. By mapping out which participants are in the same committee as one another, we can get a basic view of the playing field. It's graph theory time!

Every vertex in the graph represents a participant of Expeditie GEWIS. The larger their vertex, the more committees they are a member of. Two people that are in the same committee as one another are connected by an edge and the wider this edge, the more committees these two people share. Now of course this isn't a 100% accurate representation of reality, so we have to gather **more** information. Any time you are in the GEWIS room, keep an eye out for opponents and see who they are hanging out with and playing cards with. These people are friends with one another and can under no circumstances be trusted.

STEP 3: REPRIORITIZE YOUR LIFE.

You've got a game to win and one misstep can prevent that from happening. As much time of your life as possible should be devoted to Expeditie GEWIS. Once you have the correct answer to the daily challenge, the odds of staying in the game for another day are quite high. This makes it worthwhile to always check your answers again until you are as sure as you could possibly be. Even if that means that you have to count the LEGO bricks of the GEPWNAGE logo four times. Four times. Do I still wake up sweating in the middle of the night thinking about this moment? I definitely do, but it sure was worth it.

0

The Graph

1

Statistics about the game. Needless to say, you need to update these daily

2

Expeditie GEWIS land



ACHMEA... KAN JE DAAR JE SNEAKERS AAN?

*J*a! Dat was inderdaad één van de vragen die ik stelde tijdens mijn meeloopdag bij Achmea. Hoe ik daar terecht ben gekomen? In dit artikel neem ik je mee in mijn werkzaamheden als Data Scientist bij het Data Expertise Centrum van Achmea.

TEXT Cindy Caljouw - Achmea

IK WIL DIE RASPBERRY PI!

Op Tweakers.net vond ik een treasure hack-game waarmee je een Raspberry Pi kon winnen. 'Die wil ik hebben', dacht ik! De game was ontwikkeld door Achmea. Vol goede moed begon ik aan de game en speelde hem uit. Je studeert wiskunde of niet). Na het uitspelen van de game werd ik benaderd of ik wilde deelnemen aan een inhouse-dag voor IT-talent. Ik kon die dag helaas niet dus besloot een mailtje terug te sturen. Ik gaf aan dat ik die dag niet kon maar wel graag eens wilde kijken bij de grootste verzekeraar van Nederland. Het was te proberen...

Een aantal dagen later werd ik gebeld en vertelden ze dat het mogelijk was om een dagje mee te lopen binnen Achmea en wilden graag weten waar mijn interesses lagen. Op basis van mijn antwoord kwam er een voorstel; een dag meelopen in het Data Expertise Centrum. Het leek mij superleuk om eens binnen te kijken bij zo'n grote coöperatie met maatschappelijke impact en zulke gigantische datasets.

DE GEVREESDE IT-GROT

Je hebt het begrip vast wel eens gehoord; de IT-grot. Dat was het beeld wat ik van werken binnen een IT-afdeling had. Tijdens de meeloop dag bij het Data Expertise Centrum van Achmea werden mijn vooroordelen direct ontkracht. Ik trof sociaal capabele mensen aan die zich met innovatieve projecten bezig hielden. Even ter informatie; ze zaten niet in een grot). Tijdens deze dag vuurde ik allerlei vragen op ze af; ik wilde weten wat voor een sfeer er heerste binnen het team, met wat voor projecten de Data Scientists zich

bezighielden en niet geheel onbelangrijk; of ik mijn sneakers aan mocht...

WAT IK NU DOE?

Ik werk nu als Data Scientist bij het Data Expertise Centrum van Achmea en programmeer data-applicaties met R. Het toffe aan deze functie: je bekleed als het ware een consultancyrol, maar dan wel binnen een organisatie met maatschappelijke impact. Iedereen binnen Achmea met data én een vraag kan een beroep op ons team doen. Samen proberen we het vraagstuk te kaderen en te zoeken naar een manier waarop we met behulp van data (en wiskunde!) een antwoord kunnen formuleren. Na het maken van deze data-applicaties moet de data-applicatie uitgelegd worden aan de opdrachtgever, en wanneer ze tevreden zijn, zo worden (om)gebouwd dat het in het bedrijfsproces gebruikt kan worden!

WISKUNDE & ACHMEA; ER ZIJN HEEL VEEL COMBINATIES MOGELIJK ;)!

Ik heb het genoeg gehad om al een aantal verschillende combinaties te mogen beleven. Zo heb ik opdrachten gedaan voor diverse domeinen (o.a. Human Resources, Achmea Bank en Eurocross Alarmcentrale) waar ik allerlei wiskundige technieken heb kunnen gebruiken! Naast mij zijn er momenteel ruim 300 andere data-analisten verspreid over diverse afdelingen binnen Achmea. Ieder met hun eigen expertise en doel. Of je je nu bezig houdt met het analyseren van klantgedrag, meewerkt aan proces- en productverbetering of aan het vaststellen van premies: je werkt hoe dan ook met enorm veel gegevens.

COMPANY





WHY MATH ISN'T FOOTBALL, BUT IT COULD BE

Playing for my local football team at age ten I had an amazing coach. He was the kind of coach that could give game changing half-time pep talks. The kind of coach you wanted to play a fantastic game for. I'm very lucky for having had that kind of experience. Having had a person, not family or friend, who made you want to be the best version of yourself. Who made you appreciate the game. I wish math was like that.

TEXT Robert de Keijzer

When I started to study here in Eindhoven I thought I fully understood what math was: trying to solve textbook problems on your own and always ending up looking at the answer sheets. That view drastically changed after the first lecture of Set Theory and Algebra. What had I gotten myself into? During the first few homework classes half our year was crying while the rest was probably doing so internally. But don't get me wrong, I loved the theorems, the lemmas and finally being able to be creative with math. It was a new opponent, on that freshly mowed pitch, that I was happy to challenge.

After a while though you start to get into a routine. You've played all the games, seen all the stadiums. Most of your work starts feeling like high school again. Making homework exercises, exchanging answers with others, learning old-exams by heart, etc.. That was, until this winter, while I was working on my thesis project. Somewhere during that project I got promoted to a higher division where there were unknown opposing teams ready to play.

I chose a project on algorithms for energy estimation on quantum computers. In my literature study I found a scheme for qubit reduction. The validity of this scheme was proven the physicists way, meaning there was most certainly some faulty reasoning. The proof of the scheme was at most sketchy, referring to a lot of papers that didn't quite say what they were looking

for or didn't have anything to do with the topic at all. So I tried to find a better one, but to no avail. After the first half of my new game I was 1-0 down.

Halftime: in a meeting with my mentor I told him about this proof and how I couldn't find a better one. "Why don't you do it?", he said and the way he said it reminded me of my football coach. "Yeah, why don't I", I thought to myself and I started working. Before I would have thought I would never be able to come up with anything like it. But with some help here and there I managed to get a proof of the scheme in a few weeks. Winning the game with, let's say, 3-1.

Any mathematician who's been stuck on a problem for weeks will tell you that solving that problem is one of the best feelings you can get. It's exhilarating. You almost kind of somewhat really deep down start to understand Emma Waaiboers reaction to Duncan Laurence winning the Eurovision Song Contest. The feeling when all things finally click. That feeling is almost as good as seeing 'frikandellenbroodjes' on sale at the SPAR, or that video of the board collapsing in Audi 10.

I think that the best coaches give you the feeling to believe: "Well, it sounds crazy, but maybe I can do it." And when that crazy idea becomes a reality, that feeling will never leave you.

THE ITILITY ALIEN PUZZLE

CAN YOU SOLVE IT?

In a galaxy far, far away, there lives a special race of morbid, puzzle-loving aliens. They're investigating which life force is the smartest, and due to recent developments in data driven technologies, humans have appeared on their radar. Therefore, they've abducted 25 samples from planet Earth...

WHAT IS THE MAXIMAL K ,
FOR WHICH YOU CAN BE
SURE TO FIND THE
POISON?



- » The aliens select 5 subjects out of the 25 humans that were abducted
- » They have K kegs with liquids. 1 of the kegs contains poison
- » The aliens prepare drinks for the 5 humans (and can mix liquids of multiple kegs).
- » The aliens will have 2 rounds, in which they will administer a drink to every still living subject.
- » Calculate how many kegs can be tested (largest K) such that the aliens know for sure which keg contains the lethal liquid.
- » For full details, scan the QR or visit bit.ly/alien-puzzle



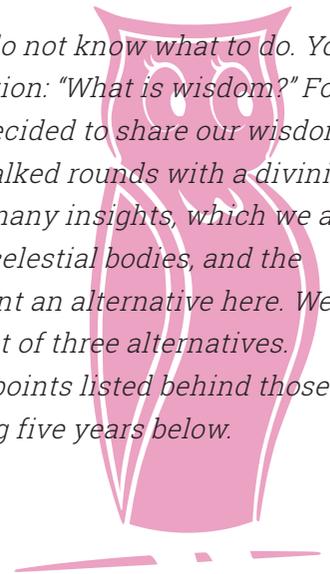
GO COMPANY





WISDOM ABOUT YOUR FUTURE

We all recognize those moments in life when you do not know what to do. You have to make a choice and ask yourself the question: "What is wisdom?" For this Supremum edition, we as the fraternity ATHENA decided to share our wisdom with you. We read the tea leaves and coffee grounds, walked rounds with a divining rod and studied the starry sky. From this, we received many insights, which we are going to share with you. Since we did not see much in celestial bodies, and the corresponding classification by constellation, we present an alternative here. We selected five categories, in which you can select one out of three alternatives. Choose your favorite of these alternatives and add the points listed behind those options. Then find your future prediction for the coming five years below.



TEXT Dionne Heuvelman - ATHENA

CHOCOLATE (RELATIONSHIP):

- » Caramel sea salt (2)
- » Dark chocolate almond sea salt (3)
- » White chocolate raspberry cracker sugar (1)

ANIMATION MOVIE (FAMILY):

- » Minions (2)
- » Frozen (3)
- » Beauty and the beast (1)

HOLIDAY DESTINATIONS:

- » Hawaii (2)
- » Scandinavia (3)
- » Greece (1)

COCKTAILS (FRIENDS):

- » Gin Tonic (2)
- » Cosmopolitan (1)
- » Mojito (3)

COLOR (DIVERSE):

- » Pink (1)
- » Blue (3)
- » Green (2)

PREDICTION 1 (5 - 8 POINTS)

As you love the sun shining outside, your house will totally fit this idea. It will be small and cosy, however it can be reorganized such that all your friends, family, neighbors and others fit in the house. It may be hard to imagine, but your spatial awareness will help you with this! You are really popular and have a bunch of friends. You still have contact with your friends from high school and met some study buddies at the university. In the future you spend your personal time mostly to keep in contact with your friends.

You are always looking for adventures. Nothing is too challenging for you, because you know exactly what you want and what you start. The tattoo or piercing you will get in the coming years, is something you will not regret!

During your relationship in the future you do not hold back from an adventure or party. Your partner is aware of this and trusts you. Because of your enthusiasm you can go together some time.



PREDICTION 2 (9 - 12 POINTS)

You are part of a close group of friends. In the future some friends will leave and some will join the group, but still you will keep in contact with each other to have your yearly trips.

In the meantime in the summer you can chill together in the pool at the backyard of your house and share some drinks. During these moments you share funny and embarrassing stories.

Your loved ones will become part of your close group. It is not surprising that the loved ones already knew each other, so therefore it became an even closer group of friends.

For you, money is something you need, but not something which makes you happy. You like your work, but only because it is necessary. Therefore, you have plenty of time left to chill at home and watch Netflix.

PREDICTION 3 (13 - 15 POINTS)

Since you were young, animals were always distracting you. No matter whether it's a small animal like a rabbit or big one like a panda, they are all cute in their own way. When you are grown up and got a job, you do not hesitate to get your own fluffy animal, all by yourself.

You love nature, and that can be seen around your home too. You will have a big garden outside your house, where you might even grow your own vegetables! Make sure you also make time for your loved ones, or sit in the garden together!

You have found your soulmate who totally fits in your best friends picture. You are never apart from your buddy. If something is wrong with you, your best friend is always there for you. You will keep in touch with each other, even when you are aged.

Your buddy and you are both going to find the perfect match in five years. You still take the time with the two of you to continue with your best friends habits, however this can be extended in a double date sometimes. Maybe your children can come along in the far future.



“I CAN OFFER SOLUTIONS”

Gabriele Spini is a cryptologist at Cyber Security & Robustness. He enjoys using cryptography to come up with solutions to problems that colleagues in other fields encounter.

TEXT TNO

“At Cyber Security & Robustness, we focus on two areas. On the one hand, we conduct research into the vulnerability of systems, improve the detection of security risks and draw up security protocols. On the other hand, we develop ways to make systems more efficient and resilient to disruption. As a cryptologist, I currently focus on two focal points: I use post-quantum cryptography to look for ways to make normal computers resilient to quantum attacks. Also, using secure multi-party computation, I help to make data analyses possible while still protecting privacy, such as combining resources in the medical domain or detecting fraudulent transactions in the financial sector. The personal data will then remain encrypted, but you will see the result of your analysis.”

PHD IN CRYPTOLOGY

“I did my Bachelor’s degree in Italy before going on to do a Master’s degree partly in Italy and partly in Bordeaux. I came to Leiden for my PhD research. After that I stuck around! The Netherlands is a beautiful country to live in and offers great career opportunities in cryptography. After my PhD I did a postdoc in applied cryptology at CWI in Amsterdam – and that’s how I got to know TNO.”

NOT A SEPARATE WORLD

“What I like about TNO is the deep and interesting research we do here, without this being a separate world. What we do is relevant to society and is immediately applied everywhere. TNO is also a great place to make connections with people from different disciplines. The nice thing about my profession is that I can offer solutions – the problems come from other fields and cryptography is often a solution!”

TNO

CONVEYING KNOWLEDGE

“It’s great that I get a lot of freedom at TNO to develop myself, and to be of value to others. My day is satisfying not only when I get a step further in a project, but also when I can convey knowledge through demonstrations and presentations. While I am specialising quite a bit right now, in the field of secure multi-party computing I do cover the entire process from concept and development to delivery and communication. I am mainly concerned with building up knowledge in the post-quantum field, which I then transfer to colleagues. In the future, I would like to focus on other disciplines, something that TNO also gives us scope to do. Would I consider taking the step from content to management? It’s something I’d like to try, but for the time being I’ll continue to give priority to content.”



ESPORTS

Esports, a sport practiced by many, yet unknown to most. A sports that differs from most other sports. A new fashion among many teenagers and young adults. You might be clueless of what esports is or you might have heard the term once or twice. So let's cover what exactly is this 'Esports'.

TEXT Jeroen Oerlemans

Esports is a 'sport' practiced on a gaming console (take for example a Desktop, laptop or PlayStation). Even though there are many esports players, it is a common misconception that all sports players are alike. Esports has a wild variety of games which are practiced by different types of players: there are team games or single player games, there are strategic games and action games, all practiced by different players.

Another misunderstanding about esports is that many 'outsiders' see it as 'playing a game'. The competitive esports environment differs a lot from casually gaming. Take street soccer for example: You play the game with friends with the purpose of having fun, however it looks nothing like the Champions League. This concept can be applied to the esports scene as well: while 'casual gaming' has similarities to competitive esports, it is completely different (in case you are wondering, yes there is a Champions League like tournament for most esports' games).

Now that you have an idea of what esports is, how do I (and many others) experience this sports on the TU/e and in my daily life? I practice the game called 'League of Legends'. This game has a massive esports environment. This summer I joined the esports association 'ESEV Zephyr', a sport association dedicated to esports. Like other sport associations, we have practice, we need a ESSC sport card and we attend national tournaments. League of Legends is a team game: we practice together, we play matches against other teams together and when we are not behind a screen we drink and go out together.

Like football, the tournaments have different tiers. You have the amateur teams, which play against other amateur teams to attempt to get better, and you have a professional scene, with prizes of millions and players earning a surgeon-like salary. Despite me being an amateur player, the experience of playing with and against others who share this hobby is truly amazing. I enjoy watching the professionals, you would be surprised how much skill, practice and dedication these athletes put into it.

I can already hear you thinking: "Jeroen, your story about esports is making me want to be an esports athlete, where do I start?". Pick a game and join an association, being in an esports environment greatly improves your skills. However, the main factor is practice, practice, practice. The best players in the world practice for at least 10 hours a day, every day. Of course, to participate in esports does not imply one has to be a professional.

Esports is an upcoming branch in the sports scene. It is the competitive environment based around playing games, with athletes all around the world competing against others to be the best in their field. However, one should not consider us as people who game their time away: esports is a team environment and I made many friends along the way. Your team is not just to do gaming with, they are friends who you can talk to, drink with and go out with. Esports is awesome.

MEMBER





ADVANCE WARS

You get better at playing games by playing them. This is especially true for tactical games, where the wisdom that you gain makes you win the hardest fights. The first game of the Advance Wars series is the third best turn-based war video game I have ever played. Period. Spoiler alert: the reason it is the -third- best, is because the first two sequels are even better than the original.

TEXT Henk Alkema

ADVANCE WARS

2001 - GBA



In a game of Advance Wars, you play as a Commanding Officer (CO), (hopefully) winning battles. This can be done by wiping your enemy completely off the map, or sneakily capturing their headquarters. Battles are fought on land, at sea, and in the air, with a grand total of 18 different units. Every unit has its own strengths and weaknesses: all infantry units are killed easily, but are the only units capable of capturing buildings. Some units are ranged, but cannot attack and move in the same turn. Aircraft is lightning fast, but can easily be shredded by anti-air units. Furthermore, the terrain features play a critical role. Buildings generate money, which can be used to repair or build units like barracks, ports and airports. Roads let you move faster, but forests and mountains give you a defensive bonus.

Every single aspect of the game is masterfully introduced. You can do the extensive tutorial, or simply skip it by winning a mock battle. Only after a few campaign battles, marine units are introduced, and it will take another few before you face your first aircraft. The plot, on the other hand, is practically nonexistent. The simple banter between the COs before each battle, however, is enough to flesh out their personalities. Speaking of COs, this is where the game shines most brightly. Every CO has the same 18 units, making it easy to remember every strength and weakness. However, every CO also has two unique traits. First of all, a flat bonus / malus for specific types of units (e.g.: infantry captures buildings faster, and can walk

further). This already gives the players a preferred way of playing. Secondly, there are the CO powers. When attacking or being attacked, a special meter fills. When filled, you can use your CO power, draining the meter. These can, when applied at the perfect moment, completely turn the tide of battle. They usually enhance the preferred units of the CO even further for a single turn, allowing you to break through carefully constructed defenses with ease, or capture a building of an opponent a turn earlier than they expected you to be able to.

Graphics-wise, the game is exactly what it should be. First and foremost, the battlefield is extremely easy to read. The sprites are bright and crisp. However, even though the maps are usually small, and the battles therefore really tight, still sometimes only a quarter of the map fits on the screen at once. My only other gripe with this game is the AI, which has a single glaring error which can be abused in most maps. To be honest, you usually will have to. The last battle of the campaign, and plenty of the >100(!) scenarios you can unlock, can be really difficult.

ADVANCE WARS 2

2003 - GBA



While Advance Wars 2 is a separate game, it is basically a DLC for Advance Wars. It cranks up the amount of COs from 11 to 19, introduces one new unit, and has its own campaign (with a bit more variety). In addition, every CO now has two powers, a standard power, which

only drains about half of your meter, and an extra strong power, which drains the full meter. That's all there is to it! In conclusion: epsilon better than the previous game.

ADVANCE WARS: DUAL STRIKE

2005 - DS



We continue towards the DS era, which has plenty of video games inspired by the number 2. And hey, if fighting one battle, using one CO per player is fun, what could possibly be more fun than using two COs per player, or even fighting two battles simultaneously? Nothing, of course! Normally, you 'only' have a single battle, but are able to swap between two COs. The titular Dual Strike is performed by using the CO power of both of your COs in the same turn. This, aside from ruining the life of your opponent the normal way, gives you an extra turn to boot. The most fun can be found when fighting on two fronts at the same time. Units can be sent from the primary front to the secondary front (not vice versa). While winning the primary front wins you the battle, winning on the secondary front gives you some kind of boon on the primary front. This gives you the sometimes extremely hard decision between either simply trying to survive on the secondary front, or stretching your already hard-pressed units on the primary front even thinner, hoping that victory on the secondary front will win you the entire battle in the long run.

The graphics haven't changed much (now having a 2.5D-ish look), but the increased total screen size helps with keeping an overview of the battlefield. The AI has clearly improved, and an even larger set of COs means even more variables, and therefore, more interesting decisions. All in all, a simply amazing game!

ADVANCE WARS: DAYS OF RUIN

2008 - DS



The year Dual Strike came out was the same year the wave of gritty movie reboots got kickstarted by the Dark Knight trilogy. Probably completely independently, Advance Wars got a gritty overhaul of its own. Days of Ruin takes place in a post-apocalyptic world, more than a hundred years after the previous games. This game is a brave experiment, which sometimes pays off, and sometimes utterly fails to do so. One of the fun new additions is that units can now level up twice by killing other units, making them slightly stronger. However, we're back to one CO per player, one front, and worst of all, the CO powers and special stat bonuses have been nerfed hard.

I have to admit, it is still a very solid game. However, in addition to my gripes mentioned above, the graphics look plain weird. Just look at those units, much larger than the bridges they are supposedly driving on! All in all, if another Advance Wars ever came out, and it were to combine the best of both Dual Strike and Days of Ruin, it could be a simply superb game. But this one isn't.

In conclusion, simply start by playing the very first Advance Wars. As long as you keep enjoying them, play all of the games in order. One note of warning: playing too much **will** make it feel all samey. The solution is simple: just play it on the go! I haven't been bored on public transport after starting to play these games, and maybe, you won't have to be anymore either.



0

Advance Wars - The battlefield, a.k.a. where the magic happens

1

Advance Wars - Same unit, different sprites for different countries

2

Dual Strike - A slightly different look

3

Days of Ruin - Just look at those units on bridges!



*Infimum: A strange or funny quotation from a teacher, a student or faculty member.
Here you can find infima sent to the Supremum committee via inf.gewis.nl.*

Emma: "Hij was wel groter voordat hij in de thee ging"

David: "Wie is Paul?"

Kas: "De barman"

David: "Van GEWIS?"

Max M: "Jort we hebben niet allemaal jouw biceps."

Jort B: "Ja ik ook niet."

Teun over zijn glas: "Mijn penis past hier niet eens in!"

Ilse op het NWERC: "Stel, je hebt een pak aan, zou je dat dan wel of niet een diamanten vlinder op je rug doen?"

Benne de Weger tijdens college: "Did I offend anyone?"

** stilte **

Benne de Weger: "No? Pitty."

Volenthousiaste, zodoende ernstig luide sjaars achterin de bus bij de ALD: "Ik wil worst!"

Op GEZWEM

Thomas: "Waarom drink je bier?"

Minimeeles: "Het stond in de koelkast."

Anoniem: "Ik weet niet wat anaal in het Noors is."

Ruben: "Ik weet niet hoe lang jij doet over 5 minuten lopen."

Het bord valt naar beneden tijdens Discrete Dynamische Systemen.

Luc Habets: "Dit heb ik nog nooit meegemaakt."

Ruben wordt over 18 dagen bestuur.

Ruben: "Ugh, ik heb helemaal geen zin in bestuur."

Laura: "Ik ben niet Laura."

Rick zit in Leons stoeltje, waar Leon ongeduldig langs staat

Thomas: "Laat me raden: jij wilt naar huis en hij zit in je stoeltje."

Leon: "Jup!"

Rik: "Weet je dat ik mij meer naakt voel zonder horloge dan zonder onderbroek?"

Arend en Järvi zijn in de Spar.

Arend: "Waarom wil je een bonnetje?"

Järvi: "Ik wilde weten hoelaat het is."

Romy (om 10:40): "Anne doe je mee bussen?"

Anne: "Nee, ik ga eerst ontbijten."

“ Ik weet niet hoe lang jij doet over 5 minuten lopen. ”

Kees: "Doe maar 38 x 2."

Lisan: "56 dus."

Willem van W.: "Ik kan wel even iemand aanrijden, meer bier voor ons."

Niels voelt aan zijn schouder.

Niels: "Jeetje, heb ik hier nu ook al vet zitten?!"

Bij een nabespreking van de acceptance test voor SEP: "Het is misschien niet zo handig om een Dvorak toetsenbord te gebruiken tijdens de test."

Koen de N.: "Maar we doen dus discodel, Sander's moeder en schultie op een rotonde."

Lisan krijgt een drankje met de naam orgasme: "Moet ik het shotten?"

Niels V.: "Zelfs mijn onderbroek is nat van Bas."

Rob (over hem en Eug): "Wij als seksgodinnen...!"

Max L.: "Een dispuut is een luxe vriendengroep."

Oma van Max: "Dan mag je je wel eens luxer kleden."

Kutjeroen ontvangt zijn BAC plaat tijdens de brandweer borrel: "Ik ben nu al... teleurgesteld..
Gelukkig functioneert hij altijd als onderzetter"

Tobin: "Is het trouwens Bas Gieling of Bus Gieling?"

Tijdens DBL meeting:

Rick S.: "Ik heb iets te veel buik op, daar houdt mijn bier niet zo van."

Arend: "HAHA! Scheurbuik is wel leuk!"

Feut: "Ik houd niet van geforceerd drinken."

Bouke: "Romy, het maakt toch niet uit in welk gat ik hem duw?"

Niels: "Heb je geen SEP nu?"

Bouke: "Nee, ik heb college nu dus ik hoef niet naar SEP."

Tobin: "Bestuuuuuur! Het is nat!"

Jeffrey: "Ja, dat zeg ik wel vaker tegen het bestuur..."

Tim K.: "Ik wil geen stoelen, ik wil een kapstok!"

lopend naar de fiets

Anoniem: "Moet er iemand anders ook naar.... Laat maar ik weet niet meer waar ik woon"

Pim: "Ah, kut!"

Klein kind: "Wat riep u, meneer?"

Pim: "Ai, chippies!"

Vincent: "Hey Arend, heb jij 1A al?"

Arend:

Vincent: "Ik ook niet."

Lars V.: "Ik ben dol op energierekeningen."

Damaris: "Een shotje Peachtree zit toch peer in?"

Evie N. tegen Patricia V.: "Ik vond onze camera-mentale sessie echt goed!"

Niekie verliest met mexxen

Niekie: "Zo wordt mijn bier tenminste niet koud."

Tamara: "Kees is heel subtiel met stickers plakken."

***Ysabelle zit aan haar kont*:** "Oh, ja!"

Willem: "Is dit een Ice of ben je blij om mij te zien?"

Romy: "Niemand wil mij in zijn kamer!"

Bouke: "Ik wil jou wel in mijn kamer."

Kees: "Get a room, you two."

Romy: "Ja, ik doe mijn best!"

Amber M.: "Ja, maar je kont heeft toch billen!"

Illona na telefoneren: "Deze vrouw had echt een veel te hoge stem. Nu snap ik wel dat mensen me vervelend kunnen vinden."

Over werken op de Markthal

Anne: "Waarop?"

Ruben: "Aardbei."

Reinier: "Is het dan niet aardop?"

Geert: "Nee, artisjok."

“ Is dit een Ice of ben je blij om mij te zien? ”





MEMBER

MY OWN EULOGY

I think about death sometimes. As I suspect many people do. Every time I do, there's one recurring thought: It's weird how death is something we consider such a normal part of life, yet it makes us so sad when it actually does happen. Which brings me to my own death, and how I would very much like my friends and family to not be sad when my time has come. I've had a good life. Not a whole lot to complain about, but a lot to be thankful for.

TEXT Mitchel Brunings

First of all, I'm thankful for the people that spawned me. My mom and dad. I'm thankful for their endless patience and for showing me how to be a good person. Teaching me the difference between right and wrong, good and bad, and left and right. Providing me with all basic human needs and so much more. I would never have been where I am without you. I wouldn't even be, literally.

They didn't just spawn me, though. I have a sister. And a half-brother and -sister. I thank my siblings for all the fights and fun we had. For the numerous alliances forged against my parents in the eternal power struggle for more candy and tv-time. I'm especially grateful for my sister, who's been my stylist, hairdresser, personal shopper, life coach, and more. I should probably try a little harder to follow her style advice...

In my youth, I didn't have too many friends, but the friends that I did have were all great! I thank you for the games we played, the stories we crafted, and the parties we've had. But most grateful of all am I for the fact that even though we don't see each other regularly anymore, we can just pick right up where we left off. Whenever education comes up, I often realize how lucky I have been with my teachers. Almost all of my teachers in primary and secondary education have been really great, as they were able to teach a whole class even while I was being an idiot. The amount of skill and patience they demonstrated was extraordinary, like when I would hide under my desk during the monthly civil defense siren test. I am

incredibly happy that they hardly ever kicked me out of the classroom. They usually managed to find some way to include me in the lesson, regardless of my behavior.

“ I should probably try a little harder to follow her style advice... ”

And then there's the extended friends and family: friends of my parents (and their kids), grandparents, aunts and uncles. Even great-grandparents and great-aunts and -uncles! Unfortunately, those that have passed, all passed when I was still quite young, though I still have a few fond memories of them. Those that are still here – especially family – make one thing very clear: We are always there for each other. I've seen it in action a few times when someone had a rather big problem; no matter the inconvenience, friends and family showed up to help. It's great to see such community, and I'm grateful to be a part of it.

As I grew up and started forging my own path in life, I gradually saw the people mentioned earlier less often. I went to university, so I didn't see my friends from school every day anymore. Instead, we hung out online playing (online) games with each other while chatting a lot. As a group of friends online having fun, we often



ran into like-minded people, who stuck around for more of that same fun with us. I'm grateful for this international community of retarded friends thanks to whom I never felt lonely.

It took four years after starting university, but eventually I moved to Eindhoven. After the move, I didn't see my family as much as I used to. Fortunately, I made new friends in Eindhoven as I met more people liking the same niche things I did. I became more active within GEWIS by joining the Supremum committee, serving as chairman for over a year, and final editor for the years after. Until this edition, that is, and I would like to thank Erik for taking over as final editor. I'd also like to thank all other members, current and past, for coming along this journey. Special thanks go to Alex for initiating the Grand Transformation into the slick new design we're now used to.

Somewhere along the way I also joined GEPWNAGE, a great group of friends with a love of the nerdiest stuff, and a special knack for combining those passions with beer. Thank you for showing me how social nerds can be!

A bit over a year ago, I figured out I really like archery, so I joined Da Vinci and you'll now find me on the shooting range regularly. Similarly, I learned that fencing is quite fun, and you'll find me on the piste when I have time. I'd like to thank the members of these associations for welcoming me with open arms, making the sport even more fun!

“ Thank you for showing me how social nerds can be! ”

Near the end of my bachelor studies, I found out I really love the Swedish language, and I started learning it. Having learned a bit of the language, and feeling it was time to visit the country, a Swedish friend invited

me to stay over at his place for a week in the summer. I accepted his offer, and I've been welcomed back there for a week every summer since. So Mattias: thank you! As I was starting my master graduation project, I was unsure about what I wanted to do after graduation. And then came the question of whether I'd want to do a PhD, with a position opening up right after my scheduled graduation date. I still needed to figure out if I wanted to do a PhD at the time, but as it turned out I really enjoyed the topic of my graduation project, and I really enjoyed working with my supervisor, so I accepted the offer. So, Dirk and Boudewijn, thank you for offering this position and for showing me where I belong!

But it's not just my supervisors and job that I like, but also my other colleagues, especially those with whom I share an office. I really enjoy our (sometimes random) discussions on life, the universe, and everything. Thank you for making my place of work also a place of fun!

And with that, there's one thank-you to give: to you, dear reader, for being interested in my story. And though this may be titled a eulogy, I'm not actually dead (yet). Should you be interested in knowing more about me or my hobbies, feel free to get in touch!



GALA

To close this fabulous lustrum year of not one, not two, but three of our amazing fraternities, we take a look back at the exquisite Lustrum Gala that these fraternities organized in collaboration with each other.



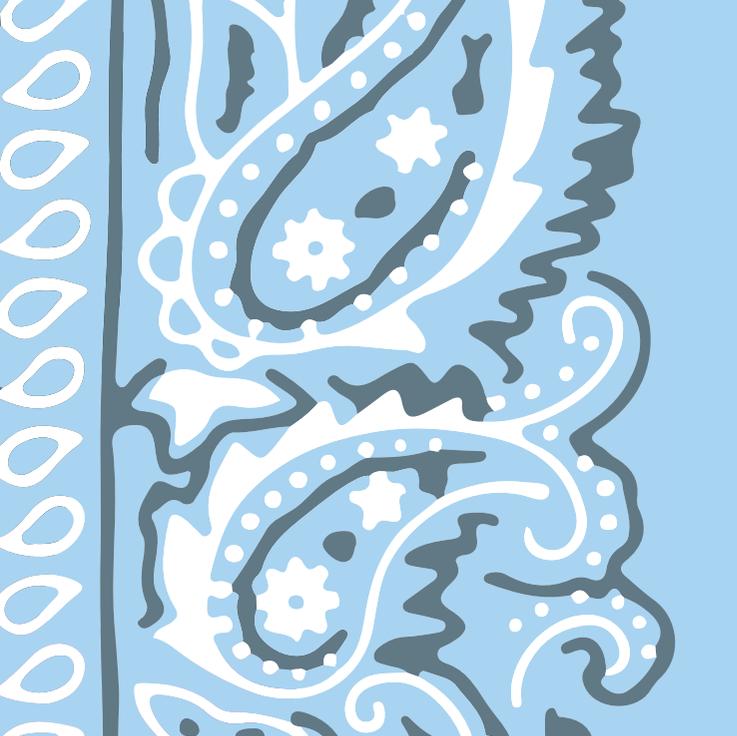




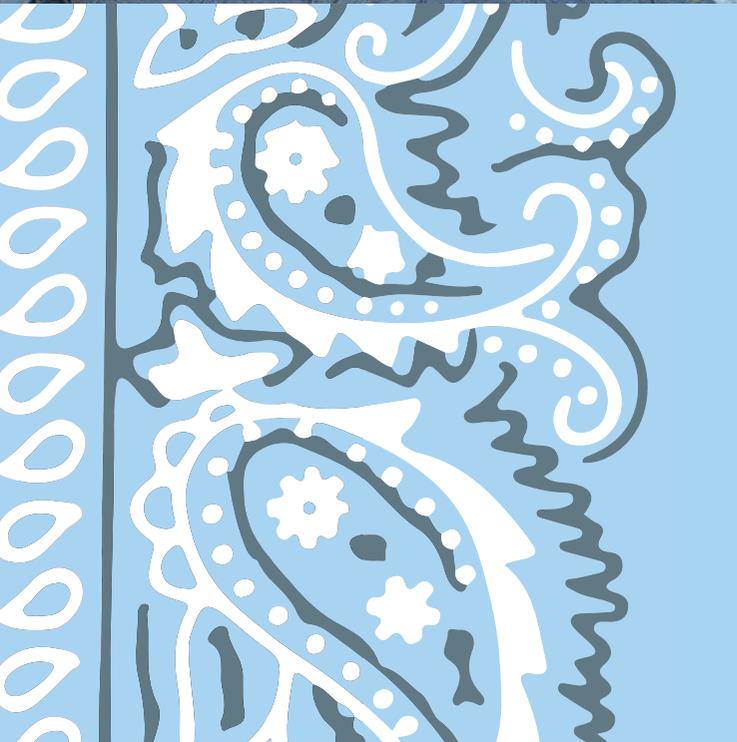
ATHENA

To honor the 5th birthday of our wise fraternity ATHENA, we here present a recap of their activities this year!





**CANDIDATES
FOR THE
38TH BOARD**



MEET DE KANDI'S!

To introduce themselves, the candidates of the 38th board have written a little introduction about each other with some inside information about their daily lives. Can you find out who wrote which piece? Did you read anything you did not yet know about our soon to be board members? Or do you want to know more about something you read? Don't hesitate to ask them when they are sitting at the bar in 'het Dakterras'.

TEXT Candidates for the 38th board of GEWIS

MEET KEES!

The saying "high trees catch a lot of wind" doesn't really work with Kees, because this not-so-tall B.O.O.M. member is the candidate chairman of the 38th board! Fortunately, this Soestenaar practices the volume of his voice every week at the borrel with B.O.O.M., volume which may come in handy as a chairman. When B.O.O.M. is done yelling, don't hesitate to have a chat with Kees at the borrel, as he won't bite, because he's probably too busy smiling and laughing. Apart from his pretty much endless positivity, he also cares a lot for the wellness of the group and his fellow GEWIS members – a real leader. Kees loves running across a football field kicking balls around, or when no balls are available, Kees loves running without kicking balls. He kicks ass doing it though, because he is pretty fast – he ran 21 km in 1:40:05 last year! This makes keeping up with him on foot as difficult as keeping up with the number of committees he's been a member of.



MEET BOUKE!

Bouke will be the 38th secretary of GEWIS and will therefore invade all your mailboxes as of the 1st of July. While Bouke is a 4th year GEWIS member, he is a 3rd year Computer Science student at heart. Bouke's greatest hobbies are soccer and drinking beer; the perfect man. While you can often find this party animal in the city on Thursday evenings, Bouke is not a fan of real animals, horses in particular. Bouke is very sociable and this has already landed him a total of 2 feutschappen! You might have seen him around drinking beer in a pink shirt, or drinking wine in a white shirt. This secret(ary) is not so mysterious, and will tell you a good story at any time, especially for 5 euros. While some days it will take hours, Bouke makes excellent minutes. Be warned though, he is also very skilled at dropping stuff, glass in particular.



MEET ANNE!

Origami, maths, crafts? Meet Anne! Someone who has many talents. Currently finishing two bachelors side by side, she will be in charge of the financials of GEWIS next year. That's right, you read it here first, Anne will be our treasurer! Quite active at GEWIS and the department, you might know her from the Supremum where she currently is secretary, the yearbook committee of 2018 where she was treasurer or the department council where she is a student member. As you have probably already guessed, Anne is a multitasker at heart, and an extremely capable one as well! Coming from Tilburg just recently, Anne has found a nice home right here in the beautiful city of Eindhoven. This means Anne can spend even more time at GEWIS and all the borrels and thus can enjoy even more leermomentjes, beers, a bottle of wine or pennoshots.



MEET ROMY!

Who is Romy? You might know her from the first year committee GEBRO'D, Supremum and every Thursday you can see Romy shine during the borrel. Romy is very special. Not only because she is studying web

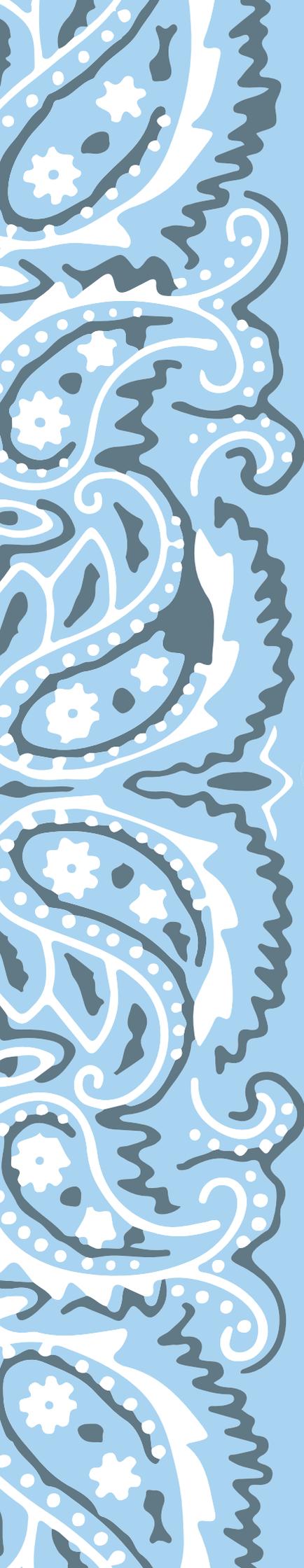
science, which is a study programme one cannot start anymore, but also because when you see her, she is always smiling and open for a conversation. Furthermore, she is always working on her appearance. This year she dyed her hair grey, to look like a grandma, and she will never wear jeans and a denim jacket together, because then she will look like a denim teletubbie. Next year she will be the internal affairs officer of GEWIS. With the qualities she has as a person, she will definitely become a good board member. If you want to know more about Romy, ask her and she will answer all your questions!



MEET BAS!

This multi storey skyscraper of a man called Bas will be the Educational Officer in the 38th board of GEWIS. He is already keen on receiving all your complaints, because his primary source of nutrition consists of salt and the tears of study coordinators. Due to his titanium reinforced backbone (no joke) his goal of standing strong towards a good education will be no challenge for Bas. This born multitasker is so great at doing things simultaneously that he even takes on two bachelors at the same time. This makes him, next to a computer scientist, also one of the only two mathematicians in the 38th board. In the little leisure time Bas has, he likes to enjoy a few (read 'many') glasses of wine along with some good food together with comrades, and therefore he is feut at the fraternity In Vino Veritas. Hopefully he will be a member soon, but for now he has a lot to learn. So don't be afraid to offer him a 'leermoment'!





MEET SUSAN!

As our lady from the north, starting in Tiel, via Culemborg, Susan finally found her way over the rivers to the City of Light, to study Web Science. Soon after, she became an active member of GEWIS, going by the name Suuscijzenbroodje, as member of EJC 17-0 GEBRO'D. By then, #0 on her bucketlist was to get quoted in the infima. Now she can proudly say that she accomplished this at least 6 times. However, that's not all! Meanwhile, she has been studying, organizing activities, editing the Supremum, serving beer, setting up a fraternity, and showing up at a great deal of other activities. As for parties, organizing them in Eindhoven, or attending them in Hungary, she knows her way around. Her journey does not end here, however. As of next year, she will be traveling around to present GEWIS to the world, as our external affairs officer!



MEET RUBEN!

You will recognize this red curly head everywhere! If it isn't for his fluffy hairdo, it is for the big smile that is always present on his face. Not only is Ruben very happy and sweet, he is also a great cook and he is currently (re)building his own motorcycle! Besides this, you can almost always find Ruben strolling around at borrels in his black and green sweater, where he is screaming his (curly)head off about trees and branches and stuff while drinking very sweet shots. In addition, Ruben is also very technical, smart etc. He is now fully engaged in his major Software Science and will be fulfilling the role of Digital Infrastructure Officer in the 38th board of GEWIS! Right now Ruben is also active at GEWIS as the chairman of both SSG as well as the fraternity B.O.O.M.!

Want to know more about Ruben and his function in the board? See: <https://www.youtube.com/watch?v=DT6tpUbWOMs>



Are you good at

- Designing?
- Mailing?
- Writing?
- Spellchecking?

Then the  **UPRENUM**
wants you!

The Supremum committee is looking for new members, if you are interested please contact us at: supremum@gewis.nl

AANSTUREN OP NANOMETERNIVEAU

Op de nanometer nauwkeurig een lineaire motor aansturen en dat uiteraard zo efficiënt mogelijk. Dat is één van de uitdagingen waar de mensen van Prodrive Technologies zich iedere dag mee bezig houden. Met succes, want Prodrive loopt wereldwijd voorop in deze (en andere) technologie.

TEXT Prodrive Technologies

Lineaire motoren kennen een breed scala aan toepassingen: van innovatieve nieuwe liftsystemen tot de productie van data chips. Vooral in de laatste soort toepassingen is nauwkeurige positionering van de motor van essentieel belang. Dat vergt een buitengewone performance van de hardware, firmware en software en dus ook van de mensen binnen Prodrive die zich hiermee bezighouden.

EVEN VOORSTELLEN...

Voor wie Prodrive Technologies niet kent: het bedrijf heeft vijf vestigingen wereldwijd, van waaruit het unieke technische oplossingen ontwikkelt en produceert in vele verschillende branches. Van automotive tot medisch, van semi-conductor tot industrial, motion en nog veel meer. Het hoofdkantoor van Prodrive is gevestigd op het Science Park Eindhoven in Son.

Eén van de vele mooie projecten van Prodrive omvat de ontwikkeling van lineaire motoren. Deze motoren werken op basis van magnetische velden, die gecreëerd worden door permanente magneten en elektrisch aangestuurde spoelen. De aansturing van die spoelen, de motor-drive, wordt onder andere ontwikkeld door Cas Bakker (drive design architect), Sander van den Hoek (firmware developer), Tom Thevissen (motion software developer) en Remon Damen (drive design developer). Zij bijten zich, samen met vele anderen binnen Prodrive, met plezier vast in de technologie achter de motor-drive.

HIGH END-TOEPASSING

Waar een motor op nanometer niveau aangestuurd moet kunnen worden, gelden strenge 'requirements' aan de drive. Technische eisen die het uiterste van de bestaande technieken vereisen, of zelfs iets meer. Aan de mensen van Prodrive de uitdaging om de grenzen van de technologie op te zoeken. Zo is voor de drive in dit verhaal een zeer precieze uitgangsstroom en zeer lage ruis vereist. Tegelijkertijd moet de motor zo snel mogelijk van A naar B bewegen, om voor de klant een zo efficiënt mogelijke productielijn te realiseren. "Daarvoor is een technisch hoogstandje nodig", zegt Remon Damen. "Zo moeten we heel precies zijn in de gain errors, offset errors en lineariteit, zodat we met een hele hoge precisie stroom kunnen maken." Ook is het van groot belang dat de positie van de motor voortdurend gemonitord wordt via allerlei verschillende sensoren. "Dit is dan ook echt een high-end-toepassing. Eén van de beste drives die je op de markt kunt krijgen."

Producten volledig op maat produceren is natuurlijk mooi, maar het maatproduct doortrekken naar een breder level, zodat het als generiek product 'off the shelf' verkocht kan worden, is ook één van de dingen waar Prodrive zich mee bezig houdt. Daarom is het volgens Remon zaak dat de drive bijvoorbeeld kan communiceren via verschillende protocollen, zoals Ethernet en EtherCAT. Dat wordt gerealiseerd door



gebruik te maken van een SoC (multi-processor system-on-a-chip), die zowel embedded processoren als een FPGA (field-programmable gate array) bevat. Het gebruik van de SoC biedt veel flexibiliteit, waardoor de drive zowel stand-alone als in een real-time communicatienetwerk als EtherCAT kan worden ingezet.

PRODRIVE MOTION PLATFORM

Op de drive draait PMP-software (Prodrive Motion Platform). Deze zorgt er niet alleen voor dat exact de juiste hoeveelheid stroom gegeven wordt om de motor tot op het kleinste detail de juiste bewegingen te laten maken, maar kan ook een bijzonder uitgebreide diagnostiek faciliteren. Dat is volgens software-developer Tom Thevissen de kracht van dit software-platform. "Vier jaar geleden zijn we van scratch af begonnen met de ontwikkeling van dit platform", geeft hij aan. "En de diagnostiek ervan werkt supermooi. We kunnen heel gemakkelijk tracen wat er precies op die controller gebeurt. Een klant kan eenvoudig zeggen: 'Ik wil nu weten wat mijn stroom op exact dit punt is, en wat hier de fout is in de positie van de motor, wat die encoder uitstuurt en wat die temperatuursensor meet. En dat wil ik allemaal in één plaatje hebben.' Of dat nu op 1 kHz is of op 10 kHz of zelfs op 250 kHz, dus met een super hoge frequentie, je kunt precies zien wat er gebeurt. Als we dit software-platform niet zouden gebruiken, dan zou dat veel moeilijker zijn."

Om communicatie tussen het PMP (dat op de drives draait) en het systeem van de klant mogelijk te maken, levert Prodrive API's aan. De klant kan 'daartegen praten' in verschillende programmeertalen, zoals C#, C++, Python en MATLAB. Op die manier kan iedere klant zijn eigen klantspecifieke data en diagnostiek verkrijgen.

VAN CHIPS TOT LIFTSCHACHT

Net zoals de hardware en firmware, dient ook de software voor vele verschillende klantwensen en met een breed scala aan specificaties ingezet te kunnen worden. Het systeem is dan ook modulair opgebouwd. De klant kan vervolgens aangeven welke bouwstenen nodig zijn in zijn specifieke geval. Dat maakt het

volgens Tom Thevissen ook erg leuk: "Van de productie van superkleine chips tot medische röntgenbogen en een lift die theoretisch gezien een kilometer hoog zou kunnen zijn... het kan allemaal aangestuurd worden door ons softwareplatform. Die diversiteit vind ik één van de leukste dingen in mijn werk."

ALLES IN EIGEN HUIS

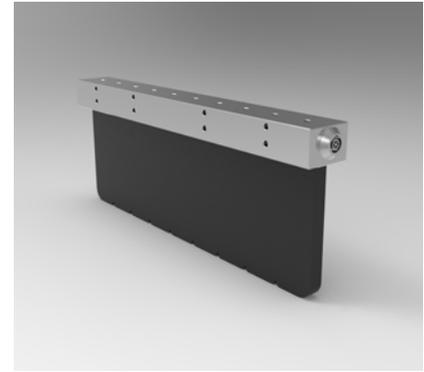
Van de PCB tot aan super-low-level programmeren, het software-platform en de API's die zorgen voor de koppeling naar de systemen van de klant: alles kan door Prodrive in eigen huis ontwikkeld worden. Dat kan soms een grote uitdaging betekenen. Sander van den Hoek: "Voorheen maakten wij voor deze lineaire motoren gebruik van een losse processor en een losse FPGA die via een PCB aan elkaar gekoppeld waren. De MPSoC (gecombineerde chip) krijgen we aangeleverd, maar de code die op de processor draait, maken we zelf. We maken de hardwarebeschrijving die op de FPGA draait zelf, we maken alle interfaces en hardware die eromheen zitten zelf, het PCB-design doen we zelf. Er heeft veel uitdaging in gezeten om dat allemaal goed op te zetten. Het enige wat we aangeleverd krijgen, zijn componenten. Maar het is gelukt, en juist die uitdaging maakt het zo interessant."

TECHNISCHE DIEPGANG

Behalve de nauwe samenwerking met een groot aantal collega-specialisten wordt ook de technische diepgang van de projecten binnen Prodrive door de medewerkers geroemd. Cas Bakker: "Binnen Prodrive krijg je veel uitdaging: je kunt technisch heel diep gaan. Je zit niet stil, verveelt je nooit en wordt flink uitgedaagd. Behalve met je eigen kleine stukje, kun je als je dat wilt ook bezig zijn met het grotere geheel. Ik zit ook weleens om de tafel met een klant, ik maak het ontwerpproces vaak van begin tot eind mee. Eerst is er iets in theorie, dan komt dat op papier te staan en uiteindelijk komt er echt iets in het lab te liggen waar je dan metingen op kunt verrichten. Daar worden we hier heel enthousiast van!"

Meer weten? Kijk dan op:

www.prodrive-technologies.com/supremum



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Drive Render X-motor CU



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MEMBER

STUDYING ABROAD

COMMUNICATION, HIERARCHY AND SELF-SHAMING

I t's New Year's Eve, and together with over a hundred thousand other people I am standing at the famous Shibuya Crossing. Just ten seconds to go before midnight, and everyone starts counting down out loud in their own language. When the counter reaches zero, I look around, and everywhere around me people are cheering, including me. However, there is one major difference between almost all people there, and me. I am wishing my newly made friends a happy new year, while most other people are on their phones missing out on the people around them.

TEXT Leroy Visser

Mobile phones are taking over the Japanese culture. During my internship, I had to commute by train daily. In the beginning I was fascinated by it; especially during rush hour. After a month I realised that it was nothing more than many people looking on their phones, and being silent all the time in a small and crowded space. I did not only see this behavior in trains, but also at bars and restaurants. Many Japanese people would go out for dinner or drinks by themselves, and just consume without interacting with others. This is completely different from the Dutch standards as we would go to a bar to talk, and interact with people. This culture of non-communication, unfortunately, leads to many cases of loneliness in such a huge city as Tokyo. To avoid this, many neighborhoods organize gatherings to meet new people and to start connecting. I had the opportunity to go to such a meeting, and I was able to talk to fellow students about the subject of loneliness. Most of them felt lonely and according to them it was part of the Japanese culture and education. Most Japanese students live with their parents until marriage, as solely renting an apartment in Tokyo is too expensive, and living together while you are not married is quite unique. Even if you are able to afford an apartment you are not allowed to make noise; and therefore, invite friends over at your apartment. So, you will have to meet your friends at for example restaurants or sport facilities. This in turn can be quite expensive, so many students get part-time jobs for the evenings and weekends. The combination

of study and work leaves little room for free time. Moreover, when they start working they become a member of the "karoshi"-culture, which is the most negative word given to describe the overtime-culture. This word roughly translates to 'death by overworking'; and it originates from the '70s. I have seen this overtime-culture at my internship as well. My team members made extremely long days, and it was normal. When asking them about it; they said they preferred working over other things. Additionally, they always made sure to start earlier and leave later than their managers; even though they were just looking to a computer screen and doing nothing to impress the people "above" them. Nowadays, the Japanese government is taking numerous measurements to reduce this culture. These were reasons provided by the students I spoke to, but I think there is more.

Taking a step back and watching the Japanese lifestyle from a Dutch point of view, I would like to add some of my own observations. The first observation is the lack of physical contact on a daily basis. When you greet people you bow, and if you are "close" you also wave a lot; but you do not touch. Touching, like giving a hug, is only common when you are in a relationship. I do not have to explain that the lack of physical contact plays a role in loneliness. The second and most important reason, is that Japanese people find it hard to connect on a deeper level. Therefore, it is difficult to build up close relations with people. One example



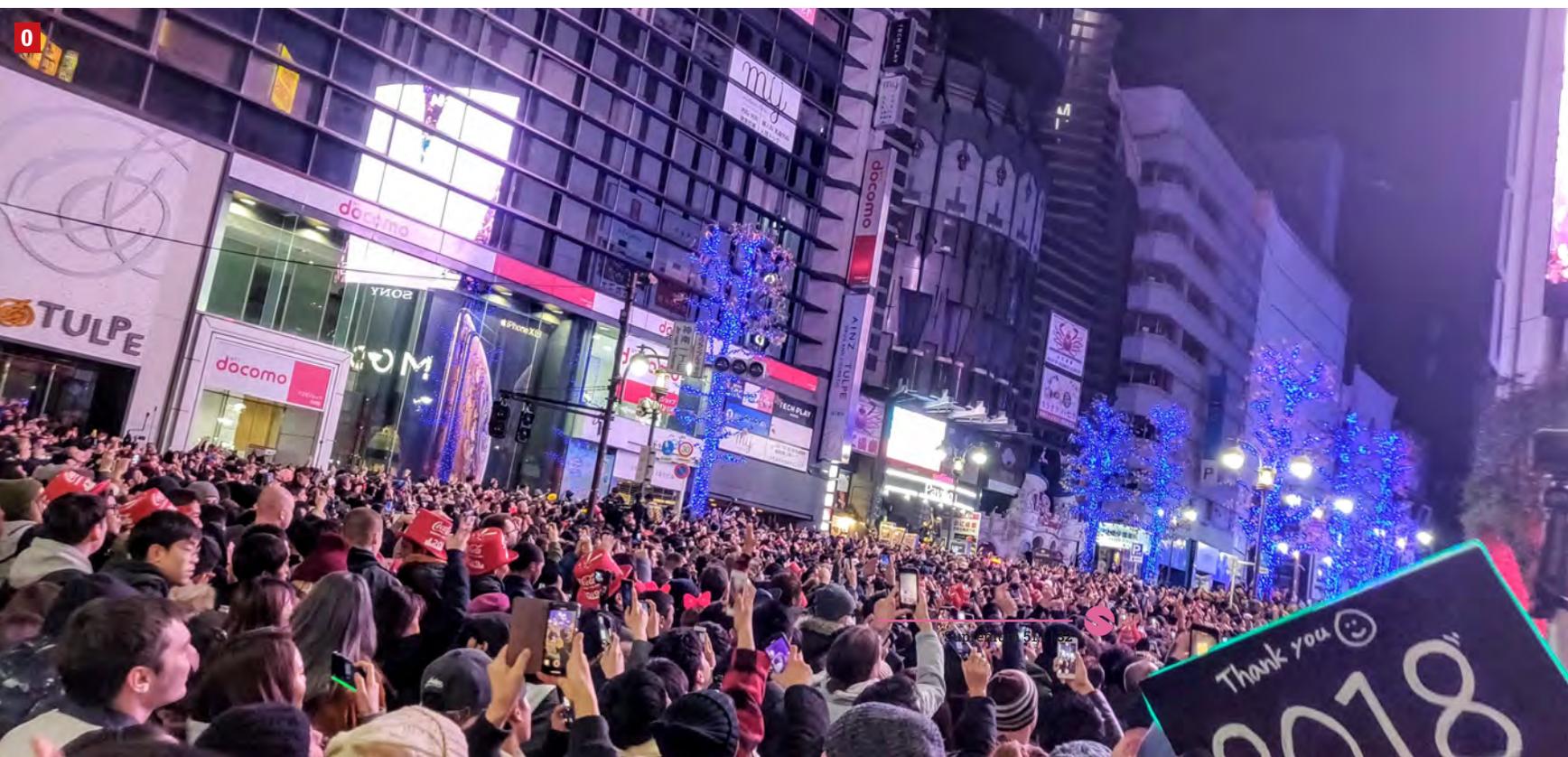
is a girl I met. At some point she slipped and fell on the ground; which was pretty hilarious to see. So, I laughed and helped her get up on her feet. This event, made her feel ashamed for the rest of the day towards me and others that saw her fall. Moreover, it made her so ashamed that she did not want to continue our visit to a Japanese garden together. She left, and I did not hear from her ever again; despite me thinking that we were becoming friends. This is just one example, but unfortunately I have encountered many situations for which a person could feel ashamed. For example, many young people were so ashamed for their mispronunciation of the English language that they did not want to speak ever again after one conversation. This led me to specifically state that they did not need to worry about their pronunciation. Additionally, I even complimented their efforts for trying, and suddenly I was able to connect with more Japanese people. This difficulty to connect to people because of shame, in turn, leads to loneliness. Next to being ashamed, it was also rude to ask your coworkers about their free time. I would always ask my supervisor how his weekend was, and if he did something interesting only to later learn that it was not appreciated in work related settings. This meant that it is also difficult to connect to your fellow colleagues during office hours.

I wanted to write about a topic, which was fascinating and different from the Dutch culture. Hence, I chose the topic of loneliness; but this is not at all how I experienced Japan in my international community. My internship was an amazing experience, I made new friends, learned about different cultures, and learned about my own culture as well. If you ever have the opportunity to go abroad please do so; it will be a life changing experience.

Taking all of this into account, the culture of non-communication, lack of physical contact, feeling ashamed, or pressured due to hierarchical status can lead to loneliness. The mobile phone only aids this cause, and therefore, I would urge people to connect more in real life instead of social media. Additionally, please use the Dutch directness to connect with international students on our University, because even here students may feel lonely as well!

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The specific moment in time



*Infimum: A strange or funny quotation from a teacher, a student or faculty member.
Here you can find infima sent to the Supremum committee via inf.gewis.nl.*

Saskia: "Wat doen die mensen hier allemaal?"

Maureen: "Dat is iets van ID."

Saskia: "Wat een kut ID."

Lars V.: "Ik ga toch zeker geen entertainment kijken om te worden geconfronteerd met de realiteit?! Daar zijn natuurdocumentaires voor!"

Keltjens tijdens I.V.V Beleidsweekeinde: "Wat is hier de best drinkbare bocht?"

Tim S. zit op een wiebelstoel

Tim: "Ik voel me net Groningen."

Van Veenendaal: "De Heer Ledeboer, ik heb zin in een straf."

Tamara: "Er zat opeens veel volume in me."

Bouke B.: "Wie zitten er eigenlijk allemaal in bestuur?"

Wietske na vele shots om 01.36: "Ik ben opzich best wel nuchter."

Theezakje: "Welk tv programma weiger je te kijken?"

Bouke: "Alles met Patty Brard!"

Gerben: "Behalve..."

Bouke: "Sterren springen."

Gerben: "Volgende keer moeten ze echt hogere gebouwen pakken."

Jeffrey: "Ik vind het wel knap dat ze zeggen dat $14+8=26$."

Illona: "Huh, maar dat is toch ook?"

Dante: "Oké, dit is wel een duidelijke penis."

Dante later: "Ik kijk toch nog even verder."

Bouke: "Hee Baard, je bent net over de 75000 gegaan."

Baard: "Uhhh, er staat 75301..."

Tobin tijdens GEMOLD: "Het slechte nieuws is dat ik geen kratten bier meer kon vinden. Het goede nieuws is dat Femke er nog wel drie kon vinden."

Eugen: "Met mijn lange pookstick kom ik niet dichtbij genoeg zonder mijn gezicht te verbranden."

Tijdens een maandelijke borrel van I.V.V

Marcin: "Waarom is je glas zo vies?"

Kevin J.: "Er staat een I.V.V-logo op."

Georg Prokert: "En nu ga ik weer kleuren.. Want dat vind ik gewoon leuk."

Floris: "Moet je voorstellen dat Ingmar hierbij is."

Laura: "Dat past niet."

Sabine J.: "Sjoerd, waarom heb je kleren aan?"

Thomas while blindfolded: "I thought it was caramel at first sight."

Bram W.: "Soms neem ik een grote slok whisky en dan doen mijn ballen pijn."

Thomas slaat Niels op het hoofd.

Niels: "Moest dat?"

Thomas: "Ja, zo blijf je mals."

Dionne H.: "Ik wil graag weten welke buitenlandse universiteiten ook met kwartielen werken."

Jeffrey M.: "Die in Maastricht!"

Ingmar (Net afgestudeerd): "Het is 4 uur, wat doen jullie hier nog?"

Thomas (Bestuur): "Wij hebben wel een voltijdbaan."

Mr. Tse answered a question.

Tse: "Are there any more questions? Good question."

Tse: "I mean their question, not the question whether there were more questions."

SUPREMUM WISDOM

THE WISDOM OF THE UNKNOWN

“As the old Chinese proverb goes,” there is an obvious difference between seeming wisdom, real wisdom and just being a smartass for the sake of it. But what defines wisdom and truthfulness? Is it new to look for prophecies and the wisdom beyond our own world?

TEXT Bor de Kock

Questioning wisdom and advice has played a central role in human life since the beginning of time. In fact, it is the center point of many myths and sages. The oldest examples known in the literature are the oracles in ancient Egypt: “Frenzied women from whose lips the gods speak”, of which the most well-known one was the Wadjet Oracle. The snake-goddess herself was rumored to speak there and people traveled long distances to find answers.

The stories and rumors of these Egyptian wisdoms directly inspired the oracles of ancient Greece, of which the Oracle of Delphi is the best known. Interestingly enough, the great reputation of Delphi was established in an even slightly scientific way: then-king of Lydia Croesus sent emissaries to the seven oracular cities and had them all asked the same question on the same day, where Delphi gave the best and most specific answer. We know that Delphi in particular had a strong influence on the classical Greek culture. The belief was that she functioned as the spokesperson of the god Apollo himself and it made her allegedly the most powerful woman in the entire Greek world.

Interestingly enough, the prophecies of the oracle were never wrong, at least not according to the Greeks: the error, if any, was always in the interpretation of what was said. Interestingly enough there are many points where history was arguably altered by the prophecies: the founding of western philosophy by Socrates was for instance a direct result of the oracle

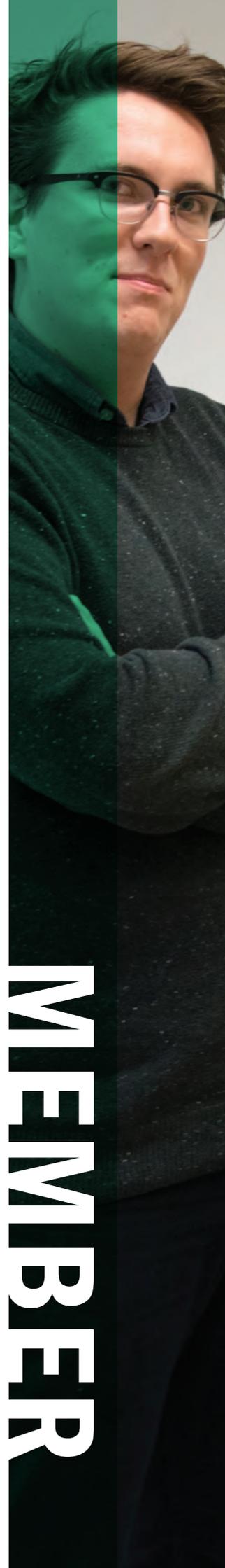
pointing him out as the wisest man on earth. Socrates replied that if he was so wise, it was only because he doubted himself, and dedicated his life to thinking. Wars were started, weddings were sealed and indeed a large part of civilization seemed to take a liking to this wonderful place of answers.

It is fascinating that that search for the truth in the divine existed in many cultures around the world. In the Norse mythology it was Odin who sacrificed his eyesight for gaining sight of the divine, in ancient China the seers looked upon the cracks of bone, and now in 2019 the Dalai Lama still consults the official State Oracle of the government of Tibet.

A bit broader than the oracle as a mystical place, we still love using it as a metaphor in computer science and mathematics, for instance in software (like the name of the Oracle database, which of course should answer many of the users queries) and as a tool in proving and verifying (“say we have an oracle that solves $\$x\$$ ”). A related concept is the random oracle model, which is a security model for usage in hash functions, where we assume every hash function is actually an oracle that in some magical way answers all queries – and because of its divine ways we cannot make any assumptions about its workings.

So why do we look for the wisdom of a proverb or ask for the answers of a spirit? Let’s hope we can go to Delphi and find out.

MEMBER



DATAOPSLAG IN DE CLOUD

De mogelijkheden voor softwareontwikkeling zijn de afgelopen jaren sterk veranderd. Eigenlijk is het beter om te zeggen dat er heel veel opties bij zijn gekomen. Met de definitieve doorbraak en continue uitbreiding van de cloud is het aanbod van onder andere rekencapaciteit en dataopslag groter dan ooit tevoren. Waar voor het kiezen van de juiste vorm van rekencapaciteit in bijvoorbeeld Microsoft Azure zelfs een beslisboom i beschikbaar is, is het optimale type dataopslag minder eenvoudig vast te stellen. Dit artikel probeert achtergrond te geven op de vraag hoe dit komt en richting te geven voor het maken van die keuze.

TEXT Rick van den Bosch - Betabit

“DIE GOEDE OUDE TIJD”

Voorheen was de keuze voor de opslag van data over het algemeen simpel: gebruik een relationele database. De reden hiervoor was even praktisch als beperkend, namelijk dat relationele databases vaak (als enige) voorhanden waren, zowel wat betreft de software als qua kennis van medewerkers.

Omdat de database meestal op eigen hardware draaide, was de eerste oplossing voor problemen met de performance vaak snellere hardware. Het cloud model van relationele databases is anders. Performance problemen los je niet eenvoudigweg op met zwaardere hardware. Natuurlijk kun je opschalen naar een snellere variant, maar daarmee verhoog je ook de (terugkerende!) kosten.

VERSCHILLENDE TYPEN DATAOPSLAG

Relationele databases zijn niet ‘uit’. Sterker nog, ze zijn nog steeds immens populair, maar dan wel voor de juiste data. Ervaring helpt bij het bepalen wat ‘de juiste data’ daadwerkelijk is. Daarnaast kun je onder andere gebruik maken van documentatie die hier inzicht in geeft.

Naast relationele databases zijn onder andere de volgende categorieën dataopslag te onderkennen:

- » document database (NoSQL)
- » key/value opslag
- » graph database
- » search engine database

Moderne business software verwerkt steeds meer data, zowel van interne als van externe bronnen. Dit zorgt voor diversiteit in de karakteristieken van de data en de manier waarop deze verwerkt moet worden. Hierdoor is het vaak beter om verschillende typen dataopslag te gebruiken, afhankelijk van de vorm van en behoefte aan elke set data. Dergelijke systemen, die verschillende typen dataopslag gebruiken, maken gebruik van zogeheten *polyglot persistence*.

CONSEQUENTIES

Betekent dit dat je terug moet naar de tekentafel? Dat de hele datastructuur van je applicatie herzien moet worden? Gelukkig is dat in veel gevallen niet nodig; een kritische blik kan al veel inzicht geven. Door binnen je huidige datastructuur op zoek te gaan naar data die beter past in een ander type dataopslag kun je de datastructuur ontleden en optimaliseren.

CONCLUSIE

De keuze voor het type dataopslag is een fundamentele ontwerpkeuze. Hierbij is het belangrijk te beginnen met het bepalen welke categorie dataopslag het beste past. Zodra je deze keuze gemaakt hebt, ga je binnen die categorie op zoek naar het juiste type dataopslag. Houd hierbij rekening met factoren als kosten, beschikbare features en het gemak waarmee het beheerd kan worden.

RAMMSTEIN'S LUCIFERIC 'RAMMSTEIN'

Du hast keine Lust auf einen Artikel über Rammstein? Dann hast du Pech gehabt, denn die nächsten Seiten sind voll davon! Well, that was my low-key try at writing German... Even though I live in Northern Limburg, close to the German border, my German is in no way anything that I would call tolerable. However, I do have a little bit of knowledge about the German music scene and – logically – also about their uncompromising adoration for metal. And whenever we speak about German music, we often speak about RAMMSTEIN: one of the founding fathers of German industrial metal and Neue Deutsche Härte.

TEXT Lars Verstraelen

Industrial metal has kind of a vague and strange origin. It started with black metal bands merging the sounds of industrial with metal, to make it sound more aggressive. Bands like Ministry and Nine Inch Nails further developed the genre in a unique way; harsh guitar tones, bashing drums, weird noises and synthesizer sounds made for a bombastic stance of music. Rammstein further strengthened the genre by adding German into the mix. Singing in a language that was not generally understood by listeners, would prove to add a sense of mystery and discomfort to the genre; something that would improve the genre even more.

Their latest effort 'RAMMSTEIN' only recently came into my field of view. Not that I am particularly interested in metal anymore, but I went to an amazing live show by Rammstein a few years ago. If you ever want a proper demonstration by licensed pyromaniacs: they are the real deal. It is just a guilty pleasure for me sometimes. Just like how you would scream along with 'Paradise By The Dashboard Light', 'Du Hast' is a song you would hear people chant in a regular hard-rock pub. On top of that: their last release was back in 2009 under the title 'Liebe ist für alle da'. Only more reasons for me to delve deeper into this new record. Once again, I spoke with a few of my friends who I meet at my local CD store. One of the regulars there

asked me whether I already listened to the new Rammstein effort. After I answered 'no', he told me that it was no problem since this record is 'nothing new', or 'more of the same'. And if you think about it, it is somewhat of an expected comment on the record. Mainly because Rammstein has always stayed with their slamming industrial sound, their German lyrics and Till Lindemann's haunting/strong vocals. But I believe that saying that this record is nothing new, is like saying that grass is green; WE KNOW! Now let's just listen to the disk.

“ But I believe that saying that this record is nothing new, is like saying that grass is green; WE KNOW! ”

Something that is immediately notable about the record, is that it is the first one without their regular producer Jacob Hellner, who has been the band's producer since their first album 'Herzeleid'. For this effort they asked for the services of Olsen Involntini. Involntini is also a member of the band Emigrate, and

COLUMN





thus a bandmate of Rammstein guitarist Richard Kruspe. The producing, mixing and mastering by Involntini has left its mark already after only a few minutes of listening to the CD: they sound so much more polished! They still have that very metallic and industrial sound, but it sounds way more dynamic and cleaner. You can hear every little segment in the music composition.



“ It already starts with the first song ‘Deutschland’. ”

It already starts with the first song ‘Deutschland’. The intro of the song is an upbeat synth which screams for anticipation. And then the other instruments kick in: furious guitars, loud cymbal clashes and a deep, moving bass. The song continues with the vocals of Till somewhat later, and he guides the song in a very dramatic and powerful manner. The song does not lose structure and it sticks with its true power. So does the second song ‘Radio’. It is an almost Nine Inch Nails-esque song. It contains a bit of a disco vibe melted together with techno, accompanied with a beat that might just punch holes in your wall. And the lyrics are as simple as they can be: ‘I enjoy listening to the radio because of music and news (mein Ohr ganz nah am Weltempfänger)’. A simple song with a fluent and heavy composition.



‘Zeig dich’ even features choirs and it gives it a bit of a religious tone. This is quite a simple song; in fact, it features a lot of standard (power-)metal elements. From strumming guitars, to tremolo, to very atmospheric choruses. It is a bit of a standard song. Not at all a game changer, but just a nice song. We cannot say the same about ‘Ausländer’ though. Even though it contains a verse-chorus-verse-chorus structure, the lengths of each of these parts are sometimes a bit stretched, which gives a bit of an unexpected twist. Also notable to say: it is one of those rare songs where Till does sing in another language: ‘Ich bin Ausländer, mi amor, ma chérie’. This is one of

the first songs of the record I immediately put into my playlist: amazing!

And then: ‘SEX’. It has a lower tempo which generates more of a garage rock flow. It is not at all a ‘get loose’ song, but it surely generates a nice song about the enjoyment of sex. Again, it is loud, pounding and has some nice techno elements. And after you think that we are really getting more of the same, ‘Puppe’ kicks in... This song is insane, literally!! It has a very calm buildup, which makes it creepy; you can feel something boiling. And then Till just explodes into psychosis: ‘Und dann reiß’ ich der Puppe den Kopf ab. Ja, ich beiß’ der Puppe den Hals ab. Es geht mir nicht gut!’ just blasts into your ears. It builds up strong and finishes strong. A great one if you feel like ripping your study books apart.

‘Was ich liebe’ again has this Nine Inch Nails vibe. It is quite calm and has a lot of different instruments and compositions going on. The vocals are also quite calm. And I think this is kind of a dip in the record’s strength, especially after ‘Puppe’. ‘Diamant’ also does not add a lot of power in ‘Rammstein’-terms but is surely is a good ballad. It is a neat balance between ambience and vocals. After this we start to rise a bit in strength with ‘Weit weg’. Once again, a bit of a ‘textbook’ metal song, but this time with a few spacey elements, keeping melody throughout the whole song. An easy song to tolerate and it does not drop the attention: a little spike, but not too pointy.

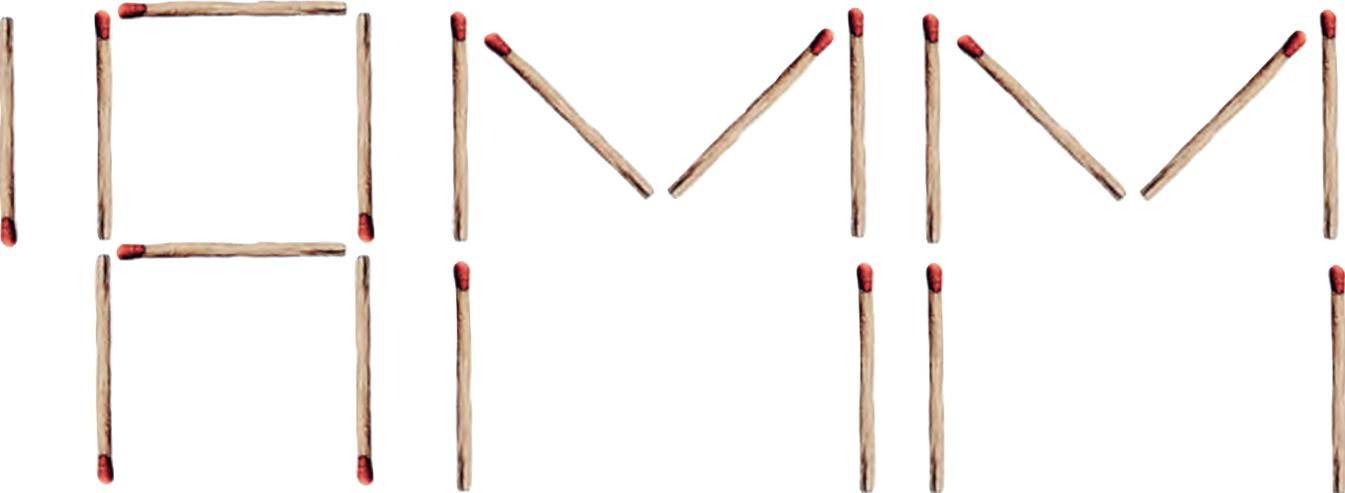
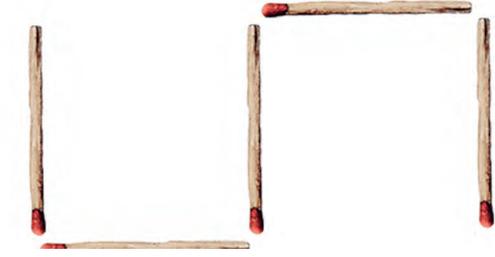
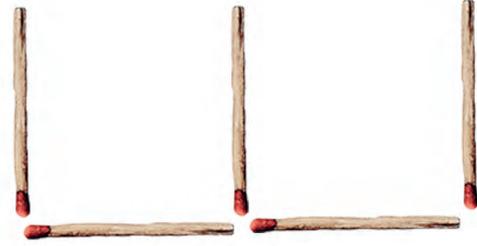
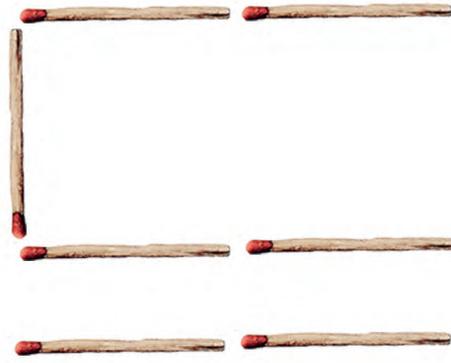
Things get pointier with ‘Tattoo’ though.

This song is classic Rammstein. It pounds like a steamroller’s heartbeat and you just want to head bang. The buildup is amazing and even leaves space for a few keyboard tones, before the bridge and chorus grant you Rammstein at its most classic. We finish the record with ‘Hallowman’, which is a bit more haunting, and is quite a discomfiting song. It features some prog riff elements, which keeps it musically very interesting.



This really drains the last bit of attention that you need for this record.

As far as my opinion goes: 'it is more of the same' does not quite hold. Rammstein generally strives for more 'song songs' on this record instead of just a very industrial sound. Some songs however are a bit too thought out in my opinion, where they lose my attention sometimes. Rammstein's core is all but lost, but it is not as gun metal grey as it used to be. This record utilizes more color and it shows you Rammstein at a new level. A great listen for anyone who wants an easy listen, or to anyone who wants a nice introduction to Rammstein, even though this is probably the last record they will ever release...



THE ERA OF 'THINGS' IS COMING AND OUR INDUSTRY IS ENABLING IT

In today's connected world, semiconductor chips can help save energy in a smart thermostat for your home, are helping you drive your car, and can reliably monitor your heart rate with your watch. The 'Internet of Things' is expected to connect anywhere from 50 to 200 billion such devices by 2020⁰. Toni Mesquida Küsters (Senior Director Product Marketing DUV at ASML) explains how these new applications of chip technology are enabled by mature lithography systems. can say I am part of the final group of people, but I can't say my life hasn't actually gotten any better because of that.

TEXT Sander Hofman - ASML

The legendary inventor Nikola Tesla might have predicted the rise of the Internet of Things (IoT) in 1926 when he said, "When wireless is perfectly applied the whole earth will be converted into a huge brain¹, which in fact it is, all things being particles of a real and rhythmic whole."

The world is certainly more connected than ever before. In 2011, the total number of connected devices had already overtaken the global human population². In 2015, the internet traffic from wireless devices surpassed that of wired devices³. And while you're reading this article, some 40,000 new devices⁴ with all kinds of purposes will connect to the internet for the first time.

That growing number of connected devices and the sheer amount of data that they produce, makes IoT a red hot trend with vast economic potential. A report⁵ from the McKinsey Global Institute estimates that IoT could have an annual economic impact of up to \$11.1 trillion by 2025 across various settings, such as factories, cities, automotive and health.

THERE'S A CHIP FOR EVERY THING

At the heart of it all is a tiny device with great power: the semiconductor chip. Over the last decades, the semiconductor industry has innovated across a wide range of chip types to improve performance and reduce cost. While the most advanced chips are powering high-end electronics and digital developments, simpler, low cost chips are finding a new market, at the heart of IoT.

Toni Mesquida Küsters (Senior Director Product Marketing DUV at ASML): "IoT drives both mature- and leading-edge lithography demand"

"Crucially, mass production has steadily reduced chip prices across the board," says Toni. "We've entered an era in which it makes economic sense to integrate low cost chips in all kinds of products, making them a lot smarter at little extra cost."

The smallest feature sizes on the lowest-cost chips are several hundred nanometers across, compared to just ten nanometers on the most advanced chips. But these chips are able to provide the functionality needed in connected devices. As a result we're seeing a resurgence in chip factories (also known as 'fabs') using older lithography systems that make chips on 200 mm silicon wafers.

THE FAB THAT MADE A COMEBACK

"With the increasing demand for IoT chips, the industry sees 200 mm fabs boosting their output to levels we haven't seen in a decade", says Antonio. "The global semiconductor industry association SEMI expects that fabs will beat their 2007 record capacity⁶ of 5.7 million wafers per month by 2020."

You could almost forget that a decade ago, the fate of 200 mm fabs seemed sealed. "When the economic downturn of 2007 hit the market, 200 mm capacity was already slumping to give way to the more advanced 300 mm fabs," says Toni. "Larger wafers allowed chipmakers to put significantly more chips on them, dramatically reducing the cost of each chip."



But the tide has turned: an industry SEMI report⁷ notes that worldwide there are 188 fabs with 200 mm technology in production in 2016, with expansion plans to 197 fabs by 2021. The 200 mm market is truly resurrecting. The question is: will the added capacity boost be enough to meet the IoT demand?

Chipmakers building new 200 mm fabs are mostly in Asia, with China leading the pack. For chipmakers with older 200 mm fabs, boosting output means upgrading the lithography equipment within.

Many 200 mm fabs are relying on ASML's mature lithography machines – the PAS 5500⁸ and TWINSKAN XT⁹ lines. The PAS was introduced in the 1990s and is no longer made as new (only refurbished), but demand has prompted us to extend our service of them to 2030, as well as to offer major upgrades for improved productivity and reliability. Chipmakers building new fabs look to the more versatile TWINSKAN XT⁹ line, which can be tweaked to handle either 200 mm or 300

mm wafers. For other chipmakers, it could make sense to replace multiple older PAS systems with a single new XT system, giving the fab output a much needed boost while using less fab space to do it.

IT'S ALL ABOUT THE ZETABYTES

The IoT trend is also resonating across other parts of the semiconductor industry. The growing number of connected devices in the market generates huge amounts of data that needs to be stored and crunched. Last year's IDC Digital Universe¹⁰ estimated that the amount of data created in the world annually would be 180 zetabytes (that's 180 trillion gigabytes) in 2025, up from less than 10 zetabytes in 2015.

"To store and process such amounts of data, you need the most advanced memory and logic chips", says Toni. For example, Intel's 8th gen logic processors that give a 40% performance boost generation-on-generation, and the memory technology that powers our data centers, like SSD, DRAM or HBM for deep learning. Toni: "These chip technologies can be manufactured in 300 mm fabs with our state-of-the-art immersion and EUV lithography systems."

In the end, the Internet of Things is part of a bigger cycle, which has the consumer at its heart. Toni: "The world around us is changing fast and technology is fueling that change. It is a growth cycle, resulting in more capacity for both simple and the most advanced chips. The semiconductor industry both drives and benefits from this cycle."

Sander Hofman is a Corporate Communications Manager at ASML

ASML

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http://paxtechnica.org/?page_id=738

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COMMITTEES & FRATERNITIES

GEWIS is built on top of committees. Besides, Study Association GEWIS has several fraternities which contribute to the atmosphere and organize activities.

Find out more at: www.gewis.nl/association.

FRATERNITIES



ATHENA
ATHENA



B.O.O.M.
Buitenplezier Op Onze Manier



GELIMBO
GEWIS Ervaart Limburgse
Initiatieven Met Bewondering en
Ontzag



GEPWNAGE
GEWIS Plant Weer Nerdige
Activiteiten en Geeky
Evenementen



I.V.V.
In Vino Veritas

COMMITTEES

AC
Activiteiten Commissie

AVICO
Audio- en VideoCommissie

BAC
BAr Commissie

C4
Corporate Communication and
Contact Committee

CBC
Computer Beheer Commissie

FESTIVITEIT
Feestdagen Extreem Smaakvol
Tevens Ietwat Verantwoordelijk
Interessante Toffe Enthousiaste
Ideeën Teweegbrengen

FYC19-0 Beercode
First Year Committee

FYC19-1 GeDoe
First Year Committee

FYC19-2 Carpe Noctem
First Year Committee

FYC19-3 PushPin
First Year Committee

FYC19-4 de Smurfen
First Year Committee

GEBALLMERPIEK
GEWIS'sers Ervaren BALLen MET
Rigoreuze Precisie In Excentrieke
Kups

GEFLITST
GEWIS Fotografeert Leden In
Toffe Situaties, Toch?

GEHACK
GEWIS Ervaart Het Algoritmisch
Code Kloppen

GEILER
GEWIS Eet Ijsjes Lekker
En Regelmatig

GELIFT
GEWIS'sers Liften
Ieder Fantastisch Traject

GEMOLD
GEWIS'sers moeten
overal leugens doorzien

GETAART
GEWIS'sers Eten TAART

GEZWEM
GEWIS Zeilt Weer Een Meter

INTRO19 ★
Introductiecommissie 2019

ODC
Ouderdagcommissie

SR
StudentenRaad

STIJL
Huisstijl Commissie

SUPREMUM
Supremumcommissie

TRAIN
Training committee

VrijMiSO ★
Vrijdag Middag Spellen Orgaan

WC
Web Commissie

SUPREMUM COLOPHON

SUPREMUM

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