Commercial Data Collection
"Paying with data today, sir?"

Social Credit Systems
Patriotism as a game

Automated Decision Making
The Less Contentious
Child of Automation

Selfish Ledger
Do you control yourself?

Digital Addiction
Is your phone your best friend?

Study Tour Shift
Cyber-Physical Infrastructure

And more...
Pandora 2018
Columns
Company visits
Puzzle

Inter-*Actief*

Gezocht: baanbrekende programmeurs

Wil jij ook werken aan innovaties als *Blockchain file sharing* of *Bitcoin forensics* in een jong team? Solliciteer dan op één van deze vacatures.

storro

Vacature Storro, Hengelo
C++ programmeur

We bouwen een internationaal bekroonde p2p file-sharing applicatie. Storro is qua technologie het beste te beschrijven als een mix van Blockchain, Git, TrueCrypt en BitTorrent.

Wij werken met Gitlab, Qt en C++17. Vrijheid in keuze van je OS.

Jouw profiel:

- C++ expert (>2 jaar ervaring)
- Achtergrond in security
- Interesse in blockchain technology
- Teamspeler

COINTEL

Vacature Cointel, Hengelo
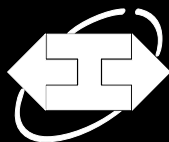### Full stack developer

We ontwikkelen software om forensisch onderzoek van (criminele) transacties in crypto valuta te kunnen doen. Met onze analyses en eigen forensische technologie helpen wij opsporingsdiensten wereldwijd.

Wij werken o.a. met Docker, Postgres, Python, Flask en React.

Jouw profiel:

- Ervaring met onze technology stack
- Interesse in bitcoin, blockchain en cyber security
- Teamspeler

Meer weten? Kijk op storro.com/jobs en cointel.info/jobs of bel 053 8200 924 en kom een keer kennismaken!

I/O VIVAT

//Editorial

Dear reader,

For ages the entertainment industry has had fantasies about technology gone rogue, many games and movies have been based on the principle of 'the dark side' of IT. Some of the movie plots are highly doubtful to us now, but the developments may surprise us in the (near) future. To give some insight into this 'black mirror' this issue of the I/O Vivat will discuss the dangers of technological evolution.

As said, some movie plots seem doubtful. However, even though the story of Sesame Credit that our new editor Sven illustrates in his article may sound like the storyline of a new Blockbuster, it is completely real for the people in China. Whereas Chinese citizens have no choice in sharing their data, Dutch citizens regularly pay tech companies with their data. Companies probably know more about you than you are comfortable with, Dennis describes in his article about Commercial Data Collection.

Of course it's wonderful that technology lifts so many things of our shoulders, but do you really want to let computers make all decision? That's what new editor Harindu asks himself in his article about Automated Decision-Making. The Selfish Ledger, a thought-experiment by Google touches upon the same subject; can such a ledger use a lot of data to determine what you might do in certain situations?

Have you ever talked to your phone as if it were your personal assistant? Commanding it to set a timer, tell you about the weather or even note down appointments in your calendar? Using home assistants you may even never have to close your own curtains again! The question is: Do you want to provide multinationals such as Google with even more details about your life? After all, we are already tied to our devices all the time and "the online life has many pleasures, but there are many dangers hidden underneath it", according to our new editor Emma.

Lastly, for those who could not get enough of Inter-*Actief*'s annual Pandora week, this I/O Vivat contains a surprise in the middle. I can't tell you much, but it might just be a nice little bonus puzzle. And if you can't get enough of puzzling, do also check out the back of this magazine where Meike has done her best to challenge you to a game of Nausea.

Enjoy reading!

Niels de Groot
Editor-in-Chief I/O Vivat

Puzzle 33.1

The solution of the puzzle from issue 33.1 was: PRINTER. Apparently the puzzle was quite challenging because we only received a small number of e-mails!

The winner of the previous puzzle is Simon Arends. Congratulations! You will receive your Inter-Actief cinema voucher as soon as possible!
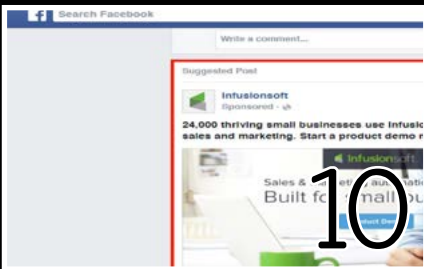
//Content 33.2
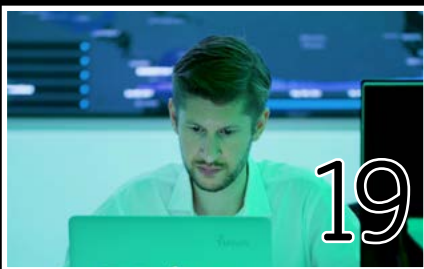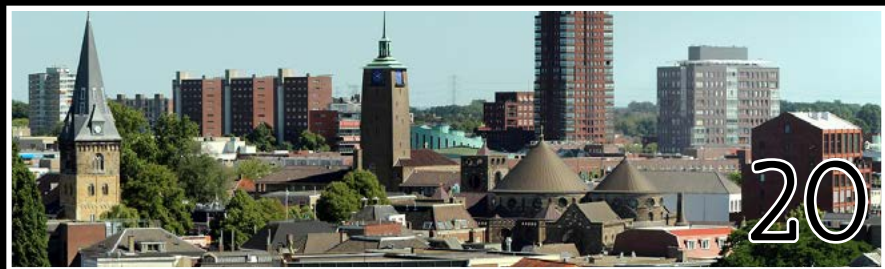
Automation of Assistants

The Selfish Ledger

By the Chairman

By the Candidate Chairman

Addicted to you

ASML

Study Tour Shift

Puzzle

Social Credit Systems

Patriotism as a game

By: Sven Mol
Editor I/O Vivat

One morning you wake up, and notice you have a text from your parents wishing you a happy birthday. You text them back, a simple thank you will have to suffice, you have a train to catch. You'd wanted to celebrate your birthday with your parents, but they are 1500 kilometers away and you have a job to maintain. While eating breakfast, you notice a notification: "5 Points awarded for maintaining contact with your parents." Must be from that new app, it gives you rewards when taking certain actions. You've already accumulated close to 500 points. If you had 28 more, you'd be able to get a ticket back home. When you arrive at the station close to your work, you decide to grab a coffee, the Starbucks is around the corner after all. When you are ordering your soy latte, you get another notification: "You could have gained 3 points by visiting a locally owned shop."

You might consider this a far off dystopia, but the China's Communist Party has proposed a social credit system, called Sesame Credit, just like the one imagined above. It will become mandatory in 2020, and there are already pilots in a few dozen cities, some of which are on a voluntary basis. It will assign all citizens a score, based on how "valuable" they are to society. It will increase when you buy items deemed valuable like work shoes and

local produce and decreases when, for example, you import items.

This, already, seems somewhat unethical, but the devious part is the connection with your social media. Posting a picture of Tiananmen Square (see the sidebar), being friends with a "dissenter" or sharing an article about recent economic issues will decrease your score. It will also decrease when you fail to separate garbage or when you play too many games or games deemed to be "counter to Chinese values".

But then there is the final piece of the puzzle, making it outright devious: Your score is tied to what you are allowed to do. If your score is too low, your paperwork might be declined, your bandwidth limited and you can even get

evicted. A really low score can even land you a place amongst China's blacklisted citizens. This is a list of close to 10 million people. Anyone on this list is considered untrustworthy and can be barred from buying property, boarding planes and even booking a holiday.

And the system will scrape even more than just your social media account. Plans exist to connect it to payment providers and CCTV cameras with facial recognition. China's CCTV system, consisting of over 170 million cameras, already identifies citizens and vehicles, and determines when they are speeding, jaywalking or committing another crime. This system is promoted as "helping in the fight against crime," but its critics argue it will be used to punish petty crimes instead. China already

Figure 1: Social ranks on public transport.

shows portraits of offenders on large LED screens, often paired with phrases like "not trustworthy" and what crimes they have committed.

This public shaming of dissenters leads to ostracization, already contributing to families being torn up by these convictions. But this ostracization doesn't cost the government anything as the social network unintentionally does that. As their scores will increase when they cease contact, friends will unconsciously handle the re-education. Radical ideas are suppressed through social isolation and conformists are happy to enforce the policy and gather some more points.

That begs the question, is the Communist Party of China alone in this? Or are there other parties attempting similar things? Vitality, a British health insurance company, introduced its Active Rewards programme at the end of 2015. When people sign up for its insurance, they are asked to share data from their fitness tracker, in return they get a lower rate and rebates on gym memberships. Privacy experts are worried, as they fear these practices might become common place.

But no one bats an eye at the customer loyalty programs of supermarkets, even though they are, in essence, identical to Sesame Credit: You get rewards for sharing your data. But if they are two sides of the same coin, why am I okay with

Appie from Albert Heijn, but not with the proposed Sesame Credit in China? Some might point to the mandatory participation in Sesame Credit, but I am not sure that tells the whole story. To get the whole picture, we have to look

"A really low score can even land you a place amongst China's blacklisted citizens"

at what the goals of the systems are. For Appie, that's simple: Let people shop at Albert Heijn. Sesame Credit, however, is a system designed to incentivise patriotism and loyalty to the party. It is starting to look like a standard tool for the 21st century authoritarian regime.

Historically, authoritarian systems were based on negative enforcement, people were being locked up or punished when they defy the government. The Sesame Credit, and other social credit systems alike, enforce their ideals through positive reinforcement. This is something which hasn't been done before. The major advantage is that people will not come to hate a system that positively reinforces behaviour. And as people will not detest a system that positively reinforces behaviour, the chance of a protest is significantly smaller. Sesame Credit seems benign and even fun to citizens and makes them enjoy falling in line.

It's all doom and gloom in China, but very few of us have a vested interest in that. What is more worrisome is the

precedent this might create. People are voluntarily signing up for Sesame Credit, and sharing screenshots to show how patriotic they are. But similar systems are used by a lot of companies, it might well be one of the driving forces behind the Big Data explosion. In the near future, as with Sesame Credit, people will sign up for surveillance based products like insurance, simply because of the rewards it offers. And those who hesitate about privacy will have to make do without those perks, even if those rewards are basic human needs.
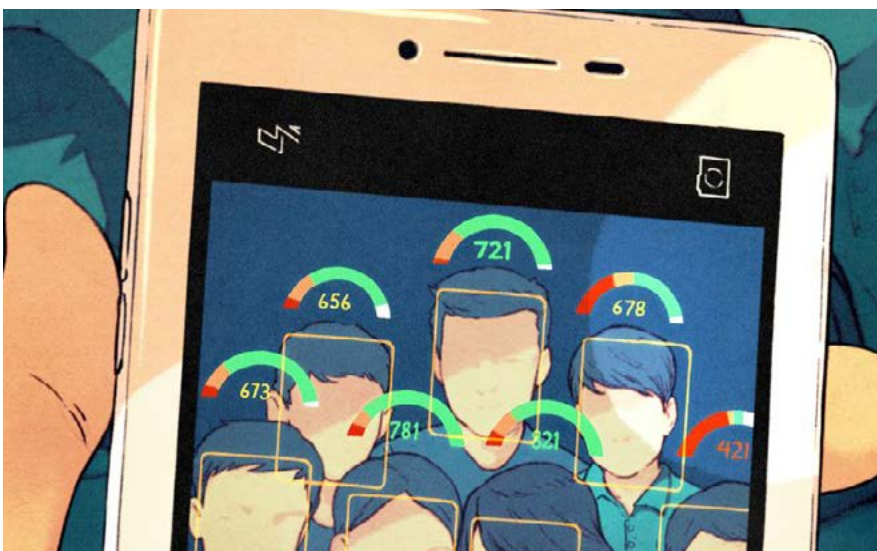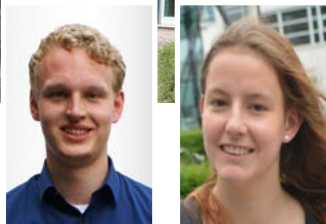
Figure 2: Facial recognition used to detect one's score.

BetterBe transforms automotive leasing

By: Niels de Groot & Sieta de Jong
Editors I/O Vivat

The nickname 'most enterprising university' has been used by the University of Twente for a long time. It is probably correct if you look at all the career options that students have after their studies. The Kennispark opposite the campus is a breeding ground for companies that have always lived up to their name, but also for business concepts that are fresh from the brains of ambitious students. Of course it is certainly not excluded that what is now only a concept will later grow into a lively start-up or spin-off, as is the case with BetterBe. We went to visit their office.

It struck me that when googling your business name Google indicates that you are a 'web design' company. Is Google correct or is what BetterBe does far beyond their description?

Well, BetterBe was founded in 1999 and was never really meant to be a website building company, we rather see ourselves as a company that uses new technology to optimize business processes. Of course, a web application is often needed for this, but it is certainly not BetterBe's core business.

BetterBe was actually created from Sightline, a UT spin-off at the time. Due to the internet bubble that grew at such a rapid pace, BetterBe quickly increased in size. We became very committed to building company infrastructure instead of simply 'building websites', which

we often call 'boring' pay by the hour work. We began as a company creating tailored solutions, but started building a product of its own later on. The advantage of having your own product is that you can think for yourself what is best for the market, instead of relying on existing customers who ask you to build based on how they work right now.

BetterBe is focussed on products for the mobility market. It seemed to us that that technology was worth diving into, because that market was, and is, of global importance and we predicted the market would start to change quickly within a few years, which gave us time

to come up with our solution. After all, less change means a lot of stability and in stable times changes can be made.

We are allowing companies and their processes to go into a digital transformation, which is accompanied by a completely different way of thinking. As an example: Car manufacturers had the goal to sell as many cars as possible. Now the goal is to have customers drive as many kilometers as possible in their cars. Such a small change already makes a difference for your company. This shift from ownership to usage is very apparent to our business. Just think of shared cars, for example,

or all those students cycling around on bikes with blue tires.

Is the mobility market the only market you are in or is BetterBe broader than that?

If you're just starting out as an entrepreneur, you take on everything because work is work. We see that many companies stick to this, but then one does not really grow. At one point we said "We really want to make a difference in this market" and that means you have to make choices. Because if you want to be the best you can only do that if you are concerned with one thing, which is being the best. There are plenty of companies that only take your product if you are the best, because if you are not, there is enough choice, and they will find who is actually the best.

To give another example: You probably know the catalog when you want to buy a car, you get a booklet with all the options that you can choose after which you can pick what options you'd like. But of course there are so many upgrades nowadays that there are thousands or perhaps tens of thousands of variants. Making a choice is much more difficult. Besides the composition that is of course already complex, there is also a very complicated financial part to this scenario. When you talk about cars, you often get to leasing now. Nowadays there are options to simply drive a car for 200 euros a month. With all these possibilities, just try to make up your mind about quality requirements. That is precisely why it is in our system. There is so much number-crunching attached to such a case that it is incomprehensible, which is why we luckily have some smart people here who work on figuring that out.

With so much choice, do you notice that there is more and more focus on a variable product, something the customer can choose?

Yes, certainly, of course you try to offer the customer a lot of choice, but you also want to offer customers a certain experience. After all, at some point it becomes confusing with so much choice. You want to be able to come to their aid and bring it back to something manageable. That is also what we use our IT for,

because the overview of many complex choices is not something that a human person can easily do.

You notice the change most clearly when looking at requirements. Suppose you want a small red city car because you live in a big city. You will have the requirements that it should be small, a city car, and red because it is your favorite color, and because you're a bit unsure about your driving skills in the big city you want a reverse camera on it. Previously you would hand those requirements to the car dealer and if you were at, for example, KIA then they picked a KIA Picanto for you and the mechanic would go and see what could be done with it. If you put that into our system nowadays, we can select something in one go - it doesn't matter what brand - that fits all requirements well.

And then the customer gets the idea that it is easy, while giving him access to many more possibilities.

Yes, exactly, you get real access to that customer and you can also think with him or her. In this way you also bind people to your company as an entrepreneur. People will think "Well, that company understands me" and will think of you again.

There are also enough companies that offer something similar, but the big difference is in the way the product is put together. There are plenty of companies that, for example, offer a basic, plus and luxury model, but everything has been chosen for you in advance. You get the idea that you can make a certain choice, yet these are not custom models. They have been determined in advance and if you want to adjust something minor it quickly becomes difficult, because with this tactic you can not measure the product, in this case a car, on the same criteria as the customer would like.

We have heard a lot about BetterBe's work and its results, but suppose you are part of your team, how does that work?

At the moment a group of students is working on a project with cardata they've collected of oldtimers. The product they develop will be used to demonstrate the complexity of our product during sales pitches at leasing com-

panies. Another possible assignement is measuring our performance with the newest tooling. Based on these measurements we know where we (or the student) can improve our performance. Most of our students are working part-time jobs in our teams where they can work on our products together with our developers and architects.

For this article we interviewed Geatse Meester (CEO), Marc Maurer (CTO) and Dennis Gerritsen (Account Executive) from BetterBe. We thank them for their cooperation.

About BetterBe

The global mobility market changes rapidly. New transportation concepts and mobility sharing models arise. Digital technology drives this 4th industrial revolution and puts focus on the end-users.

Our customer, mobility suppliers, are European based multinationals such as:
- car brands like Volkswagen, Mercedes and BMW that face the change from car ownership to car usage;
- leasing companies like LeasePlan and Arval (BNP-Paribas) that face the change from B2B to B2C

They are all inspired by our next level approach to the mobility market. With our Software as a Service (SaaS), we enable them to move faster, think bigger and stay ahead. We help them to bridge the gap between the old world and the new customer centric world of digital.

How it all started

We were the first to create solutions that engage car users throughout the continent: superior car search, configuring makeable cars, real time pricing and customizable quotes. And we made them available through a single, highly specialist service; our API. All business leaders embrace this API, because smart technology is your greatest ally when steering toward the future of sustainable mobility.

A team of 35 specialists works on awesome software, formalising knowledge with algorithms and touching concepts as machine learning and AI. Our company is located in Enschede and works closely together with the University of Twente and Saxion.
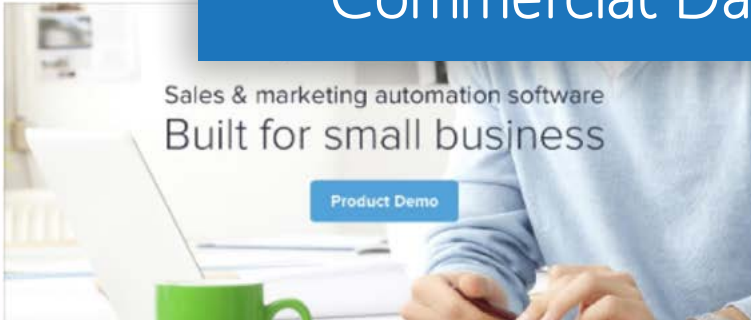
Commercial Data Collection

By: Dennis Aanstoot
Editor I/O Vivat

Modern technology companies don't ask for money to use their services. They have space on their web pages and apps reserved that can be sold to be used. Advertisements will be placed for the ones visiting the page. Advertisements are more effective if they can be aimed towards the person looking at it. If we know more about a random person in question (male, female, age, interests), we could make more complete personal descriptions of that person. This means that we can show a suitable ad to that person. With more of those personal description the one selling the ad can sell more products and the ads gets more clicks. The ad is more effective. However, how much information can be stored of a person? What are the laws that stop companies from storing every bit of data they can get? Is there a limit of what information a third party can store about you without consent? Can you force a company to remove everything they know about you?

Google ads

Google uses its AdWords program to sell places for advertisements. Companies who want to advertise can buy screen time on websites and apps of companies who want to profit from their loose space. At some point, a person opens a web page where such a space can be found. At that moment

an auction is held. Every company that wants to sell their ads will have a bot which will bid for that single auction based on some parameters. Youtuber CGP Grey explained that for Youtube videos a quarter of a US penny is made per view of a single video, which is then split between the creator and youtube. One of the parameters is a list of keywords which describe the interests of someone. One of the reasons to reach a certain viewer is that this person has a bigger chance of actually being interested in the company or the product. Google also wants to reach the viewer, because the advertiser only has to pay if the viewer clicks on the ad. This means that Google needs to have a good picture of the viewers that see the advertisements. A lot of information about a single person is kept at any moment.

At Google, that can consist of multiple gigabytes. They know when it's you opening some page based on your browser cookie or ip address, so avoiding a aimed ad is hard.

Laws for data protection

The problems that the law has to deal with are still debated. Data mining has become more popular and much easier, which means that the usage of this personal data on this scale is a recent occurrence. Every government's purpose is to protect its citizens. That means that if a government agrees that the way data is stored isn't the way it should be, it can make laws that make sure that that won't happen. In the EU GDPR has been put into place to just that. The GDPR is a guideline on which

member states will make laws that follow that guideline. For the Netherlands that law is called the AVG (Algemene verordening gegevensbescherming).

A few months ago in the US, Facebook CEO Mark Zuckerberg was questioned by the senate about the fact that his company had sold personal data to another company without the consent

structured, machine readable form so data can be transferred to another company. The right to be forgotten in this context means that you should be able to force a company to delete all data that can be traced back to you. That has the consequence that anonymous data that originated from you doesn't have to be deleted.

In real life, companies sponsor events, just to have their logo on some leaflets. They have chosen for a specific event to reach a specific group of people. The people on that event pay less for the event because the company has paid for a part. Energy drink companies want their logos on sport event posters and beer companies want to show themselves on music festivals. The digital world has a equivalent that uses the same principle, but rules should be in place to play the game fair.

"In the Netherlands it was always possible to have some basic rights regarding data"

of the people affected. In the US, the 2011 consent order should protect its citizens against this data breach. In the US too it is illegal to share data without consent of the person in question, so Facebook could get a big fine because of this.

In the Netherlands it was always possible to have some basic rights regarding data. It was possible to have insight in the data a third party has stored or to rectify the stored information. Additions to the data protection of people in the AVG are data portability and the right to be forgotten e.g. Data portability means that it can be delivered in a

Does that mean that you won't be bothered anymore with advertisements that look a bit too adjusted for your taste? Probably not. You can ask Google to remove everything they have about you, but if you are too dependent on their services, they will continue to be able to collect data about your personality. But think about the situation where it would be possible to stop companies from assembling certain information, would the world be better? Many internet services are free because of the efficient ads. When ads will not make enough money to keep the services running, the services will stop, or they will become paid services.

References

https://www.autoriteitpersoonsgegevens.nl/nl/onderwerpen/avg-nieuwe-europese-privacy-wetgeving/voorbereiding-op-de-avg#stap-2-rechten-van-betrokkenen-5892

https://www.nu.nl/internet/5216846/belangrijkste-uitspraken-zuckerberg-verhoor.html#slide-2

https://www.eugdpr.org/

https://www.europa-nu.nl/id/vhkejco8liwc/bescherming_van_persoonsgegevens_in

https://www.youtube.com/watch?v=KWOeUrUiyxo

Automated Decision-Making

The Less Contentious Child of Automation

By: Harindu Perera
Editor I/O Vivat

Want to buy a house and trying to get a bank loan? You can easily find whether you're eligible online. Your credit card limit? Easy. How much should you pay for your new health insurance? Fill out a form online, and you're good to go. Things that otherwise would have required an appointment can now be decided upon instantaneously. This is indeed very convenient, or at least seemingly so at first glance.

While the replacement of manual physical labour with automation is often a topic of much discussion and debate in contemporary dialogue, the process of automating decision-making (business or otherwise) is usually overlooked in public discourse. Each day, many trivial and not-so-trivial decisions are made by machines, which may have very real consequences on lives.

The Good Sides

That is not to say that automated decision-making is entirely without merit. On the contrary, in many areas where repetitive decisions are made, machines can improve the efficiency by leaps and bounds. Those made strictly based on the same data and using fixed means, without exceptions are especially so. Automating 'trivial' decisions is also seen as a way to put human judgement to better use. From a business point of view, there is also an advantage of having quick decisions, for both the customer and the business itself.

Another instance is in precision decision-making based on large amounts of data. An example for this might be for some cases in medicine, where a machine might be able to detect subtle differences in conditions to make decisions about surgeries and medications, and to avoid errors. Automation is also a good tool to limit subtle subconscious biases or prejudices about race, gender, etc. from coming to play in decisions.

The Ugly Sides

Considering this, one might wonder what the downsides of this — seemingly benign — aspect of automation are. Going back to the instant housing loan check, think about how this decision about eligibility is made, and how it affects a person. Being able to afford a home is considered a basic human need. Making this decision on eligibility in a split second, purely based on a few entries in a form and on a fixed algorithm, seems indeed quite unjust, since many personal circumstances need to be taken into consideration.

A more pressing aspect is the profiling that is required to make a more informed automated decision. For example, a health insurer can decide to collect and analyse a person's medical data to determine coverage and the monthly premium. Not only can this be seen as a violation of privacy, but it

"Automating 'trivial' decisions is also seen as a way to put human judgement to better use."

can also deny access to such facilities to people who need them the most. Here, automation decisions can be equal, but not equitable. While giving similar decisions in apparently similar |circumstances, the impact may not be fair and have a similar impact.

Another possible flaw in such decision-making comes from algorithms which make decisions based on past decisions. Especially with learning algorithm based decision-making, previously flawed human judgement and biases can come into play, and may not be very easy to detect and eliminate.

Current Safeguards

The good news, however, is that automated decision-making and closely related profiling, have been receiving more attention recently. The EU GDPR which came into force this year has several special clauses dealing with profiling and decision-making: "the data subject shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her." A data subject here is a person about whom such decisions are made. This can of course overridden by explicit consent, but even in that case, there are

safeguards to protect rights of the subject.

What Could Be Done

Developers and entities which develop and use automated decision-making for and as a part of critical processes also indeed have a more ethical obligation to ensure that such a business process has checks and balances and possible human interactions to counteract the lack of empathy and in-depth understanding a human may have, and to make room for human intervention and appeals in decisions on a case-by-case basis.

There is also a less invasive form of automated decision-making, namely decision support, which simply assists a human to make decisions. Here, human discretion can be applied as necessary to weigh the impact of a decision more fairly. This might be a more suitable approach for instances where the decisions have a lasting and/or legally binding impact on a person.

All in all, it is of paramount importance to understand that, as with all technological advancements, careful consideration must be given to the effects of automated decision-making on humanity, and it should be used without losing human empathy and

consideration. As the common saying goes, with great power comes great responsibility, and indeed when vesting such powers in systems, this should be kept in mind.

References

'Art. 22 GDPR: Automated individual decision-making, including profiling'

https://gdpr-info.eu/art-22-gdpr/

'Report to the Congress on Credit Scoring and Its Effects on the Availability and Affordability of Credit'

https://www.federalreserve.gov/boarddocs/RptCongress/credit-score/creditscore.pdf

'Effectiveness of Computerized Decision Support Systems Linked to Electronic Health Records: A Systematic Review and Meta-Analysis' - Am J Public Health

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4232126/

'Decision support systems : a research perspective' - Peter Keen

http://dspace.mit.edu/handle/1721.1/47172

Application Performance Monitoring still growing

By: Peter Klijndijk
Employee Poldervalley

I n the continuously changing world of IT, Application Performance Monitoring is one of the most interesting and fast-growing developments for organizations. First, let's have a look at the definition of APM.

Gartner* defines application performance monitoring (APM) as one or more software and hardware components that facilitate monitoring to meet five main functional dimensions: end-user experience monitoring (EUM), runtime application architecture discovery modeling and display, user-defined transaction profiling, component deep-dive monitoring in application context, and analytics. (*www.gartner.com)

Infrastructure

In today's reality many companies are transforming their IT infrastructure into a modern (hybrid) cloud infrastructure. Larger enterprises have been slower to adopt that mindset, preferring a private cloud/private data center strategy as a starting point. Now, the biggest barriers to cloud adoption, security and data privacy risks, are well understood and processes have been put in place to mitigate them. Enterprises now also recognize that most cloud companies invest heavily in the security of their cloud infrastructure, platforms and cloud applications.

From that perspective organizations increasingly acknowledge the importance of end user monitoring, the most im-portant dimension of APM. More than anything else, applications are the "products" of IT, the core services through which businesses perform. Organizations must organize their IT in such a way that their users, such as employees, customers, students and citizens, are satisfied with the services that are offered. These organizations are transforming into a demand supply organization.

End-User Monitoring

To increase control, different IT monitoring tools are being used, each with their own specifications and added value. The most common techniques to monitor the end-user experience are synthetic monitoring, and real user measurement. Synthetic monitoring simulates user interactions with applications, including fully scripted transactions, from any location around the world. By simulating user interactions in this way, you can constantly test applications for availability and performance (time). It provides detailed information on what's causing application performance issues. This can be a problem with web hosts, API calls between applications, cloud service providers, or organizations own network. By constantly simulating the end-user, performance issues can be recognized before the users are impacted. With real user measurement you can monitor end-user interactions with applications. You

can observe their behaviour on the application. This can help you drill-down into specific application issues.

It becomes more interesting when there is a correlation between technical monitoring, synthetic monitoring and real user monitoring. It can show how users are potentially affected by detected performance issues. You can also create baselines, to ensure that customers or employees are engaged and satisfied. After monitoring these two ways of end user experience, alerting and dashboarding are the way to put these measurements into the service management process. For example, different stakeholders have different kind of information needs. If you are a manager you have to know if all the IT-services

vice management process.

Trends

What brings the future of APM? We have selected a list of trends in the APM market:

• The continued heightened adoption of machine learning, data science principles and big data techniques that will improve pattern discovery, anomaly detection and root cause analysis. Enterprises have been quick to adopt these techniques after realizing their potential to reveal granular details from large piles of data. Because of this, artificial intelligence for IT operations (AIOps)/ IT operations analytics (ITOA) will play a larger role.

"In today's reality many companies are transforming their IT infrastructure into a modern (hybrid) cloud infrastructure."

are performing well, especially when they are mission critical applications. At what point do you want to be notified? In case you are an operator, you want to know in time if there is a threat of disruption and avoid the potential problem.

Anyway, due to the APM industry evolving at such a rapid pace, users dependent on APM solutions can't find a one-size-fits-all approach. There is, of course, a serious necessity for effective end-user performance monitoring. Whether it's a hybrid approach or one that's more traditional, APM should be tailored to the unique needs of any organization. Often this will be combined with the deployment of the tooling by professionals who not only know the specific tooling, but also have sufficient knowledge of embedding it in the ser-

• Improved visualizations and "data blending" techniques, providing better context to application monitoring. Data blending is the process of combining data from multiple sources into a functioning dataset. Visualization tools are improving across the board, for many different IT purposes. Productivity increases when you can drill down into data, adjust times to contextualize cycles of activity—really understand what users are doing in an easily interpreted presentation.

• User experience (UX) monitoring becoming more prevalent, as organizations seek to better understand and highlight the last mile. Fully understanding how users interact with applications is paramount when looking to truly connect with them.

Sources

- www.poldervalley.com
- www.techspective.net
- www.apmdigest.com
- www.gartner.com

POLDER VALLEY

Pandora 2018

Meet the Radiation Safety Group

By: Jelle Maas
Chairman Pandora Committee 2018

From May 14th till May 18th Pandora 2018 took place. For those that don't know what it is, it is an annual puzzle game where people have to solve puzzles and search for the next ones all around the campus. During all of this, there are also fights with various weapons; pool noodles, blow pipes and this year nookies (small throwable rockets) could be used to kill one's opponents.

I hope everyone who participated enjoyed the Pandora week very much. And even if you did not participate you might have enjoyed the cake drink on Tuesday and the closing drink on Friday. Our commitee had a great experience organizing Pandora, during our preparations and during the week itself.

Before the actual event we also hosted the pre-game, a taste of what is to come. The pre-game puzzles were easier than the puzzles during Pandora, but the committee did have some troubles. When a puzzle has been placed, we hope it will stay put. Unfortunately, sometimes there are unexpected environmental factors which tear down the puzzles, for example: cats! We had a puzzle hanging at Bastille, but apparently cats like ductape so much that they removed it with their fluffy paws.

During Pandora itself we did not have problems with cats, but some people did have problems with finding our puzzles this year. Whether we hid them well or people didn't try hard enough, at least it was challenging enough!

Another new thing this year was the Pandoradio. We hosted our own station in the Bastille with all the radio equipment you would ever need. Any radio host would be jealous if they had seen our setup. We also made an escalation mix with a bonus puzzle in there.

This committee of Inter-*Actief* is one of the best committees you can ever do if you like solving puzzles, making them, creating a storyline and organizing a big event which influences peoples lives for a full week. Should you ever be in the Pandora committee then it will most likely be the best week of your study time, even when taking your lack of sleep into consideration. Luckily, there are enough enthusiastic teams that will literally and figuratively keep you up at night!

Pandora is a week long puzzle-feast after which some people suffer puzzling withdrawal symptoms. To allow you to puzzle one more time I have added a new never-used-before puzzle at the bottom of this page. Good luck!

CONFIDENTIAL
RADIATION SAFETY GROUP
RADIATION NUCLEAR SUMMIT
UNIVERSITY OF TWENTE, NETHERLANDS

CONFIDENTIAL

Subj: International sign

Pandora 2018

This years Pandora committee consisted of:

Jelle Maas (Chairman)

Jakub Mysliwiec (Secretary)

Bram Denkers (Treasurer)

Simona Filipovic (Logistics)

Pelle de Greeuw (Website)

Chris Jansen (Story)

Floris Weers (Pregame)

Lindsay Kempen (Board Representative)
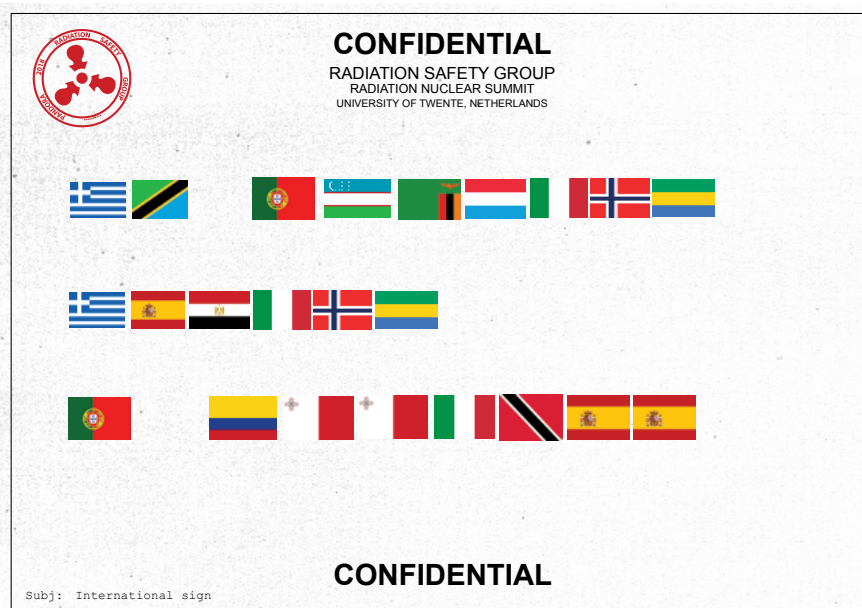
TNO vs Cybercrime

Door: Rolf van Wegberg
Medewerker TNO

D e ontwikkelingen binnen cybercrime volgen elkaar in rap tempo op en brengen veel maatschappelijke uitdagingen met zich mee. Beleidsmakers en politieprofessionals zijn echter niet altijd volledig op de hoogte van de ins & outs rondom cybercrime. Bij hen is de behoefte aan nieuwe inzichten groot. TNO doet er alles aan om het kennisniveau van alle betrokkenen op een gelijkwaardig niveau te krijgen.

"Het aantal rechtszaken rondom cybercrime groeit met de dag", vertelt TNO-onderzoeker Rolf van Wegberg. Uit onderzoek van TNO blijkt dat bitcoins steeds vaker worden gebruikt om illegale handel te drijven en geld wit te wassen. Daarbij is het gros van de activiteiten op het Dark Web drugs-gerelateerd. Bitcoins zijn echter een legaal betaalmiddel en ook het surfen op een Tor-netwerk is op zich geen strafbaar feit. Als de politie een tap zet op een laptop en constateert dat de gebruiker op een Tor-netwerk actief is, betekent dat juridisch nog niets. Niet gek dus dat deze ontwikkelingen veel uitdagingen met zich mee brengen. TNO werkt in haar Dark Web Research Programma aan concrete oplossingen, zowel technisch als socio-technisch, om bijvoorbeeld de politie effectief op te laten treden tegen cybercrime in het algemeen en criminaliteit op het internet in het bijzonder.

Spanningsveld tussen technologieën en de wet

Om criminelen te kunnen opsporen, vervolgen en berechten, is het voor de betrokken partijen essentieel dat de kennis rondom de ontwikkelingen binnen cybercrime op een hoog niveau is. Hoe belangrijk die kennis is ondervindt Rolf van Wegberg nu hij zelf in een paar strafzaken optreedt als getuige-deskundige. Het aantal strafzaken waarbij digitaal bewijsmateriaal naar voren komt, neemt hand over hand toe. "De drie partijen in de rechtszaal moeten goed onderbouwd met bewijs kunnen omgaan. Als je in drugs handelt op het Dark Web, lijkt de zaak duidelijk. Maar hoe bewijs je wie de personen zijn die achter de aliassen op een Tor-netwerk schuilgaan? Is de politie in de opsporing technisch en juridisch correct te werk gegaan en is te bewijzen wie de feiten heeft gepleegd? Het zijn vragen die steeds vaker opdoemen. Er is ook een spanningsveld tussen nieuwe technologieën. Aan uitleg en inzichten is bij advocaten en rechters grote behoefte."

De hele strafrechtketen opleiden

"De kennis over hoe criminaliteit in de digitale wereld werkt, is namelijk nog beperkt bij partijen die elkaar in de rechtszaal treffen", zegt Rolf. "Als expert op dit gebied en onafhankelijke partij stelt TNO zichzelf de taak om de hele strafrechtketen op te leiden in de nieuwste technologieën die criminelen gebruiken en de consequenties die dat heeft voor het opsporen, vervolgen en berechten van verdachten." Dat streven om experts bij te spijkeren heeft geleid tot trainingen die TNO in samenwerking met INTERPOL in Singapore heeft georganiseerd voor politiemensen. Rolf ging samen met collega-expert Mark van Staalduinen tijdens die trainingen in op onderwerpen als het anonieme internet en Tor-netwerken (The Onion Router); de technische, juridische en maatschappelijke aspecten van het Dark Web; de bitcoin-technologie en hoe criminelen daar misbruik van maken.

Ecosysteem ontrafelen?

Vooral de verwevenheid tussen het Dark Web en het betalen met bitcoins heeft alle aandacht van TNO. "Hiervoor verdiepen we ons voornamelijk in de steeds veranderende businessmodellen van de criminelen", zegt Rolf. "We willen hun ecosysteem ontrafelen. Zij moeten elkaar ook kunnen vertrouwen. Hoe beoordelen ze wie een betrouwbare partner is? Hoe werken hun reviews met sterren en punten? Welk systeem en welke techniek zit daarachter? Als je dat kunt doorgronden, is het de truc het systeem zo te beïnvloeden dat het zich tegen de gebruikers keert. Je kunt een illegale site offline halen, maar dan hebben de gebruikers in no time nieuwe sites en aliassen in de lucht. Het is een continu kat-en-muisspel. Bij TNO onderzoeken we hoe de criminelen werken, het is aan politie en justitie om hen met onze kennis aan te pakken."

Dompel je onder in de wereld van cyber-criminele verdienmodellen bij de mede door TNO georganiseerde Summerschool in Milaan (2-5 Juli 2018). Zie voor meer informatie: http://bit.ly/SummerSchoolCybercrime2018

Kijk voor meer informatie én jouw mogelijkheden bij TNO op: TNO.NL/career.

TNO
innovation
for life

ENIAC is ready for a takeover!

By: Sandra Drenthen
Chairman ENIAC

Together with my board, I had the honor to lead the ENIAC association for almost two years. We've organized fun events and drinks for our members, held graduation speeddates with companies and have awarded the best thesis awards. Furthermore we had an extra focus on professionalizing the member administration including direct debit transactions, renewing our statutes and regulations and organizing a lustrum symposium by alumni and for alumni.

We had a great time and are giving other alumni the chance to lead ENIAC and improve the organisation with their ideas and goals. We have found a candidate board consisting of: Lisa de Wilde, Regie Mocking, Matthijs Koridon and Martijn Hoogesteger. Fun fact; all of them were part of an Inter-*Actief* board as well! They will present their plans during the upcoming general member meeting at the 7th of July; save the date! As always, a fun event will be held around this meeting as well, which will be announced soon.

We would like to thank Inter-*Actief* for our good collaborations, and would like to invite all new graduates, bachelor or master, to join ENIAC to keep our network up!

ENIAC is the alumni association for the bachelor programs Technical Computer Science and Business & IT and the related master programs at the University of Twente. The association has the mission to stimulate the contacts between alumni and with the faculty of EEMCS. Therefore, ENIAC regularly organises meet-ups and events, which is a great way to keep in touch with your former studymates!

ENIAC and Inter-*Actief* have a close collaboration. This means, that while you're a member of Inter-*Actief*, you are welcome to visit all activities of ENIAC, and conversely, members of ENIAC are welcomed at all of Inter-*Actief*'s activities.

By: Lisa de Wilde
Candidate chairman ENIAC

Imagine a car with two seats, two engines and no steering wheel. Joysticks are connected to each of the engines in order to control the car. To go straight ahead with this car two persons need to accelerate at the same time and with the same amount. If they do not, the car will turn and if they accelerate too fast, the car will tilt backwards. As you can see, driving this car is all about teamwork. This term is commonly used during your studies and within your job. In general it is stated that to achieve results better and faster, you have to work together. However, is this also the case during this car driving activity called powerturnen? We will find out during our first activity on the 7th of July.

During the general member meeting prior to this activity, Regie, Matthijs, Martijn and I hope to become the next board of ENIAC. To set out new plans for our time as ENIAC board, we have been working on our policy plan for the second half of 2018. Just like previous years the graduation speeddate and regional drinks will take place. In addition to that, we are looking forward to organize activities together with you! Would you like to give a presentation about a topic in IT? Do you know a professor who is a very inspiring speaker? Would you like to organize an event or help us with updating the website? Please contact us via our Facebook group 'Alumnivereniging ENIAC',

bestuur@eniac.utwente.nl or meet us at one of the ENIAC activities.

ENIAC does not only organize activities for alumni, but also for students. Therefore, we already planned a introduction meeting with the candidate board of Inter-*Actief*. During this meeting would like to get to know each other (better) and discuss the continuation of the good collaboration between two the associations. By working together we can help students to find a place for their master thesis or first job. Teamwork between ENIAC and Inter-*Actief* can be the perfect amount of acceleration that you need.

Automation of Assistants

How computers can help you in your life

By: Thijs van Essen
Editor I/O Vivat

Automation and computers go hand in hand. Besides the, by now, known application of robots in development processes, artificial intelligence is advancing. In previous years a human was needed to create your appointment or write a memo, now a computer can take over. The days of having a human providing the service of a secretary are over. Computers, or even mobile phones, can provide the same service.

Naturally, there is a top amongst the flock when it comes to providing us with digital personal assistants. The top consists of companies which have the user base and resources to provide satisfactory answers to common queries. The mainstream provides a user with four options: Google Assistant, Siri, Alexa, or Cortana.

All four options aim to be a conversational tool which provides services to integrate in the life of the user. This might be making an appointment in the calendar of the user and synchronising this appointment with all connected devices, or facilitate a nonsense conversation with the user. In other words, the software should be able to replace a human assistant.

Luckily, during the time of writing this article Google introduced a new and subjectively amazing feature for their virtual assistant, namely Google Duplex. It has not been rolled out to the public yet, but promises to open up a new world of possibilities in the automation of your life. Consequently, it provides me with something of relevance to discuss and maybe stir up a conversation instead of a summary down of different personal assistants.

First off, for everyone who does not know what Google Duplex is, a short run down. Duplex can book an appointment at a hairdresser or make a reservation at a restaurant or anything alike. This does not sound so special yet, however, it can also book an appointment at a place where there is no online reservation possibility. It is able to phone the place and have a conversation with the person taking the call. This conversation would be so lifelike that the human in the conversation will not be able to tell they are talking to a machine. According to Google, Duplex will be available in 80 countries and will be able to speak 30 languages. These countries and languages are to be announced. In other words, Google Duplex will pass the Turing test. The question is, will it deliver on its promises.

Before discussing a machine passing the Turing test, the problem should be nuanced. Duplex is only able to have conversations with regards to booking an appointment, within this space it is incredibly versatile and quick, but wandering outside of this domain it will start talking gibberish. This means that we do not have to worry about Skynet just yet, but there are still some interesting viewpoints to be discussed.

An interesting question, if I were to be asked, is on the other side of the line. The person who answers the phone is completely clueless. Should a person be made aware of the fact they are speaking to a machine? Before Google Duplex was introduced there were robot callers, mostly in the telemarketing space. However, figuring out if they were a robot most often did not even take any effort.

The main consideration surrounding Duplex is the tradeoff between convenience, privacy and trust. Google Duplex offers a user the convenience of just telling a phone what to do in about 30 seconds and the phone will do the tedious work. Before going into a meeting or class you can ask your phone to book an appointment and afterwards the appointment has been made, all while you were discussing important things. From your point of view it does not seem half bad. However, this is yet another step in providing the automated system of a big American multinational with more details of your life. Depending on how big your tin foil hat is, this might be a terrible thing.

> *"A long-standing goal of human-computer interaction has been to enable people to have a natural conversation with computers, as they would with each other. In recent years, we have witnessed a revolution in the ability of computers to understand and to generate natural speech, especially with he application of deep neural networks (e.g., Google voice search, WaveNet)."*
>
> *The first fragement from Google's own blog post about their new technology. The blog post, including examples of Duplex in action can be found at the following link.*
>
> *https://ai.googleblog.com/2018/05/duplex-ai-system-for-natural-conversation.html*

The Selfish Ledger

You don't own your data

By: Sven Mol
Editor I/O Vivat

Fifty years before Darwin introduced his theory of evolution, Lamarck came up with a similar theory. He postulated that a creature has an internal code, and that this code is updated with experiences. As such, the creature would pass on an updated version of this code to its offspring, enabling evolution. While we now know this not to be true, it is still a widely used simplification.

A recently uncovered short film by Google introduces us to the concept of a selfish ledger. A ledger, originating in finance, is a collection of financial records. In the video, however, Nick Foster postulates that our digital selves, consisting of all our decisions and actions, can be described as such a ledger. Or even as a lamarckian epigenome, a constantly updating representation of who we are. It then imagines what would happen when such a ledger was given a volition, instead of existing purely for historical record. It asks: *"What if we thought of ourselves not as the owners of this information, but as custodians, transient carriers, or caretakers?"*

The video continues by explaining that the ledger can be given a goal to work towards, which can be anything you want it to be. Once a user has selected a goal for the ledger, every option can be compared to its alternatives, which enables the ledger to suggest options that move it closer to its goal. Examples like taking the bike instead of the car come to mind. Over time, this will change the behaviour of its owner, and this modification in behaviour is the ultimate goal of the ledger. It does not want to enable temporary changes, but sustainable difference in behaviour.

All these decisions are based on what the ledger knows about you: what you have eaten last night, what your last order from bol.com was or how you feel about reading the I/O Vivat. All that data is used to determine what you might do in a certain situation, which in turn enables the ledger to figure out the best course of action to achieve its goals.

But what if you don't share data with the ledger? If you are a bit wary about the privacy violations this might result in? The ledger will then propose products and services it can use to fill gaps in its knowledge, using the already collected information to ensure the highest probability that you will actually acquire and use its suggestion. The video illustrates this, the ledger shows it doesn't know the weight of a user and proceeds to find a scale that its bearer might buy. When it doesn't find such a scale, it proceeds to design a custom scale, all to gather that one vital datapoint.

After the video became public, Google quickly disavowed it, stating that it was merely a thought experiment that was "not related to any current or future products." A spokesperson said it was a thought-experiment to provoke discussion and debate, "we understand if this is disturbing — it is designed to be." But it does fit a greater pattern we have been seeing from companies like Google. Their ultimate goal seems to be changing user behaviour to something that suits them best. And this ledger could be a great tool in enabling that.

The ledger can, by trying to preserve itself and its "offspring", nudge users in the right direction. A direction chosen by the company developing the ledger. As Foster puts it in the video: *"As an organization, Google would be responsible for offering suitable targets for a user's ledger."* But there is no reason to believe that these goals are what Google

says. Google has proven time and again they do not care about ethics or telling people the truth. The recent scandal of project Maven comes to mind. Project Maven was (is) a cooperation between Google and the american Department of Defense and is supposed to bring artificial intelligence to the battlefield.

"We understand if this is disturbing — it is designed to be."

Earlier, Google had spoken out against such partnerships. Even after its employees voiced their concerns, Google didn't terminate the program. It took public outcry for Google to start scaling back. It is currently unclear to what extent the project will be terminated.

But even if Google is honest about the goals, they might still not be what they intended them to be. A thought-experiment, the paperclip maximizer, comes to mind. The paperclip maximizer was first described by Nick Bostrom in 2003. It starts by giving an artificial general intelligence, such as the selfish ledger, the goal of maximizing the amount of paperclips it owns. It is a very simple and straightforward goal. The AI might start to collect paper clips, start earning money to buy paper clips or start manufacturing paper clips itself.

The AI would, however, quickly realize it is not smart enough to determine the best way to collect paper clips and it would start on improving itself, resulting in an intelligence explosion. It will quickly surpass even the brightest human minds, and at some point it can decide that it should convert the entire earth to paper clips. While this may seem like a stupid decision, the goal doesn't state anything about preserving earth or humans, so the intelligence simply doesn't care about humans or our values. Similarly, the selfish ledger may be given a seemingly neutral goal which turns out adverse to our values as humans. A ledger given the goal to reduce CO_2 emissions might decide its best course of action is to have the energy grid disabled or even destroyed, with all its consequences.

With all these risks, one can only wonder if this is a good idea. There are a lot of risks involved in the creation of such a ledger, both ethically and technically. Everything outlined earlier certainly paints a dystopian picture of such a selfish ledger, but it might also bring a lot of good to society. As Foster puts it: "As cycles of collection and comparison extend, it may be possible to develop a species level understanding of complex issues, such as depression, health and poverty." While I am unsure if the benefits outweigh the risks, we cannot deny there are benefits. As we are tracking more and more data, we create a detailed account of who we are, both individually and as a species. The tracking reveals new patterns which can be used to shape our behaviour, and with these patterns, we can more accurately set the goals of this ledger, over time changing the field of user data from merely tracking our behaviour to a system that offers direction towards a desired result.

"By applying our knowledge of epigenetics, inheritance and mimetics to this field, we may be able to make mental leaps in our understanding, which could offer benefits to this generation, to future generations and the species as a whole."

Lamarckian evolution

Lamarckian evolution, or Lamarckism, was a hypothesis on how evolution might work. It postulates that an organism has an internal code which can be updated with experiences of the organism. This adaptive force ensured offspring that was more suited for the environment.

While it was eventually largely superseded by Darwin's theory on evolution, there are still specific fields where it finds application, like early life epigenetics and artificial intelligence. In the field of artificial intelligence, lamarckism is a simplification that is often used to reduce the complexity of genetic algorithms, as it uses the adaptive force instead of randomization and elimination to determine the traits of offspring.

By the Chairman

It's time to say goodbye

By: Wouter Kobes
Chairman I.C.T.S.V. Inter-Actief

The end of the academic year is approaching and with it comes the final part of our board year: the summer holidays. Time to reflect on an awesome year at Inter-*Actief* as your chairman!

It might be a big cliché, but time has flown this year! It only feels like yesterday when we were appointed as the thirty-ninth board of our association and we have done so many things since then. I can't even mention half of them!

Our board year really started with the board change GMM and the constitution drink one week later. After physical repairs of walls and board members, all the focus could be lain on the tasks at hand. We had do-group lunches with all the freshmen and eventually held a very well-visited committee market where all committees were represented.

In October the Study Tour Committee announced their theme and destinations: Japan and South Korea. They will depart next September and will travel for three weeks to visit companies and universities there. A completely new activity followed later that month; the Virtual Reality Arcade gave members the possibility to explore the world of VR and its applications first hand.

The final month of the year 2017 was dedicated to a new committee; the Christmas Committee. They organised a broad range of activities, of which the Christmas dinner and the visit to Dusseldorf's Weihnachtsmarkt can be marked as most memorable. Participants that completed their advent calendar received unique Inter-*Actief* Christmas balls.

Just before the spring break our symposium Vigilance took place, about cybersecurity. This day filled with interesting speakers gave participants information about DDoS attacks, insight in how the Dutch national police hijacked an online drugs-selling platform and much more.

The half-way point of our board year was marked with the celebration of our association's Dies Natalis. The festivities started with a blockchain-themed Rially and was followed up with a nice dinner. This activity I enjoyed most, due to its great atmosphere and of course its superb food.

At the beginning of April, we announced our candidate board. Consisting of six heroes, whom are most likely to succeed us next September. In their candidate period, they are being prepared for their tasks at hand. It was also time for the parents' day, on which the parents of freshmen where introduced to the university, our study programme and the association.

Early May we departed to Vienna for this year's EEMCS trip, to experience the (drinking) culture there first hand. Directly after our return, Pandora started. This radio-active week of puzzling and playful fighting caused the usual sleep deprivation that can be expected by this event.

We arrive at June, which immediately started good with our International Business Course to Stockholm, Sweden.

The next few weeks will be packed with activities to give year a great ending. Our last responsibility as the board will be the introduction camp in August, on which the committee is working very hard right now and will continue to do so in the following months. We are looking forward to welcome about 300 new Bachelor and Master freshmen then.

This concludes my overview of highlights of this year. I would like to thank every member that contributed to this great year, whether you helped organising events, participated in them or assisted the association in any other way. I speak on behalf of the entire board when I say we are amazed by the effort that people are putting in our association. Keep up the good work for the years to come!

It is time to say goodbye. On September 4th, we will hopefully pass on our responsibility to our candidates. The best of luck for them and I am sure they will enjoy their year as much as we have done.

Thank you for putting your trust in us this year and I would like to see you again at Inter-*Actief* next year!

Warmest regards and signing off,

Wouter Kobes

Chairman of the 39th board of
I.C.T.S.V. Inter-*Actief*

By the Candidate Chairman

Meet the Candidate Board

By: Jelle van den Wijngaard
Candidate Chairman I.C.T.S.V. Inter-Actief '18-'19

On the third of April, 2018, we were officially announced as the candidate board of Inter-*Actief* for the academic year of 2018/2019. That means that at the time of writing, we have been the candidate board for about six weeks. During those weeks, we have already learned a lot and experienced a lot of interesting things.

For some time now, the last line of our mail signature has been as follows:

"I.C.T.S.V. Inter-*Actief* is the study association for the Bachelor and Master programmes of Technical Computer Science and Business & IT, taught at the University of Twente." While this is a nice summary for use under professional emails, to many members Inter-*Actief* is much more than that. Inter-*Actief* is a place to meet like-minded individuals, a place to connect with companies in the beautiful field of work that we're in as well as a place where one can gain experience that one does not get from the study programmes, for example by doing committees. To each member of Inter-*Actief* certain aspects of the association are more important than others. It is the task of the board to make sure that everybody has the opportunity to make the most of all the advantages that a membership at Inter-*Actief* can offer.

Quite some time ago now, the current board started their search for a candidate board. Eventually, our candidate board was put in a room and after some time we managed to come up with a function division with which all six of us were content. Since we have been formed, we have had the opportunity to learn a lot of things to prepare us for the coming year. We have talked to and learned directly from our predecessors, mainly about our specific functions, committees and responsibilities. Additionally, we have participated in a lot of meetings, of which a lot will undoubtedly follow. Besides that, we have been doing a lot to get to know all the people that we will encounter if we do indeed become the next board of Inter-*Actief*. This includes all the other candidate boards, as well as a lot of different people from the UT.

Aside from having learned so many things, we have also been working hard on our policy plan which will hopefully be a good guidance for us during our board year and which should inform you, our members, about the things we plan to accomplish during our board year. All of this has been very exciting so far and it is our hope that by the time of the next GMM, we will be ready to start what will hopefully be a nice board year for us, and even more so a great year for all members of Inter-*Actief*.

With so much more to come we are thankful and humbled to have been given this opportunity and we are looking forward to having a wonderful year with all of you. For now, all that's left to say is that any input you might have for us that might help us in any way at all is very much appreciated and can be sent to us at cb@inter-actief.net. Of course you can also recognise us by our candidate board shirts and ties, so you're very welcome to just talk to us in person too!

The candidate board hopes to see you soon at Inter-*Actief*!

About Jelle

Jelle is currently a third-year student. He was born on the 18th of September, 1996, in the village of Breukelen. After finishing high school at R.S.G. Broklede, he moved to Enschede to study there. Since he arrived at the UT, Jelle has been quite active at Inter-*Actief*, having been in the CoLeX, the Dipsoman1A, the TAPCc, the SymCie, the bartenders guild and the SocCie. After gathering experience in these committees, he now wanted to explore what else there is to learn at and about Inter-*Actief* and so he applied for a board year.

Besides activism at Inter-*Actief*, Jelle also likes to do mountain biking, bouldering, sailing as well as some other sports. Occasionally he reads a good book and he likes to listen to good music, preferably on vinyl. Jelle has a guitar but he can't play the guitar, at all.

Candidate Board

The candidate board for the academic year 2018/2019 was constituted as follows:

Jelle van den Wijngaard *(Chairman)*
Niels de Groot *(Secretary)*
Yoeri Otten *(Treasurer)*
Jeffrey Bakker *(Internal Affairs)*
Egbert Dijkstra *(External Affairs)*
Wessel Ammerlaan *(Educational Affairs)*

Addicted to you

The risks of having your phone as your best friend

By: Emma Sloot
Editor I/O Vivat

I n the last decennia, technology has made entire leaps forward. This is noticeable everywhere, but the place where people can see it the most is in their own palm. Mobile phones went from big, to small, to big again. Whereas mobile phones used to be a rare sight, nowadays it is almost expected from everyone to have a smartphone.

Smartphones also started to become a sign of social status. In the past we had the tendency to judge people based on clothes. These days, we prefer to use the 'newness' of a smartphone and other technology to measure wealth. But is it safe to be so dependent on something that small? Should we perhaps look for alternatives?

The luxury of having internet (almost) everywhere has a lot of advantages. It is easier to check the weather, a lot of real-time warnings can be issued, and even the sense of safety has improved. When a situation seems unsafe, there are hundreds of tracker apps that can notify the authorities of your location and request them to dispatch their services if necessary.

However, there might also be a danger in all of this. The location that we so freely give to have more comfort can be abused. Even with GPS off, if we use internet, there are the transmission towers that are on fixed locations and can be used to track other locations. Authorities usually have the location of the one
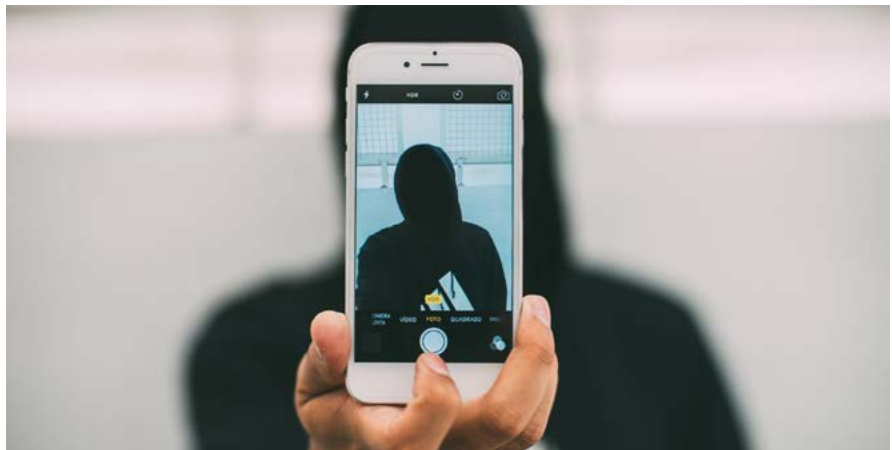

Figure 1: You may not be as anonymous as you think

closest to you, but there only has to be one person or company with bad intentions, and your location might fall into the wrong hands. Now, what can people do with the location of the nearest transmission tower? With one, nothing too specific, but keep track on when and where someone switches from tower and stalking becomes a lot easier. Luckily, the chances of an average person getting stalked are very slim. For celebrities, important political figures etc. it can be a way bigger risk. People tend to go quite far in following their idols, or in attacking others because of their political opinion. Also, thieves can use it to figure out whether someone is home, or, especially in countries without freedom of speech, journalists can be traced and arrested while trying to remain anonymous.

There are a lot more risks in smartphones. Apps are making it easier than ever

to spend money. Most banks now have an app, and with two or three clicks something new is bought, and nowadays you can pay with your phone, without entering a passcode, for most small things. Then there's the practical aspect. We are expected to be online all the time. Emails, announcements, chat messages, all quick ways to communicate. This speed, however, has its disadvantages. Students are expected to read their mail or Blackboard first thing in the morning. Changes in timetables, cancellations etc. are becoming more and more of a last minute thing[2]. Our ability to adapt to sudden changes has to be better than ever.

The more well-known aspects of phones are the social ones. Originally a medium to connect people through calling, and later texting, the phone has evolved to be so much more. It still has the main function of a connectional medium, but

it has become much more efficient at doing so. Sadly, this is a double-edged sword. The bright side is that contacting others is easier than ever, which is ironically also the dark side. On the one hand, emotional support is available on different levels. Asking friends for help, meeting like-minded people, and receiving professional help is all possible online. However, these opportunities have also opened the gates for risks and dangers.

Even with the large number of warnings that are given nowadays, stories arise of blackmailing, bullying, and even abductions or murder that were caused by social media. The fact that we almost always have the option to use social media when we like, mainly because of smartphones, creates a whole new set of risks. We as humans are so desperate to belong to a group that we are willing to neglect some of our own values in trying to do so. This in itself is nothing new, an example can be seen in the student associations and their, sometimes very harsh, introduction periods. However, society has changed, and nearly everyone nowadays has a portable camera with them. Those embarrassing moments that used to stay contained within a small group of friends, are now easily distributed among thousands or millions of others.

If you look online, a lot of the populair videos are of people making a fool out of themselves by falling down, getting

drunk, getting rejected etc. All these moments are now online for everyone to see. Why we enjoy it so much to watch other people fail, suffer, or embarrass themselves is a question with dozens of different psychological answers. The fact that we do this is part of

> "We as humans are so desperate to belong to a group that we are willing to neglect some of our own values in trying to do so."

the reason that people that are trying to bully others are more successful nowadays. The platform for it is bigger, and easier to access.

Also, as seen in research about the relation between internet addiction and mental health disorders[3], there seems to be a positive correlation between these two. This may be the reason that according to the previously mentioned article, people with ADHD-like disorders are more sensitive to rewards. When they feel like they are in control, or have the freedom of self-representation that comes with being online, people tend to feel more rewarded. However, the feeling of being in control is something entirely different than actually being in control. If someone has felt weird and like they do not belong for a long time, they will be more vulnerable to people that make them feel like they do belong. This has two sides. If we believe in the good of people, which seems to be the

right way more often than not, someone can get an awesome group of friends that helps him/her through a lot of problems, and can give advice. The other side, however, is a bit darker. The risks of wanting to belong are even bigger for a group of people that have never truly felt like they fit within a group. They are even more susceptible to dangers arising on the internet.

And there's the other parts. Being online can give you the possibility to create an 'other self'. This can make you less susceptible for what is actually happening around you. A way to illustrate this is GTP[4], game transfer phenomena. GTP in itself has enough sides to write an entire article about, but it is a way to illustrate how being online, in this case while gaming, can transfer itself to real life. Trying to reenact moves that can only be done in games, like climbing a tower in real life in the way that it happens in assassin's creed, shows how much the online life can influence us.

To wrap it up, the online life has many pleasures, but there are many dangers hidden underneath it. Whether these are small or big, they can hurt you. Even bigger than these dangers, however, is the need for smartphones, and social media in this age of digitalisation. We can try to protect ourselves and be as safe as possible, but to create full safety

Figure 2: Social media is around us, and becoming a bigger part of our life than ever

References

[1]https://www.tandfonline.com/doi/abs/10.1080/1369118X.2012.710245

[2] https://www.cbs.nl/nl-nl/publicatie/2018/09/veiligheidsmonitor-2017

[3] https://www.jahonline.org/article/S1054-139X(07)00093-6/fulltext

[4] http://gametransferphenomena.com/the-game-transfer-phenomenon/

The era of 'Things' is coming and our industry is enabling it

By: Sander Hofman
Spokesman & Communications Manager at ASML

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 2020 [1]. Toni Mesquida Küsters (Senior Director Product Marketing DUV at ASML) explains how these new applications of chip technology are enabled by mature lithography systems.

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 brain [2], 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 population. In 2015, the internet traffic from wireless devices surpassed that of wired devices. And while you're reading this article, some 40,000 new devices 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 report [3] 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 ste-

adily 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 capacity of 5.7 million wafers per month by 2020." [4]

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 report 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 5500 and TWINSCAN XT 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 TWINSCAN XT line, which can be tweaked to handle either 200 mm or 300 mm wafers. For

"When wireless is perfectly applied the whole earth will be converted into a huge brain..."

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 Universe [5] 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."

References

[1]: How Big is the Internet of Things? http://paxtechnica.org/?page_id=738

[2]: Nikola Tesla Predicted Smartphones In 1926 https://www.huffingtonpost.com/2015/07/10/tesla-quotes_n_7771358.html

[3]: Unlocking the potential of the Internet of Things https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/the-internet-of-things-the-value-of-digitizing-the-physical-world

[4]: 200mm fabs thriving https://electroiq.com/2017/07/200mm-fabs-thriving/

[5]: IoT Mid-Year Update From IDC And Other Research Firms https://www.forbes.com/consent/?toURL=https://www.forbes.com/sites/gilpress/2016/08/05/iot-mid-year-update-from-idc-and-other-research-firms/#56695a4e55c5

Study Tour Shift

Cyber-Physical Infrastructure

By: Sytse Hartvelt
Chairman Study Tour Shift

In September 2018, Shift, the latest instalment of study tours by Inter-*Actief*, will depart to South Korea and Japan. The participants will spend three weeks discovering these two countries through company visits, university visits and cultural activities.

During these visits the participants have a chance to do cases, get tours through leading universities and cutting edge companies and enter into in-depth discussions with their employees. Outside of regular working hours, the participants have the chance to experience an entirely new culture and explore some of the biggest cities on earth; Seoul and Tokyo. Upon their return, they will have a wealth of new experiences, and they even get ECTS for their Bachelor or Master programme. Before departure however, the participants do have to put in a lot of effort. Roughly nine months before departure, the group of participants is announced, after which they start to work hard on completing their preparations.

The first of these is the Theme Course, a research project within the theme of the study tour. The participants get appointed a specific track within the theme. For Shift's theme Cyber-Physical Infrastructure, the tracks are Security, Networking, Big Data & Deep Learning, Embedded Systems, Sensoring & Robotics, and Technology Acceptance. Each participant finds a supervisor within a relevant chair of the university and performs an entire research project, from idea to final paper.

After finishing the Theme Course in the third and fourth quarter of the academic year, the participants give up part of their summer break to perform a contract research assignment. These assignments are IT-related work assignments at a company. In the past, study tour participants have been employed to do various researches, perform penetration testing, organise a conference or implement software systems. Currently, one of our participants is using LoRa and seismic sensors to visualise data about the earthquakes in Groningen. These contract research assignments do not only provide the participant with relevant working experience, but also fund the study tour.

Finally, the participants follow a full-time course for three weeks at the start of the new academic year. During this course, they conduct research and perform analyses about the countries the study tour will visit. The participants analyse the scientific and professional landscape within the theme of the study tour and analyse the cultural differences between the countries of destination and the Western countries they are used to living in.

When all is said and done and the participants have spent nine months doing research, gaining work experience, conducting more research and getting to know the culture of their destinations, it is finally time to depart and put all the attained knowledge and experience into practice. Study Tour Shift will leave on September 22nd, 2018 and all our participants are hard at work to prepare themselves as well as they can. Speaking from experience with the previous study tour, they will not be fully prepared and still be overwhelmed by the cultural differences and all the new impressions and sensory overload that they will experience during the study tour.

Shift

For you, it is sadly too late to join Study Tour Shift. However, in 2020, the next instalment of the study tour will probably take place with a new theme and a new destination. If you want to take on the aforementioned challenges, gain valuable research and work experience and have the experience of a lifetime, be sure to consider enrolling. If you're up for an even bigger challenge, consider being a part of the organising committee. It's a lot of stress and a lot of work, but it's very fulfilling and probably the biggest committee of Inter-*Actief*. Plus, you get to choose the destination for the next study tour!

About Sytse

Sytse Hartvelt was born on May 12th, 1994. He came to the University of Twente in 2011 to study Technical Computer Science. After obtaining his bachelor's degree in 2016, he is currently in the closing stages of his master degree in Business Information Technology at the University of Twente.

During his years at Inter-*Actief*, he has been a very active member and was the officer of internal affairs in the 36th board. He participated in study tour 'MISC' and is currently the chairman of the study tour committee 'Shift'.

Nausea puzzle: rules of play

Tetris and Nurikabe combined

By: Meike Nauta
Puzzle maker

A new issue, a new puzzle! Remember the Nautia puzzle of the previous I/O Vivat? The current puzzle is a variant of the Nautia puzzle: a bit simpler with a new twist. Following the suggestion of Rien Heuver, we can call this puzzle 'Nausea'.

The Nausea puzzle is inspired by Nurikabe and Tetris. The puzzle is played on a rectangular grid of cells, some of which contain clues. Cells are initially of unknown colour, but can only be black or white. Two same-coloured cells are considered connected if they are adjacent vertically or horizontally, but not diagonally. Connected black cells form 'islands', while connected white cells form the sea.
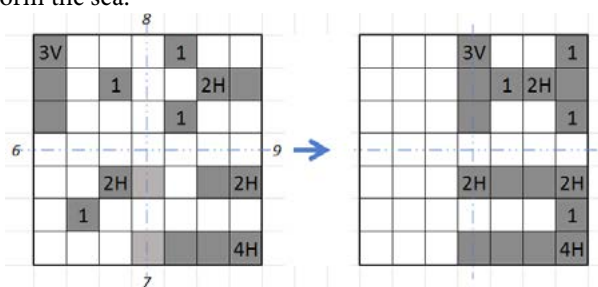

Figure 1: Example for rule 7 where the black cells fall to the right side of the grid, since this half has the highest weight. By rotating the page, one can see the letters U I.

New Puzzle Maker?

Do you enjoy these puzzles? Enthusiastic about creating puzzles yourself?

Since I am graduating, this is my last puzzle for I/O Vivat. Interested in making 2 to 3 puzzles a year for I/O Vivat? Send an e-mail to iovivat@inter-actief.net or talk to one of the committee members.

The challenge is to paint each cell black or white, subject to the following rules:

The rules of play

1. Each island must contain exactly one clue.
2. The number of cells in each island equals the numeric value of the clue.
3. All islands are isolated from each other horizontally and vertically.
4. All white cells need to be connected, either horizontally or vertically (i.e. there must be exactly one sea of white cells).
5. When a cell contains a clue with the letter 'H', the island has a horizontal length of the numerical value of the clue, and a vertical width of 1 cell.
6. When a cell contains a clue with the letter 'V', the island has a horizontal length of 1 cell, and a vertical width of the numerical value of the clue.
7. The grid balances on a needle that is placed under the grid, exactly in the middle, as shown in Figure 2. When all islands are colored, the grid tilts to one of its four sides based on the number of black cells as explained in the next column. All black cells will fall to this side of the grid, just like Tetris (Unlike Tetris, islands cannot be rotated). An example to clarify is shown in Figure 1. (Note that this example violates rule 4.)
8. The black islands will form a computer term which is the solution to the puzzle.

Figure 2: The grid balancing on a needle

The balancing grid

7a. Imagine the grid being divided in four equal sized parts, as shown by the blue lines in the puzzle. The number of black cells in each quarter determine the weight of that quarter.

7b. One black cell has a weight of 1. If a black cell falls only partially in a quarter, it has a weight of 0 (as can be seen in Figure 1 where the light grey cells have no weight).

7c. The half with the highest weight (so the sum of two adjacent quarters), either the right, upper, left or bottom side of the grid, is the side towards the grid will tilt.

A few strategy hints

- A cell with a clue that equals '1' needs to be black.
- Dot a non-numbered cell when you've determined that it needs to be white.
- Since two islands may only touch at corners, cells between two islands must be white.
- Once an island is 'complete', all cells that share a side with it must be white.
- Don't forget rule 4.
- When you've solved the puzzle but you cannot read the word, ask the person next to you or look at it from a distance.

Good luck and enjoy!

NAUSEA
by Meike

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
1	1		4V		2H		3V	1		1	1	1
1	1			2H		2V						
	2V							3H				
				3H	2V		2V					
			1						3H			3V
		1			2V							1
	1	3H						3H				
						1						
1			4V	1	3V		3V					3V
		1								1		
2V									3H		2H	
		1										2V
						2H			2V	1		
									1			
2H		2H				1			4H			
									1			
				6V					1			

Send in your solution

Turn this page for the explanation how to solve this puzzle. The solution after solving this Nausea puzzle is a computer term. Send your solution to puzzle@inter-actief.net before the 1st of October 2018 and get a chance to win a €10 IA-cinema voucher!

The answer and winner of the puzzle of the previous edition (33.1) can be found on the editorial page.