



I/O VIVAT

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Eelco Eerenberg
'Techie' in municipality Enschede

ICT in Politics
Views of the political parties on IT

Electronic Voting
Risks and Possibilities

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Different Electoral Systems Applied to
Current Election Results

IT IN POLITICS

Politics in a Hyper-connected World

How new technologies form the new political landscape

And more...



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Puzzle
Company visits
Columns

We push
technology further

to print microchip
features that are
finer

to accelerate
artificial
intelligence



to make
robots
understand
humans

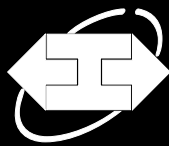
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I/O VIVAT

//Editorial

Dear reader,

Our voting makes the Dutch politics going through turbulent and uncertain times. We could choose from 28 political parties. A voting advice application like StemWijzer or KiesKompas was no frivolous luxury. But do these applications influence our voting and therefore the Dutch politics? And what role plays social media in this? Willem and Yannis give you the answer in the article on page 18-19 and 6-7.

On March 15th, the day was finally there: we could vote! Still with pencil and paper though... Dennis explains us why we don't use voting machines and compares the Netherlands with other countries.

Eventually, as much as 13 parties made it to the Second Chamber; all with different views, polarised to the extreme left and right of the political spectrum, varying from conservative to progressive. Looking at the election result, the Dutch society is divided over social issues like environment and immigration. But, what do parties think about IT? And what IT opinions did we vote for? Marlene gives you an insightful overview. Talking about IT & Politics, we all know that IT experts are underrepresented in politics. Eelco Eerenberg (computer scientist and former chairman of Inter-Actief) tells us about his experience as 'techie' in the municipality of Enschede.

Furthermore, the complicated election result makes the Dutch formation game even harder. Wouldn't it be easier to change our voting system? Thijs shows you the remarkable consequences when we had voted per province or per municipality.

When you are sated with politics, cheer yourself up with my puzzle. Enjoy your summer!

Meike Nauta
Editor-in-chief I/O Vivat

Answer puzzle 32.2

The solution of the puzzle from issue 32.2 was: "Blue Energy for a Green Future".

The maze in the Inter-Actief shape led you to the Blue dot. Crossing out all words in the word search (except the word 'tyre' which was missing, my apologies for that) gave you seven uncrossed letters which could form the word 'energy'. The match stick puzzle was a challenging one: moving the matches F, O and R solves the puzzle. The missing letter in the cross was of course an 'A'. When you solved the Sudoku, you would find that 'green' was the colour we were looking for. Eventually, the rebus showed 'fuel' minus -el, giving 'fu', and 'turban' where ban=e, giving 'ture'. After solving all these puzzles, you had the solution sentence: Blue Energy for a Green Future.

Winner puzzle 32.2

The winner of this puzzle is Thijs van Ede. Congratulations! You will receive your Inter-Actief cinema voucher as soon as possible!

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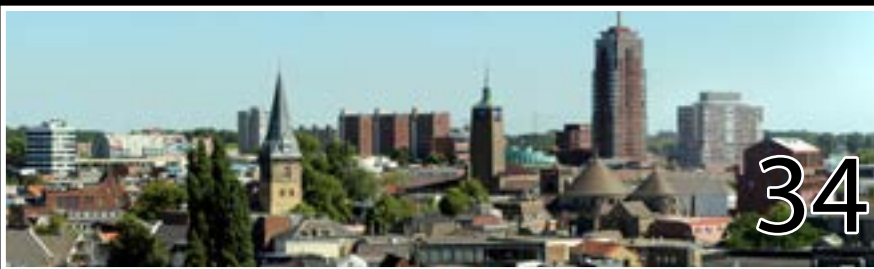
From the ENIAC board



By the Chairwoman



Candidate Board



Eelco Eerenberg: 'Techie' in Municipality Enschede



Puzzle: Pazurgo meets Maze

Better  Be

 moneybird

 KRAMP

 LYNXX
data inspired by people

Politics in a Hyperconnected World

How new technologies form the new political landscape



By: Yannis Linardos
Editor I/O Vivat

It was a sunny summer day in 2015 and I was sitting in the beach with my cousin and her boyfriend discussing politics. I was very frustrated by how an otherwise smart person would believe such “nonsense” when it comes to politics while she would look at her boyfriend and say: “You see, there are still people voting for those guys”. It was very surprising to me how two persons with a very similar background would find each other’s views so foreign.

What I first-hand experienced that summer is called “echo chamber” [1], a metaphorical description of a situation in which information, ideas, or beliefs are amplified or reinforced by communication and repetition inside a defined system. Inside a figurative echo chamber, official sources often go unquestioned and different or competing views are censored, disallowed, or otherwise underrepresented. It is analogous with an acoustic echo chamber, where sounds reverberate in a hollow enclosure.

To put it in simple words, in my YouTube, Facebook and Twitter accounts I would subscribe, like and follow only pages and accounts that reflect my point of view. And my cousin would do the same. In the end, neither of us had been exposed to the opposite opinion before our discussion. In each one’s “echo chamber”, their political opponents seem stupid, “old” or, even worse, evil and traitors. It is ironic how the same technology that was supposed to make

us more connected, ended up alienating us from each other.

The “echo chamber” is only one way where social media affect politics nowadays. Considering that over 60% of our generation uses social media as their main source for news, it is obvious that there will be many other influences, too. [2]

During the American presidential elections campaigns, there was much discussion about “fake news” on both sides of the political spectrum. The Internet has enabled everyone to broadcast their opinion anonymously and with minimum cost. Although this fact can lead to a further democratization of our societies, it can also be used to spread pro-

paganda. The more provoking and eye catching the title of an article, the more possible it is to become viral and, unfortunately, not many people check their sources. A story that verifies one’s views would “reverberate” inside their “echo chamber” without much questioning. Hence, there has been a surge in false stories gaining publicity, possibly influencing people’s decisions and widening the gap between political opponents. Shockingly, fake news outperformed mainstream news on Facebook during the last months before the American elections [3].

In our hyperconnected [9] world, the attention span of information consumers has shortened dramatically [4]. It is only natural for our brain to decrease the



During the American presidential election campaigns, there was much discussion about “fake news” on both sides of the political spectrum

time it spends on each new information it gets when the total quantity is huge. However, this creates the need for much more condensed sentences. Is it possible, though, to create a proper political argumentation within the 140 characters of the twitter character count? If you add to the mixture some anonymity-fueled trolling, the answer is negative. When was the last time that you had an “an interesting and respectful exchange of ideas” on the Internet?

The above points paint quite a bleak picture regarding the influence of so-

cial media in politics, especially coming from a magazine edited by Computer Science students. However, there is always another side on the argument.

Social media have indeed led to a greater democratization of our societies. Less popular groups and parties can get representation and exposure on the Internet while the mainstream media ignore them. Even if someone disagrees with their ideas, the fact that everyone can be heard is a step forward.

This is quite critical, especially in countries under totalitarian regimes. For instance, social media played an important role in mobilizing the masses during the Tunisian anti-government protests of 2010-2011 [5], which led to a gover-

ment overthrow and the first free elections since the country's independence. [6] Moreover, social media contributed in the failure of the 2016 coup d'état in Turkey by keeping communication open between the Turkish people and their elected leaders [7], despite the fact that the Turkish government had banned the use of Twitter a couple of years ago. [8]

“It is on us to always check our sources and keep an open mind about the world”

In countries which have a stable democracy, social media have helped in a less obvious way. The distance between the politicians and the citizens have been shortened. Before Twitter and Facebook, a politician could only massively reach the electorate via newspapers or TV channels. Nowadays, the politicians can instantly transmit their opinions to everyone interested. This has decreased, but not yet eliminated, the need for expensive campaigns and politicians' dependence on traditional media. Furthermore, politicians can weigh the public opinion by just checking what is trending in the social media and adjust their policies accordingly. In a sense, trending has rendered traditional polls obsolete. This possibility of getting immediate feedback is unprecedented in

representative democracies and it opens the gates for greater engagement of the public in forming the political agenda.

It is obvious that social media have many positive as well as negative influences in politics. However, the point is that new technologies, including social media, are here to stay. Hence, whatever their influence, there is no point in complaining against them. We can do nothing but

embrace them and try to lessen their negative aspects.

Companies or governments cannot do much to combat the problems of fake news or echo chambers though. Every possible solution that they may try to implement, like the proposed ban in fake news, will dangerously collide with our right to free speech. It is on us, daily information consumers, to be aware, always check our sources and keep an open mind about the world.



Social Media played an important role in the Tunisian anti-government protests that led to the first free elections since the country's independence

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Interview with Paul Rooijmans and Sanneke Mulderink

By: Marlène Hol and Dennis Aanstoot
Editors

You are barely outside of station Amersfoort and you are already at the head office of Lynxx, a company which has as its target public transport. On this very suitable location, we met with Sanneke Mulderink and Paul Rooijmans, the founders of Lynxx and Data-Lab. Lynxx helps companies in public transport or logistics to improve their KPIs, and to get more value out of their data by using in-depth analyses and machine learning. This is done from their head office in Amersfoort, where they currently have 25 employees. But don't think that this is a typical Dutch company. Lynxx has customers all over the world and recently opened their new office in Australia.

Paul and Sanneke founded this company five years ago. They worked together before on a different project, but after a few years of working on different projects, they got in touch again and decided to combine their strength to found Lynxx. In the years apart, Paul has helped developing and implementing the OV-chipkaart, whereas Sanneke gained a lot of experience in the development of dashboards and getting value out of data. By combining this knowledge and experience, Lynxx started out as a company to develop dashboards for several public transport companies. In the next few years, they discovered the need for more in-depth analysis. They therefore extended their company with different analyzes and they also started applying

machine learning. Now, they support their customers in three ways: dashboards, bids & funding, and modelling.

The services described have as main focus to process and present the data of their customers. However, Lynxx also started collecting their own data. Paul showed us already at the beginning of the visit two applications they developed with their subsidiary Data-Lab: MyOV and Tranzer. The first application, MyOV, is an application developed for people who often travel with public transport. By coupling you OV-chip card to the application, you can collect points when travelling with trains. These points can then be exchanged for se-

veral things, including free coffee at the Kiosk or a voucher for the Google Play Store. With the app, you are rewarded for desired behavior. When travelling on less popular times or routes, you get extra points.

The second app, Tranzer, is focused on more incidental travelers. With the app, you can easily plan your trip, which can be directly paid with iDEAL or your credit card. After paying, a QR-code is generated which can be used to check-in. You also get support when you have to leave the train. Tranzer is the perfect app for the insecure traveler.



That data is the core of this company, becomes clear immediately. Paul described us that they make a distinction between data 1.0, data 2.0, and data 3.0. Data 1.0 is about optimizing the data, which is already done at a lot of companies. Data 2.0 is about reuse of the data in a smart way. Data 3.0 is about finding solutions that work for you. Paul used the example of Google for this. Everybody is working for Google, only you do not get paid for it. Google finds a way to make people work for them, without people expecting to get paid for it. With Lynxx, dashboarding is about data 1.0, and this is where the most revenues are made now. However, data 2.0 and 3.0 is the future. With their modelling services, this is now part of the business plan of Lynxx as well.

The slogan of MyOV, $E = MyOV2$, immediately tells you something about the company. Lynxx almost exclusively has technical students as employees. Right now, these are mainly econometrists, but also other beta-students like mathematicians or scientists. However, since they are collecting data and developing applications themselves to support their customers, this team will be extended with computer scientists.

opportunities come with the creativity of the solution and with finding new ways for what you can do with the data”, said Paul. They expect their employees to have ideas on their own and not to be afraid to execute these ideas. In exchange for your commitment, you get a lot of opportunities within the company, both nationally and internationally.

That Lynxx invests in you is without a doubt. “We do not only invest in the education of our employees, but also in the team”, Sanneke told us. Working at Lynxx does not mean a standard 9 to 5 job. You spend so much time with your colleagues, that there should also be space to get to know each other on a more personal level. A good example of this philosophy, is that every year they go skiing with the entire company for four days. You really become a part of the team, where there is enough space for self-deployment.

Lynxx has projects all over the world and the expectation is that this is only becoming more and more in the upcoming years. However, this does not mean you work in a hierarchical multinational. Both Paul and Sanneke emphasize that it is a flat organization where

This philosophy is clearly reflected by the office in Amersfoort. The design of the office shows you that a strong, informal team works here. There are a lot of open spaces and glass, which emphasizes that the managers are close to the other employees. “We like it that the office here has a typical Dutch culture, where everybody can be direct and can give their opinion”, Sanneke tells us.

The apps that are developed by Lynxx are built in modern technology. Right now, Python is used with Django as the framework. They expect from their developers that they think about what they are implementing. Sanneke and Paul explain to us that they are looking for new team members that not only generate code. The developers have to contribute to the concept and the implementation of this concept. This fits the vision that their employees should look for creative solutions to the task. As Paul put it “Whether this company succeeds or fails, that depends on the people”. If you fit in the team and want to invest in the company, then Lynxx invests in you!

“The opportunities come with finding new ways for what you can do with the data”

Working at Lynxx will not be the same as working at many other IT-companies. At Lynxx, they believe in investing in their employees. Support for your education, development, and foreign experiences is something you can expect from Lynxx. However, of course this also means they expect serious commitment from you. Employees of Lynxx are expected to look beyond the current situation and ideas. “The greatest op-

everybody works together. Paul tells us that they are often told by younger employees what to do and how a project should happen. This is the culture they want to maintain in their company. “The office in Amersfoort will never be very large”, Sanneke tells us. This is against the philosophy of the company. A more realistic scenario is then that an office on another location in the world is established.

About Lynxx

Lynxx is a company based in Amersfoort. The company is engaged in making the public transport sector more smart and more efficient. For example, Lynxx makes dashboards for transport companies, that will give an overview of the current situation.

Lynxx's main expertises are: Making operational KPI's work, Making data work by analysis and Machine learning.

Do you want to find out more about Lynxx?
Go to www.lynx.eu



www.lynx.eu

Political campaigns

The IT-topics they are talking about



By: Marlène Hol
Editor I/O Vivat

On March 15, the elections for the House of Representatives in the Netherlands took place. The main topics in the debates were climate, refugees, and culture. However, in a time where IT is moving quickly, social media influences all kinds of behaviour and IT threats are huge, it is almost impossible to restrain from talking about IT on a political level. In this article, we present the different views of the political parties on IT. After that, we will take into account the outcome of the elections and see which themes are likely to be discussed in the upcoming years. IT became such a big part of everyday life, it is almost impossible to imagine that this would not be incorporated in political plans anymore

In this article, we will discuss the seven largest parties in the Netherlands before the elections: VVD, PVV, CDA, D66, GroenLinks (GL), SP, and PvdA.

VVD

The two main topics related to IT in the election programme of VVD, and of many other parties, are privacy and internet crime and security. Privacy is mainly about the protection of personal details. In the opinion of the VVD, individuals and institutions all have a responsibility to protect this data. However, this means that the government also has a responsibility to carefully protect the data they gather and main-

tain. Besides that, VVD believes that there should be more supervision on the gathering of personal details. You should remain the owner of your own data. However, under certain circumstances this protection would not apply, e.g. when there is suspicion of a terrorist attack.

VVD states that the conviction of internet crime should have tougher penalties and more regulations. The police and the department of justice should gather more knowledge about this topic and there should be dedicated authorities for e.g. hacking. Moreover, this also means that it is inevitable that systems and networks should be protected. But as mentioned several times in the election programme of VDD, also related to this topic, this should be a shared responsibility between government and companies.

PVV

As was often discussed in the build-up to the elections, PVV only has an election programme of a single page. As to be expected, there is no special focus here on IT. It is mentioned that there should be more money for the police. However, what should happen with this money or whether it is related to IT-related topics such as cyber-attacks is not mentioned.

CDA

In their election programme, there isn't much regard to IT. However, they do have some interesting points of view. First of all, CDA would like to give the AIVD, the intelligence service, and related organizations more authority to (better) protect the citizens. They state that the laws that should protect citizens are outdated and they should be



Figure 1: The different party leaders

reviewed. No statements on how to protect the privacy in these cases are made.

Also when it comes to protection against internet crime, CDA feels like we are outdated. The police and department of justice are behind. CDA wants to invest in extra capacity and knowledge about these themes to fill this gap. Interesting here is that the CDA feels like when a person is suspected of serious crimes like kidnapping or terrorism, the suspects should be forced to decrypt encrypted information.

D66

In this election, D66 had a lot of focus on IT in its programme. Related to privacy, the D66 has as main focus that the civilian should be the owner of his own data. They should therefore be able to see, change and alter their data. Also, the consumer should be able to determine which data they do not want to share and services should not depend on the sharing of data. There should also be more transparency within (large) companies and the government about what is happening with the (consumer) data. There should be a larger budget for the supervision on different activities related to sharing and usage of data and to trendwatching of developments like Big Data and the Internet of Things.

Related to security, D66 states that the government should not be discussing internet protocols and influencing the internet behaviour by filtering, blocking or controlling the internet. Furthermore,

“It is almost impossible to restrain from talking about IT on a political level”

re, the government should not be able to decrypt or use vulnerabilities in the software. D66 also states that companies should be held liable for bad software.

Noticeable is the mentioning of modern techniques like drones, Internet of Things, autonomous vehicles and 3D printing in the election programme of D66. They think that there should be more investments in research about these themes. Also, they think that there should be European guidelines for drones and that the government should start preparing for autonomous vehicles. Other points of view are that digital topics like privacy should be included in primary education, software developed by the government should be open source and the digital infrastructure in the Netherlands should be improved.

GroenLinks

In their election programme, GL talks about a ‘free and open internet’ where protection of personal details should be

key with the development of databases. Also GL thinks there should be a higher capacity for the Dutch Data Protection Authority to improve the protection of the privacy of citizens, especially in regard to IoT-devices and data stored by e.g. the government. GL states that email and WhatsApp including the metadata of the messages should also be protected, whereas now only physical letters are protected by law. If the investigation services want to see the data of a suspect, a judge should rule about this.

In regard to security, GL states that encryption should not be weakened and that government systems should have a security audit on regular basis. Results should be published in a reasonable matter. GL wants that linking to and embedding of content remains legal and that the banning of downloading should stop.

SP

In the election programme of the SP you can find the statement ‘boss of your own data’ several times. One of the views here is that citizens who are not a suspect, should know for sure that no data is collected about them without their permission. Also, both the government and companies should be unable to sell data to other parties without permission. The government should also not be able to aggregate data for profiling and data mining. The SP also wants protection which is now only there for traditional mail, to be extended to electronic communication like

Result elections (seats)

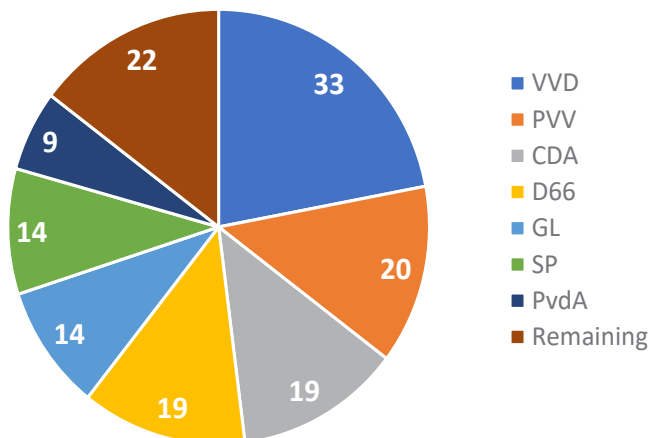


Figure 2: The results of the election

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All the content of this article is based on the party programmes which are publicly available on the websites of the parties. The content of this article is partly based on a article published by Tweakers: <https://tweakers.net/reviews/5277/technologie-in-de-verkiezingsprogrammas-2017.html>

email and chat. The Dutch Data Protection Authority should be strengthened.

In regard to internet crimes, SP would like to have more international cooperation. Moreover, more resources should be made available for the police and the Public Prosecution Office. Encryption should be stimulated according to the SP and the police should report vulnerabilities instead of using them. SP also wants the government to use open

a responsible manner. PvdA also wants to invest in technology for autonomous vehicles.

What's next?

The elections are over and the citizens voted. What are the results going to mean for IT-related laws and decisions? The important thing to note here is that not all laws and decisions in the Netherlands are made during the for-

“Though the desired approaches are different, the value seems to be the same.”

source software and make their own developments open source. However, SP wants the development of this software to happen mainly in-house to be less dependant of external suppliers.

PvdA

In regard to privacy, PvdA mainly puts the focus on privacy in respect to the government. The emphasis here is that citizens should be able to see what data the government has gathered of them. They also mention this should be the same for companies. About the intelligence service, PvdA also mentions that there should be new investments in extra capacity and new technology.

In regard to new technologies, PvdA mentions big data and autonomous vehicles as an upcoming opportunity. They mention that big data gives opportunities, however this should be used in

mation period. All parties are allowed at all times to propose laws and regulations (of course with strict rules). However, the parties that are in the cabinet and have the majority in the House of Representatives have more influence and these plans are more likely to have a majority. Therefore, the outcome of the elections can influence the upcoming years heavily.

Based on the results of the elections, it seems very likely that VVD, CDA, and D66 are going to govern together. At the moment of writing this article (April 6th 2017), there are conversations between these three parties and GroenLinks, the largest party and the big winner of the election. One of the points they all agree on is that the sell of user data should be restricted and that there should be more protection of citizens. However, the extent of this differs. D66 and CDA also focus on the fact that data should be

more transparent and D66 even wants citizens to be able to alter the data. All parties also agree that in some form certain authorities should get more resources to research new technologies or protect the data in a better way. The details of these discussions however are not always clear or they are very different, so we won't know what is going to happen until the final plans are finished.

We can definitely conclude that the differences are big between these parties. This is nicely illustrated by the voting of bills in the past years. In the last term of the cabinet, there have been two IT-related bills: 'Computercriminaliteit III' and 'Wet op de inlichtingen- en veiligheidsdiensten'. The former is about what is allowed in the case of an internet crime and the latter is about the authorities of the intelligence services. Whereas CDA and VVD both voted in favor, D66 and GL both voted against. If these parties are going to govern together, a lot of different IT policies are possible.

At the moment of writing, it is almost sure that PVV will not rule, since other parties will not form a cabinet with them. Due to their big losses, PvdA mentioned that they do not want to be part of the cabinet. Due to the big win for the right-wing parties, it seems very unlikely SP will rule.

In a few months, we (hopefully) have a cabinet which takes IT-related topics as privacy, security, big data, autonomous vehicles and many other emerging technologies serious. The opinions are widely spread, but all parties seem to agree that citizens should be protected in a form. Though the desired approaches are different, the value seems to be the same. A promising fact for the upcoming years.



A small update

Just over two months after the elections, news has reached us that the negotiations between VVD, CDA, D66 and GL have failed. Since the beginning of the negotiations, the message was that the four parties were really different and so the negotiations would be hard. Eventually, immigration was the breaking point for the negotiations. What is going to be next is uncertain at the time of writing (May 23rd 2017). Not many constructions are left and not everybody is optimistic about the options left. Hopefully, it will not be long until we know more about what is going to happen with our government and what this is going to mean for IT passionates like us.



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Programming in the BIT Bachelor programme



By: Luís Ferreira Pires
Programma director Business & IT

Last year I had the opportunity of following a very interesting training on leadership in high education, and in the scope of this training I had to do a project. Since I wanted to profit somehow from the results of my project in my tasks as programme director and associate professor, I chose to take up the programming education in the first year of the Business & IT business programme as the topic of this project.

Since 2007, when I started giving the programming courses for Computer Science (CS) and BIT, I noticed that the students who start their Bachelor studies have different levels of prior knowledge in programming. This creates a big challenge for the programming teachers, because targeting the students with poor initial knowledge makes education boring for the students with more advanced knowledge, and targeting the students with more advanced knowledge makes the study too difficult for students with poor initial knowledge.

Before 2013, when TEM (Twents Education Model) was introduced, some students already struggled with the programming courses (Programming 1 and Programming 2), but finally most of them passed both courses, possibly after some resits. With TEM we created an additional problem, since P1 and P2 have been compressed in Module 2, and there is much less time for students with poor initial programming knowledge to catch up. In general (and without the intention of 'stereotyping'), less BIT students have prior programming knowledge when compared with CS students, so this became a challenge for me as BIT Programme director.

In my project, I tried to find solutions to this problem. The most straightforward but also most expensive solution is to rank the students, put them in different groups according to their prior knowledge, and tailor the programming education in these groups. Unfortunately, we don't have enough resources for this, so the next option is to offer more coaching to the students that lack prior knowledge. To do this properly I first tried to understand what these students actually miss, and I came up with a simple classification: (1) students who have never programmed anything, (2) students who have programmed but have not used object-orientation, and (3) students who have programmed in an object-oriented way. Of course, this classification is not as strict as it looks like, but at least I had a starting point, since I realised that I should mainly target students classified as (1) or (2).

I would like to produce something in my project, so I decided to target the first module of the programme (Module 1, Introduction to BIT), which is an excellent place in the curriculum to do something with programming as preparation for Module 2. Therefore, I planned a so-called 'Java week' in Module 1, with short lectures and exercises for the students to learn the essence of programming and how programming works, and the basic concepts of object-orientation. When defining the course material and activities I exploited the notion of 'threshold concept', which are the concepts responsible for the 'penny drops' effect, and 'automated feedback' by using the CodeAcademy site.

I don't know for sure what has been the learning effect of the Java week on the BIT students because I haven't done a

formal evaluation, but the BIT students performed comparably with the CS students in Module 2, which has never happened before and indicates some success. I also noticed during the Java week that I took away the frustration that some students exhibited in the beginning of the week.

In the long run, we can expect that programming will be mandatory in high school education and the gap I discussed here tends to disappear. For example, the D66 political party is in favour of having programming education already in the elementary schools (see <https://d66.nl/content/uploads/sites/2/2016/12/Definitieve-VKP.pdf>), and since this party is currently negotiating its participation in the next government, there is hope for programming education in the future.

Luís Ferreira Pires was born on 7 April 1961 in São Paulo (Brazil). In 1983, he received his engineering degree from 'Instituto Tecnológico de Aeronáutica' (ITA) (São José dos Campos, Brazil) and obtained his MSc degree in 1989 at 'Escola Politécnica da Universidade de São Paulo' (São Paulo, Brazil). In 1988, Luís moved to the Netherlands to start a PhD project at the University of Twente, and he obtained his PhD degree in 1994. He is currently an Associate Professor at the University of Twente, in the 'Services, Cyber-security and Safety' (SCS) group. In August 2013, Luís also became Programme Director of the Bachelor 'Business & IT' and the Master 'Business Information Technology'.

Luís lives in Hengelo with his wife and three kids: Elena, Melinda and Caio. In his spare time, Luís likes to watch and practise sports.

From the programme director



By: Geert Heijenk

Programme director Computer Science

On the 15th of March the Netherlands have held elections for their parliament. When showing up for the ballot, I received a huge paper form with 28 parties. The sheer size of it prevented me properly unfolding it in the voting booth, where I had to check a box next to the name of one of the approximately 1000 candidates. Furthermore, during election night, I had to stay up very late to learn the election outcome, because all these votes were manually counted. So, while democracy is a 2000 year-old concept, we also use 2000-year-old technology to implement it.

the CS Specialization Data Science & Technology might think that based on a good analysis of all available data, such a good prediction can be made that in a few years it is not needed anymore to do the actual voting.

The truth is, in the 90s and early 00s, we have been using voting machines. Due to security concerns, mainly concerning verifiable integrity and confidentiality, the use of these voting machines has been abandoned in 2007. Maybe a student from our CS specialization Cyber Security can judge if this has been done rightfully. At the recent election, even the use of automated systems to count and collect votes were banned, due to

and an emergency brake, just in case. My hope is that graduates from our new master programs in the area of Computer Science (all mentioned above) will make sure that we indeed can justifiably rely on ICT in the future.

“Only if we, computer scientists, can build systems one can justifiably rely on, than we can really harvest the fruits of our science”

As computer scientist we are inclined to look at these kinds of processes and think of ways to make them much more efficient using information and communication technology. If you are doing the master Internet Science & Technology, you may be wondering if it wouldn't be a lot easier if everyone would be voting via the Internet. As a student doing the Computer Science (CS) specialization Software Technology you might think that it should be easy to write a piece of reliable software that does the counting automatically, whereas a student from

concerns of foreign intelligence agencies trying to influence the outcome of the elections. So, while information technology is pervading our society and personal life, once we really start to depend on it, we start realizing that we are missing the trust to rely on it. Only if we, computer scientists, can build systems one can justifiably rely on, than we can really harvest the fruits of our science. Otherwise, we will continue to build voting machines with a built-in printer, and fully automated autonomous vehicles with a steering wheel

Geert Heijenk is an associate professor in Wireless Networks and Mobility at the University of Twente. He received his M.Sc. in Computer Science from University of Twente in 1988, worked as a research staff member at the same university and received his Ph.D. in 1995. From 1995 until 2003, he was with Ericsson EuroLab Netherlands, first as a senior strategic engineer, and from 1999 as a research department manager. He is program director of the Computer Science and Internet Science & Technology bachelor and master programs of University of Twente.

In 2011, he was a visiting professor at INRIA Rocquencourt, Paris. In 2002, he was a visiting associate professor at the University of California, Irvine. In 1992, he performed part of his Ph.D. research at the University of Pennsylvania.

Geert is living near Joppe, a small village between the towns of Zutphen and Deventer with his girlfriend and daughter. He likes outdoor activities, traveling, playing volleyball, music and reading.



De Belastingdienst

Sneller, dus anders werken bij de Belastingdienst



By: Meike Nauta
Editor-in-chief

Robert van den Breemen is IT Architect bij IV-accent, een dienstonderdeel van de Belastingdienst dat IT-processen versnelt en nieuwe applicaties ontwikkelt om dienstverlening aan burgers en bedrijven te verbeteren. Wij gaan met hem in gesprek.

De bekende slogan van de Belastingdienst is "Leuker kunnen we het niet maken, wel makkelijker". Maar, wat maakt werken bij de Belastingdienst zo leuk?

Wat mij overtuigd heeft, is dat we hier werken in een innovatieve omgeving. Met gevarieerde projecten ondersteunen we de Belastingdienst op IT-gebied. IV-accent is een DevOps organisatie, dat wil zeggen dat we niet alleen de nieuwe applicaties bedenken en ontwikkelen, maar ook zelf verantwoordelijk zijn voor het in productie brengen en het beheer. Er is daardoor een grote mate van diversiteit in werkzaamheden.

Afhankelijk van je ervaring en interesse kun je bij ons zeer uiteenlopend werken; van applicaties ontwikkelen tot werken met de meest moderne technieken zoals Watson, artificial intelligence of machine learning. IV-accent is eigenlijk de innovatiemotor van de Belastingdienst.

Het thema van deze uitgave is IT & Politiek. Hoe beïnvloeden beslissingen in de Tweede Kamer jullie werk?

IV-accent is gelieerd aan de Investeringsagenda van de Belastingdienst die in de Tweede Kamer aan de orde is geweest. Doel van de Investeringsagenda is hogere belastingopbrengsten tegen structureel lagere kosten. Vernieuwing van de ICT is een belangrijk onderdeel van de Investeringsagenda. Het gaat om ambitieuze doelen, een hoog tempo en intensieve samenwerking. Veel verschillende soorten expertise werken bij elk product samen aan tastbare resultaten. Hiermee hebben we een toekomstgerichte benadering.

We werken aan vijf verandergebieden:

- informatiegestuurd toezicht en in-nig;
- moderne interactie met burgers en bedrijven;
- data & analytics;
- verbeterde sturing, verantwoording en effectmeting en
- we brengen onze ICT op orde.

Dat houdt in dat we, op basis van de data die we hebben, efficiënter toezicht houden door onze medewerkers informatie op maat te geven. Burgers en bedrijven die meer risico vormen om niet te gaan betalen kun je dan eerder identificeren. Het ontwikkelen van nieuwe risicomodellen doen we met behulp van data science en predictive analytics. We hebben niet voor niets al 70 data scientists in dienst.

Digitalisering vergt nieuwe manieren van interactie met de burger. Zo hebben we nu al online formulieren en de vooraf ingevulde belastingaangifte, maar in de toekomst willen we dit nog uitbrei-



Belastingdienst

den. Bijvoorbeeld dat je een signaal krijgt van de overheid dat je kindertoeslag kunt aanvragen als je net een kind hebt geregistreerd. Of bijvoorbeeld een nieuwe ondernemer die zich inschrijft bij de Kamer van Koophandel wijzen op zijn rechten en plichten.

Als overheid volgen we de ontwikkelingen in de maatschappij er wordt ook verwacht dat we een moderne digitale effectieve en efficiënte organisatie zijn. De Belastingdienst heeft al honderden systemen geproduceerd, dus een betere informatiepositie creëren is een

van data uit systemen die er niet voor bedoeld waren komt gegevensafscherming naar boven. Daarom wordt voor elk project binnen de Belastingdienst een zogeheten Privacy Impact Analysis (PIA) uitgevoerd.

“We hebben al honderden systemen geproduceerd”

Ook geven we op dit moment nog weinig informatie over de voortgang van een bezwaar of aangifte. Veel bedrijven en burgers contacteren de Belastingdienst om een statusupdate te vragen. “Ik heb niks meer gehoord van mijn bezwaar, hoe staat het ermee?”. We willen meer inzicht gaan geven in waar de aangifte of bezwaar zich bevindt in het proces door middel van bijvoorbeeld een mobiele app of portal.

Dat klinkt veelbelovend, maar andere bedrijven in Nederland zijn al verder met digitalisering. Hoe komt dat?

Een stap naar voren is inderdaad nodig voor de Overheid. Om de Belastingdienst gereed te maken voor de toekomst is de Investeringsagenda tot stand gekomen. Als kleine afdeling vormt IV-accent de motor van modernisering. Innovatie is noodzakelijk maar een groot robuust ICT systeem is niet zomaar te veranderen.

uitdaging. We zijn nu bezig om data uit verschillende systemen te managen en integreren zodat we betere analyses kunnen toepassen. Als je ons in volle breedte vergelijkt met belastingdiensten uit het buitenland, dan zijn we erg vooruitstrevend. Het digitale douane proces zorgt er bijvoorbeeld voor dat Nederland een van de grootste doorvoerlanden van Europa blijft.

Is door het combineren van data uit verschillende systemen het privacy in het geding?

Voor alle afdelingen van de Belastingdienst geldt een streng toegangs- en databeveiligingsbeleid. Dit is in lijn met de wet- en regelgeving op het terrein van bescherming van (persoons)gegevens. Het strenge beleid geldt ook voor de externe partijen die voor de Belastingdienst werken. De Belastingdienst is zelf verantwoordelijk om aan de privacywetgeving te voldoen. Bij het samenvoegen van datasets of het gebruiken

Daarnaast is er bij elk project sprake van privacy-by-design, hand in hand met security-by-design. Het is belangrijk om bewust na te denken over of data wel nodig is. Heeft een toezichtmedewerker echt een dashboard nodig met allerlei gedetailleerde informatie? Aan de IT afdeling van de Belastingdienst worden daarom mogelijkheden geboden om data te anonimiseren en pseudonimiseren. Dus in plaats van dat data op niveau van burger en bedrijf wordt uitgewisseld, wordt bijvoorbeeld de top 100 van bedrijven met betalingsproblemen gegeven zonder te noemen welke bedrijven dit dan zijn. Dit resulteert in iets ingewikkeldere systemen maar wel met privacywaarborging.

Wil je ook werken bij IV-accent?

Dat komt goed uit! We zijn nog steeds op zoek naar nieuwe mensen die helpen moderne technologieën en innovaties van de grond te krijgen. Met name in IT land gaan ontwikkelingen heel hard. Over veelbelovende technieken, zoals advanced data analytics, virtuele assistenten, dialogondersteuning en deep learning hebben we nu nog weinig kennis. Nieuwe collega's kunnen ons leren en inspireren. We zijn dan ook een lerende organisatie: medewerkers leren van elkaar en we geven vrijheid die ze vanuit het regeltjes denken niet meer gewend waren. In teams, zogeheten 'Centres of Excellence', ontwikkelen we op een agile en scrum manier. Deze aanpak leidt tot een uitdagende omgeving, zowel op technisch als sociaal vlak.



Robert van den Breemen, IT architect bij IV-accent

Bronnen

<https://belastingdienst-in-beeld.nl/themas/investeringsagenda-belastingdienst/factsheet-investeringsagenda/>

<https://belastingdienst-in-beeld.nl/streng-databeveiliging-bij-de-hele-belastingdienst/>

VOTE!

Voting advice applications

Can we put our votes in the hands of a computer?



By: Willem Siers
Editor I/O Vivat

Last March the Dutch elections for the house of representatives was held. There was some rallying to remind the people to the importance of voting in order to maximize the voter turnout.

This is easy to say. However, due to overchoice of parties the voter may just give up and abstain from voting altogether. While some parties have clear standpoints, others' overlap which makes it difficult for the voter to find the best match based on their priorities. A tedious process of finding the best overlap among many choices sounds like a candidate for automation.

Voting Advice Applications (VAA) were created to facilitate this process. The user fills in 30 or so quiz-like questions and, via an algorithm, gets a suggestion for which party to vote for. The most used dutch VAA is StemWijzer which was filled in 6.8 million times these elections [5]. This is a general purpose VAA, but there are many alternatives that focus on specific areas such as religion, the environment and science/technology [6]. However, these are biased towards suggesting parties that take these topics into their election programme. General VAAs should form an unbiased advice across all participating parties that actually corresponds to the user's views, and this task brings a few challenges.

Demographics

VAAs are used in many, mostly European, countries, and adoption in multi-party systems is much higher than in two-party systems [1] like the United States. Besides national usage, they have also been used trans-nationally, most notably in the elections for the European Parliament. Due to this widespread usage and apparent demand, researchers started uncovering how VAAs do and should operate and how they affect voters.

Interestingly, users are not representative of the electorate, in terms of demographics, media consumption and political interest. The main observation is that a typical VAA user is a politically interested, highly educated, young male [1]. Furthermore, only 2-10% of the users are swing voters (depending on the country), and the most common usage is to "confirm" their choice (as opposed to finding their choice)[4].

Influence on users

What do we know about the effects VAAs have on users? Studies confirm that the use of VAAs improves the user's political knowledge during the campaign [1]. Furthermore, it even motivates them to collect more political knowledge about the election campaign and its parties as a result of having used the VAA. These are long-term cognitive effects that exceed the duration of using the application.

The clearest behavioral effect is an increased likelihood for a user to take part in elections (desirable in a democratic system). A more complex problem is determining the effects on party choice, since modeling this requires to take the user's initial ideas, VAA outcome and actual voting behaviour into account. Because the acts of using a VAA and voting are performed in different locations and moments, many short-term events can influence the party choice. Despite these challenges, party choice is a core issue of research.

VAA Design

Considering that VAAs play a large role in the outcome of elections, it is important they function correctly, to avoid mismatches between the voter's wishes and the carried out politics by elected ministers.

When designing VAAs, five design aspects can be thought of: statement choice, their formulation, identifying party positions, which algorithm to use for calculating the proximity of the voters to the parties' positions, and the way in which the results are displayed.

Starting with statement selection: it turns out that when many statements are selected that are treated in some party's programme, then this party is favored significantly in the results [8]. Formulation also matters, for example: "Students should receive grants" and "Students should not receive grants"

both ask the same question. However, it turns out choosing a positively phrased question will get you different results than a negatively phrased question [9].

Furthermore, different VAAs use different methods of determining a party's view on an issue [2]. Originally, members of the parties themselves would deliver their stances on the statements. The downside of this approach is the fact that there are many actors within a party, i.e. how a party is positioned depends on which members deliver their stances. Another concern is strategy. An example: large established parties should not clarify their stances too much, in order to get a more positive outcome in the VAA [1]. Instead they have incentives to blur their positions. For these reasons the VAAs moved towards letting experts on politics determine stances for the parties instead. The most transparent approach is manifesto coding, a scientific method for determining party positions from (natural language) documents provided by parties (usually party-programmes)[2,7]. This method however has downsides for small and new parties, as they themselves know their own stances better than coders can derive. A newer method, originally used by Kieskompas and later used in the European Parliament elections, combines self-positioning and expert-positioning to overcome shortcomings of both previous methods[1].

“Large parties shouldn't clarify their stances, in order to get a more positive outcome”

Concerning the algorithm to calculate the proximity between parties and users, the most prominent discussion concerns whether to use multiple dimensions to calculate this proximity or not. StemWijzer, which uses a high-dimensional model, awards one point for each statement when user and party agree (double points if the user later

marks it a priority issue), which is easy for the user to understand (see figure 1). In this approach every statement can be seen as a separate dimension and the result is calculated as the Manhattan distance over all dimensions [3]. A low dimensional model, such as used in Kieskompas, maps user and parties to a spatial representation (e.g. liberal vs. progressive and left vs. right) to additionally provide insight in the user's position in the political space and insight in differences of parties within this space (see figure 1). Moreover, it shows coherence in political preferences. This means that for example the stances “anti same-sex marriage” and “pro legalization of cannabis” don't coexist, due to both stances being on different ends of the same dimension (former being conservative, latter being progressive). The higher dimensional model falsely implies that parties are uniformly distributed among all dimensions, which is far from the reality. This latter approach (low-dimensional model) was developed through political science and preferred in trans-national elections and is used for the European elections.

Concerns

One shortcoming is the ability to consider parties with very special views on politics, such as GeenPeil, because their views cannot be expressed by the quiz-like format. Furthermore, these VAAs should be correct and unbiased, although it is difficult to ensure they are implemented correctly, and whether the used model is even suitable for voting advice. It is good to remain critical: after all, it's your vote and not the developer's one.

Conclusion

Technology improves modern elections in the form of Voting Advice Applications, for example by increasing the voter turnout and increased long-term knowledge of the campaigns among voters. Note that we can not blindly let the computer decide our vote for us, illustrated by how much research and improvements have been done in its brief existence. At the same time, this same fact is reassuring, because it shows that people are taking the (potentially negative) effects on democracy seriously. Voting advice applications are a nice tool to find an entry into the wilderness of political parties without having to spend your days reading party-programmes.

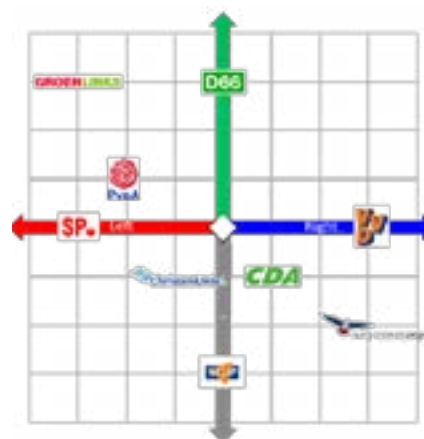


Figure 1: High dimensional model (left) and Low dimensional model (Right)

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Electoral Systems

What is the effect electoral systems have on the Dutch democracy?



By: Thijs van Essen
Editor I/O Vivat

The negotiations for the new Dutch parliament are well on its way. The result of the election showed clear candidates. However, what if our electoral system was different. Which party would have won the election, and what would be a favourable construction of parliament in that case.

There are three changes which will be discussed in this article. All can be applied to the current electoral system to transform it. The changes would transform a national system to a more local based election. On the local scale there are three logical varieties, namely: providential, municipality, and voting district. The different options are sketched below and consequences are discussed.

Province

During an election each province in the Netherlands would be appointed a certain number of seats based on their population. In this system the principle of winner takes all is applied. This means that the party with the most votes in a province automatically receives all the seats of this province. Taking the results of the last election and applying this

system would mean there would not have to be any bickering during a formation as the VVD could form one on its own. The results, which are shown in figure 1, show a stereotyping image. In the most southern province the PVV takes the lead, where in the more northern provinces CDA claims victory. The rest of the country is dominated by the VVD.

Municipalities

If we narrow the provinces down to municipalities we see a little more variety. The left parties start emerging. However, as can be seen in figure 2, in the house of represen-

tatives the VVD still holds a strong lead and would form the 'coalition' by itself. Looking at the results of the provinces and the municipalities we see a pattern. The VVD takes a strong lead when a non-linear, winner takes all principle is applied. Other notable things include; when looking at the closer communities, municipalities in this case, like minded people are heard more. An example of this is a hint of the bible belt. The middle of the country sees municipalities where the SGP comes out on top.



Figure 1: The house of representatives based on the voting results of provinces

Voting Districts

When dividing the seats based on the winning parties in the voting districts the smaller communities phenomena is even stronger. The results of the district based electoral system are shown in figure 3. For the first time, demographic specific parties enter the house of representatives. This might be because voting districts are made up of about one thousand people. In large cities this might only include a few blocks or streets. The population of a district likely consist of like minded people. Consequently, parties who target

“only one party benefits - in enormous proportions”

specific demographics benefit from the concentration of the voters. They are likely to win in the districts with people who agree with their ideology. Since these district now correlate directly to seat in the house it make a huge impact for these sort of parties.

Employing this type of electoral system might mean the redistribution of voting districts and circles. This can be done to heavily favour one group or completely ignore the

opinion of minorities. Heavily favouring one group can be done by making a district with a majority of people who would vote for that group. Ignoring minorities is a consequence of requiring every voting district to be an exact representation of the Dutch population. Naturally minorities will never get a majority in an election, thus drowning out their opinion.

Consequences

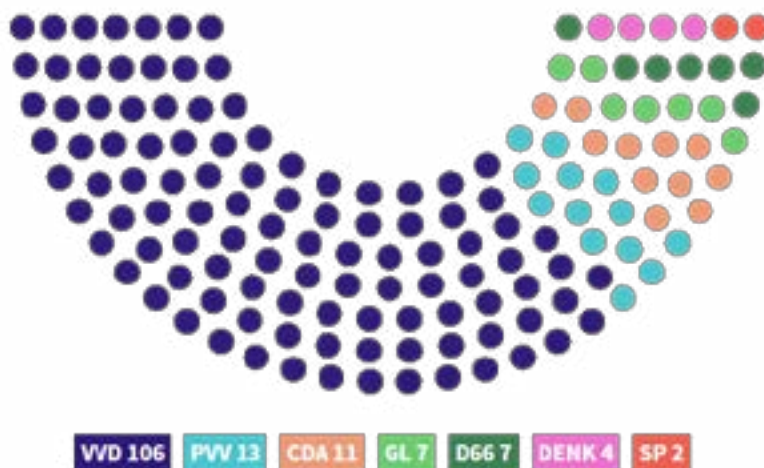


Figure 3 The house of representatives based on the voting results of districts

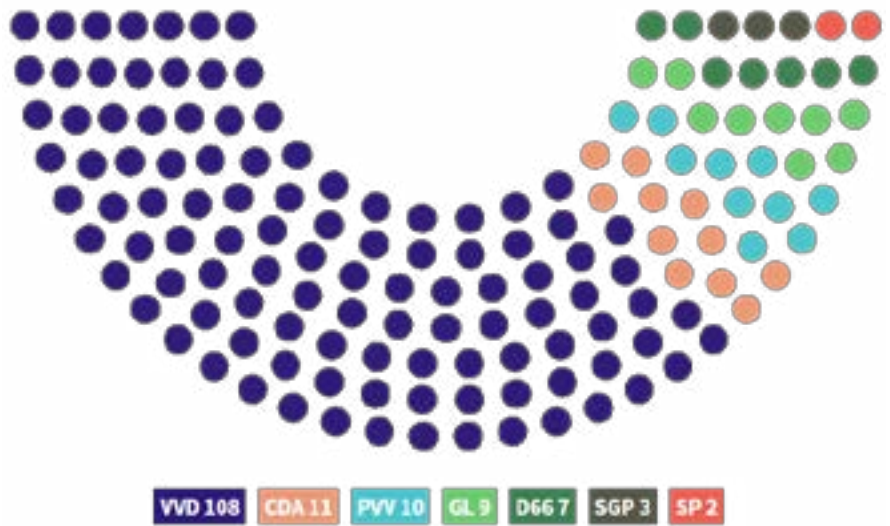


Figure 2: The house of representatives based on the voting results of municipalities

Though we see the number of parties in the house of representatives decline, only one party benefits - in enormous proportions - from the changes which are discussed above. This would mean that if we were to step away from a linear seat division based on the number of votes the VVD would be lone ruler of our house of representatives. Possible counteractions from The Hague might involve a national Leftist party, combining the supports of all left parties to oppose VVD, CDA and PVV.

With people voting in the exact same way we see completely different outcomes when the electoral systems differs. On a local level the biggest party in the country indeed is also heavily favoured on the local level. However, this would undermine the strength of our representative democracy. To preserve the integrity of our government possible counter action will emerge, including the merger of left parties and the redistribution of certain areas to ensure every part of the population is represented fairly.

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The article is based on a site provided by 'De Volkskrant'

<http://www.volkskrant.nl/kijkverder/2017/stemverdelers/>



By: Geatse Meester
CEO BetterBe

Software matters

Can you picture yourself working with some of the best software engineers of the Netherlands? Together you'll create code that matters. Software used by the largest financial corporations and automotive brands alike. You can actively help transform the global mobility market and contribute to a more sustainable planet.

Awesome technology

Software will drive most of the game changers in the coming decade, with technology creating daily solutions that are truly awesome. The Tesla, for instance, already has only nineteen moving parts left. New and improved features become available by software updates. And demand-based car sharing – like Uber – will reduce logistic movements by more than 25%.

Scalability

Companies like ours are formalising knowledge into intelligent algorithms. With it, we offer the world mass customization: every customer served in an ultimate individualised fashion. IT is moving from smart software to machine learning and then on to Artificial Intelligence. These developments impact all related areas, such as hardware, cloud services, security, performance, quality, availability, compliance and legal.

Our flagship product interprets vehicle data supplied by an ever-increasing number of suppliers. It is capable of searching through trillions of vehicle configurations to find an optimal match for the customer based on fully customizable vehicle properties and available budget. Intelligent search algorithms, a highly optimized calculation engine, and dedicated hardware support result in the optimal performance that is required for present-day internet applications.

Sustainable Society

We believe that the effective use of modern internet technology improves and accelerates the way we move into the future. Mobility is a primary need all around the world. This poses a global challenge, in terms of available resources, the effects on our planet and costs for car-users.

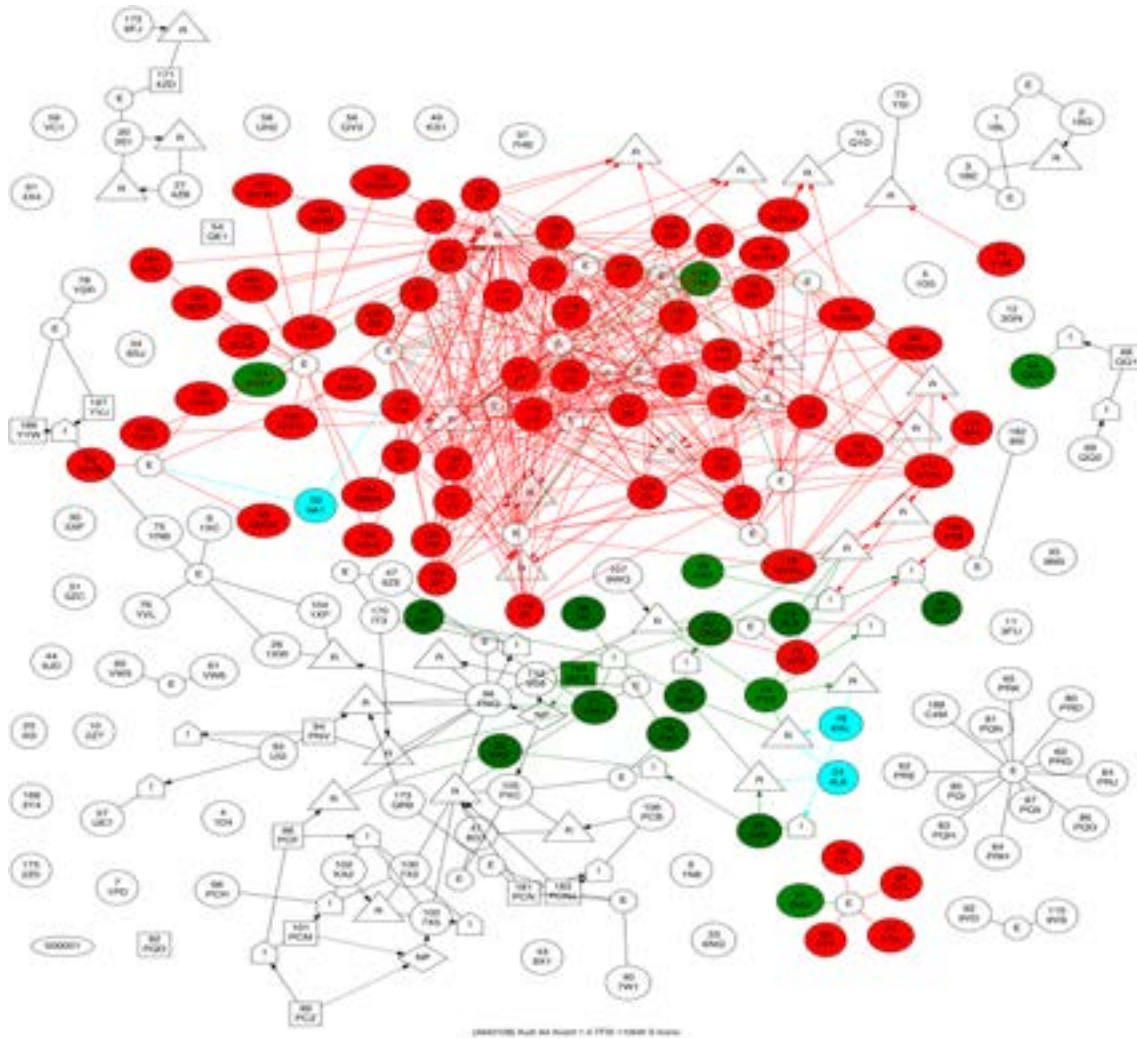
“Companies like ours are formalising knowledge into intelligent algorithms”

It is this optimal performance, and correctness, that enables end-users to profit from the vast amounts of formalized knowledge available in the domain of vehicles. This knowledge was previously only available to (sales-)experts; it is now also readily available to normal car-users, enabling them to make much better informed decisions on purchasing or leasing a vehicle.

We've taken on that challenge, and started by creating the most scalable, user-friendly and intelligent algorithm, to revolutionise mobility. It has been embraced by all the top tier players in the European leasing industry. So now, we move on to new horizons.

Ambition: Join us

If you aspire to be part of our global impact, and you want to work with some of the best Dutch engineers, and you are one of the top coders in your group yourself, and you want to boost your cv; then it can be worthwhile to contact us. We invite you to experience a day at our office, as part of one of our teams. See



them in action, and it will feel like coming home.

The image represents a single vehicle with all of its options; the dataset for a single country typically has between 10.000 and 20.000 vehicles.

A circle represents an option, which might be a navigational system, a colour, a business pack, or in general anything that the manufacturer can add to the vehicle. The other elements depict relations between options; for instance, the business pack might *include*, at no additional cost, the navigational system; the navigational system might *require*, for an additional cost, a multi media system; and the misano-red colour will *exclude* the cortina-white colour.

Once options are *selected* (green in the image), the options that are included and required are *automatically selected* as well (blue) and the options that are excluded are automatically *deselected* (red). This graph is part of the formalized knowledge that is encoded in the system.

For a vehicle with approximately 100 options as here, the size of the search space for this single vehicle is 2^{100} ; option rules reduce this to around 2^{60} viable configurations, which is approximately one trillion. Among these, the search algorithm finds the cheapest configuration satisfying the requirements. This happens for all vehicles in the dataset, in a time of less than 1 second.

About BetterBe

BetterBe is transforming automotive leasing worldwide

Our customers are mostly European based multinationals, inspired by our next level approach to automotive lease. With our Software as a Service (SaaS), we enable them to move faster, think bigger and stay ahead.

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, from CFO to CEO, embrace this API. Because smart technology is your greatest ally when steering toward the future of automotive leasing.

Better Be

Digital Voting

Should we use it?



By: Dennis Aanstoot
Editor I/O Vivat

During the last decades many countries have experimented with the usage of digital systems to replace the paper ballots that were used before. It is a way to get the voting system to the 21st century, but is the system as great as it looks? It is an opportunity to speed up the process of counting the votes, and saves a lot of paper. Brasil and Estonia have implemented a form of digital voting, and the Netherlands has used it in the past, but isn't using it any more. Why?

Different types of electronic voting; Voting machines and via the internet

Electronic voting can be realised in a multiple of ways. One way is replacing the usual ballot paper with a voting machine. Voters will still go to a polling station, but will now cast their vote on a machine. This makes counting of the votes a lot simpler, since the machines themselves will keep track of this. This way of voting gives hackers opportunities of manipulating the data, so if the machines aren't secure, passing multiple voting could be possible.

Another way of voting could be Internet Voting. This means the voters could cast a vote at home. A safe way of identifying the voter is very important to ensure the user is allowed to vote, and hasn't voted already. In Estonia for example, citizens use a voting website where you vote using their ID card and an App for the

mobile phone confirm their vote.

The dutch pilot with voting machines, and why it is discontinued.

In the Netherlands, electronic voting was used by a large portion of the population. In 2007 however, it was discontinued by the dutch government. Why was this decision made?

In the year 2006, voting machines were used during the elections. They were made by two companies from the Netherlands, who build them with security as a high priority. Also the government believed these statements. During the usage of the electronic voting devices, some groups like the "Wij vertrouwen stemcomputers niet" ("We don't trust voting computers") were unconvinced

by the government's statements that the voting machines are safe to use. They thought the votes people make could be susceptible to fraud and that the voting machine themselves aren't very good in giving feedback to the user that the vote has been sent and everything has gone right. In 2007 the government of the Netherlands was convinced, and all voting returned to paper and red pencils. They say that finding an electronic system that is better will cost too much money, and isn't really better than the system of voting on paper.



Figure 1: The voting machine that Brasil uses

Brazil is still using voting machines. Why?

An example of a country with a long history of using technology for passing votes is Brazil. Brazil has been using voting machines at polling stations since

Despite these concerns, there haven't been any confirmed election frauds, so the government isn't considering aborting this voting system.

“The Estonian counting software used on the server is spread on CD's which can be intercepted”

1996. People from the country go to polling stations, identify themselves just like you would in the Netherlands, and vote, but the voting process will be done on a machine instead of on paper. Minimalistic is key with the design of the computers. The voting machines are about the size of a home telephone, and run very simplistic software. Before the user can vote, he or she has to identify him or herself again with a fingerprint. After the authentication, the voting can happen. All the software runs in a single threaded process, so the possibility of manipulating the voting software is minimal.

Multiple organizations have indicated that the voting machines aren't that safe. For example, there are concerns about auditing the results. A recount isn't possible like it is with physical voting papers. Also, there could be ways to break the software and vote multiple times.

Estonia was the first country to use internet voting. How is this working for them?

Estonia is the first country on earth where Online Voting is legally used. During the last parliamentary elections 30.5 % of the votes were passed on the internet. Even though internet voting is very popular in Estonia, there is some controversy concerning this privilege. An independent report (<https://estoniaevoting.org/>) shows that the way the e-voting is performed isn't very safe. There are concerns with the software the voting servers use (which is open source), but also the way of installing the voting server software on the computers and manipulations in counting the votes. The team that wrote the report walked along with the people who ran servers in the polling stations, and found some very concerning problems with the polling stations,

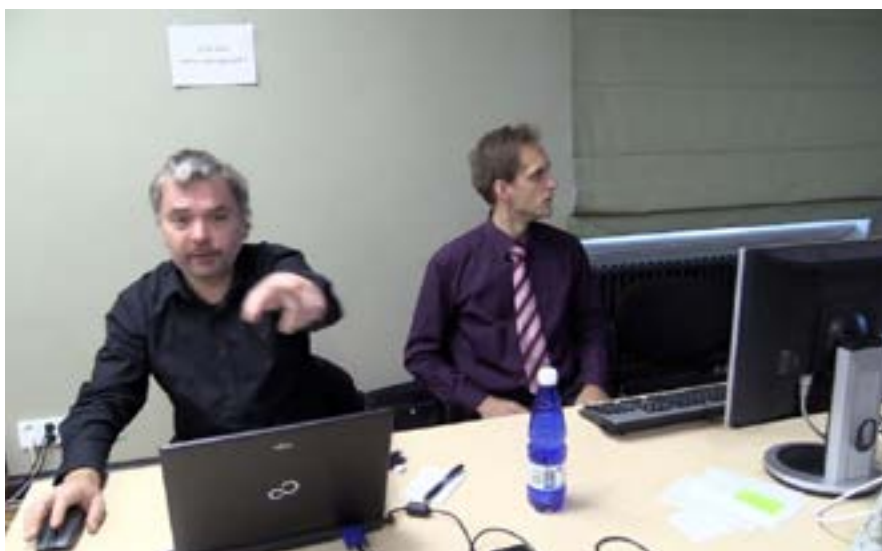


Figure 2: A wifi-password for a secure network in Estonia

Blockchain: the solution?

Blockchain is a form of distributed database where records take the form of transactions and a block is a collection of these transactions. With the use of block chains a secure and robust system for digital voting can be devised.

Plymouth University proposes a geographically distributed network comprising of machines from both government and public infrastructure; this infrastructure houses two distinctly separate blockchains, one for voter information such as who has voted and the other for vote information such as what has been voted. These blockchains are held completely separately to remove any threat to link votes for certain parties back to individual voters while maintaining the ability to track who has voted and how many votes are actually present.

The blockchain containing information of who has registered to vote also allows the service to ensure each voter is unique. To ensure that registered voters are who they say they are when voting, there is a 3 factor authentication. To ensure that people are not forced to vote in a particular way, they have incorporated a double-check service where by users shall be prompted a second time to confirm their submission before the vote is sent; this also then allows us to almost eradicate accidental votes.

Due to the encryption mechanism used, it would be close to impossible for any person(s) to gain access to all the votes without first taking control of the entire service network. Moving on from this the publication method of the private keys allows anyone to read the blockchain of votes and decrypt them with the newly available constituency private keys to verify the result of the election.

including wifi passwords on post-its on the wall (like the one on shown in Figure 2) and system admins who follow the instructions for installing the voting software incorrectly. The Estonian system uses a security architecture that may have been adequate when the system was introduced a decade ago, but it is now dangerously out of date. Since the time the system was designed, state-level cyberattacks have become a real threat. Two different attack types have been discovered by the team. The first attack is a client attack where a vote of a user can be overwritten. The

About voting systems; Is the use of technical voting systems wrong?

When performed well, voting online shouldn't be any less safe than voting on ballots. Digital voting has a lot of benefits: It is possible to immediately know the results, without paying people to count the papers and the chances of an incorrect result have decreased. Moreover, by using internet voting it is possible to vote at home. Furthermore, voting on paper can be unsafe too. Ballots can be (intentionally) miscounted, or

“When the data of the digital votes has been edited, it is impossible to recover the original result”

second one is a server attack where the counting of the votes can be manipulated. Furthermore, the software used on the server is spread on CD's, which can be intercepted and replaced with CD's with tweaked software that can count the votes favorable for some candidate. The recommendation of the report is very clear: Estonia should discontinue the digital voting. Estonia hasn't done anything with this report and plans to continue using this system in the future.

thrown away. The difference is that any corruption with voting on paper ballots is more obvious than on machines. Voting ballots can be recounted, but when the data of the digital votes has been edited, it is impossible to recover the original result. That is exactly the reason why most countries decide that using papers and red pencils is good enough. Developing a system which meets all the requirements for a safe voting system is expensive, and even then safety flaws can be found in the future.



Figure 3: A voting computer used in the Netherlands

Current situation Netherlands and what about the future?

At the moment there isn't any effort to implement digital voting for the public. There isn't per se any need for it, and the innovation needed to reach the goal is too expensive. Therefore, the voting will be done on paper for the coming year. However, for counting the votes, the polling stations are allowed to use a computer with a spreadsheets program if they desire to use one, as long as the computer isn't connected to the internet.

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From the ENIAC board

Koers houden en toch een eigen weg!

By: Sandra Drenthen
Chairman ENIAC 2016



As the alumni association of the computer science related bachelors and masters of the UT, we host several events for our members (note that the members of Inter-Actief are also welcome to our events!).

In this column, I will take a look back to our last event, mark the dates and locations of our drinks throughout the Netherlands and look forward to our special lustrum event.

General Members Meeting with Archery Tag (past)

At March 18, we held our annual general members meeting with a cool activity afterwards. This time, we did an activity called Archery Tag; a mix of paintball, dodgeball and archery. There were two teams, a field with a lot of obstacles, two goals with a 5 targets, and for each person a bow and a couple of foam-tipped arrows. One of the several game-modes was to shoot all of the 5 targets out of the opponent's goal by hitting these with an arrow. When a player was hit with an arrow, they were out of the game until one of their teammates would be hit by an arrow.

Drinks (past and future)

Every now and then we host a drink in different locations throughout the Netherlands. This year, we held drinks in The Hague and Apeldoorn already and we hope to see you at our next drinks: August 18th in Utrecht, October 13th in Enschede and December 8th in Leiden. All drinks start at 20:00 and the exact location is announced via mail, our website and via Facebook.

Lustrum Symposium (future)

We have started with the organisation of the Lustrum Symposium that will take place somewhere after the summer. We would love to make this symposium for ENIAC-members, by ENIAC-members. So are you, or do you know an ENIAC-member that can tell an inspiring story or hold a workshop, let us know (for instance by mailing to bestuur@eniac.utwente.nl)! We are thrilled to host this event and are hoping to reach members of all ages and experience.

Stay Informed!

Next to these events, we will also host the annual Graduation Speeddate and, at the end of the year, the Graduation Event with the Thesis price. For most of the events, further information will follow. We send all ENIAC-members emails with announcements to their alumni email address. Do you know you can forward this mailbox to your personal email address via the alumni portal of the University of Twente? Then you are ensured not to miss an update!

Next to mail, we also have a Facebook group where every activity is announced. If you would like to join the group, search for 'Alumnivereniging ENIAC' and request to be a member of the group. Last but not least, we will keep the ENIAC-website up to date, so all relevant information can be found there.

Sandra Drenthen is the chairman of ENIAC: the ENSchedese Informatica Alumni Club. ENIAC is the alumni association for the bachelors and masters of Computer Science, Telematics and Business & IT at the University of Twente.

ENIAC has the mission to stimulate the contacts between alumni and with the faculty of EEMCS. Therefore, the ENIAC Thesis Award is awarded yearly to the best thesis of the college year. ENIAC also regularly organises meet-ups and events, which is a great way to keep in touch with your former study mates!

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. You can learn more about all activities through our websites and we'll keep you up to date with our regular mailings.

For only €5,-, you're a member of ENIAC. Members receive several benefits, including the I/O Vivat (like the one you're currently reading) on their doormat and access to all activities. Graduated bachelors are also welcomed. You can find the membership form on the website (www.eniac.utwente.nl).

Interview with Erwin Middelensch



By: Marlène Hol and Dennis Aanstoot
Editors

We met with Erwin Middelensch at the head office of TNO, next to the central station of The Hague. Erwin completed the Master Information Security Technology at the University of Twente and graduated two years ago. He started at TNO for his master thesis and never left after graduation. And thus, he made the move from the small city Enschede to the political capital of the Netherlands, where he is now working with great pleasure.

TNO is a research institute employing about 2600 professionals. They have a broad range of research they conduct, but about 200-250 of their employees work on IT-related problems. This is divided in four departments: Cybersecurity & Robustness, Data Science, Networks, Monitoring and Control Services, and Embedded Systems Innovation. Erwin is part of the Cybersecurity & Robustness group. Within each team there are a lot of different projects, where every project has its own project leader. Besides that, every employee can work on different projects. Erwin is currently working on five different projects. That is a great benefit of the work, as he told us. "There is a lot of variation, which keeps the work interesting".

Another positive point related to the different projects according to Erwin, is that there is a lot of freedom on what you are working on. The project leader

of every team is responsible of creating a team. This gives the possibility to start working on another project when you have interest in that topic. You are never forced in doing a project. Of course, you need to have enough projects to fill your week, but he never faced that problem. "There are always enough interesting projects to work on", Erwin told. Besides that, it is also possible to create your own project. "When you have a good idea, and it is possible to find the funding, you can work on your own project", said Erwin. You automatically become the project leader of that project.

As an IT-researcher at TNO you are not responsible for the funding and the sales

of a project. This is done by the business developers of TNO. However, the expert is often involved in the process to create the desired solution for the customer. It is up to you how much you want to be included in the process with the customers. "That is one of the great things of working by TNO, you can decide what parts of the process you would like to do and which parts not" Erwin explained to us. If you would like to have more contact with the customer, this is possible. If you prefer to spend more time on research in the office, this is also possible. If one thing became clear to us, was that the process at TNO is very lean. There is a lot of time you can spend on your projects without being concerned



with the sales and support process. You can define your own role in the different projects, where there is enough space to find out which role you would like.

One of the nice aspects of working at TNO is that you are often concerned with the newest technologies and developments. “If you are doing it good, Google will be useless to you”, is what Erwin told us. At TNO you are not concerned with developing products and supporting the users of the product. You develop a solution for the customer, which is build and maintained by another party when the company accepts a final solution. However, this does not mean there is no practical component in the work there. Erwin actually likes the fact there is a lot of hands-on work. “We do a lot of prototyping to show the solution to the client and to test the solution”.

We also talked with Erwin about the different projects he is working on. His master thesis was about hiding the communication of malware. This research resulted in a published paper and a new project at TNO. A new project that is created as a follow-up of another project

information security of their networks and applications. The customers of TNO are often large companies, which results in projects with companies like KPN, Ministry of Defence and several other multinationals. However, sometimes there are also project with SMEs or other organizations like the European Commission.

Erwin explained to us that even though they are a large company with many big clients, the atmosphere of the organization is very informal. Especially within the teams, there is very little hierarchy. “The manager is one of us”, Erwin said. This is also very nice for the projects. You can just walk up to one of your colleagues and discuss the process or talk with the project leader about ideas you have for the project. The way of working reminds Erwin of the projects he did at the University of Twente. “You have a rather unclear assignment, and together with your group you have to find a solution for this problem”.

The office we visited in The Hague confirms the open working environment Erwin described. The office is one open space and all the desks are close to-

gether. “but this freedom comes with responsibility”. You are responsible for finishing your tasks. Of course, you can discuss it with your project leader or colleague when you are unable to finish the project in time, however it is expected that you finish your tasks and contribute to the project. For Erwin, this freedom is definitely a benefit. “The combination of the environment, the freedom in the projects, and the interesting and modern topics is what makes working at TNO so great”.

“Two years ago, I barely knew anything about networks. Now I am writing standards about it”

at TNO is not unusual. Often projects lead to other projects, both because the customer wants it but also because the team members find an interesting new topic. Now, he is also concerned with detecting cyberattacks on systems of the Ministry of Defence. Another project they are working on in his group is detecting malware by looking at DNS records. Furthermore, all the banks of the Netherlands are conducting a shared research program with TNO on the

ther. If you need a little more privacy you can go to a separate room or the quieter desks at the other side of the office. This open office space also stimulates working with the other departments. “Two years ago, I barely knew anything about networks. Now I am writing standards about it”, said Erwin.

The working conditions and the kind of work is great, Erwin told us. “This way of working gives you a lot of freedom,

About TNO

TNO is an innovation organization based in multiple cities in the Netherlands. The head office is located in The Hague. The organization does research and gives advice to clients (government and business) solving societal and economic problems. One of the focus areas is Cyber Security & Resilience where new ways are found to make our computer systems more secure. This research can also be used to help companies and the government to prevent damage done by hackers and discover ways of finding them.

Want to know more about TNO?
Visit www.tno.nl

Or check our vacancies at www.tno.nl/career

TNO innovation
for life

By the Chairwoman



By: Iris Heerlien
Chairwoman Board 38

We have been a board for almost a year now and in this year a lot has happened. A new group of students joined our association. This group of students was very big, bigger than previous years due to the internationalisation and the popularity of our study program. This was also seen during the committee market at the start of the academic year; so many people showed up and wrote their name on one or more committee interest list that a second committee market was not needed since all places were filled in! It is nice to see how these new members find their way in the association and to see them having fun at activities and working hard in committees. In this new group of students there were also some international students. This was new for the association and so we were very curious how this would go and if they would like the association and wanted to be involved. After this first year we can say that we are satisfied; almost half of the international freshmen have taken place in committees and we see even more of them on our activities. However, there is still room for improvement; an example is the standard language at activities and in the association room which is still Dutch. We are very hopeful that this and other issues will be improved upcoming years.

But, beside our new group of students, we also see that our second years students and up are also still involved! It is great to see how they keep our association a very open

association at which every new member gets a warm welcome, at committees as well as at activities. I think this is one of the great aspects of our association and I hope this will stay the same the upcoming years!

Together with a big group of our members we did a lot of great activities the past half year, such as the study tour, MISC, who went with a group of students to Malaysia, Singapore and Indonesia. The symposium *Virtuosity* took place as well. Both committees worked very hard to make it a beautiful experience for the participants and according to the stories I heard they succeeded!

As a board member, I experienced the past year as a beautiful time in which I was able to learn a lot and to develop myself. We as a board formed a real team which helped us when we had to make difficult and important decisions, such as to update the function division. I also met a lot of new people, not only at *Inter-Actief*, but also at other associations at the campus and in the rest of the Netherlands. It is nice to see in what ways their associations differ from ours and in what ways they are the same. I believe that we can learn a lot from each other. During the past year the time has flown and I think that this will continue in the last months as well.

We already formed the candidate board to whom we will probably turn over the keys at the beginning of September. The past few months we made sure that they are ready in September to run the association.

Although we do have a candidate board now, this fortunately does not mean that our board year is over yet! We will still try our very best to improve the association were possible. The last months will also be full of awesome things, such as the Kick-In! And beside the fun stuff, we of course still help our members, or soon-to-be members, with their questions about, for example, their study program.

I hope to see you soon at *Inter-Actief*!

About Iris

Iris is a first year student of the master Technical Computer Science. She is 22 years old. She lives in Eindhoven for 18 years of her life where she completed her primary and secondary school. She moved to Enschede when she started her study. She completed the bachelor Technical Computer Science after which she decided she would like to do a board year at *Inter-Actief*. In her free time she likes to be around people and train for the *batavierenrace*.

By the Candidate Chairman

By: Wouter Kobes
Candidate Chairman '17-'18



On Sunday, the 26th of March, the five of us officially became the candidate board of I.C.T.S.V. Inter-Actief for the academic year 2017/2018. Since then the way we dress has slightly changed, since we wear our candidate board tie(s), choker or shirt at all times.

To introduce myself, my name is Wouter Kobes, I am 21 years old and a third year Technical Computer Science student. Halfway through my first study year, I decided to become an active member at Inter-Actief. My first committee was the symposium committee of 2016, which organized symposium Cashflow. It was a fantastic experience to be involved in the organization of such a large event. After the symposium I joined multiple smaller committees, which were the FlitCie, the Studio Cinematografico and the WWW. Previous summer, I was also trained for becoming a bartender.

Inter-Actief is clearly an association with lots to offer. However, I also have been active at some other associations. Currently, I am a member of the technical committee of the Kick-In, the iDB committee. Next to that, I took seat in the first executive committee of SBZ, the foundation responsible for our beloved AbScInt and the MBasement.

As the end of this academic year comes closer, we have started on our policy plan for the next year. The content of this policy plan arises from three sources: current developments which the association has to deal with, the ideas of us as a candidate board and last but certainly not least, the ideas of our members.

Many of you already submitted their brightest ideas at our Drink of Brilliant Ideas, which was held on the 30th of May. After filtering all the input we received, what we had left was a broad spectrum of ideas, ranging from original party themes to serious policy changes. We want to incorporate as much of your input as possible in our policy plan. This also means that if any ideas arise after reading this article, we would love to hear them still!

Our time as candidate board has up to now been very interesting. Since the fourth quartile started, we are invited to the weekly meetings of the thirty-eighth board, on which the current status of the association discussed. We also started to attend the meetings of committees, of which we will hopefully become the board representative next year. We were also asked for our input on important decisions and discussions, for instance about internationalization and the future of BIT-students within our association.

In the following months, we will continue with our policy making while you enjoy the holidays. Hopefully, we will see you at the Board Change GMM, which is planned for the 5th of September, where we will present our policy plan. If everything goes well, we will be appointed as the thirty-ninth board of the association. To celebrate this, a constitution drink will be organized on the 12th of September, for which of course you are also invited.

We are really looking forward to the next academic year and hopefully you will join us in another year filled with fun and informative activities, good educational support and awesome drinks and parties!

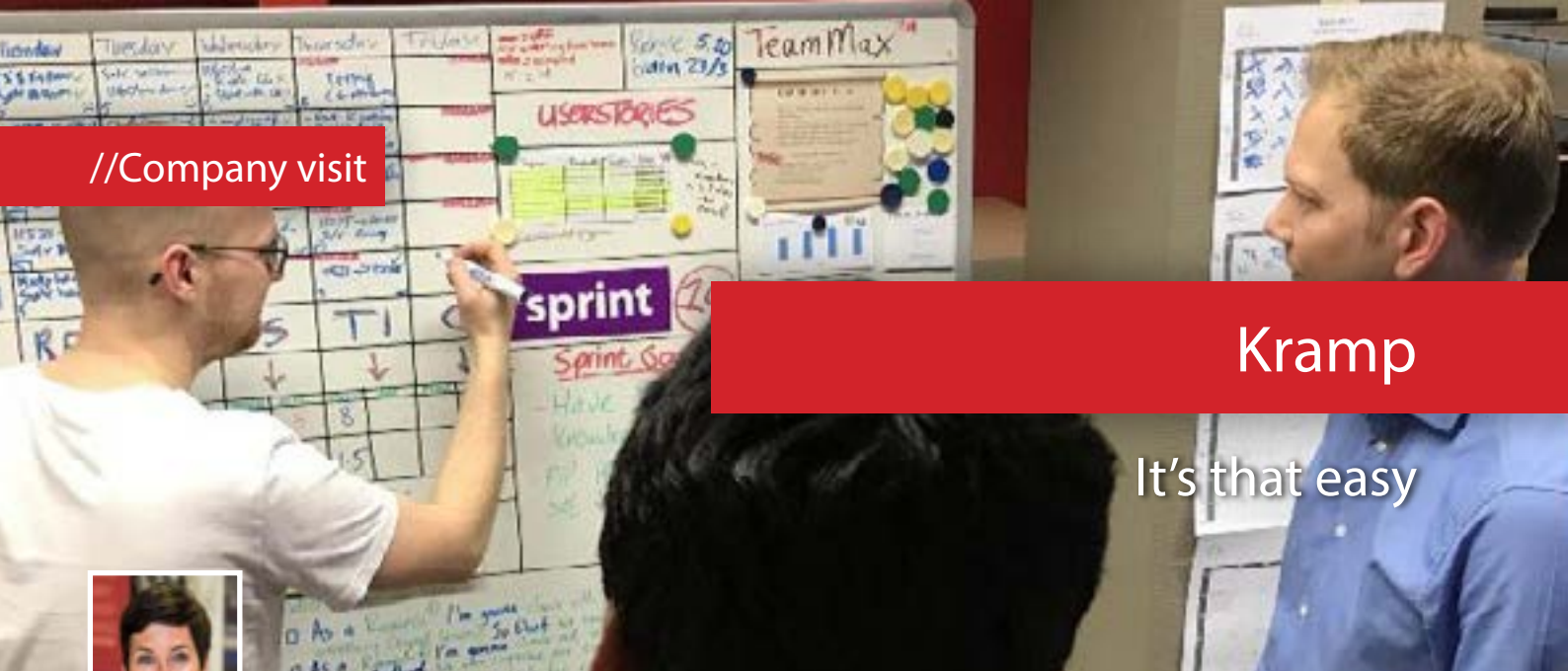
See you at Inter-Actief!

About Wouter

Wouter Kobes was born on the 13th of February, 1996, in Leusden. After his elementary school he moved to outside the city and went to Stedelijk Gymnasium Johan van Oldenbarnevelt in Amersfoort. His affections with computers was already noticeable at a young age, as well as his preference for the exact subjects.

After his graduation, he moved towards the University of Twente's campus in 2014 to study Technical Computer Science. Next to studying, he co-organized symposium Cashflow in 2016, was a participant of study tour MISC and took place in several other committees at I.C.T.S.V. Inter-Actief. Currently, he is the candidate chairman of the study association.

//Company visit



Kramp

It's that easy



By: Femke Koppen
Scrum Master at Kramp

Back in 1951, Kramp was founded by Johan Kramp as a motor spare parts retailer. The company has since then grown into one of the largest technical wholesalers in Europe. The company's philosophy is 'making our customer's work easier and more efficient'. Incorporated with the motto 'Think Global, Act Local', they have achieved the rapid growth needed to get into this strong market position.

We asked Femke Koppen (43), a few questions about Kramp and her role as Scrum Master within the company. Femke started working for Kramp in January 2015 and lives in Doetinchem.

What is the main focus at Kramp?

More than 90% of our turnover is digital. To make it even more easy for our customers, we invest a lot in e-business and the user-friendliness of the web shop. We are flexible and work in short cycles. We optimise the web shop continuously, without inconvenience for our customers and by constantly measuring and testing, we know where we need to work on to make it as easy as possible for the customer. We make choices based on data, rather than our own gut feeling. Customer demands are central.

With the creation of multidisciplinary teams, an 'Agile' way of working and optimum coordination between the e-business teams, Kramp is ready for the future. The world around us is

continues to change. That is why we're building an organisation that can keep up with these changes and that is why we're investing in both technology and people.

What attracted you in Kramp as your employer?

When I joined Kramp 2,5 years ago I stepped in the Agile transformation where I could be part of. Kramp is a family company, changing rapidly to an E-Business company. The SCRUM values; commitment, focus, openness, respect and courage fit perfectly

with Kramp's core values. The working atmosphere is open, people are dedicated and proud of what they are doing, all over the company, from warehouse employee till Executive Board members.

As a Scrum Master, how does your workday look like?

My work as Scrum Master is very diverse. No day is the same. Usually my day starts with facilitating stand-ups for different scrum teams. As a coach I support the team to get the most out of their daily stand-up. I give tips and let



Figure 1: The first Hackaton at Kramp: BootKramp. Creating business value while having fun.



them practise with different methods. However, I never take over. The teams are self-steering and I see my role as a servant leader. Making sure the scrum teams can focus on what they are good at: developing great software.

Another day I'm working more with the business. Working in an Agile way, means the business needs to change as well. Planning your project from A to Z is not what we do, but is still requested sometimes. As a change agent I convince the business of using small iterations in which we develop software with high business value. We believe this is the best way to keep up with an everyday changing environment. I enjoy this very diverse role!

What makes working at Kramp challenging?

Because Kramp is an international organisation with local offices and country specific needs, the 'think global, act local' mentality is also in the web shop development teams top of mind. Together with our e-business marketing team we want to create the best customer experience every day again.

What's your main message to students Business & IT?

To quote Pippi Langkous: 'I have never done this before, so I think I can do it.' Trust that you can do it. Even if you have never been in the situation before.

Interested in a job? Take a look at www.careeratkramp.com

Who is Kramp?

Kramp Groep is Europe's largest specialist in spare parts and accessories for the agricultural industry. Kramp is the essential partner for its customers and suppliers with over 500,000 products online available, 10 distribution centres and 24 sales offices spread over Europe. Kramp Groep still has its headquarters in Varsseveld (the Netherlands), where the company was originally founded.

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"I have never done this before, so I think I can do it."



Eelco: 'Techie' in Municipality

ICT & Politics



By: Eelco Eerenberg
Alderman Municipality of Enschede

The world is digitizing at an ever faster speed. This poses considerable challenges to the government. My ambition is to contribute to a different way of working for the municipality, a different way of dealing with inhabitants and the partners in the city: open and transparent. This approach resulted in, among other things, a new website and an online appointments tool. I aspire to make Enschede a testing ground for disruptive digital developments, so companies will come here to experiment. We are working on this project together with Maarten van der Steen of the UT, who is also a computer scientist. It is really helpful for my work as an alderman to be a 'techie.' Organising structures, understanding problems quickly, and coming up with solutions that can satisfy everyone all require a certain degree of creativity. I learnt to be creative as a student.

I have always been attracted to administrative positions. As a student at the UT, I was a member of several student governments. When I started studying, I joined D66, at a time when the party was nationally struggling. I actually believed that there were opportunities for D66, for example, as a student party. I soon got involved in the Enschede political scene, first as a committee member, and later as a full-fledged municipal council member. It is really wonderful to be given the opportunity to actually be at the wheel, to become a full-time administrator and to have an opportunity to realize your political ambitions – at least, some of them.

I had a wonderful time at university. The possibility to develop yourself in all sorts of ways, in addition to your studies, appealed strongly to me. That is what I did to my heart's content, mainly at *Inter-Actief*. One of the highlights was organizing a study trip to America, a most inspiring and great time. Besides, I have always experienced the lecturers as very approachable and stimulating, which made my studies a great success overall.

I also did several student assistantships. To name just one: assisting in shaping ICT education at Technical Medicine was a most rewarding job. After my internship in America I worked as a consultant in Silicon Valley for a while, which was also most challenging and instructive. After my studies, I worked for four years as a strategy consultant at Thasis, the company of Theo Huibers, professor of Information Retrieval. At that stage I had already abandoned hardcore information technology, and I worked mainly at the intersection of IT and business administration. In a short space of time, I was able to look behind the scenes of various companies, and I learnt how multifaceted digitization is.

I feel that you should certainly take some time to engage in activities outside the curriculum. Not only is this great fun, but you also learn a lot. Your studies teach you everything about your subjects, but learning what it is like to work together and solving things you do not expect to solve are just as important, to say the least. Activism teaches you this, no matter if this concerns an association, trip, government or yearbook. All aspects of government and management are on the menu, and this gives you a big advantage in the

labour market. In addition, you make many friends, build a network, and get to know your lecturers in a different way. Most committees do not take up too much time at all and can have a considerable impact all the same. And last but not least: many hands make light work.

It takes clever computer scientists, people who can do more than what they learned from the books, to make disruption possible. I feel that *Inter-Actief* provides the best basis for this. I wish you all good studies and great student days!

Eelco Eerenberg (Hilversum, 11 April 1984) is Alderman for D66 and deputy mayor of the Municipality of Enschede. In 2006, he received his bachelor's degree in Computer Science, with distinction, from the University of Twente. He obtained his master's degree in Computer Science in 2010, also with distinction. Eelco was the chairman of the 26th year of *Inter-Actief* (2004-2005). From 2010 to 2014, Eelco was a member of the municipal council in Enschede. He was chairman for mobility, board, and environment. In 2014, he was elected as one of the five Aldermen of the municipal council. He is responsible for finance, education, youth, sustainability, and the city centre. He is also first deputy mayor. In January 2016, he was voted the best young governor of the Netherlands. Eelco lives in Enschede with his wife and their young baby.

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Puzzle: the Rules of Play

Pazurgo meets Maze



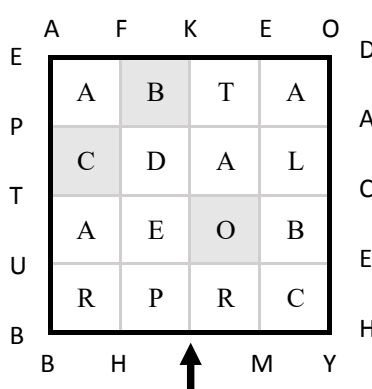
By: Meike Nauta
Editor-in-chief and puzzle maker

Ever heard of Pazurgo? Probably not, but this article will explain this word puzzle to you! However, an I/O Vivat puzzle wouldn't be an I/O Vivat puzzle without an interesting twist. After solving the Pazurgo puzzle on the back, you are left with a maze! Excited? Let's do this!

The goal of a Pazurgo puzzle is to solve each of the Trivia clues by finding the solution word in the puzzle by forming a "chain" linking the letters of the word together. Beginning with the grey highlighted letter, each letter of the solution word chain is discovered and circled, in turn in a horizontal or a vertical direction from the previous letter (there are no diagonal solutions). A line is drawn linking two consecutive letters in a word, crossing out any letters of the puzzle which fall in between, and letters which are crossed out may no longer be used in a solution word. Each letter may only be used once for a single solution word, and any letters which are circled may not be crossed out by a solution word chain. A solution word chain may cross over itself, or cross over the chain of another solution.

When all of the solution words have been discovered, the remaining letters which are not circled or crossed out will form the solution to the clue, when those letters are unscrambled in the correct order. However, one extra letter is needed to have the complete solution. The solution to the Pazurgo puzzle will create a maze. The letter at the exit of the maze (one of the letters around the Pazurgo field) is the extra letter needed to get the scrambled letters for the solution. Unscramble the letters and you have found the 8-letter solution!

Still a bit vague? Let's look at an example:



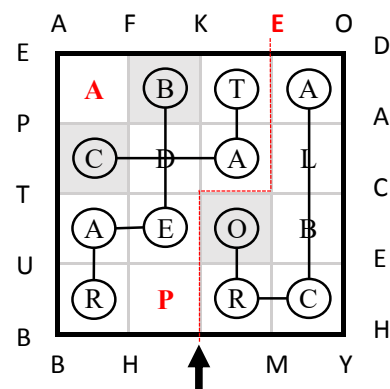
1. A large, furry mammal with a short tail. There are several kinds of this animal, including Black, Grizzly and Polar.

2. A small, furry mammal with whiskers, short ears, and a long tail. Often kept as pets or to catch mice and rats.

3. A black and white, toothed whale.

Each grey highlighted letter is a starting letter. So we have to find three answers starting with a B, C and O. After some thinking about the clues, you will know that the answers are Bear, Cat and Orca. You start with the B, and look horizontally and vertically for an E. You circle the E and cross out the D in between. Note that you can cross uncircled letters multiple times. After crossing out the three words, there are 2 letters left uncrossed: the A and the P. The solution of this example is shown on the right. By solving the maze that is created, we get the last letter needed at the exit of the maze: an E. Unscramble the letters and you get the solution of this puzzle: Ape!

You got it? Good luck with the large puzzle on the back!



History of Pazurgo

The Pazurgo puzzle is invented by Jeremy L Graybill in 2003 while he was playing the piano. Pazurgo includes elements from crossword puzzles and word search puzzles, along with the addition of its own unique elements. The first international Pazurgo puzzle book was published in 2010.

Send in Your Solution

The solution after solving the Pazurgo and Maze is an 8-letter word. Send this word before the 1st of October 2017 to puzzle@inter-actief.net and get a chance to win a €10 IA-cinema voucher!

The answer and winner of the puzzle of the previous edition (32.2) can be found on page 3.

Look inside for the rules to solve this puzzle.
The uncrossed letters plus the letter at the exit of the maze give you the 8-letter solution!

F K ↓ O R T B M S N C P D Y

	E	B	G	A	R	T	Y	U	N	N	K	G	A	M	S	
P	C	D	S	A	B	E	L	H	P	E	G	E	T	N	L	A
T	R	K	D	H	N	I	R	O	T	S	N	U	J	I	C	C
U	J	P	I	E	T	M	S	E	K	R	R	C	O	P	O	E
B	F	E	A	G	O	R	L	C	F	S	N	P	E	D	E	D
Y	K	U	S	P	N	C	I	A	W	M	F	W	U	E	F	K
S	T	O	W	E	G	B	W	D	Z	C	A	T	B	Z	H	L
H	V	R	T	B	V	E	S	V	I	B	D	N	N	E	V	M
L	K	A	A	R	J	S	I	U	K	S	E	O	K	L	Z	N
G	I	L	S	F	L	I	E	D	G	R	D	H	J	Y	E	Q
D	D	G	Z	B	A	U	R	I	P	Y	T	C	G	F	A	W
W	N	T	E	H	I	Z	P	H	I	A	E	P	R	P	M	R
A	H	S	O	R	T	A	V	I	L	U	S	M	W	U	W	P
J	E	O	C	T	I	K	B	N	A	W	C	H	I	K	P	L
V	S	A	F	N	E	S	R	F	T	M	R	O	E	A	T	T
	H	M	U	Y	W	E	S	N	T	R	L	C	V	A		

1. Dutch computer scientist, and recipient of the Turing Award (first name and last name)
 2. Our Study Association
 3. Software for animations, games and applications with lots of security vulnerabilities
 4. Rector Magnificus at the University of Twente until 2016 (surname)
 5. Building of the UT that houses the mathematics and computer science departments
 6. Portable personal computer
 7. Area where students and staff live, work and study
 8. Programming person
- City where Inter-Actief is located 9.
Eight bits 10.
The extra charges for this are abolished by the EU in June 2017 11.
Fourth city of Overijssel (population) 12.
Higher Education Institution 13.
Current Rector Magnificus at the University of Twente (surname) 14.
Free online encyclopedia you probably used to solve clue twelve 15.

