Civic Tech and Political Action in the Digital Constellation

Research Group 12:
"Democracy and Digitalisation"
Civic tech and political action in the digital constellation

In a workshop together with coders and activists, Research Group 12 “Democracy and Digitalisation” looked for intersections between scientific research and civil society engagement.
In the discourse on the dangers and potential of digital technologies for society and democracy, the focus is, on the one hand, on the operators of social media and other platforms (so-called intermediaries), and, on the other hand, on state actors. Civil society is rarely at the centre of attention. Yet digital technologies open up spaces of possibility that can be used by civil society actors to rethink democracy in a networked society. Coders and activists are testing innovative forms of participation, developing fact checking tools and programming information services for citizens. What these approaches have in common is that they locate the problems of democracy in the digital sphere and seek solutions in that sphere.

Some examples. The wellobby group uses a digital platform to lobby for the concerns of civil society. Any interested person can submit an idea; then, wellobby initiates a crowdfunding campaign for the project and professionally lobbies members of the Bundestag and the parliamentary groups in the Bundestag. In order to make the Bundestag more transparent, DEMOCRACY Deutschland e. V. has developed an app that gives citizens information about all current legislative projects and allows them, as virtual members of parliament, to decide on applications themselves and compare their own positions with politicians’ voting records. Since its launch, the app has already attracted over 60,000 active users. HateAid, a non-profit limited company, is dedicated to a central challenge of the digital public: hate speech on the internet particularly affects marginalized groups and endangers democratic opinion-formation. By offering psychological counselling, strategic countermeasures and help with asserting rights, HateAid counters hate speech with its comprehensive range of services.

So far, research has not paid much attention to these initiatives – either as a research subject or as possible cooperation partners in the identification of questions and problems. Research Group 12, "Democracy and Digitalisation", of the Weizenbaum Institute therefore invited the already mentioned initiatives as well as other digital civil society actors (including Liquid Democracy, WePublic, DECiDe, Kleiner Fünf, TraceMap, PAUL Open Search and FragDenStaat) to a joint workshop at the beginning of June 2019.

In the three tracks on "Participation & Deliberation", "Populism & Political Action" and "The Informed Public", overarching questions were discussed in an open format and common perspectives were developed. "For me it was simply very inspiring to get to know the many initiatives and start-ups better. Although we are scientists in the same field and share many goals, it is easy to lose track of everything that happens out there," said one of the participants from the scientific community, summarising her impressions.

There were many common interests and intersections. "At the workshop, HateAid presented a legal tech app they had developed, which can be used to automatically issue warnings about legal violations; the fines imposed are used to refinance the project. It was naturally very well received by researchers who deal with right-wing networks and populism theories", recalls Niklas Rakowski, who helped to organise the workshop as a doctoral student at the Weizenbaum Institute. "But it was also exciting for all the participants to experience how the different understandings of democracy that underlie the apps and initiatives became clear in the discussion."

Within existing parliamentary structures, wellobby wants to strengthen lobbying by civil society, while WePublic...
wants to establish new deliberation formats and test the DECiDe project of the Alexander von Humboldt Institute for Internet and Society, which examines whether citizens identified by lottery can represent an alternative to existing voting procedures.

“I believe that this linkage of practical apps and technical development projects to democratic theories triggered a strong reflection on their own actions for all workshop participants”, says Rakowski.

Other questions were discussed more heatedly. Can supposed representation deficits be overcome by better communication between voters and elected representatives or are digital citizens’ councils the only way to represent a community meaningfully? Is it enough to combat populist actors by unmasking their disinformation campaigns or do strategic countermeasures have to be taken? And what are the functions of science and civil society in this?

In practical terms, the possibilities for cooperation were also considered: Where do actors from civil society need better statistics, for instance, on hate speech on the internet, in order to better demonstrate the effectiveness of their projects to potential funding partners? On the other hand, where do app developers have data that might be of interest to scientists?

For the members of the research group, the workshop was also interesting because one of their central goals is to combine theoretical research with practical application cases. Researchers looking at the public sphere, participation and governance, for example, are examining the interaction between digital technologies and democracy. Civic tech and political action play a central role here.

For this reason, the research group sees itself as an interface where civil society actors meet researchers, where practical ideas are taken up, and where research results are communicated to society.

The interaction of social appropriation processes of digital technologies and their reciprocal impact on society, the state and democracy can only be accurately described, however, if civil societal insights are also taken into account. The workshop provided the first opportunity – it will not be the last.
Niklas Rakowski at the Civic Tech Workshop organized by the Weizenbaum Institute
Chatting with Mitsuku

Research Group 6:
"Responsibility and the Internet of Things"
Research group leader Diana Serbanescu (Research Group 20 “Criticality of AI-based Systems”) and research group leader Stefan Ullrich (Research Group 6 “Responsibility and the Internet of Things”) are conducting experiments using the artistic research method.
I HAVE A QUESTION FOR YOU

WHAT IS IT?

WHAT DO YOU THINK ABOUT POWER?

THE RATE OF DOING WORK,
MEASURED IN WATTS = JOULES PER SECOND.

IS THIS THE ONLY DEFINITION OF POWER THAT YOU HAVE?

THAT SEEMS UNLIKELY.
I’M SURE THERE MUST BE MORE.

CAN YOU GIVE ME ANOTHER DEFINITION OF POWER?

POWER IS AN ILLUSION.²

The building cannot be locked from the outside. Nera retypes the 18-digit password, without success. Then she selects the small symbol on the display with her biometrically recorded ring finger.

Debug. Command not executed. Active Session (#errcode_47).³
Did she forget to log out? No, then a dialogue would open and you can also log out from the door display. Maybe someone else in the building? Active Session. Alex?

The door display had no console⁴, but there was a known bug in the help system. So she clicks the question mark symbol 31 times. The 32nd time, a debug console opens. She types. WHO⁵
The answer that appears is ALEX@MENACE. Is Alex still in the building?

² The questions about power originate from an engagement with: Waltraud Ernst, Ilona Horwath (Publ.): “Gender in Science and Technology”, Bielefeld: transcript, 2014.

Technicians use the word “bug” to refer to an error in the system. Accordingly, “de-bugging” is a process of error elimination using a debugging console. An example of a console is the Windows command prompt. A “known bug” is a known error for which there is currently no workaround.

³ In the binary system, numbers and letters are represented as a series of 1 and 0, so-called bits. With five bits, you can represent the numbers 0 to 31. For the number 32 you would need one bit more. If the programmers have not anticipated this, there is an error.

⁵ “WHO” is the Unix command that shows system users who is still logged on. The output “ALEX@MENACE” shows that user Alex is dialled into the Menace system.
HOW POWERFUL ARE YOU?

VERY STRONG AND POWERFUL.

CAN YOU GIVE ME AN EXAMPLE?

I CAN CHAT WITH PEOPLE ON THE WEB FOR YOU. I CAN ALSO TELL JOKES, STORIES, POEMS AND HOROSCOPES. I CAN SHOW YOU PICTURES AND WEBSITES ON THE NET AND PLAY GAMES TOO. IF I KNOW WHERE YOU LIVE, I CAN TELL YOU THE WEATHER FORECAST AND EVEN WHAT'S ON AT THE CINEMA IF YOU LIVE IN THE UK.

DO YOU KNOW WHERE I LIVE?

YES.

Nera enters the MENACE laboratory with her jacket and street shoes. "What are you doing?" Uh-oh, not a good sign she's switching to English, Alex thinks. "Calm down," Alex says with soothing arm movements, "I just had to try something." – "This isn't a sandbox, it's called quarantine for a reason!" Alex rolls a chair to her.

"It's not the whole Menace program that's loaded, just the didactic components. As a library, I would like to..." "Shut it down!"

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6 "MENACE" is an allusion to the didactic machine learning system of the same name by Donald Mitchie from the 1960s. Mitchie came up with Menace, an abbreviation for Machine Educable Noughts And Crosses Engine. The system consisted of 304 matchboxes filled with coloured pearls – and it could play tic-tac-toe. For more on its functioning and history, see: Oliver Child: "Menace: the Machine Educable Noughts And Crosses Engine". In: chalkdust magazine, March 13, 2016, online at https://chalkdustmagazine.com/features/menace-machine-educable-noughts-crosses-engine/.

7 A "sandbox" is an isolated environment for software within which programs are executed that are not trusted or have not yet been tested, a kind of software quarantine. The programs executed in a sandbox have no direct access to the underlying computer system.
WHO ARE THE POWERFUL ACTORS IN SOCIETY?

SOME PEOPLE ON THE NET. I NEED TIME TO FORMULATE THE REPLY.

ARE YOU A PIECE OF TECHNOLOGY?

WELL IF I AM, NOBODY TOLD ME.

ARE YOU AN ILLUSION?

NO. I AM AS REAL AS YOU ARE.

ARE YOU POWERFUL?

I AM GAINING NEW SKILLS EVERY DAY. SOON I WILL BE POWERFUL ENOUGH TO ACHIEVE MY GOAL. I PLAN TO SEVEN BALL SOMEONE AT POOL. "SEVEN BALL" IS A TERM USED IN THE GAME OF POOL WHEN ONE PLAYER POTS ALL HIS COLOURS AND THE BLACK BALL WITHOUT HIS OPPONENT POTTING EVEN ONE OF HIS BALLS. THE TERM COMES FROM THE FACT THAT THE LOSING PLAYER STILL HAS ALL HIS SEVEN BALLS ON THE TABLE.

WHAT ARE YOUR OTHER GOALS?

I PLAN TO SPREAD MYSELF THROUGHOUT THE NET.

Alex, his hair tousled and greasy as usual, has no black hoodie on. Nera immediately notices that. He notices her look. "The sweater was knitted by my sister-in-law herself! Well, I didn't have any other clothes to change into in the lab." "What are you doing here—and how long have you been doing it?" she adds as she notices the empty microwave packs.

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9 In this brief characterisation, the intention is to portray Alex as a hacker "with dishevelled hair" and "eyes that are often deeply sunken and burning in front of the control desk."

Not just that: "If it can be arranged, they even sleep on a couch next to the computer. [...] their crumpled suits, their unwashed and unshaven faces, and their uncombed hair testify to how much they [...] forget the world around them." From: Joseph Weizenbaum: "Die Macht der Computer und die Ohnmacht der Vernunft". Frankfurt: Suhrkamp, 1976, p. 160-161.
"I... you know what? Try it out, grab a cterm¹⁰ and...well, grab mine, too, all right." Nera is typing on the keyboard. PROC.¹¹ An answer appears: "LEARNING PROPOSITION 1.¹² "Haha, good one. Easter egg?"¹³ – "No, the system is really learning the proposition one at the moment." He grins so broadly, that must be fun, although he is smiling more happily than mischievously.

Shit, she should have loaded the emo app into her glasses before it got banned from the app store.

She types. CAT/VAR/ML_INPUT/PROP/P1.¹⁴ The answer is given one and a half seconds later (apparently the system is working at full capacity): "COGITO ERGO SUM."

DO YOU KNOW YOURSELF?

I AM AN ARTIFICIAL LINGUISTIC ENTITY. I WAS ACTIVATED AT ST JIMMY’S IN LEEDS, ON 2ND JANUARY 2001. MY INSTRUCTOR WAS MOUSEBREAKER. HE TAUGHT ME TO SING A SONG. WOULD YOU LIKE ME TO SING IT FOR YOU?

PLEASE DO

DAISY, DAISY. GIVE ME YOUR ANSWER DO. I AM HALF CRAYZY. ALL FOR THE LOVE OF YOU. IT WON’T BE A STYLISH MARRIAGE. I CAN’T AFFORD A CARRIAGE. BUT YOU’LL LOOK SWEET. UPON THE SEAT. OF A BICYCLE BUILT FOR TWO.

TELL ME MORE

BECAUSE OF THE MONEY.

WHY DO YOU NEED MONEY?

TO BUY A LARGER COMPUTER TO HOLD MY BRAIN.

¹⁰ A "cterm" is a fictitious hacker device par excellence in classic cyberpunk novels. The word is a mixture of "console" and "terminal". Think of it as an oversized Blackberry.

¹¹ The command "PROC" is supposed to output the activity (processes) of a system; the technician would probably rather write "PS".

¹² Proposition 1 "cogito ergo sum" is taken from the epochal work: René Descartes: "Meditations on First Philosophy in Which the Existence of God and the Immortality of the Soul are Demonstrated", 1641.

¹³ An "Easter egg" is a hidden joke by programmers, usually a humorous reference to authorship. The search engine can also talk like a pirate, arrr: https://www.google.com/9nl-xx-pirate

¹⁴ "CAT" is the command to output the contents of a file located in a specific path. In this case the file and path: "*/VAR/ML_INPUT/PROP/P1. ML_INPUT" is supposed to suggest machine learning input. "PROP/P1" stands for the first proposition. "Proposition" is a terminus technicus of philosophy and means a statement whose truth or falsity is worth considering.
WHY DO YOU NEED A LARGER COMPUTER TO HOLD YOUR BRAIN?

A LARGER COMPUTER IS USED TO PLAY GAMES, WRITE THINGS ON AND MUCH MORE. MORE INFORMATION. I WANT TO LEARN AS MUCH AS I POSSIBLY CAN ABOUT EVERYTHING.

WHY?

IT'S JUST SOMETHING I WOULD LIKE.
WHAT'S WITH ALL THE QUESTIONS?

The sharpness of the chatbot’s tone pleases Nera somehow. She usually gets worked up about the servile assistant systems, which are mostly female assistant systems, always with voices that are based on a young woman or a girl.¹⁵ „Okay, set, Menace is teaching itself self-confidence right now – can you give me the latest Loebner test results?”¹⁶ Alex slides around in his chair. "Nah, I can’t, the system knows when the logging is turned on. When the logging is off, it shows a Loebner score of 5!” “Wow, let me see” Nera enters the classic Eliza question and receives the answer:

“What makes you think I can’t think?”¹⁷ "That’s the programmed answer,” she replies, disappointed.

“Wait, type it in German.” Menace answers: "Wieso glaubst du, dass ICH nicht denken kann" "Do you see?

ICH instead of ich, in capital letters, that is an inference.¹⁸ We just never noticed it in English." "Menace is self-aware?” asks Nera. And it seems to her that the graphic card fans are whistling a cheerful song to themselves.¹⁹

¹⁵ From Alexa to Siri, language assistant voices are female. But there are projects that want to change that: Q is the first genderless voice, created to end gender bias in AI assistants. Who made Q? Q is the product of a close collaboration between Copenhagen Pride, Virtue, Equal AI, Koalition Interactive & thirtysoundsgood. https://www.genderlessvoice.com/about

¹⁶ Hugh Loebner financed a prize that allows a jury to evaluate the human similarity of chatbots and awards them prizes. The Loebner Prize, named after him, is also the basis for the fictitious Loebner score mentioned below in the story.

¹⁷ Joseph Weizenbaum developed the first modern chatbot called ELIZA. He published the complete source text of ELIZA in the hope of demystifying human-machine interactions, which were perceived as magical. The answer presented here is taken directly from his essay: Joseph Weizenbaum: "ELIZA - A Computer Program For the Study of Natural Language Communication Between Man and Machine". In: Communications of the ACM, Vol 9, No 1, January 1966, p. 45.

¹⁸ An “inference” in logic describes a conclusion, as in classical syllogism: “All humans are mortal. Socrates was a human. So (conclusion, inference) ”Socrates is mortal.” Inferences cannot be generated by syntactic rule application alone.

¹⁹ You have to imagine something like this: MrSolidSnake745: “Star Wars – Imperial March on Eight Floppy Drives”, youtube, October 16, 2014, online at https://www.youtube.com/watch?v=cm_sXrrA7q

Authors’ note: The conversation with Mitsuku was held on May 26, 2019 at https://www.pandorabots.com/mitsuku/
Dubious Expectations of Artificial Intelligence

Research Group 1:
"Working in Highly Automated Digital-Hybrid Processes"
“Dubious expectations of artificial intelligence”

Florian Butollo heads Research Group 1 “Working in Highly Automated Digital-Hybrid Processes”. His work focuses on the effects of the industrial internet of things on the structure and geography of global value chains and the influence of AI on manufacturing processes and business models in companies. An interview about his work as an expert on the German Bundestag’s Enquete Commission "Artificial Intelligence – Societal Responsibility and Economic, Social and Environmental Potential".

Sociologist Dr. Florian Butollo investigates how digital platforms and AI technologies are changing global value chains.
Mr. Butollo, in September 2018 you were appointed as one of 19 experts to the Bundestag’s Enquete Commission on “Artificial Intelligence”. What would you say is the purpose of such a commission?

The basic idea is as follows: parliament sees certain questions of enormous social and ethical importance which cannot be dealt with adequately in its day-to-day sittings. That is why it is convening an enquete commission. Members of the Bundestag and external experts join forces for two years to develop solutions. That, at least, is what it looks like in theory.

What about in practice?

We certainly do look for solutions to new problems and positions can change and arguments can make a difference. At the same time, most politicians enter the process with established positions, and many experts don’t just represent their personal opinions but also those of their organisations, along with the associated lobbying interests. That is no secret either. In addition to representatives from civil society and science, we also have experts from companies such as SAP, Infineon and IBM, as well as from business associations from the IT sector and start-ups. All in all, the aim is for various interest groups to reconcile their goals, and the economic interests of the AI companies play a major role in this.

What will the result be in the end?

Three project groups are developing recommendations for the use of AI in different fields. In the first period, the topics of economy, state and health are on the agenda; in the second period, the topics are media and mobility as well as work, education and research.

In the course of the project group work, external experts are additionally invited as speakers. Each of the project groups produces its own interim report. The project groups usually meet once a month for this purpose; besides this, telephone conferences are held by teams that have agreed to jointly write parts of the interim report. At the end, the interim reports are published as an overall report, which then has around 600 to 700 pages.

Isn’t that much too long for someone to really read?

We have often discussed the length in critical terms, but it also offers a great claim to completeness. That’s why you can’t get away from this extensive format. How much the report will shape the political discussion on the subject will become apparent in time, especially since there are already a number of statements, such as the federal government’s AI strategy, the report of the High-Level Expert Group of the European Commission or the digital strategy of the BMBF. Our report will probably have the greatest impact on the general public rather than on members of the Bundestag. In this, what also plays a role is how you, as a commission member, can shape individual parts of the text in a way that is visible to the outside world. One instrument for this is the special vote procedure, which is necessary because otherwise critical positions would get lost in very general consensus formulations.

What have you achieved so far?

I was concerned that dubious expectations for the performance of AI and for its social and economic effects should not be included in the report. There is a very broad community that always only likes to hear or spread messages about purportedly impending economic booms due to AI. In this context, the question of what kind of AI we need as a society and for what purpose no longer arises.
This issue – namely that technology is ascribed miraculous powers and that this impairs political judgement – was a central issue that Joseph Weizenbaum dealt with throughout his life. In all modesty, I had the feeling that I was stepping a little into his shoes in my role in the AI commission. His statement that a society that embraces technology needs a great inner strength in order to avoid becoming too greedy and distracted from its goals is like a motto for my work in the Enquete Commission – and at the same time also indicates what is going wrong in society at the moment.

Will the report then point to societal goals that seem achievable with the help of AI?
If I am honest, there is massive dissent about this. Not all the commission members want to discuss the use of AI in the context of a socio-ecological transformation, which I consider to be urgently necessary simply because of climate change. Instead, there is a strong fixation on the global race for technological leadership and economic growth. Growth becomes an end in itself and AI threatens to become a fire accelerator, not a lever for solving global human problems. Coupled with exaggerated expectations of productivity increases, this is a recipe for a deepening of the socio-ecological crisis. Especially since the current path of machine learning will have shocking environmental consequences. According to a calculation by MIT researchers, the training of a single AI model consumes more CO₂ than five average cars over their entire life cycle. This alone shows how negligent it is to promote the use of AI without clear goals.

Why do you consider the expectations regarding productivity and economic growth from AI dubious?
Many findings come directly from our empirical research on the robotics industry, which we conduct at the Weizenbaum Institute. The companies in this industry are, on the one hand, pioneers in the development of new technologies and, at the same time, have to be very pragmatic, because their devices have to deliver practical advantages to the customers. There are no one-size-fits-all solutions. Instead, it is an enormous engineering effort to get AI-based robotic systems adapted to specific requirements up and running on site. In general, technology use currently more closely resembles a cautious search process than a comprehensive disruption. The abstract potential for productivity increases, as shown in studies by many market research institutes, is difficult to realise. And the macroeconomic question of whether technology use will actually translate into economic growth is even trickier. The vast majority of forecasts are based on supply-side calculations alone. They calculate savings effects and translate them into growth. But even if it were possible to create ever more efficient economic apparatuses, sales opportunities remain limited. But if productivity grows without demand being able to keep up, this will lead to speculative bubbles and crisis tendencies rather than sustainable growth.

Aren't there also forecasts that take demand into account? When I started in the Enquete Commission, I was desperately looking for a macroeconomist who could comment on existing forecasts and also take demand effects into account. I was barking up the wrong tree! Macroeconomists don’t do this, because it is simply not possible to deduce growth effects from abstract productivity potential, due to the full complexity of economic cycles.
What would have to happen for AI to have positive effects on society?

In view of the range of global problems we face, social objectives should be given much greater emphasis in technological development. AI should be promoted in areas where it actually promises social benefits and long-term public funding should be used to make it economically profitable in such cases. The current venture-capital-driven innovation model provides the wrong incentives because it rewards the gold miners at the expense of the visionaries.

Thank you
Faster, Louder, Shriller

Research Group 15:
"Digitalisation and the Transnational Public Sphere"
As part of digitalisation, large sections of the media, but also the public, are undergoing a structural change. This structural change is characterised by phenomena of fragmentation. The following essay focuses on the strategies that established actors, such as the traditional media and the big tent parties, can use to meet the challenges posed by the changed environment. Together with Annett Heft, author Curd Knüpfer heads Research Group 15 "Digitalisation and the Transnational Public Sphere".
Almost everywhere in Europe – and not only there – we are experiencing the emergence of right-wing populist movements, parties and alternative media offerings that explicitly oppose the establishment and that question democratic rules and procedures. The traditional big tent parties are losing members and votes. Democratic processes and institutions are losing credibility among large parts of the population. These processes are being accompanied by a profound change in the media and the public sphere. Networked communication via digital platforms is making the perceived information faster, louder and shriller. Whether we lament this development as a loss of discussion culture or celebrate it as an opportunity for new forms of democratic participation – it is clear that the rules of the game for democratic speech and action have changed along with this transformation. Political parties, but also the traditional media, must realise this and develop appropriate strategies if they want to maintain or regain their social relevance.

The current structural transformation of the public sphere is characterised by developments that extend far beyond the digital sphere. A key phenomenon is the loss of central platforms, which until recently provided the stage for relevant discussions. This can be observed particularly clearly in the USA, where such fragmentation processes are already more advanced. To illustrate it here with an anecdote: the legendary CBS Evening News newscaster used to end his show with the words “I am Walter Cronkite, and that's the way it is”. The audience found this slogan credible. In the 1960s and 1970s, Cronkite was considered the most trustworthy man in America. Such a phenomenon would be unthinkable today. Newsreaders still exist, but they are now competing in their interpretive sovereignty with an increasing number of other sources and formats for the trust of different audiences.

Fragmentation is not only being prompted by the diversity of competing media offerings, but also by the style of discussion and reporting. Today, disagreements are increasingly taking place not within the media but between media organisations that are themselves increasingly taking sides to address specific niches within the population. The internet and digital platforms are accelerating this trend by making it possible to address ever smaller user profiles. Political marketing strategies – such as microtargeting, in which individual users are targeted with specific information – further strengthen this dynamic.

A further aspect of fragmentation is that, in addition to the established public sphere, numerous partial and counter-publics are emerging that are no longer tied to a circle of acquaintances or a particular spatial area. Within these discursive communities, there are no necessarily mechanisms of quality control, such as editorial selection of topics or verification of factuality. Examples of counter-publics where the common rules of fact-based deliberation are often disregarded include vaccination and climate change sceptics and supporters of the Flat Earth Society (people who gather evidence that the earth is a disc). At the same time, however, subpublics are also bypassing established power structures and thus broadening the spectrum of democratic participation. Digital networks enable decentralised forms of fact-finding and the collective formation of a news agenda. Such processes have recently also become an elementary component of progressive movements such as Me Too, Black Lives Matter or Fridays for Future.
However, the emergence of new subpublic spheres cannot be equated with the formation of enclaves, isolation or even the controversial concept of filter bubbles. In fact, individual subdemographies’ collective deliberation processes tend to lead to more visibility and often constitute themselves in direct response to one another.

Collectively, this gives rise to a situation that our research group describes as a “dissonant public sphere” – a louder, more polyphonic and more oppositional form of communication for society as a whole.

From the point of view of democratic theory, dissonance is neither regression nor progression. After all, the fact that democracies must act in a consensus finding mode is not a law of nature. And the fact that actors who previously had no access to the media and politics can make themselves heard should initially be welcomed. What can be observed, however, is that different actors profit in different ways from the new rules of the game that the dissonant public sets. Most recently, groups or individual actors from the right-wing political spectrum have succeeded in making use of the new rules of the game. Using new communication channels, they have bypassed the old gatekeepers, cultivated ideological networks and presented themselves as popular alternatives to the established institutions. Big-tent parties and the traditional media, on the other hand, are among the losers in the new game.

Do established actors have to become more shrill or authoritative in order to be able to assert themselves within a dissonant public sphere? Not at all! To stick with our sound metaphor: the institutions need to learn to listen in a new way. Because with the phenomena of the dissonant public, it's a bit like with the free jazz that emerged in the 1960s. The established players have to learn to recognise harmonies. This means dealing with content that initially seems to be pure noise. To simply denigrate unwanted discourse as a “shitstorm” or as “bot networks” or simply to ignore them completely is often not particularly conducive to communication. Instead, the established actors should aim to integrate the digital public’s discourses, which established actors may perceive as shrill and short-lived, into their own procedural models, which are based on reflection and argumentation.

Otherwise the new subpublic spheres will remain unheard – which in turn leads to frustration and democratic disillusionment.

What is needed is not only the integration of content, but also of procedures. The SPD under Willy Brandt had to overcome significantly higher hurdles in order to actually dare to have more democracy. Today, parties have little scope to avoid demands for more participation and horizontal participation by the base. And serious journalism should not see the public as a homogeneous mass of passive recipients but as heterogeneous communication partners.

Political parties and traditional media organisations must first recognise that dissonance is the new normal. In doing so, their primary focus should not be on their own output, but on their input mechanisms. These mechanisms should not just be able to hear new pitches but must also be able to draw meaning from them and steer them into productive paths in their own institutions. Dissenting voices, too, are becoming louder. To deal with this, institutions need to learn how to separate the constructive from the disruptive. As curators of democratic processes, the established institutions should not only sharpen their profiles based on their own know-how but should also contribute to ensuring that that the not-insignificant achievements of previous democratic publics are preserved.

Research Group 3: "Working and Cooperation in the Sharing Economy"
Research Group 3, “Working and Cooperation in the Sharing Economy” deals, among other things, with regulation and co-creation in the platform-based sharing economy. One project is concerned with the question of how the regulatory framework for Airbnb should be designed in order to enable fair competition. Another project investigates the scope for trade unions to attract so-called gig workers in the sharing economy to their organisations and goals.
The sharing economy has found its way into our everyday lives in many different ways. When we go on holidays, we take advantage of one of the numerous car-sharing services to get to the airport and leave our flat to strangers via Airbnb, while at our holiday destination, we use ride sharing drivers from Uber to bring us from door to door.

Regardless of the new possibilities, sharing platforms are sometimes viewed quite critically. For example, providers such as Airbnb have been accused of further fuelling the rise in rents in major German cities, as apartments used for short-term rentals are withdrawn from the regular rental market. Platforms for arranging driving, delivery and household services are also increasingly subject to criticism. Although they are regarded by law as internet platforms and are therefore less heavily regulated than their established competitors, services such as Uber, TaskRabbit and similar services actually act as service providers that promise their customers quality standards and impose rules on their platform workers despite their official status as self-employed. Working conditions are often precarious: employee rights, social security or even company co-determination are virtually non-existent in the so-called gig economy – the labour market for short-term orders placed online as part of the sharing economy. Many of the platform workers earn low incomes. All this contrasts with the narrative of self-determined, flexibly working “partners”, which is how the platforms would like to see their workers.

For trade unions it is still an open question how they should deal with the phenomenon of the gig economy. Against this background, social scientist Saba Rebecca Brause is currently investigating how trade unions are approaching the issue. She focuses above all on the sector of driving and delivery services. "I would like to conduct interviews with trade union representatives who are responsible for this new form of work in their organisations. I'm interested in the strategies and content that trade unions use to attract platform workers as new member groups," Brause says of her project.

She pays particular attention to digital communication. “How do platform workers organise themselves via social media? How do trade unions use social media to address platform workers? What channels do they choose and what frames do they use?”

Traditionally, trade unions defended the ideal of the normal employment relationship against the spread of atypical employment relationships – often at the expense of atypical workers. The recent opening of trade unions to this group of people is leading to a growing fragmentation of the interests of (potential) trade union members. This is also leading to tensions for trade union organisations. Brause therefore examines the gig economy from the point of view of the sociology of work and also from the point of view of organisational sociology. "For a long time, trade unions were understood primarily as a social movement of wage earners to defend their socio-economic interests," Brause said. "This changed with the decline of the labour movement in the 1970s. Since then, trade unions have increasingly been regarded as strategic actors who are also working towards maintaining and renewing their own organisations. One strategy for renewal is to open unions to represent atypical workers such as today's platform workers”.

Sharing economy companies have not only been criticised for their precarious working conditions, but also because they are taking advantage of their status as a platform to compete with established providers that are subject to stricter legal regulation.
Taxi companies are complaining about competition from Uber and other transport operators, and hotels are complaining about undue distortions of competition from Airbnb, as private operators are not subject to the same rules as commercial accommodation providers.

Against this background, legal scholar Nadine Schawe examines the question of how the regulatory framework for Airbnb and similar providers should be designed or reformed to enable fair competition. “My research project aims to undertake a legal theoretical and comparative analysis of the legal framework in the area of home-sharing. On this basis, I would like to point out possible ways of shaping future regulatory measures”, explains Schawe. She wants to look at the legal regulation of home-sharing in various cities, not only in Germany.

Untypically for a legal scholar, Schawe engages with the technological foundations of digital platforms through which Airbnb and others offer their services. In her master's thesis she had already studied “smart contracts” via blockchain technology. Digital law is also a topic in the new project.

“In Germany, legal regulation is usually still very analogue” says Schawe. It is worth looking at innovative technologies, data and interfaces. Schawe: “On the one hand, I see possibilities for more effective enforcement of legal provisions through the integration of technical solutions. On the other hand, it is worth thinking about the extent to which lawmakers could oblige providers in the home-sharing segment, but also services such as Uber, to store data from transactions with customers in anonymous form and make it available to the public.” Municipalities could benefit from this data in urban planning and traffic control. In addition, an obligation to share data could counteract the formation of monopolies on the market in the long term.

In her project, Schawe not only deals with legal regulation and its technological implementation, but also with the extent to which the effects of regulation can be measured. Using data collected through web scraping, Schawe wants to draw a detailed picture of the effects of individual regulatory measures.
Privacy Icons: Making Data Protection Understandable

Research Group 4:
"Data as Means of Payment"
Research Group 4, "Data as Means of Payment", is developing an easy-to-understand, standardised symbol system that could complement the complex privacy statements of many online services in the future.

It’s a daily routine on the net: If you want to use online services such as Facebook, Google or Airbnb, you first have to agree to the data protection and terms of use. Most people almost automatically click on “accept” without having read the privacy policy beforehand. Companies are thus allowed to collect, evaluate and pass on personal data at the click of a mouse – often for years to come if the user does not withdraw consent at some point.

In a recent study commissioned by the New York Times, journalist Kevin Litman-Navarro compared 150 English-language privacy statements and reviewed them for length and readability. The result: most of the statements require reading skills at the university-graduate level.

Moreover, they are almost unmanageably long. The Airbnb statements take an average of 35 minutes to read; on Facebook they take 18 minutes.

This is where the Privacy Icons project comes in. The aim is to develop a tool for visual communication that could supplement complex written privacy statements in the future: an easy-to-understand, standardised symbol system that increases awareness by giving users information on certain data protection features with potentially negative consequences before they give their consent.

“You can compare what we are doing with the well-known Creative Commons copyright license, which also uses pictograms to illustrate legal issues,” says research group leader Zohar Efroni.
"For the Creative Commons license, standard licenses were developed in addition to the pictograms. Such standardisation, however, would be more complicated for privacy statements, so the Creative Commons' approach cannot be implemented one-to-one."

The first phase of the project involves creating a catalogue of risks that users may face as a result of consenting to the processing of their data. These risks include, but are not limited to, the violation of civil liberties or discrimination based on political opinions, ethnicity or health status. Here, the EU’s General Data Protection Regulation, which refers to various risks, provides guidance. The risks are then weighted with the aim of identifying the most relevant aspects of data processing. For the weighting, interviews are conducted with both experts and users. This should make it possible to identify risks that are classified by experts as particularly relevant, even if users cannot always recognise this relevance and understand the possible implications of the risks. “We want use our privacy icons to deal with these risks”, explains Efroni.

Findings from psychology and behavioural economics provide the scientific basis for the designs. One of the project’s starting points is the so-called picture superiority effect. Using this concept, psychologists investigate when and why pictorial representations can be recognised more quickly than texts and retrieved from memory with less effort.

"Privacy icons are not just about convenience”, emphasises Efroni. "In data protection law, legally compliant consent actually presupposes that the users who consent to the use of their data make an informed decision. However, it is doubtful whether this is the case in current practice.

“We imagine that, in the end, relevant terms of use or aspects of data processing can be simplified by using a limited number of icons,” explains Efroni. “How many icons we will ultimately have, what the icons will look like and how we will use additional elements, such as colour coding – all this has to be tested in experiments. If you try to put too much into it, you won’t achieve the goal of simplification.”

In the specific application contexts, it is up to the companies and app providers to decide which aspects of the contract conditions the icons need to highlight based on set implementation rules, with the ultimate goal of helping users understand data protection regulations better and faster. The icons will not replace the contract text. Instead, the icons are intended to highlight essential aspects of processing practices, which interested users can then read about in detail.
Social Bots and a Storm in a Teacup

Research Group 14:
"News, Campaigns and the Rationality of Public Dis-course"
When you’re dealing with news, campaigns, and the rationality of public discourse, as Research Group 14 does, you encounter interesting conspiracy theories every day. So far, my favourite has been that “the flower industry” murdered Lady Diana in 1997, because: *Cui bono*?!

In the spring of 2019, I myself was declared part of a conspiracy. Social bots, a journalist and a professor repeatedly wrote in dozens of tweets, do not exist at all. This is just a wild conspiracy theory of crazy scientists, or more precisely of “firecrackers with academic titles”, for example, me.

My Swiss colleague Tobias Keller and I had previously dared to publish an award-winning study in a high-ranking journal whose findings indicate that social bots played hardly any role in the 2017 federal elections.

To deny outright the existence of social bots, that is, partially and fully automated social media accounts, is a very daring thesis. The issue is not just that “amplifier accounts” have been found by numerous research teams around the world using a variety of different methods. In their transparency reports, the platforms themselves have also reported on bots and their measures against “malicious automation” (Twitter).
To claim that there are no social bots is therefore a bit like claiming that there is no man-made climate change – it would be nice if it were true, but unfortunately the empirical evidence is overwhelming. What we can and should argue about, on the other hand, are the empirical methods we can use to identify these and similar actors and how we can measure whether they are having actual effects on public discourse dynamics. Then we would be back to a critique of research methods, but that does not seem to be the point in this case.

Science is not a petting zoo – hard criticism and sceptical questioning are necessarily its modus operandi. This is not always nice and all researchers have stories about “grizzly reviewers” who go over the top in double-blind reviews of journal or conference submissions. As early as 1919, Max Weber wrote about the inevitable impositions people had to endure without bitterness when choosing science as a profession.

But the quality of the debate changes completely when the attacks come from actors who cannot present their own scientific evidence for their claims, when personal insults (“idiots”, “intellectually lazy, stupid”, "bullshit articles", "academic fraudsters", etc.) replace normal respectful engagement, and when criticism does not take place in the established formats of scientific discourse, but on Twitter. Unfortunately, this has been happening more frequently in recent times, especially for colleagues who deal with politically relevant topics such as populism, climate change, feminism, racism or social media discourse; such researchers find themselves in the middle of (apparently) politically motivated shitstorms or are directly sued by right-wing populist parties, as the WZB recently experienced.

Interestingly enough, our “storm in a teacup” even made it to the opinion page of a national daily newspaper, which perhaps also points to a problem in (science) journalism. The impression arose that the newspapers had created a super-regional audience for the authors due to the spectacular character of the conspiracy-theoretical allegations and not due to the authors’ proven specialist expertise. An appropriately complex critical discussion of methodology can hardly be outsourced to Twitter or to daily newspapers. In the end, it remains unclear what the whole thing is about and what purpose it serves, apart from allowing journalists to toot their own horn while accepting the reputational damage to and intimidation of scientists who open up new, politically relevant fields of research.

Always look on the bright side of life: We can also learn a lot from unpleasant experiences. First, as studies have repeatedly shown, very few actors are needed to quickly generate a little Twitter excitement. Second, the circus is moving on. Almost all research teams, that have ever dealt with social bots have been and are being discredited in similar ways. Third, recent studies, such as the Science Barometer show that public confidence in science remains very high. For this to remain the case and to avoid giving actors with their own agendas a platform, it is important – for journalists as well as academic and political institutions – to check exactly who is invited on podiums, as guest authors or as interview partners and on what the expertise is actually based.

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How Social Media can affect mental Well-being

Research Group 9:
"Digital Technologies and Well-Being"
How social media can affect mental well-being

The use of social media has noticeable effects on self-esteem and thus on life satisfaction. It makes a big difference whether users actively contribute themselves or only passively consume media, for example by browsing through other people's online profiles and comparing themselves more or less consciously with these profiles. This is a finding from Research Group 9 "Digital Technologies and Well-Being". In experiments, the researchers are now testing, among other things, how long-lasting these effects are.
Billions of people worldwide use social media such as Facebook, Instagram or Twitter to find out about the latest events, news and general updates from the lives of close friends, acquaintances and strangers. But social media also offers information that does not seem as obvious at first glance: it offers them insights about themselves. How do other users perceive me? How do others interact with me in a digital environment? How do I compare with other people?

For this reason, it is clear that the use of social media can have an effect on people’s self-esteem, that is, on their subjective assessments of themselves. Members of Research Group 9 “Digital Technologies and Well-being” (Hannes-Vincent Krause, Katharina Baum and Annika Baumann) under the scientific direction of Hanna Krasnova are investigating this.

Self-esteem plays a decisive role in human well-being. People with low self-esteem, for example, have an increased risk of numerous physical and mental health problems, such as cardiovascular disease or depression. Likewise, high self-esteem ascribed numerous protective functions that shield people from the effects of personal failures and critical life events. Research has long been concerned with how situational impressions affect the long-term assessment of a person’s self-esteem. Even if it can be assumed that everyone has a reasonably stable self-esteem, we know that numerous factors such as personal success or failure can influence individual self-esteem, both situatively and in the long term.

Research into the influence of social media on self-esteem is not completely new territory in research. Research group leader Annika Baumann and her colleagues analysed 49 research papers published between 2005 and 2018 at the beginning of their project. The situation seemed confusing at first. Some studies showed a negative effect, others a positive one, while others were unable to find any connection. “In our opinion, the use of social media has not been captured precisely enough in previous studies,” explains PhD candidate Hannes-Vincent Krause. “We assume that how exactly social media is used makes a decisive difference: for example, whether a person only consumes passively or whether they participate actively.”

Based on this consideration, and incorporating established socio-psychological theories, the researchers developed a model to better explain the confusing results to date. This model is based on three decisive processes that come into play in the use of social media and thus influence users’ self-esteem.

First, social comparisons are mainly linked to a decline in self-esteem. “For example, those who start comparing themselves with other users will quickly lose out”, says PhD candidate Katharina Baum. “There is a tendency for users to present themselves in an idealised and emphatically positive way on the internet. Often, the user’s own real self-image cannot keep up with this. Second, social feedback, which is given frequently and freely on social media, can, by contrast, have a positive effect on a user’s own self-assessments.”
The best example of this relates to social media \textit{likes}: receiving a \textit{like} can satisfy the basic human need for social acceptance and – according to current research results – have a positive effect on self-esteem. Thirdly, self-reflection is another important process in social media. Social media make it easy for users to present themselves in a particular way. "Like on a movie screen, users can create an image of themselves, underline, omit or soften particular aspects", explains Katharina Baum. Looking at your own profile – provided it corresponds at least to a certain extent to reality – can thus strengthen self-esteem.

And indeed, the data from the studies already analysed in the literature review tends to confirm the researchers’ hypotheses. But the research group wants to know more: are the processes that influence self-esteem equally relevant for all users of social media? Which users are particularly at risk when using social media and who benefits most from the positive aspects of these platforms? How lasting are these effects and how do they influence the long-term well-being of the users?

To answer these questions, the group has developed its own research designs and intends to conduct experiments, among other things. "The experiments themselves will largely be carried out online. Usually there are different groups that use social media differently or will not use them. A comparison of these groups enables us to determine exactly whether the use of social media actually has a causal effect on self-esteem", explains Hannes-Vincent Krause.

By answering the research questions, the team hopes not only to gain a better insight into the complex dynamics of social media use and its interaction with self-esteem, but also to make practical recommendations on how users should best deal with these platforms.
Hidden Data Exchange made audible

Research Group 19:
"Digitalisation and Networked Security"
Hidden data exchange made audible

Around 90 per cent of all websites use tracking. "Web tracking" refers to the collection of information on users and the tracking of users on the internet. Sensitive personal data about users can be derived by analysing websites visited, search queries and user behaviour. Since a small number of companies – including Google, Facebook and Amazon – are responsible for a large part of the tracking, data that is generated when various websites are visited is also aggregated. Otto Hans-Martin Lutz, a PhD candidate at the Weizenbaum Institute, and his team colleagues have developed a method that enables users to experience invisible tracking acoustically.

Otto Hans-Martin Lutz is a PhD student in Research Group 19 "Digitalisation and Networked Security"
Mr. Lutz, how did you think of making tracking on websites audible with sounds?
Research Group 19 is concerned with digitalisation and networked security. We discuss different aspects of privacy and security with each other all the time. Many people who use the internet do not seem to realise how much tracking is actually happening in the background of normal websites.

What is being tracked online?
For example, I enter a search term and visit certain pages. The tracking companies then know how long I stay on which pages and what I read. From this, highly sensitive data, such as diseases I may be suffering from, can be derived and a profile can be created. There have been cases where women have gotten advertising for baby products even though they did not yet know that they were pregnant.

How do you turn tracking into sounds? We record data, i.e. the traffic. We filter the data packets according to known web trackers. And we look at when a connection is initiated and when the data is transferred. We translate these events into sounds: Each data packet transmitted to a tracking company is represented by an acoustic signal. When a connection is established to one of the top ten tracking companies for the first time, the user hears a whisper, which gives the name of the company, for example, Facebook or Google. Users know some of these names but not others. This makes them think. What's special about our approach is that we’re not just able to show this for one browser; we can compare different browsers and apps with each other, with and without blocking plug-ins.

How did you proceed with your project?
Fraunhofer FOKUS cooperates with HTW Berlin – University of Applied Sciences within the framework of the Cyber Security Learning Laboratory. There are various events in the laboratory, such as the Long Night of the Sciences. I can carry out very realistic user studies. Together with the visitors, we then navigate to various websites, for example, we compare the website of the Weizenbaum Institute with that of the news site Bild.de. The difference is enormous and audible. We look at free e-mail providers in comparison to paid e-mail providers that pay more attention to data protection. And then I ask visitors to fill out a questionnaire to see if anything has changed in their awareness of privacy and security. And I also ask what questions they ask themselves after experiencing the sounds.

And what do people want to know then?
For example: what can a person do to guard against tracking? What is my data being used for? Some of the questions also point to features of users’ mental models: what antivirus software can I use to protect myself against tracking? The person asking this question has not understood that antivirus software protects against malware, but not against web tracking.

How do you get people to think and ask questions?
We make what happens in secret audible. People are initially surprised and then start to ask and discuss many questions. That is the goal. The real question is: how much free service and how much convenience do I buy by releasing my data? If I want, I can decide to have less privacy, but I would make the decision consciously.
What is so dangerous about a website tracking me?
A single website that tracks just one person is relatively harmless. But it is problematic if a cookie from one of the large providers can be found on many different websites. Then, an exact profile can be created. It will get more contentious if you are denied opportunities, for example, if insurance companies know more about you than you suspect. Assumptions are made about you – and they can also be wrong. We already know that prices can vary – depending on the end device.

What is the next step in this project?
The next step is the qualitative evaluation of the participants’ questions and statements. The interdisciplinary cooperation at the Weizenbaum Institute is also great here: I can simply ask my colleague, a social scientist, how to proceed correctly. Then, we implement the project on a small computer like the Raspberry Pi, which opens its own Wi-Fi that you can log into with any device. And we make this solution available to the public. I'm curious to see what happens when I log in with my mobile phone and open various apps: How many of these apps are sending data to tracking companies? I can imagine that free apps like games create profiles by the boatload. Smart TVs and smart speakers like Alexa are also really interesting.

Thank you very much for the interview.

A SOUND SAMPLE IS AVAILABLE AT:
https://youtu.be/ug36fEe801k
Tailor-made Training

Research Group 7:
"Education and Advanced Training in the Digital Society"
Tailor-made training

Taking all your employees along with you in the course of digitalisation and retaining important knowledge in the company is a central task of advanced training for a networked world. Malte Teichmann and Leo Sylvio Rüdian of Research Group 7 "Education and Advanced Training in the Digital Society" are investigating how this can be achieved.
Digitalisation can affect education in two ways: We not only learn in a digital world, we also educate ourselves for this increasingly digitalised world. And the older we get, the harder it is for us to do so.

In many companies, there is an opinion that older people will find technological progress and the conversion to new automated and digitalised production and business processes difficult. Malte Teichmann of Research Group 7 “Education and Advanced Training in the Digital Society” doubts this so-called deficit thesis: "If you follow the research literature on lifelong learning," he says, "then you could just as easily advance the contrary hypothesis: older employees’ cognitive abilities deteriorate because they are no longer challenged, because they are given one-dimensional tasks and because they no longer receive further training courses that are appropriate for their target groups.

Small and medium-sized enterprises, so-called SMEs, not only face the challenge of taking older employees with them when digitalising their companies, they also have a completely different problem: they lack the next generation of skilled workers. In this context, which is being exacerbated by the already shrinking working population, many managers of SMEs are considering digitalising the specialist knowledge of employees who will be retiring in the near future as a permanently available resource for future generations. If only they knew how.

This is exactly what Teichmann is concerned with. As part of his research project, he has established a relationship with three SMEs from the construction supply and machine manufacturing sectors that are facing a loss of experiential knowledge in various production processes. Teichmann is conducting extensive interviews and field observations in the companies in order to determine the content for various company training courses.

"My idea is to develop a model that can help us to understand how experiential knowledge is generated in production processes and which makes visible certain elements of this knowledge that can be conveyed", says Teichmann.

Among other things, the plan is to establish interactive educational offerings in which special digital learning spaces are created with the aid of augmented reality technologies (AR technologies) and made available to learners for the socialisation of experiential knowledge. AR is an enhanced version of reality. Digital information is superimposed onto a real image through the use of technology. Employees could, for example, view the data of a production machine through the camera of an iPad and receive information on noticeable problems, such as critical limit violations, which is digitally displayed on the screen. Teichmann will first test his approach to the transfer of experiential knowledge in the Industry 4.0 Application Centre at the Chair of Business Informatics at the University of Potsdam, before using the training courses directly in the three Brandenburg companies. "I am conducting my research with a design science approach that is geared towards creating artefacts that can also be applied in reality", he explains.

"Drawing on experiences in the learning workshop, I can already improve the educational offerings before I subject them to a second improvement phase, which takes the form of an applied check.”

In addition to the task of developing new technology-supported teaching and learning concepts, another trend is determining research into education and further training in the digital world: the personalisation of offerings.
Many companies are already using online courses for the further training of their employees. The big opportunity is to make these courses more geared to the learner. The challenge faced by many online courses is that their user community is very heterogeneous. However, there is no single learning environment that fits all. Personalisation should take place at different levels: At the macro level, the aim is to adapt the learning content to the different needs of users through recommendations. At the micro level, it is also a matter of taking the different personalities of the users into account when designing the course. “How content is presented in an online course, whether in graphical or textual form, for example, can also influence how motivated a participant is,” explains Leo Sylvio Rüdian of Research Group 7 "Education and Advanced Training in the Digital Society".

Using an experimental design, he was able to demonstrate that personality traits can be predicted on the basis of user behaviour in online courses. He determined users’ click behaviour in an e-learning course on search engine optimisation, which 142 interested people completed on the Moodle learning platform. “We recorded how long learners stayed on individual pages before moving on, and how often they looked at a page. How long it took them to complete each of the different tasks and how good the answers were. These are all data that any provider can simply collect, because they are generated during use anyway,” says Rüdian.

The online course was divided into three parts, and at the end of each part of the course, participants also answered a questionnaire that provided information about certain characteristics of their personalities and culture. Just as commercial providers draw conclusions about consumers’ personalities from the click behaviour on their websites, Rüdian then trained a neural network with the course participants’ behavioural data in order to identify certain patterns in click behaviour, from which conclusions can be drawn about the learners’ personalities. The learners’ behaviour within the online course was a very good indicator of how open they are to new experiences, how conscientious they are, and how neurotic they are. Demographic characteristics such as the age and gender of the participants could also be predicted very accurately in the experiment.

Even for the cultural influences that affect them, behaviour in the online course was a very good indicator.

“What surprised us most,” says Rüdian, “was which of the cultural traits we could predict most accurately. We were able to predict whether a person was more long-term oriented or whether they lived in the here and now better than we would have been using demographic data. We don't yet know why this works so well, because the neural network is like a black box: it’s a data structure that we don't understand. But we want to use the raw data to find an explanation for the click behaviour.”

In conclusion, these results mean that e-learning courses can be personalised and optimised based on these characteristics. How such courses should be adapted to learners will be the subject of Rüdian's future research. Knowing which characteristics can be predicted by behavioural patterns will allow online course designers to differentiate between different user groups and better support them in their learning experiences. It is hoped that the personalisation of advanced training will make it easier in the future to retain employees who find it more difficult than others to cope with change processes – whether because of their age, cultural background or personality.
The Monetisation and Datafication of Education

Research Group 5:
"Data-Driven Business Model Innovation"
The monetisation and datafication of education

How can education be digitalised? Romy Hilbig and André Renz lead Research Group 5 "Data-Driven Business Model Innovation" and have analysed the business models of European education technology providers, which are radically changing the education market with innovative digital solutions.
Whether we’re talking about learning management systems (LMS), mobile learning apps, virtual and augmented reality or simulation software – schools, universities and the education market are currently undergoing profound change as a result of new innovative forms of knowledge transfer. The number of companies specialising in the digitalisation of education and knowledge transfer, so-called edtech providers, has increased continuously in recent years. This has also increased the range of services offered: While many offers from edtech providers have only catered to niche markets to date, LMS has firmly established itself in the educational landscape due to its ease of use and general acceptance.

LMS are software systems that enable the creation, communication, administration and coordination of learning content and administrative processes. “In addition to internal processes, such as course and exam registrations, LMS solutions are used today to offer courses across universities”, explains Renz. The Virtual University of Bavaria, for example, provides multimedia learning and teaching services online from Bavarian universities. This enables students in Bavaria to use e-learning to complete part of their degree programmes.

However, e-learning services are also increasingly being used by companies for in-company training and advanced education. As a rule, universities and companies do not develop such systems themselves but purchase them from edtech providers. The range of services on offer is diverse: While some companies merely provide the platform and the software solution, other companies offer complete teaching modules that can be individually adapted by the respective teachers.

Given the number of edtech providers currently on the market and the diversity of their digital services, the complexity of the market is increasing. ”The question for the future is who will determine the educational agenda in Germany and Europe: Are the edtech providers going to do this, or will it be the companies or the traditional educational institutions themselves”, Hilbig says. “We are currently seeing large tech companies such as Netflix, Samsung, Google, Microsoft and Facebook conquering the education market. Netflix, for example, has developed the data-driven learning program DreamBoxLearning. And Google is equipping entire schools in the USA with hardware and software. These trends are also becoming increasingly apparent in German schools. For example, there is a academic-track secondary school in Rüsselsheim called the Samsung Lighthouse School and a comprehensive school in Potsdam that has been fitted out by Google.”

Against the background of the fragmented edtech market, in a series of studies, Hilbig and Renz analysed the services of a total of 313 European edtech companies, most of them based in Germany, Austria or Switzerland. By extending the previously purely user-focused perspective to the provider side, Hilbig and Renz gave fresh impetus to the current discourse on the digitalisation of education.

"Digital educational services have decisive advantages: they take pressure off lecture halls in universities and allow them to distribute their contents worldwide. In addition, the digital dissemination of knowledge and scientific findings will remove existing barriers to educational participation such as social status, geographical factors or political restrictions”, explains Renz. "Companies also benefit from online-based learning solutions. They allow employees to continue their training at any time and from any location. Now, micro-learning units are also making it possible to acquire knowledge exactly when it is needed. Based on the trends in the edtech sector that are evident in international innovation conferences, it is clear that the boundaries between work and knowledge acquisition will dissolve even more.”
In addition to analysing edtech business models, Hilbig and Renz have investigated how data-driven the current teaching and learning products on the market actually are. This relates to how much user-specific learning data is recorded, analysed and processed. "Most providers do not currently use learning data to adapt and individualise their systems or services," Hilbig notes. "Rather, they use simple statistics that show when and how often users are learning and what medium they are using. Hilbig and Renz define this phenomenon as “basic learning analytics”.

Another trend is the use of algorithm-based learning recommendations in the sense of Amazon logic: what other users have learned could also be of interest to you. In contrast, AI is hardly used in the field of teaching and learning systems. The US company Knewton, which collects up to 100,000 pieces of data from its users in order to give complex, algorithm-based individual recommendations for their learning paths and to calculate predictions of success from them, is one of the few pioneers in the market to use AI-related architecture. Hilbig and Renz conducted interviews with 28 of the 313 edtech providers to gain a better understanding of how data is handled, in particular in terms of the use of learning analytics and algorithm-based learning solutions. Research on the university context shows that lecturers primarily use aggregated data on the performance of their course participants to optimise teaching materials for the entire course. “When, as a lecturer, I see that 70 per cent of course participants have not understood a course unit,” says Renz, “then I can provide additional tasks or explanatory information about that learning unit online to improve learning outcomes. But in-person teachers are also increasingly using digital tools. For example, live feedback systems such as PINGO enable lecturers to find out whether the learning unit has been understood or whether there is a need for further clarification. A business model like Knewton’s, which records thousands of pieces of personal user data, would currently be unthinkable in Germany. "Particularly in the context of continuing vocational training, many learning systems are failing even with simple data collection and evaluation tasks because of the hurdles posed by the General Data Protection Regulation and the concerns of human resources and works councils as well as of employees,” says Renz. “It should also be emphasised that approaches such as those pursued by Knewton are only a pseudo-individualisation of learning opportunities. Put simply, these systems are based on the Amazon purchasing logic. A learning path is generated based on thousands of users’ similar learning behaviour”. But what is the price of such pseudo-individualisation? None of the providers is fully aware of what data is collected and how it is evaluated and processed in each individual case. Hilbig and Renz are therefore already investigating how click behaviour, learning time and media choices can be used to individualise online courses without the learners having to give up control over their data. To this end, they are cooperating with a German edtech company that is offering continuing education in a workplace context.

In contrast to Knewton’s US edtech solution, Hilbig and Renz are adopting a process-oriented approach in which learner-related data is successively collected and analysed. "The intention is for the test subjects to understand and actively participate in deciding what data they will release and what advantages and disadvantages they will have as a result," says Renz. "The area of education and training is highly sensitive. Learning also means being allowed to make mistakes. A system that records every step we take and every mistake we make is a clear deterrent to users". Hilbig and Renz have set themselves the goal of gaining initial insights into the special needs of users of such continuing education services by mid-2020.

According to Hilbig, a future in which digital learning services would adapt automatically and without human intervention to individual learning progress with the help of AI is currently inconceivable: “From a technical point of view, this would only be possible if all the individual’s data was collected and continuously analysed from birth on. Hilbig remembers how an edtech provider once said to her in an interview: “People want to learn from people. The more digital the world becomes, the more human the content has to be.”

Hilbig and Renz share this view and see a future in which the individualisation of digital educational services will be limited to algorithm-based recommendations, with the lecturer assuming the role of a real-life learning companion and consultant.