MAGAZINE

of Heinrich Heine University Düsseldorf

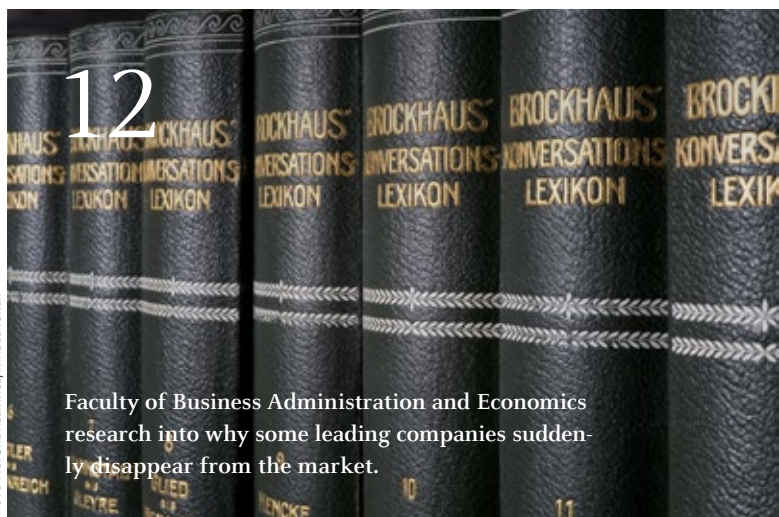## A matter of trust
Interview: AI research at HHU

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PHOTO PICTURE ALLIANCE/IMAGEBROKER

Faculty of Business Administration and Economics research into why some leading companies suddenly disappear from the market.
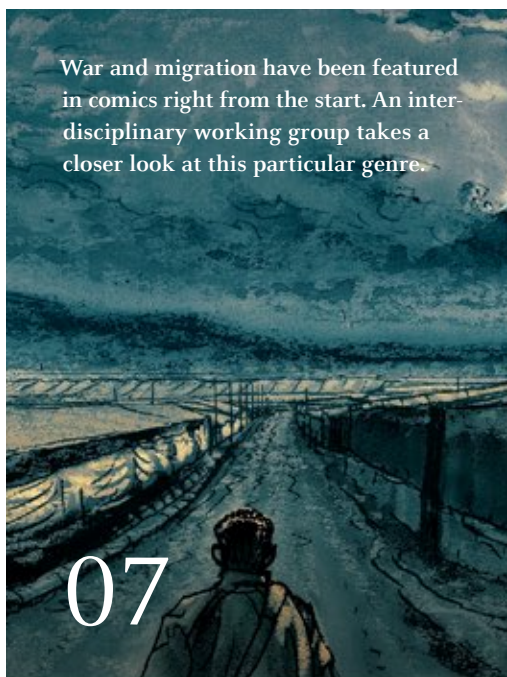
War and migration have been featured in comics right from the start. An interdisciplinary working group takes a closer look at this particular genre.

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IMAGE AVANAT VERLAG

Faculties

Legal notice

Editorial

PHOTO **IVO MAYR**

Dear reader,

Stanley Kubrick's 1968 film classic '2001: A Space Odyssey' describes the journey of the spaceship Discovery to Jupiter on the search for extra-terrestrial life forms. One of the main characters is HAL; however, HAL is not human, but a 'human-like' computer ('Heuristically Programmed Algorithmic Computer') that over the course of the story develops into an independent life from, which shows increasingly neurotic tendencies and kills part of the spaceship's crew.

With HAL, Kubrick developed a dystopian picture of Artificial Intelligence (AI) more than 50 years ago. Even today, these technologies are sometimes viewed with scepticism. However, the chances that the many fields of AI application such as medicine, economy or politics offer, come more and more into focus. Various disciplines at all HHU faculties conduct research on Artificial Intelligence with different focal points and methods – but always with the motivation to understand the chances and limitations of this new technology. The Heine Center for Artificial Intelligence and Data Science (HeiCAD) now gives HHU a structure as well as a platform that provides the basis for coordinating the numerous AI research activities.

Also the coronavirus pandemic continues to be an important topic at HHU – it influences the way we organise university operations and it plays an important role in the field of research. This current issue of HHU Magazine gives you an account of this and also covers many other interesting projects in the faculties. Find out more about the latest research activities at HHU and stay safe.

Best regards,

Professor Dr Stefan Marschall
Vice President for International Relations and Science Communication

Professor Dr Klaus Pfeffer and Professor
Dr Martin Mauve in an interview

„Making AI available university-wide"

Research focusing on artificial intelligence is gaining momentum in the 'Heine Center for Artificial Intelligence and Data Science (HeiCAD)' and the research group 'Decision-making with the help of Artificial Intelligence.'

MAGAZINE HeiCAD is the central institution that implements artificial intelligence (AI) at HHU. The Manchot research group 'Decision-making with the help of Artificial Intelligence' is analysing the specific application of AI in three use cases in a medical, economic and communication sciences project. You're both co-spokespersons of the Manchot research group, and you, Prof Mauve, are also the founding director of HeiCAD. A close connection.

Mauve: The Manchot research group is independent, externally financed and something like the experimental basis for HeiCAD. Alongside all other scientific results achieved in the research group, collaboration between the disciplines should be implemented, too. Not only do we want to research AI in computer science, but we also want to deploy it in other sectors. We want to understand what the overarching questions are, and how the disciplines interact. And we always want to see what we can transfer, which results can basically be considered for AI applications.

Overarching considerations

Pfeffer: On the one hand, the Manchot Group's objective is to research what the societal and social framework conditions are when using AI. But on the other hand, we also want to examine how AI can be deployed in various areas of the university. Very important: all faculties are on board with us, so we can generalise the findings we draw from the use cases to all potential fields of application,

Prof Dr Martin Mauve

**Founding director of HeiCAD and
co-spokesman of the Manchot research group**

too. Our core focus is on striving to make AI accessible for all of the university's fields.

Mauve: HeiCAD has the more comprehensive job of making AI available university-wide. If, for example, Germanists want to analyse Old High German texts with AI methodologies, but they don't know how to tackle this technologically, then this is a case for HeiCAD. Another task is to further educate scientists so that they can use AI.

MAGAZINE Where do you want to be three years from now when the research group has completed phase one?
Mauve: We then want the three prototypical use cases to have shown us how AI can be deployed, how it must be ethically assessed and where it helps to improve decision-making processes.

MAGAZINE Keyword decision-making. The Manchot Group's research project is indeed called 'decision-making with the help of Artificial Intelligence.' However, decision-making differs considerably depending on whether one addresses the societal and social decision-making in Prof Vowe's or Prof Weißenberger's social or economic science projects or those such as is the case with Prof Hass that are focused on medicine. Where do parallels exist, where are the differences?
Pfeffer: In the medical field, decisions have been made so far based on clinical laboratory and anamnesis data that a person integrates. In the future, AI methods can additionally be used. For example, AI can view clinical data and search for patterns that indicate certain diagnoses. It can then present these to physicians to support them in making their final diagnosis. In order to do this, we must check whether the diagnostic results obtained with AI can be used. What value do they have? It is about comparing the established, and medically ethical, standardised methods that physicians use in everyday clinical life with the methods supported by AI.

Mauve: We take a look at various focal points in the Manchot project's different sub-segments. In medicine, the main issue is particularly whether the technology works and can deliver better results than the procedures which are established in the clinic. So can this enable us to extract enough information from the data, for example, to sound the alarm in case of emergency during a monitoring situation? In the other projects, core focus is not on technology, not on how it works, but on how people evaluate the results that AI delivers. In other words, questions like trust or whether fair decisions are made or if the AI decisions are biased. You can only extract from the data what is in them.

Ethical questions

One example from HR recruiting: When we consider AI-backed recruitment in companies, it is important that religion or colour of skin do not play any role here. But if there is a correlation between colour of skin and hiring practices in the learning data set for AI, then an AI system will also learn and acquire this bias; this must be prevented.

MAGAZINE Well trust is an important keyword for AI. If nobody trusts AI, nobody will want to use it.
Pfeffer: In the medical field, the first step is validation. You have to validate whether AI can come up with equally good or better decisions than humans can. Only when this has been clarified can you trust the method.

MAGAZINE Projects in business and politics especially focus on ethical issues. But are standards already in place there or is the objective to also develop such standards?
Mauve: Of course, this is the object of research, such as the question: Under which conditions can we allow AI to prepare decisions. The legal framework is the subject of policy. However, I do not only see the ethical discourse in politics, but also with us, e.g., in philosophy or medical

„The Manchot Group's objective is to research what the societal and social framework conditions are for the use of AI."

— **Prof Dr Klaus Pfeffer**
   Co-spokesman of the
   Manchot research group

ethics. Colleagues from medical ethics are involved in the medical use case.

MAGAZINE Well, one problem is often the amount of data required to train AI.

Mauve: Yes, and we see a typical problem there. In the application area, there is frequently far too little data available to be able to adequately train AI. This may be different in some examples where AI systems are very successful. One example of this is the game Go, where special AIs defeat the best human players. But in this case, the AI can generate an infinite amount of data itself by playing the game repeatedly. This is, e.g., not possible in medicine. We have a finite number of measuring points, i.e. cases there.

MAGAZINE But this means AI has the very same problems that physicians do for rare diseases: there are not enough cases, there is not enough data.

Pfeffer: Yes, this is the current situation. You need more data, but in medicine, for example, you cannot simply generate it. That's why many studies are now looking at how to reduce the amount of data needed. The more you know about the data, the less data you have to gather because you can already predefine certain information. The question about the amount of data is one that we in the research group have been dealing with time and again and on which AI scientists participating at HHU are working intensively.

MAGAZINE So a particular challenge posed by AI research is the data reduction required to train the systems?

Mauve: Yes, this is an important question.

MAGAZINE Can this be quantified somehow?

Mauve: That depends on the problem. I know you'd like to hear that a million data sets are needed. I cannot give you a general answer like that. However, one million is already a good ballpark figure.

Pfeffer: The advantage of AI is that it can look at all the cases all over the world and draw conclusions from them. A human being can never do this. The aim is for AI to look at as much data as possible; this means we have to leave the Düsseldorf area and look for cooperation partners. We will not be able to win with Düsseldorf alone.

MAGAZINE Are there reference data sets that all researchers can access in order to test their results and make them comparable with those of the other working groups?

Pfeffer: Specifically, there are. It is particularly well-developed in speech recognition, where references and challenges exist.

MAGAZINE Do you also see university management as a field of application for AI?

Mauve: I would find it tremendously exciting. A lot of data is gathered for vacation requests or travel expense reports, but it is definitely not in the planning stage right now. I think it would be exciting, but enough natural intelligence is currently being used, so we don't need AI...

The interview was conducted by Dr Arne Claussen and Dr Victoria Meinschäfer.

Prof Dr Klaus Pfeffer

**Vice President for Strategic Management
and Equal Opportunities and co-spokesman
of the Manchot research group**

Practised interdisciplinarity

Research on war and migration in comics

BY VICTORIA MEINSCHÄFER

War and migration have defined comics right from the start, not only in terms of content, but also with regard to their historical origins. What began in the US with Yellow Kid in 1895 flourished during and after the World War II with superhero comics, and has, since the 1980s, appealed to new readers in new forms with texts like Art Spiegelmann's Maus and Persepolis by Marjane Satrapi. Now, it has become the topic of the first anthology of the research group icon (interdisciplinary comics research network) of the Faculty of Arts and Humanities, a book which takes a look at the medium comics from a wide array of perspectives. This interdisciplinarity is already reflected in the founding members of icon: Susanne Brandt (History), Michael Heinze (English and American Studies), Frank Leinen (Romance Studies), Elisabeth Scherer (Japanese Studies), Mara Stuhlfauth-Trabert and Florian Trabert (both German Studies).

"*Irmina* is a highly differentiated examination of National Socialism and the question of whether and in what way one puts up resistance."

— **Florian Trabert**
   Germanist

T he war-child comic" is the title of an introductory article by FAZ editor Andreas Platthaus. And here, co-editor Florian Trabert sees the beginning of a thread that runs through the genre's history: not only were comics often made and read by migrants in the initial phase, but the various immigrant languages in the USA featured as well. The modern comics that came onto the market from the 1980s onwards also dealt with war and migration and permanently changed the assessment of the medium in Germany: "After the publication of Shaun Tan's The Arrival, many authors worked their way through this template. The extremely positive experience of migration that the Australian describes in his book was repeatedly juxtaposed with other, usually much more negative stories. Many have questioned the optimistic model." Examples are the Invisible Hands by Ville Tietäväinen, in which migrant harvest workers in Spain without any rights find a voice, or Taking Refuge by Zeina Abirached. "Some of the authors have a migration background themselves and are thus writing based on their

Thematising their own experiences

own experiences, while others are fictional representations. The fact that authors have once made a comic on the subject of migration and/or war does not at all mean that it will become a dominating theme of their lives." Take Barbara Yelin, who before and after her 2014 graphic novel Irmina, has made comics on very different. "Irmina is a highly differentiated examination of National Socialism and the question of whether and how one puts up resistance," says Trabert. "What makes it particularly interesting are the leaps through time and place. The story begins in London in the 1930s, continues in Berlin during the Nazi era and then jumps to the 1980s when the two ageing protagonists look back on their lives. The protagonist has to confront the fact that she turned into an opportunistic follower during the Nazi era.

In this comic, as in many others dealing with war and migration, objects play a very particular role; they symbolically stand for the country of origin and for what is foreign. "In comics, objects can thus take on the function of a leitmotif," says Trabert, "suitcases, for instance,

or other utensils that you associate with travel. The theme can thus subtly be brought up time and again, simply by the suitcase appearing over and over in the individual panels, sometimes just on the side lines." Maps are another recurring motif. "This ranges from descriptions on Google Maps to drawn maps straight through to strongly alienated representations that depict monsters in unknown

Recurring motifs

territories, thus visualising the refugees' fears," says Trabert. In the comic Taking Refuge, the protagonist's body itself is covered like a tattoo with the road network of the Syrian city of Damascus. "The refugees' perspective is thus taken and it shows what it means to be fleeing and losing the entire social environment."

Things are different in Japanese mangas. In general, the focus is less on migration, if only because the topic is less present in Japanese society due to a strict immigration policy. War, on the other hand, is a central theme in

→
Migration and tourism as opposing
movements lead to completely
incompatible perceptions of the world.

In 1934, young Irmina leaves Stuttgart to go to London and train as a foreign language assistant. The courage with which she confronts racism in Britain, she will not be able to summon once she has returned to National Socialist Germany.
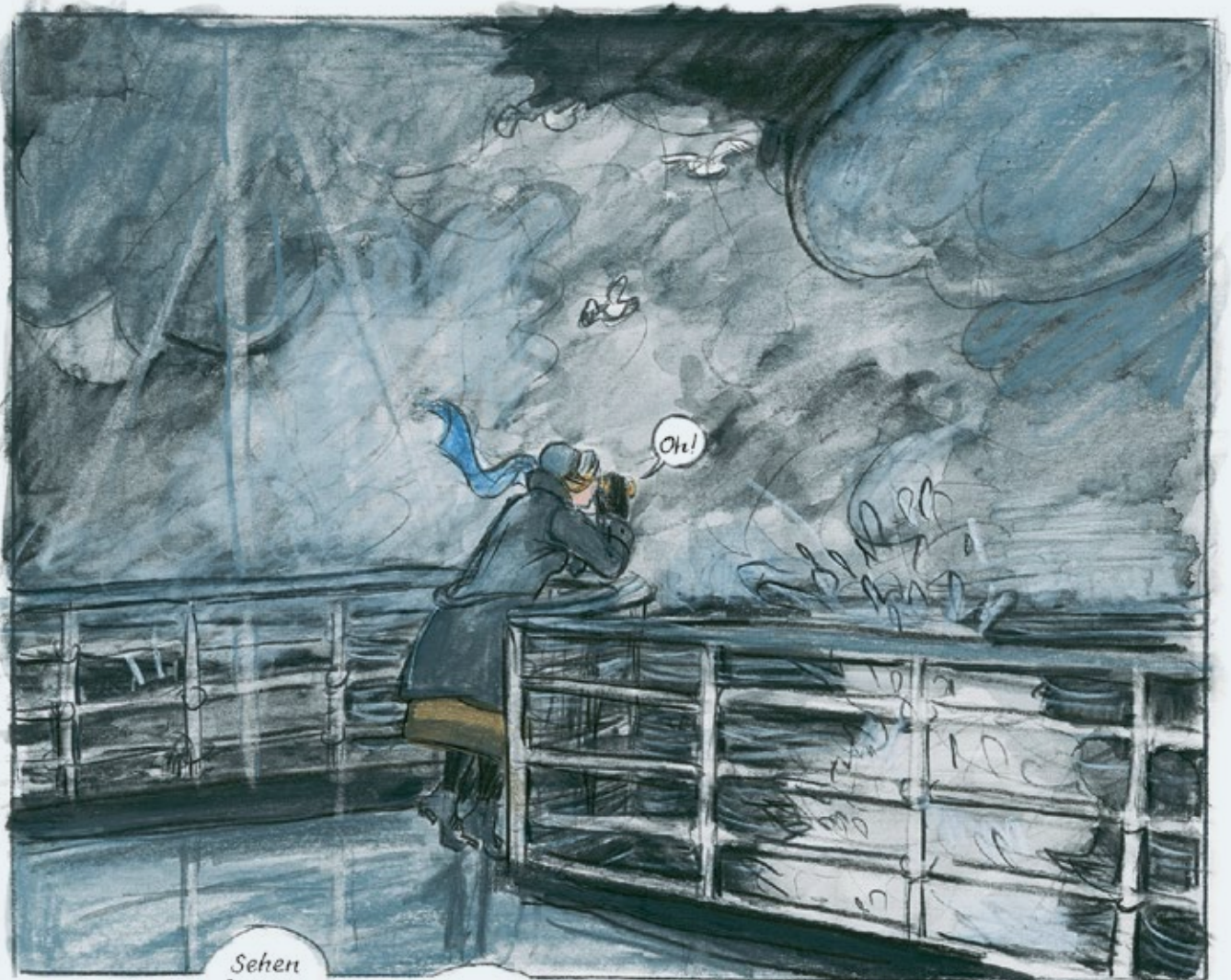
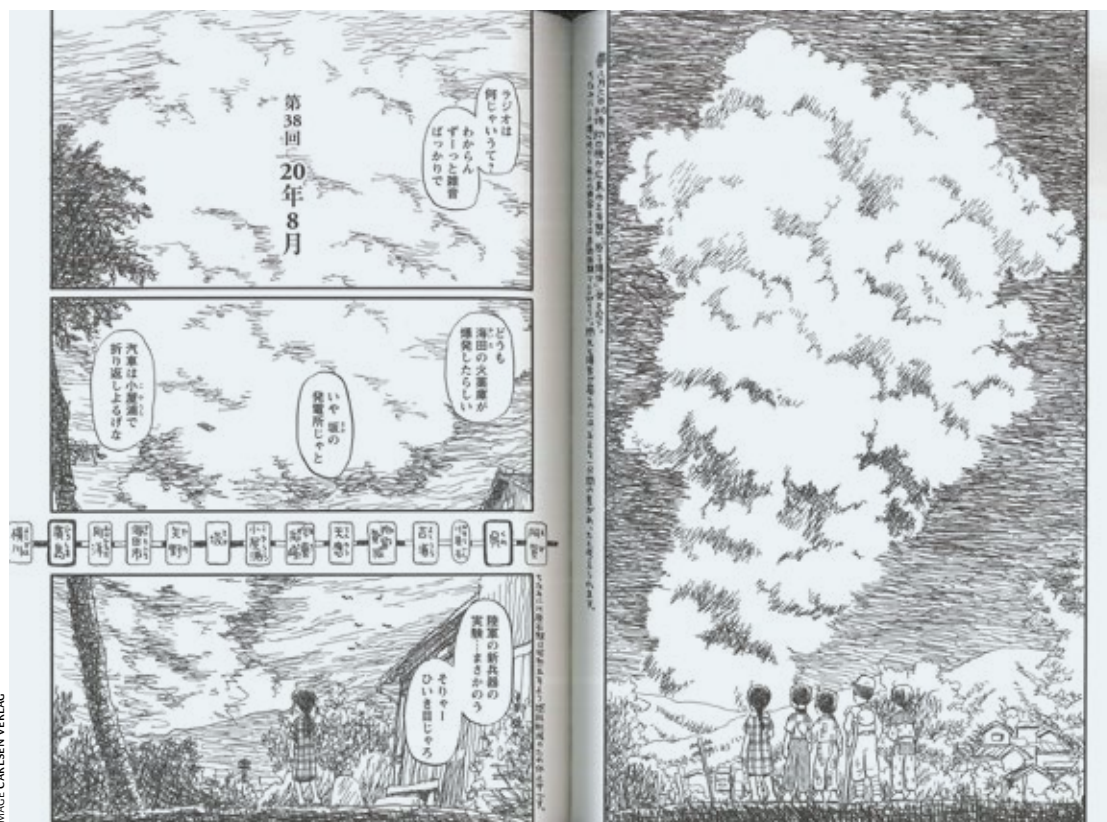# "This is how objects can take on the function of a leitmotif in comics."

— Florian Trabert
  Germanist

selected here and the explanation of political developments is largely dispensed with. The manga "instead describes Suzu's everyday life down to the last detail, which is why it has gained a large number of followers," says Scherer. Trabert assumes that this type of representation also evades the question of Japanese account-

Different traditions

ability in World War II. This is also where the otherwise highly different traditions of Japanese and German graphic novels meet as Platthaus notes in his foreword: In both countries, the new narrative form originating in America could only take hold after World War II when, "in a kind of cultural compensation, everything American, which had previously been arrogantly dismissed as inferior, was now embraced by the defeated."

mangas, and World War II is depicted in a wide range of texts in particular: "There are works that tell heroic stories about pilots in the manner of adventure mangas as well as those that show the situation of soldiers on the front line in all of its unembellished horror," says Elisabeth Scherer in her essay. There are also numerous mangas in Japan that refer to a very special narrative of their own – women experience war as a force of nature, such as the protagonist in Fumiyo Kouno's manga In this corner of the world. A very narrow narrative perspective has been

Depiction of the a-bomb attack on Hiroshima in the manga *In this Corner of the World*. The protagonist Suzu watches the cloud from the naval base Kure, located about 20 kilometres away. The comics artist Fumiyo Kouno pays attention to historical correctness here: the typical mushroom shape, as we know it from photos taken by the US armed forces, could not be seen by the people on the ground.

Market leaders only yesterday – gone for good today

For many years, the *Quelle* mail order catalogue could be found in every German household.

BY CAROLIN GRAPE

Brockhaus, Quelle, Kodak – once they were globally operating corporations and their products were often market leaders for decades: the Große Brockhaus encyclopaedia was part of every private library, Kodak cameras documented every holiday trip, the Quelle mail order catalogue could be found in (almost) every letter box. Today, they have either completely disappeared or have become insignificant, after being replaced by newcomers such as Wikipedia, Amazon or Canon.

In many lines of business, companies that former-ly dominated the market now cannot keep up with their competitors, suffer existential crises or disappear entirely at some point. Interestingly, this is a repeating pattern that can be seen over time in different lines of business. But why do successful businesses suffer crises? The economist Prof Dr Andreas Engelen, Holder of the Chair of Business Administration (Management), is looking into exactly this question and also into how companies can remain successful in the long run.

'It is always the young and small enterprises that believe in novel technologies or innovative business models and which at first only appeal to a limited number of clients. This range of services then gains momentum, becomes a dominant market factor and in the end pushes many established companies and their products to the side', explains Andreas Engelen. He refers to the theory developed by Harvard professor Clayton M. Christensen who, at the end of the 1990s, had analysed the rise and fall of companies that were operating in the hard drive business. He was the first to realise that under certain conditions successful and established businesses can be pushed out of the market and he coined the term we still use today for this process that begins in a small, inconspicuous niche of the respective line of business – disruptive innovation. The term disruptive

Disruptive innovations create new market needs

means destructive or causing disturbances. According to Christensen, two factors in particular are very characteristic in this context: compared to the core characteristics of the predominant products or services the technology used for this innovation is at first inferior to the existing one or immature. And it is also incompatible with the existing business models of the established companies.

This is what complicates matters: as market leaders, enterprises such as Quelle, Brockhaus, Kodak and such always sought to further improve their products. 'Improving an already existing product while at the same time holding on to the same business model, customer structure and distribution type – this sustaining innovation strategy had been rewarded by the markets for a long time,' says Engelen. Brockhaus, for example, used even better paper, researched contents even better, improved the quality of the photos printed. Kodak continuously refined its analogous cameras, even when the first digital cameras became available.

This is why, at the beginning, the established companies were not particularly impressed by the new products. Often, the quality was poor – the first digital cameras were

"All of a sudden it was too late – the established companies weren't able to catch up with the new developments. The trap had snapped shut."

**— Prof Dr Andreas Engelen
Economist**

far from technically mature and hardly any competition for Kodak. The first streaming services were substandard and Wikipedia wasn't considered an alternative to the long-established Brockhaus encyclopaedia.

'The established companies saw no reason to react to these changes and weren't really worried – and completely misjudged the development,' says Engelen. However, the newcomers' products evolved: camera sensors over the years got better and better and at the same time prices went down or they were even available free of charge. This rendered them attractive for the mass market and affordable. 'All of a sudden it was too late – the established companies weren't able to catch up with the new developments. The trap had snapped shut.'

A recurring dilemma: For the industry leaders it wouldn't present a technological problem to adopt niche innovations because in the beginning the new products usually are well below their own technical standards. If they jump on the new bandwagon, however, they destroy their traditional market. And at that point in time nobody can tell if that is worthwhile. Because you can only tell if and how a new market develops in retrospective.

Netflix believes in taking risks

But there are also examples of businesses that radically changed their way of thinking – one of them is Netflix. In the beginning, Netflix rented out DVDs and sent them to its customers by post. In 2011, its founder Reed Hastings did a U-turn: he sold his DVD rental business and completely and uncompromisingly focused on the rising streaming business – at full risk and with tremendous success. Today, Netflix leads the market.

Nevertheless, even for the most successful companies, there is no guarantee that in the future there won't be some invention somewhere in the world that puts them under pressure in return.
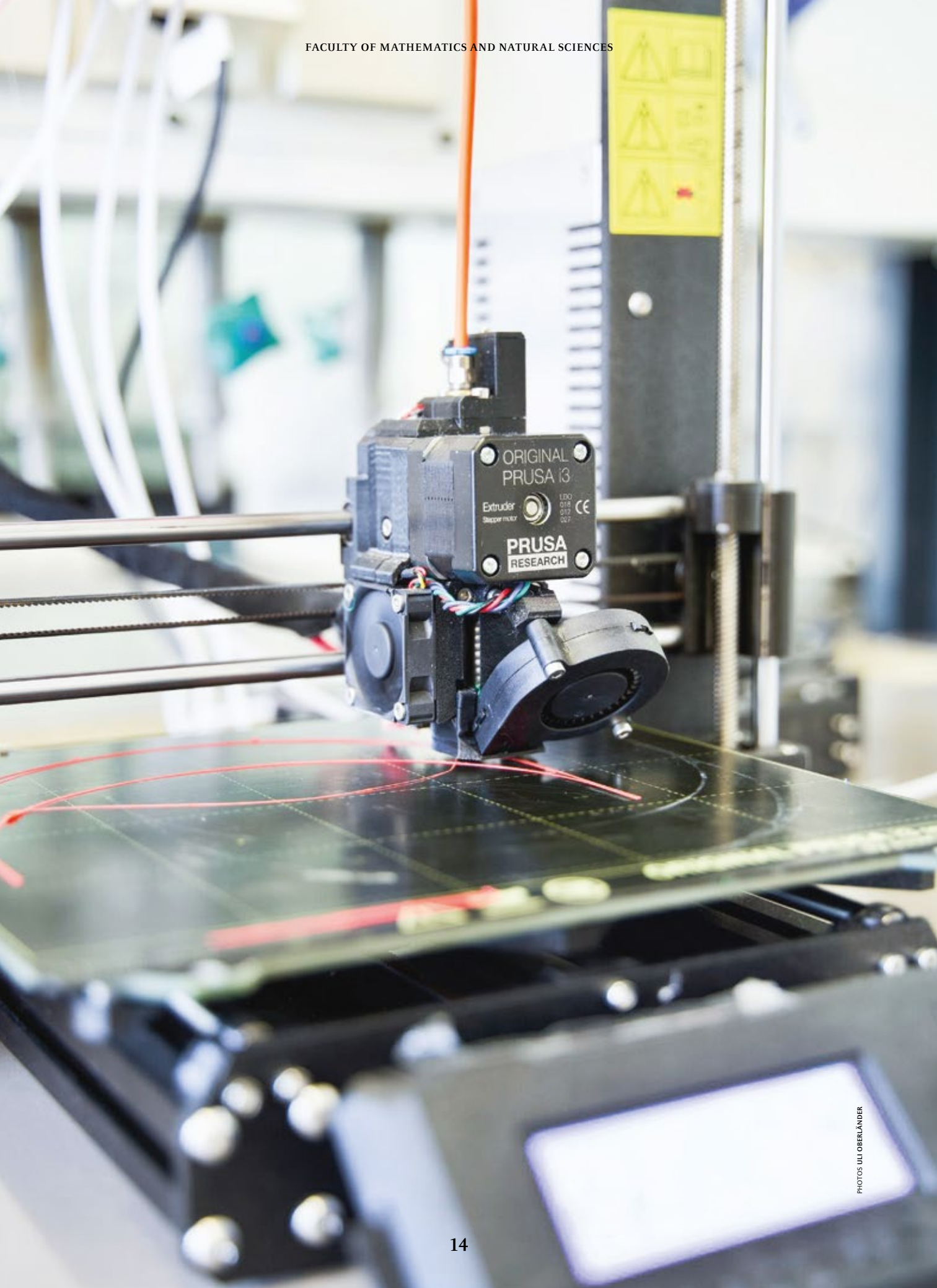
When tablets come out of the printer

Pharmaceutical Technology

BY ARNE CLAUSSEN

Pharmacists at HHU are printing customised tablets with the very latest 3D technologies. These also open up perspectives for personalised medicine where each patient gets their own individual pill in the pharmacy.

For laypersons, producing a tablet does not seem to be complicated: you mix the active ingredient with a carrier substance and pack the mixture into a tablet press. "It works this way for many traditional medications like aspirin," confirms Dr Julian Quodbach from HHU's Chair of Pharmaceutics and Biopharmaceutics, "but with modern, highly potent active ingredients, it is often unfortunately not so easy."

One major difficulty is that many novel active ingredients are extremely poorly soluble in water. "In fact, marble dissolves much better," is Quodbach's comparison. Most of the active ingredients are lipophilic, i.e. fat-soluble – which is exactly why they do not like water.

But how else do the active ingredients enter the human body and there – through the aqueous medium blood – to the place where they should do their job? There are various strategies: firstly, surfactants (fat solvents) can be added, similar to those in laundry detergents; secondly, the substances can be dissolved in lipids and then administered. The third approach that the Düsseldorf-based team is pursuing is called "amorphous solid dispersion": the substance is dissolved in polymers on a molecular basis.

Responding to the astonished question when visiting the institute of whether you can eat and digest polymers, that is, in many cases plastics, Quodbach answers: "Of course there are numerous polymers that the body can tolerate without any problems and can partly even metabolise them. The best example is bio-resorbable threads which are used for operations and wounds to suture tissue.

Bio-resorbable polymers

You don't want to operate on the patient again to remove the thread, rather it should disappear over time." They dissolve into the single basic substances in the body through metabolism.

At the Chair of Pharmaceutics and Biopharmaceutics, various procedures are being analysed and optimised to load such polymers with active ingredients and to then convert them into an ingestible form for the patients. In

"We can load our polymer with a certain quantity of active ingredient and then print it in tablets with amounts of active ingredient that vary from patient to patient."

— **Dr Julian Quodbach**
Chair of Pharmaceuticals

doing so, the HHU scientists are collaborating with other universities like TH Cologne or with companies. Focus in each case is on the 3D printing process, for which the institute has an array of devices available.

Quodbach: "With our colleagues from Cologne, we're concentrating on extrusion with an attached 3D print head." Extrusion translates into the mixing and pressing out of the active ingredient with the carrier substance. "A procedure that otherwise does not exist in this form."

"Various industry cooperations are focussing on the so-called fused deposition modelling – this is a procedure that many 3D printers use in the hobby sector, too," explains the HHU pharmacist.

The first challenge is to find suitable polymers as carrier substances in which the active ingredient molecules can even be dissolved at all. Most polymers melt at temperatures that damage or destroy the active ingredient molecules to be inserted. Carriers for medications must therefore have a low melting point.

Finding suitable carrier substances

They must also be able to be tolerated by people and finally release the substances dissolved in them again. This must be done in a defined manner. Quodbach: "A number of polymers have been approved for use in humans, but many of them dissolved too quickly or too slowly in the body." In addition, carrier materials are frequently needed that only release the active ingredient after a certain time to be able to control the time and place of release.
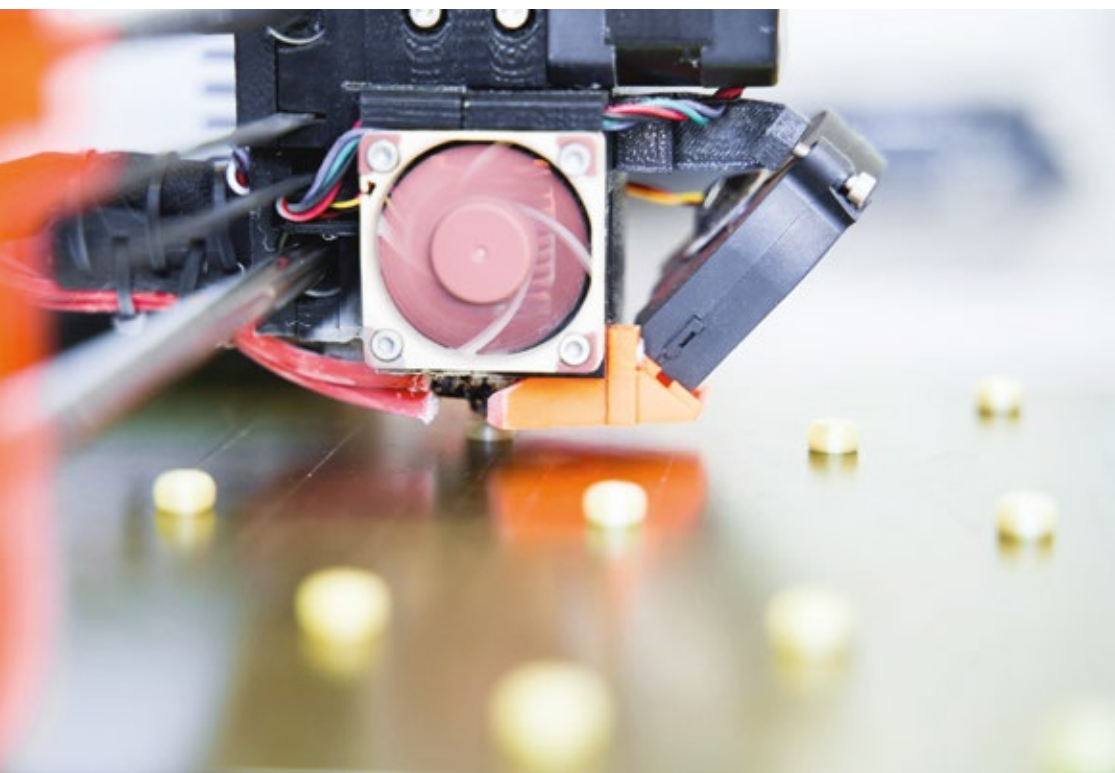
3D printer to print tablets. Such a device can typically print 50 tablets per hour.
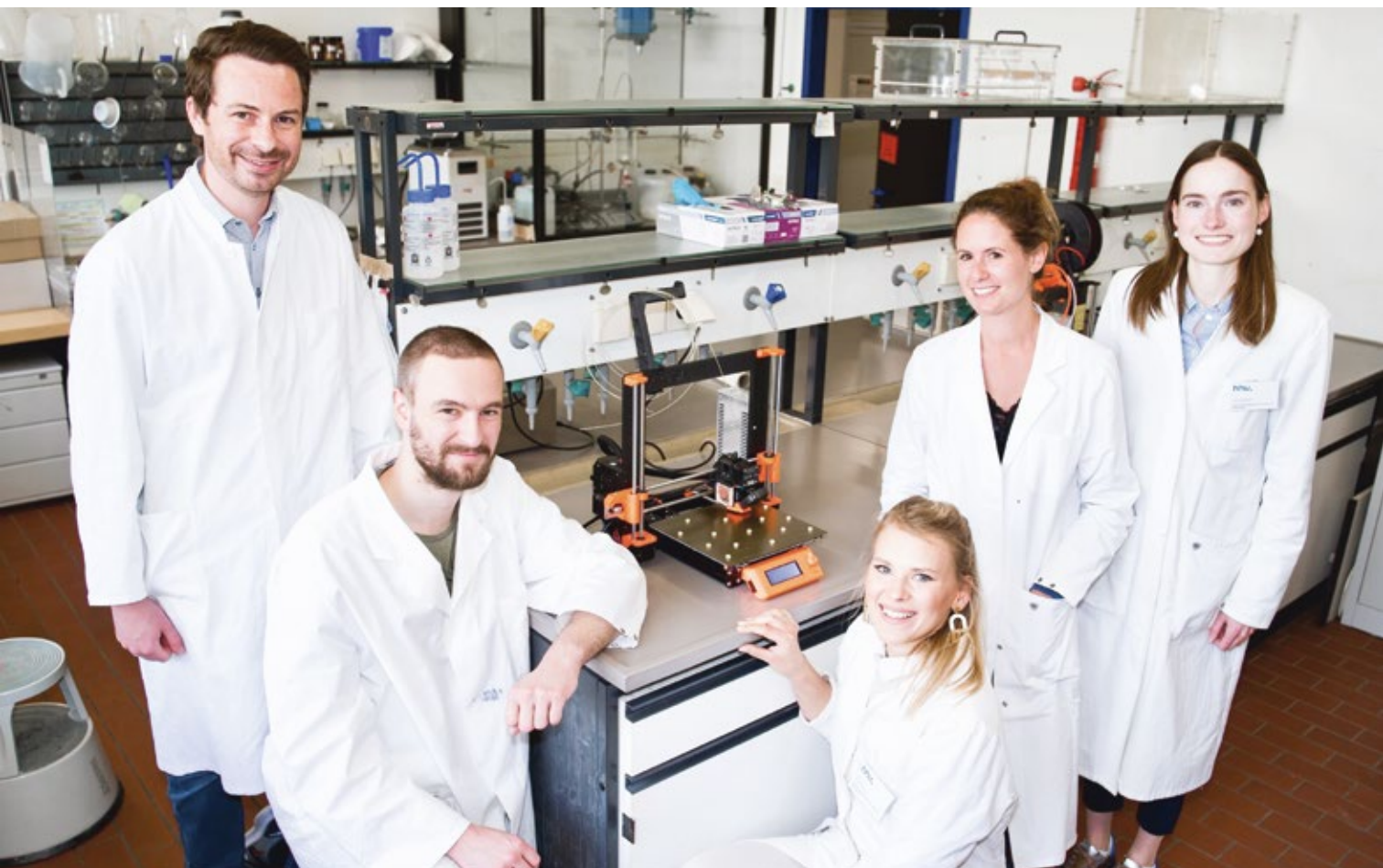
Dr Julian Quodbach (left) and some team members at the Chair of Pharmaceuticals and Biopharmaceuticals.
Next to him at a 3D printer (from left): Stefan Klinken, Hanna Ponsar, Hellen Windolf and Lena Hoffmann.

"It is often also important that the carrier substance continuously dissolves over several hours," cites Dr Quodbach as another challenge. This is because the active ingredient often needs to be released evenly in order to achieve uniform concentration in the blood over a longer period of time. Numerous substances act very quickly and potently, but are also metabolised quickly, so that the effect is quickly gone. "This is important, for example, for some antihypertensives of which you may only want to take one dose a day instead of one tablet every hour."

After all, each person reacts differently to a medication. From one to another, orders of magnitude can be in the dose they need to achieve an effect. In the case of a narrow so-called "therapeutic range," you first have to determine how much active ingredient the specific patient needs within which timeframe. If the patient does not get enough, the medication does not work; if the dose is too

high, it can be toxic. Typically, such substances are administered by infusion, but this is only possible in a hospital or doctor's practice. "This is where the hour of printable and therefore customisable drugs comes into play," is how Quodbach underscores the great advantage of the Düsseldorf approach.

Individualised medications from the on-site pharmacy

"We can load our polymer with a specific quantity of active ingredient and then print it into tablets with amounts of active ingredient that vary from patient to patient that the patient only needs to take once a day." By varying the size and thickness of tablets and, if neces-

Hanna Ponsar monitors and controls the printing process.

„We still have to solve numerous problems before the technology is really ready for the market.“

— Dr Julian Quodbach
   Chair of Pharmaceuticals

sary, using different polymers, medications can even be produced for children who often react very differently to an active ingredient than teenagers or adults do.

And this can also be done right on-site in the pharmacy. This would also compensate for a disadvantage of 3D printing techniques: as opposed to a normal tablet press, that manufactures hundreds of thousands per hour, a printer only produces a few dozen. That is then the right portion for a single patient.

When asked when the first drug printer will be installed at the pharmacy around the corner, Dr Quodbach is cautious: "We still have to solve numerous problems before the technology is really ready for the market.

Highest quality standards

Requirements on devices that produce pharmaceuticals go far beyond what current printers can do. One problem, for example, is cleaning the print heads when different active ingredients need to be printed." After all, this has to do with a medical product that must comply with the highest quality and hygiene standards.

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This system produces
filaments, i.e., the carrier
substances drawn into wires
with the active ingredient
that can then be printed.

Endowed junior professorship for legal
issues regarding artificial intelligence

From Florence
to Düsseldorf...

BY CAROLIN GRAPE

**Original plans were that Junior Professor Dr Johann Justus Vasel,
LL. M. (NYU) would only take up the newly created junior profes-
sorship for public law with special focus on legal issues concerning
artificial intelligence at the Faculty of Law after completing his
period of research at the European University Institute in Florence.
Santander Consumer Bank AG endowed the professorship in 2018
within the framework of the "Santander Universities" business unit.
But as with so many things and for so many others this spring, the
corona pandemic put an end to his plans, too.**

Johann Justus Vasel has been conducting re-
search for a year as a Max Weber fellow at the
European University Institute in Florence since
September 2019, when he travelled to Düssel-
dorf in February for his appointment negotia-
tions – and cannot go back: all options for return
flights to Italy were cancelled. "Since then, I've
basically been living out of a suitcase and have to impro-
vise a lot: My documents and paperwork at still on my
desk in Florence just as I left them in February for a
scheduled short trip. My neighbour kindly turned the
heating off for me. In Germany, I found a place to stay
at my old apartment in Berlin again at short notice."

A stroke of luck for the Faculty of Law – they were
busy switching the semester over to online teaching, which
is why they did not wait long at all to directly involve
Johann Justus Vasel in the ongoing summer semester.

"During our last Zoom conferences, we mainly discussed
the current requirements: virtualisation of teaching with
zoom, adjustments to study and examination regulations,
assistance for students in light of the exceptional circum-
stances," says Vasel.

Intensive research on the protection of basic and human rights

Vasel's core areas of research are on constitutional,
European and international law as well as on the philoso-
phy of law or legal ethics. After studying law and econom-
ics at the University of Bayreuth and Julius-Maximilian-
University of Würzburg, he obtained his doctorate in 2016

from the University of Hamburg, writing his thesis on "regional protection of human rights as an emancipation process." He remains firmly committed to issues of protecting basic rights and human rights, fundamental questions and ethical problems throughout his entire further research: during his work at the University of Potsdam's Centre for Human Rights, during periods of research at the European Court of Human Rights in Strasbourg and at the Inter-American Court of Human Rights in San José. "I hope to use the underlying trend in legal ethics and legal philosophy as well as the internationality of my research orientation for the benefit of HHU's Faculty of Law," explains Johann Justus Vasel.

Private sphere, data protection and freedom of expression

A lot of things have come into play: in the current summer semester, the new junior professor is offering a seminar on the topic of "fighting COVID-19 as a problem under public law" and interlinks his core research focus with that which affects and restricts each single one of us. Our times today are virtually mono-thematically shaped by the fight against the COVID-19 pandemic. Hardly any sector or area of life remains unaffected by it. The extensive, unprecedented measures in terms of the intensity of their intervention and speed with which they have been adopted are provoking myriad legal questions. Vasel would like to analyse current, highly controversial constitutional problems with the students such as restrictions of basic rights during the pandemic (e.g. curfews and bans on contacts, bans on church services and gatherings). However, European and international law aspects like the question of China's accountability according to international law should be covered, too.

And what is planned in the field of artificial intelligence? The newly endowed junior professorship for legal issues concerning artificial intelligence will address questions of AI in the field of public law both in research and teaching: "In the future, I will focus on the manifold challenges that AI poses for the democratic constitutional

"AI challenges the democratic constitutional state."

**— Dr Johann Justus Vasel
Lawyer**

state in a European and international context. The spectrum here ranges from research fields under constitutional law such as the private sphere, data protection and freedom of expression in the digital age on to the EU's ethical guidelines for artificial intelligence straight through to the deployment of autonomous weapon systems in international law. Right now, I'm working on facial recognition systems and the regulation of AI at the European level," says junior professor Johann Justus Vasel about the orientation of his endowed chair. This also includes interdisciplinary research with other HHU faculties: "I really look forward to actively participating in the Manchot research group's decision-making backed by artificial intelligence methods' and in the public lecture series HeiCADLectures." For the winter, the junior professor hopes to give his inaugural lecture – not via zoom, but in vivo.

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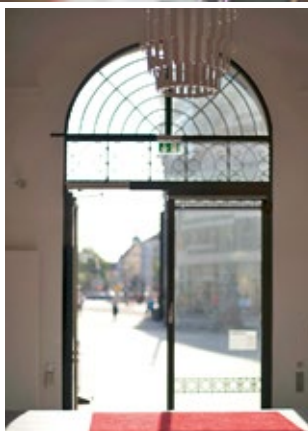
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