

Digital Sciences for Everyone / Digital for All

Professor Dr. Boudewijn R. Haverkort

Short speech delivered on the occasion of the Opening of the Academic Year 2023-2024, on September 4, 2023, at Tilburg University.

Dear attendees,

It is both an honor and a pleasure to sketch you a digital vision during this festive and important academic ceremony.

Festive because of the start of the academic year, in which we welcome another new cohort of enthusiastic and expectant students, and because of the beautiful honorary doctorate we have just awarded.

Important because of the theme, The Art of Digitalization. Digitalization, the digital transition, and its impact on everything and everyone in our society is profound. Our Secretary of State's keynote underscored this once again. Thank you for your inspiring speech in which you demonstrated, from your political-administrative role, your full commitment to responsible use of AI, for everyone, and not only for a small group of winners. A commitment that is in line with the values of Tilburg University and corresponds to our own plans for a digital transition.

There is almost nothing left in our society that runs smoothly *without* reliable and trustworthy digital systems. Systems that are sometimes very visible or tangible, for example, when you place an order online or read articles by our students on *Diggit Magazine*. But often also quite invisible, hidden, for example, when you drive a car: you then operate the physical car less and less directly, you actually operate a computer, multiple communicating computers, which then control parts of the car through actuators. By now, therefore, even a car manufacturer has become a software manufacturer. The most significant innovations and development costs of new cars are in software now.

In my oration "Hidden Connected" delivered at the University of Twente in 2004, I focused on the emergence of connectedness of everything and

everyone at all times, and the communication infrastructure required to do so. That infrastructure is here now and so strongly embraced, that many of us no longer feel like complete human beings when we do not have our personal 24-7 connectivity device with us. This has brought us a lot; how much fun we have sharing photos instantly with family or colleagues or streaming the latest music [by Ilse Delange or Guus]. But also, on the more serious side, digitalization has brought us a lot: cars meet the strictest emission standards thanks to embedded digital systems and are becoming safer and safer, healthcare is changing and improving through the use of advanced image editing algorithms, and by matching supply and demand in real time, we are better able to utilize renewable energy sources; the energy transition succeeds only with the help of the digital transition.

It is important to realize that the digital transition is substantially different from the energy or protein transition. We have to work very hard on the latter two to make them happen. The digital transition, on the other hand, is already here, we are in the middle of it, and it is almost autonomous. We cannot stop it, but we *can* actively contribute to shaping it as well as possible, including from Tilburg University. But more about that in a moment.

Designing digital systems and algorithms is something substantially different from designing and building, say, mechanical systems. The mostly restrictive laws of nature do not apply; there is a lot of room for creativity and innovation. Whereas, in the early years, digital systems were mostly designed from other disciplines, we are gradually seeing a reversal: more and more principles and ways of thinking from the digital world are being used for the design of other systems and processes, which also increasingly contain a digital core. And we have now become so used to the interfaces of our tablets and smartphones that more and more other devices are being operated in similar ways.

And just as the digital sciences have already changed the entire field of technology, it will also happen in our society, and thus also in the sciences that study our society. And so we have arrived at Tilburg University, the

university that focuses pre-eminently on people and society under the motto Understanding Society.

You can tell, I am excited about the digital transition, about the many opportunities it offers us, society, and scientists. But the digital transition also raises a lot of questions. Ms. Van Huffelen also mentioned this. Questions about the way we interact as a society and as people, the way institutions and states relate to each other, about new forms of ownership, rights, duties, and responsibilities. But also questions about cybersecurity, privacy, new forms of crime, and even warfare. Or about our dependence on a small number of commercial providers of digital services and software, big tech. And what about the emergence of generative AI, the secretary of state spoke at length about it, and the bias in decision-making that this entails, and the possible repositioning of ourselves, as employees, as human beings, in a society that is changing as a result. All questions, by the way, that we also have to address within our own university, as a micro-society, and that will also change us. And finally, I mention the uncomfortable fact that the global ICT infrastructure consumes about 4% of all electrical energy and is responsible for 1.5% of all greenhouse gas emissions.

All these questions have a technical component, certainly. But, because of their interconnectedness with people and society, they are *also* societal questions. Within Tilburg University, we study people and society; both those people and society are changing enormously because of the digital transition. Is it not then a matter of studying that driver of change itself a little more closely?

We at Tilburg University, of course, already do a lot in this area. Back in 2016, we started JADS in Den Bosch, specifically focused on data science and entrepreneurship, and we are co-founders of the collaboration in the MindLabs regional ecosystem. We have also been a major provider of Bachelor's and Master's programs in data science and AI for several years, and there are plans in the area of cybersecurity.

But we will do even more, fitting our profile. In Tilburg University's Strategy, we put a stronger focus on digital sciences in the context of

society, Digital Sciences for Society. We will do this in both education and research, and by facilitating university-wide communities. We will collaborate in interdisciplinary projects, together with partners from outside the university, on topics that require a digital perspective, using the latest digital techniques, in different sectors of society. During the reception, you can learn about these new projects through short videos.

In the area of education, we will take an additional step. It is important that all students leaving our university are adequately equipped to work in the increasingly digitalized world. The recent report *Choosing Quality*, (Kiezen voor Kwaliteit) commissioned by UNL, explicitly states that the digital transition demands that professionals in all fields, including researchers and students, must have programming and data engineering knowledge. In the words of the secretary of state, "everyone participates, no one gets left behind." Therefore, we are going to offer all of our students a learning pathway in digital sciences, appropriate to and embedded in their education. Consider topics such as programming and data science, algorithm design, artificial intelligence, but more abstractly also computational thinking. And about how the Internet or the cloud works, how cryptography works, and how we can use that knowledge to work more securely and efficiently. And this will have to go beyond just acquiring some skills. To be future-proof, it is also about the underlying layer, about how digital systems work in their coherence and context. *And*, very importantly, about what they mean in the field or application domain, and what their desirability, possibilities, effects, and dangers are, now and in the future. This reflection is extremely important, and moreover, something in which we excel as a university. We must strive to embed this reflection early in the design process of new digital systems, so that we are not allowed to make an appearance for a reflection only when the system is in place, as an afterthought, but are really at the helm during the design. This is how we bring the alpha, beta, and gamma sciences together, and this is how we make the real difference: alpha + beta + gamma, that's delta.

Is this enough, are we done now? No, it is never enough, it is never finished. We must continue to innovate as a university, to remain relevant

and attractive to our students and society at large. It requires courage to think and act outside the usual paths and structures, now and in the future, focusing on our university's mission: to conduct excellent and relevant research, and to educate our students in an excellent and relevant way, ready for a role in society. A challenging and beautiful joint mission.

In closing, I show you again the vision from the beginning. The naturalists among you have recognized the *digitalis purpurea*. This plant is known for its medicinal properties for heart problems. However, incorrect use of the active ingredient can have fatal consequences. As far as I am concerned, this is a great metaphor for the digital transition. Let us embrace and help shape this transition as a university, creatively and critically, across disciplines, in interaction with society, and with knowledge of digital matters.

I thank you for your attention.

Boudewijn Haverkort

September 4, 2023