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"We must democratize AI technologies."

Professor Volker Markl proposes an neutral, nationwide, trustworthy data and analysis infrastructure.

Germany aims to become a world leader in AI – German politicians stated this during the announcement of the German AI Strategy late last year. However, Dr. Volker Markl, Professor of Database Systems and Information Management at TU Berlin, Chief Scientist at the DFKI in Berlin, and co-author of the strategy believes both German companies and policymakers have a lot of catching up to do. Volker Markl is an experienced political adviser, successful mentor, co-founder of various IT start-ups, and an internationally renowned scientist – so he is clearly in a position to state what he thinks is missing in Germany.

Professor Markl, a week ago, dataArtisans was sold to the Chinese e-commerce giant, Alibaba. This Berlin start-up is a direct product of your research group. Now, words of warning are being heard from German industry: German IT start-ups are almost always sold to American or Chinese companies – but never to German ones. Why is that?

> *"First and foremost, it's a fantastic story of success for a start-up originating from TU Berlin to have such a successful international exit. As a place of science, it is very important for Germany to show that our technology start-ups can achieve such recognition. The foundation for the Apache Flink software technology, with which dataArtisans made such a splash, was laid in 2008. By 2012, my team already had a software prototype and was contacting various large German and European companies. However, this technology solves a problem that, to be honest, many German and European companies didn't even have at the time. Apache Flink enables the efficient processing of massive data amounts and particularly data streams. A topic that is primarily of concern for large platform and cloud infrastructure operators, such as Google, Amazon, Uber, Netflix, and Alibaba. All companies, which continuously accrue tremendous amounts of data. And, as it turns out, none of these companies are headquartered in Germany or Europe."*

Like many technologies in AI, Apache Flink is open source – meaning both developers and users from around the world have access to it. So, does it make any difference, at all, who the associated company belongs to?

> *"That's right, Apache Flink will continue to be open source. However, the difference is that the open source technology can no longer be viewed as a product, but as an important part of one's own business strategy and as a recruiting tool for good software developers. An obvious goal of open source is to distribute the costs of software*

development among as many parties as possible, which makes particular sense when a complex tailored software solution is needed in which different users are potentially interested. However, anyone wanting to not only use, but also further advance and sustain the technology must contribute a significant number of their own developers to the software pool. This is the only way to exert a degree of control over the software components and significantly shape and direct them. Nowadays, almost all important software innovations are conducted through open source. Yet the importance of open source has still not yet become clear to many German companies."

How do you view the state of science in Germany when it comes to AI technology, particularly compared to the USA and China?

Germany is well-placed when it comes to basic research. We have outstanding researchers and research institutes in the fields of machine learning and data management, both of which are important cornerstones in the current AI wave of innovation. However, competitive pressures have grown immensely. Today, both governments and large companies around the globe are investing massive sums of money, and other countries are advancing substantially faster, more determined, and consistent. This could further exacerbate brain drain. Nevertheless, we do need to examine some aspects of our science system. Primarily, limited or short-term contracts, the so-called Besserstellungsverbot, where employees in the same salary category cannot be offered different payment levels and funding schemes that are too rigid, which no longer do justice to the enormous dynamic experienced in technology development."

How would you judge the situation in companies?

"Above all, companies need to change their thinking: Many did not see the opportunities and potential of big data and basic AI technologies in time. They do not yet view themselves as IT companies, but rather as IT users. They purchase IT instead of having in-house talent who are capable of developing it themselves. Due to a lack of their own software skills and innovations, some companies are seriously threatened by new competitors. An awareness of this is beginning to establish itself in German industry, but it will take time to develop the necessary skills.

The federal government intends to invest three billion euros in the German AI Strategy by 2025, which you were involved in developing. The European Commission will contribute 20 billion euros to its AI strategy by 2020. Will this help us to catch up to the USA and China?

It is important to create new professorships and academic chairs in the mid-term in the fields of machine learning, data management, and other areas of AI and Data Science. However, quantity does not always equal quality. But maybe current events – I'm talking about Brexit and the Trump administration – are a key to successfully attract international top talent to Germany and the EU as a whole. The already established, internationally recognized national competence centers dedicated to big data and machine learning play a pivotal role, as their groups have been conducting world-class research over many years and are drivers of innovation and training in Germany. These centers must be strengthened. They need to expand, in order to provide them with the necessary critical mass to boost innovation and enable the AI and Data Science landscape in Germany to develop and thrive."

So, is a better promotion of science sufficient to turn Germany into a forerunner of AI technology?

"No, in order to compete with the USA and China, at the same level, we will need a broad technical foundation that offers both the data and data-processing capability to industry, science, and every individual citizen. It's ultimately about democratizing AI technologies."

You're talking about the infrastructure for data management and analysis mentioned in the federal government's declaration of intent in the AI Strategy?

"Yes, exactly. Currently, there's a tendency, unfortunately, to regard certain aspects of AI in an isolated manner. For example, there is a lot of discussion about algorithm research, such as in Deep Learning. This is certainly important. However, not even the best algorithms can help us, if they cannot access the underlying technologies and systems, in which real data are sustainable and processed efficiently. Success in AI will be determined by efficient processing infrastructures and the interaction among data, algorithms, and applications. It is extremely important to consider the entire system, including the hardware, software, data, and the algorithms as well as consider the community and market mechanisms." Holistic process- and system-perspectives play a decisive role for the economic success of basic research, i.e., for scalable and sustainable commercialization and the development of business models and products."

You mean a German equivalent to the large data monopolies prevalent in the USA and China?

"The vision should be to securely and reliably manage data collected in Germany, or even better, in Europe, in a neutral, trustworthy infrastructure. With the aid of our public institutions, must ensure that such an infrastructure is in conformity with the law, and protected from takeovers from abroad. I am thinking of an infrastructure that provides public and protected capabilities well as the factors of production, i.e., data, algorithms, and processing capacities, to industry, science, society, and every individual citizen. It should be possible for everyone to use data in adherence to data protection regulations and conduct interactive analyses of this data. This could serve as a foundation for a lively, internationally competitive marketplace that yields innovative applications and business models, an incubator for AI innovation, where algorithms, data, and data apps can be developed and traded."

That sounds like a big pitch.

"It's a big job, yes. However, it's important to think this big, in order to attain the critical mass and scale effects with regards to use and cost efficiency, which are necessary for operations and success. This would enable Germany and Europe to create innovations in AI, take the lead in the global competition for talent, technologies, and applications, and simultaneously ensure digital sovereignty and the preservation of European values.

This interview was conducted by Katharina Jung representing the TU Berlin Press, Public Relations and Alumni Office.

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