The data hunter

The research carried out by ETH professor Tanja Stadler has the potential to deliver key information that could nip future epidemics in the bud. The crucial factor is how quickly she can get her hands on good data.

Having started out as a mathematician, you're now a biostatistician who tracks epidemics by comparing the genetic data of a virus in different patients. How is that done?

TANJA STADLER – Viruses are also subject to evolution: they change continuously. These changes allow us to trace the origin of a virus and map its geographical spread, essentially in real time.

With reference to the coronavirus pandemic, can you explain what we learn as a result?

TANJA STADLER – As soon as we start travelling again, we will look at questions such as: how many of the infected people in a particular region were infected there and how many caught the infection elsewhere? These findings can complement the tracing of carriers and those with whom they have been in contact, and enable the authorities to adapt their healthcare policies if necessary. Another major benefit of our method is that we are able to calculate the number of unreported cases in an epidemic – always assuming that we have enough virus samples. To evaluate the situation in Switzerland, we are working with a diagnostics company that provides us with all their examined samples of Sars-CoV-2 in an anonymised format.

A third of the researchers in your group are mathematicians, a third computer scientists and a third biologists – how do these disciplines work together?

TANJA STADLER – You can picture it as a loop: the mathematicians develop models that allow statistical estimations to be made. The computer science researchers are crucial because we are working with very large data sets, so we need good algorithms. The biologists then interpret the estimated results and provide feedback to the mathematicians, so that they can refine their models. We are also examining how we can process and link new types of data, for example linking epidemiological and genome data.

Alongside your research, you also teach – how have you found the experience of teaching online?

TANJA STADLER – It's going surprisingly well. But I'm very much looking forward to standing in front of the students again. When I'm teaching a group of 70 to 80 students on a platform such as Zoom, I can't see all their faces at the same time. If you don't have that feedback from the faces and the body language, it's more difficult to tell when people are struggling to understand.

Do you have the impression that society has given more weight to the voice of science over the past few months?

TANJA STADLER – I think that today, more people understand that scientists may work on very timely topics of direct relevance to society. My hope is that the pandemic has given more people an insight into how science works and how we come to our findings – and that more attention will be given to fact-based arguments in future.

What do we need to prevent future pandemics?

TANJA STADLER – Very fast, standardized and transparent data gathering is crucial, so that we can see immediately if a problem emerges somewhere. It's the old adage: if you can't measure it, you can't manage it. That's why it's so important to drive forward digitalisation in the area of epidemiology and set up suitable structures, always respecting the individual's right to privacy. We have to be able to intervene at an early stage, before an epidemic turns into a global problem. My vision is that by making the observed and gathered data available immediately, we will gain a detailed insight into any emerging epidemic literally overnight in the future.

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Tanja Stadler
The biostatistician grew up near Stuttgart and studied for her

degree and doctorate at TU Munich. Today she is Professor of Computational Evolution at ETH Zurich's Department of Biosystems Science and Engineering. She lives in Basel and is the mother of two small daughters. (Picture: ETH Zurich / Gerry Amstutz)