

# GEOMATICS EDUCATION BROADENS ITS SCOPE

## New mix of knowledge creates new competitive edge



ETH zürich

TECHNICAL UNIVERSITY OF KENYA  
Education and Training for the Real World

(LALAN): a newly formed network of universities that have decided to share their land administration curricula with one another in online webinars. "They will get new ideas from each other and will also exchange recorded lectures." A similar network is active in Africa: the East Africa Land Administration Network.

During his period as chair he will also facilitate a structural worldwide exchange of experiences among and with young surveyors (<35 years of age) who are simultaneously still pursuing some form of education or on-the-job training. "I am certain this will be a new source of ideas. My aim is further to promote student-centred education and share advanced learning methods. Blended learning, for example – a mix between face-to-face and online teaching – is the topic of our next FIG Commission publication." The editors are the current commission chair and the previous one, Prof David Mitchell from Australia. Methods for life-long learning are also a priority on Todorovski's programme to support adequate geomatics education.



Dimo Todorovski. (Image courtesy: VBB)

FIG  
武汉大学  
测绘遥感信息工程国家重点实验室  
State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing

To find out more about the geomatics education situation across the globe, 'GIM International' spoke to several industry experts from academia around the world.

Are the numbers of students in geomatics and land administration-related studies diminishing worldwide? Perhaps. Do the majority of graduates want a job in the IT sector rather than as surveying engineers? Maybe. Despite 'measuring' being key in our sector, it seems we have fewer facts available about professional education than you might expect. To find out more, *GIM International* spoke to several industry experts from academia: Dr Dimo Todorovski (the new chair of the FIG Commission on Professional Education), Prof Konrad Schindler from Zurich, Prof Bisheng Yang from Wuhan and Prof Francis Aduol from Nairobi.

What is the current situation in geomatics education at various universities around the world, and how are things changing? To answer that question, the new chair of the [International Federation of Surveyors \(FIG\)](#) Commission on Professional Education is a good place to start. Dr Dimo Todorovski has recently become its chair, until the end of 2026. "To meet the needs of our markets and communities, we are constantly identifying changes in the necessary requirements and abilities. This also enables us to share timely updates with our members about educational innovations. Our priorities lie in developing academic networks for knowledge sharing. In those networks, the participants can show examples of more interactive teaching methods that could be innovative in many places."

As an example, Todorovski mentions the Latin America Land Administration Network

### Analysing the worldwide offering

The LALAN network counts eight universities at the moment. That sounds like a very small number. So how many educational institutions are actually currently teaching land administration, surveying or geomatics? Nobody knows. But this will soon change, because Todorovski

and his commission team are going to analyse the worldwide offering. “I think there will be more universities than we know of. The general feeling is that the number of students globally is diminishing in the core of our field. I think that is perhaps the case at ‘traditional’ universities, but that is compensated by new institutions – maybe with less demands on mathematics and science to attract more students. In my opinion, the societal and economic demand for enough graduates on every possible level in this sector is unquestionable. Nobody in this industry is without a job if they want one. The technological innovations are appealing to many: geo-related artificial intelligence, spatial IT programming, drones, 3D models, digital twins, etc. And there is an enormous range of chances to be able to contribute to today’s global challenges, in your own country,” he continues.

Todorovski, who coordinates the master’s specialization in geo-information management for land administration at the [University of Twente/ITC](#) in the Netherlands, admits that interest among adolescents in doing a surveying engineering-oriented degree varies around the world. “There is perhaps less interest in the USA, parts of Australia and in Western Europe. But everywhere else, surveying education is core for national sustainable development and will as such be supported. When the students get attracted by the impact that they could make in the future, by the latest technological developments in our field and via student-centred interactive education, I believe there will be no shortage of well-educated surveying and land administration specialists to fulfil all the good work to be done.”

## Spatial planning in Switzerland

“Classical surveying is still part of our geospatial engineering education, but it is now only one component in a broader portfolio. We have enough students for a sustainable curriculum since we have widened the scope,” says Professor Konrad Schindler from the [ETH Zurich](#) (24,500 students) in Switzerland. Schindler is head of the [Geodesy and Photogrammetry group](#), one of ten institutes within the Department of Civil, Environmental and Geomatic Engineering (1,400 students, 300 postdocs, one third are female). “We have moved to a broader definition of geomatics and spatial data science. This includes spatial planning, which is of high importance in a densely populated country like Switzerland with fragile natural resources. We annually attract about 40 new first-years to our geospatial engineering bachelor programme, and we have over 20 new master students in geomatics per year. Besides from our own Swiss bachelor graduates, we receive many applications for the master programme from all over the world, but we don’t have the capacity to accept all of them. Likewise at the level of doctoral students, we get dozens of applicants for a position. Here we benefit from the fact that ETH has a high position in university rankings, while at the same time not asking high tuition fees.” Almost all research positions are on a temporary basis. “Young people are supposed to move on. We are there to bring them further in their professional career.”



Konrad Schindler.

His group has learned to be agile and to react fast to changing needs. According to Schindler, today’s data-capturing tools on the hardware side are highly automated and user-friendly; they’ve become black boxes that you can quickly learn to use competently. “It is now more about data processing and management: big data analysis, machine learning, information extraction or ‘artificial intelligence’, as people now call it again. Even smaller companies who employ our graduates need and want those skills. Every single graduate must be able to programme. It’s about turning measurements into actual, useful information. There is a growing need to extract value from raw data to support the sustainable development of our living space, our environment and resources.” He observes: “This does of course increase the competition for the core surveying industry; surveying practices suddenly have to compete for personnel with software firms and consultancies. But that is also a sign that more employers see that our students bring valuable knowledge which isn’t available elsewhere. In fact, that competition affects us too; we are keen to hire strong graduates as doctoral researchers, but IT firms like Esri, Google or Hexagon pay more. Meanwhile, the scene of small local companies and start-ups – in the drone industry and for autonomous driving, for instance – is also attractive for graduates.”

The focus in Schindler’s research projects is on the use of multi-sensor data for environmental monitoring, climate change mitigation, agriculture, etc. “This is a challenge our generation has to resolve. It is also a topic that many young students have an interest in, all around the world, so we can recruit our doctoral researchers internationally,” he states. In terms of numbers, there is a striking level of interest from Wuhan, China.

## Number 1 in China

Is the number of master and doctoral students rising at Wuhan University? “No, per year it’s stable,” responds Professor Bisheng Yang. “About 29,000 out of a total of 58,000 students.” Yang, who was a PhD research fellow in Zurich 20 years ago, is now one of the directors of the [Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing \(LIESMARS\)](#) at Wuhan University. “Seen over a longer period, we are producing more graduates, because today’s young people want as many degrees as possible in a shorter time than ten years ago,” he adds. LIESMARS is the main geospatial research centre of Wuhan University. Divided over 14 research groups, it has about 900 master and doctoral students (one third are female), of which 105 are from abroad. About ten applicants apply for each PhD position but, as in Zurich, the university is high ranked and can therefore select the better students. Overall, Wuhan University is number ten in the national ranking of universities and the geospatial research centre is number one.



Bisheng Yang.

“A few years ago we still concentrated on methodology development and the more traditional surveying engineering. But the technological developments in data capturing, data analytics and GIS changed the way we could add value to society. Additionally, our students wanted to see the role IT plays in everyday life reflected in our educational offering, so we adjusted our curricula. Now we focus on artificial intelligence and the integration of position, navigation, timing, remote sensing and communication. We want to make a difference in areas such as feature extraction, intelligent navigation, industrial 3D measurements, multimedia communication, RFID in surveying and mapping, intelligent transportation, smart cities, carbon stock and other climate change-related challenges,” Yang explains.

“The students very much appreciate the interesting research projects we do for government and commercial parties. 50% of our students do their dissertation at Chinese IT companies such as Tencent, Baidu, Huawei and Qualcomm. Students are also attracted to the autonomous driving industry, governmental smart city projects and space information integration.” Yang makes another observation: “In general, graduates do not want to work outside China’s three largest cities. Also, our graduates are mostly hired by the big IT companies.”

And just as in Zurich, companies who can't pay a high salary lose out.

## Land management in Kenya

Things are no different in Nairobi, observes Professor Francis Aduol, academic team leader of the [Department of Surveying and Geodetic Science](#) and vice-chancellor at the Technical University of Kenya. "Moreover, graduates do not like to work in areas that involve the use of traditional and mundane technologies. They prefer to work in jobs that involve the application of high tech, IT and space technology." That impacts on the curricula. "We will concentrate more than before on the use of sophisticated analytical tools in engineering surveying to cover wider applications in engineering, environment management and land management. Another interesting area is the use of maps and remote sensing data in people's daily activities: in agriculture, intelligent transport, smart cities."

As more and more students are gaining admission to the Technical University (now at 14,000 students), this is also reflected in the growing number of geospatial engineering students. In his department alone, there are 90 students finishing with an undergraduate-level degree each year. At the moment there are 20 postdocs and 10 master students, all on staff positions. "Most MSc and PhD students work on issues that revolve around land management, which is a serious problem in my country just now," states Aduol.



Francis Aduol.

Although there is a steady growth in students, he does feel pressure to further 'soften' the curriculum. "What worries me is that there are more and more students opting for the 'soft' side of the geospatial engineering discipline, which is more IT-based, at the expense of the 'hard' part that focuses on surveying engineering. They consider IT to be fancy and believe that they will have more flexibility in finding employment, especially in the promising IT sector." He further clarifies his concern: "The fact that students are avoiding the surveying engineering aspects means that the core of the discipline is likely to be lost in the near future. The focus on the IT part of the discipline tends to produce graduates who lack analytical rigour but are stronger in IT manipulation. In the long run this may not be sustainable since our graduates will be competing with dedicated IT graduates."

Todorovski understands Aduol's concerns and this is one thing urging him forward at FIG. "IT and geo are converging, as in every aspect of our life. Young people who do not see the big picture may choose the IT sector, developing and testing all kinds of prototypes. I am convinced more people will become interested in modern geomatics studies – either early or later in their career – and will want to contribute to sustainable living conditions based on more extensive knowledge and a longer-term vision. Then the tables will turn; IT graduates will have a hard time competing with 'our' graduates."

---

<https://www.gim-international.com/content/article/new-mix-of-knowledge-creates-new-competitive-edge>

---