

Surveyors of Tomorrow – Ideas to "Get Kids Into Survey" in Germany: Education for the Future

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SUMMARY

Geodesy, and especially surveying, is a multifaceted and fascinating profession with the possibility to work in different technical fields. Although it is considered an exciting discipline, the number of experts is decreasing. Thus, about 20% of surveying professionals in Germany are going to retire by 2025. Unfortunately the amount of young professionals, which could possibly fill this gap, is insufficient. Consequently one of the main problems in Geodesy is the lack of knowledge about the profession itself, although numerous people are using geodetic products. Therefore it is essential to start attracting and fascinating children for geodesy as early as possible and in every age.

In the following, some examples of our initiative to "get kids into survey" in Germany will be presented. A great success story is the little PIXI-book "Ich hab eine Freundin, die ist Geodätin" about a female surveyor during a cadastral survey. The book highlights the daily life of a surveyor in a child-friendly way, using illustrations and pictures. Thereby, this little book aims at giving children a first understanding about geodesy in a natural way. At the same time however, the parents get to know geodetic work by reading out the book to their children.

Further on older children shall be attracted to surveying by a so called "day of geodesy" or "week of geodesy". Within this week school students get the chance to inform themselves about geodesy. Professional surveyors use this possibility to show kids what they are doing as daily work and why it is an interesting job. There are several main organizers, which promote the various offers on a webpage and organize one or two main events in bigger cities. Teachers and students are invited to come and join these events to learn about geodesy in exhibitions or with interactive presentations, presenting new surveying technologies. In addition, to inform young people about these activities is also helpful to bring the interesting surveying profession to the broad public.

Besides these examples of initiatives for attracting young people to surveying in Germany, there are additional good projects in other countries. It is important to "get kids into survey" by raising their interest. Therefore we have to start now, following up on the idea to learn from each other and to get an impression what is possible.

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1. INTRODUCTION

To meet changing job market demands different and flexible pathways to education are needed. OECDs "Education at a Glance 2019", which is part of the campaign "I am the Future of Work", identifies some sectors in high demand struggling to be prepared for the future. The research indicates a low number of entrants to bachelor's in STEM subjects, i.e. science, technology, engineering, and mathematics despite these sectors having among the highest employment rates and earnings.

"Demand for tertiary education continues to rise, but its further expansion will only be sustainable if it matches the supply of graduates with labour market and social needs and gives them the skills required to navigate the future" (OECD 2019). Fig. 1 shows the rising percentage of tertiary-educated people that still does not meet the human resource needed. Across OECD countries university degrees have pleasingly increased over the last ten years on average. On the way to meeting the Sustainable Development Goal for education by 2030 the analysis of youth moving into work is assessed.

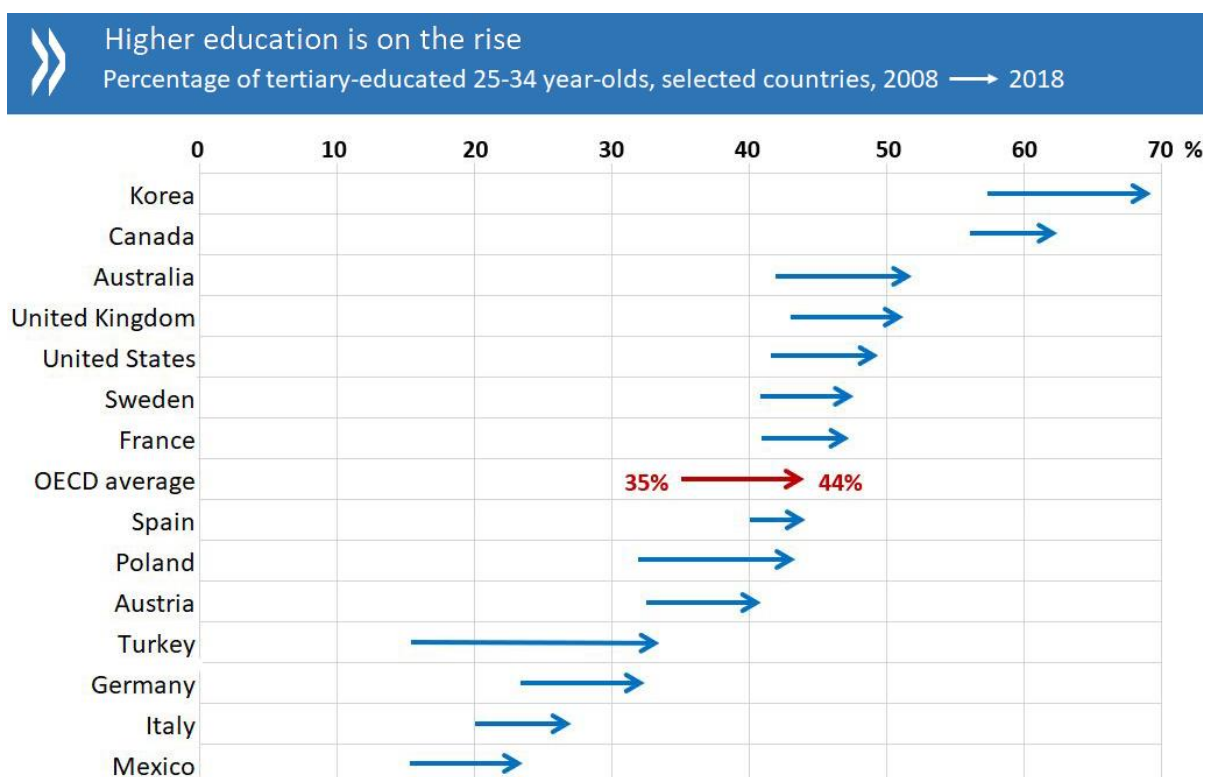


Fig. 1 Source: Education at a Glance 2019: OECD Indicators



In comparison to the OECD average Germany's number of degrees has risen only sparsely. Looking at the numbers of surveying and geodesy students at German universities it is obvious that we have a shortage in young engineers and technicians coming into the relevant jobs. According to the German Federal Employment Agency the lack of professionals – surveyors – shall be focused especially in times of mega-trends like digitalisation and globalisation (KOFA 2019).

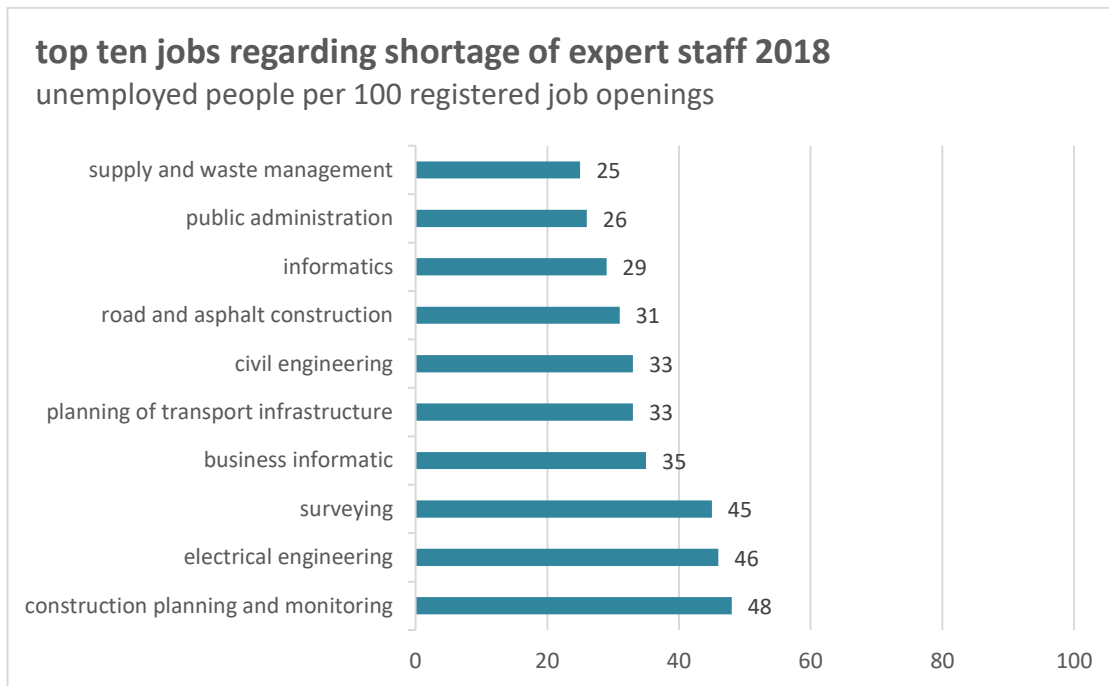


Fig. 2 Top ten jobs regarding shortage of expert staff 2018
Source: calculations of KOFA based on special analysis of Federal Labour Office

Qualified personnel is particularly scarce in the fields shown in fig. 2. It shows surveying as one of the most wanted professionals – it belongs to the top ten regarding the shortage of staff. For 100 vacant positions only 45 qualified people are available. This is a rather critical recruitment situation. The German community of surveyors records this fact in all areas of surveying jobs.

The naming of the profession has been marked under the term "Geodesy" in Germany ever since 2010 in order to raise awareness towards the geodetic field of work (IGG 2010). The term clusters all of the activities concerning "surveying" and henceforth will be named accordingly. Geodata and spatial data is of general interest as many public decisions are based on the evaluation of said data. Politicians and administrations need spatial information in order to make economical and business related decisions. Geodetic products with high quality have to be provided by highly qualified professionals. In Germany the current situation in the job market for surveyors and geodesists indicates a decrease in suitably qualified staff. This is not only for the demographic progress but for the lack of interest in the young for an engineering career as well.

2. DEVELOPMENT IN GERMANY

Regarding the situation of demographic change we are facing the challenge of numerous retiring experts of the baby boomer generation. Surveyors are collectively referred to as experts in geodesy, the German generic term.

Public authorities have done research in order to determine the number of professionals going into retirement in the next 5 to 10 years. Recruitment for administration jobs is difficult as there are only few professionals available. Not only in this field of work but also in different work areas like the publicly appointed surveyors the lack of qualified personnel is a real concern. BDVI, the German association for publicly appointed surveyors, has recognised the need as well since they know that most of the colleagues are at the age of more than 55 years (fig. 3)

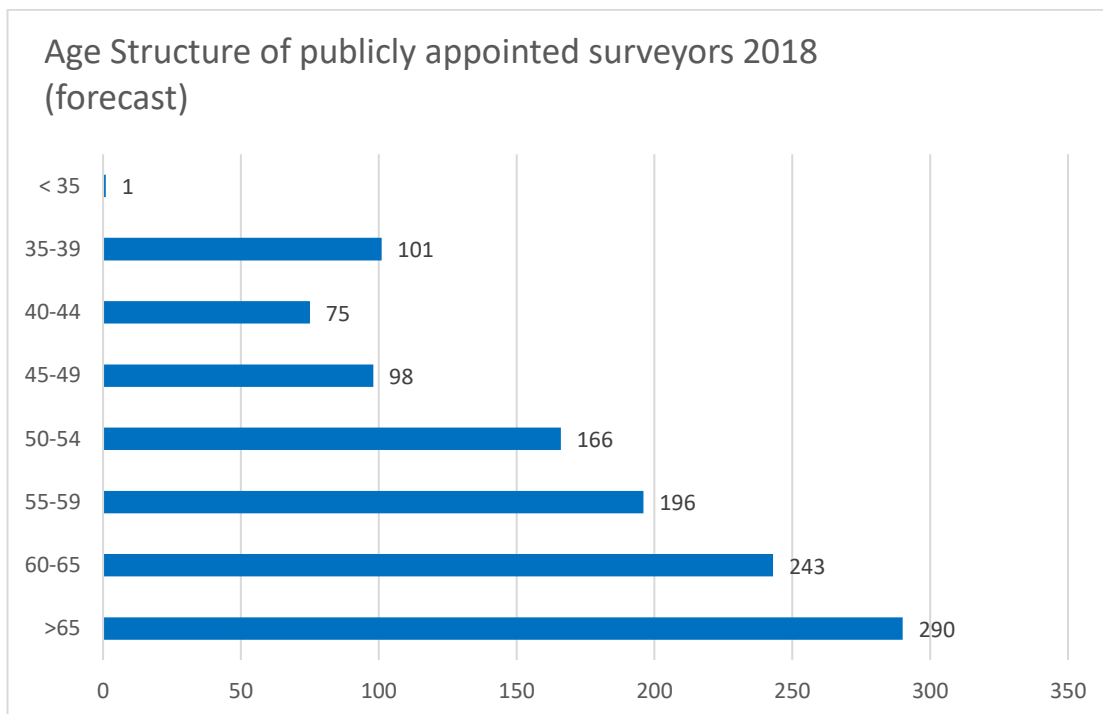


Fig. 3 Age structure of publicly appointed surveyors (horizontal: number, vertical: age in years) source: BDVI, IGG (2015)

Scientific Researchers at universities and other research institutions have a lack of personnel as well.

What action can be taken to get more people into this field of work and raise interest in the exciting work of surveyors? Many people do not even know of the profession in surveying and geodesy. They know of medical doctors, teachers, lawyers and other jobs but they are not familiar with the wide scope of activities of surveyors as can be seen in the technical programme of FIG working weeks or at INTERGEO, the world's leading expo and conference platform for geoinformation, geodata and future-oriented applications.

The need to get more people interested is obvious. Several years ago a website called "arbeitsplatz-erde" – working place earth – was initiated by the German associations DVW,



Fig. 4 Examples of advertising in the cities of Bonn, Hamburg, Frankfurt and Koblenz

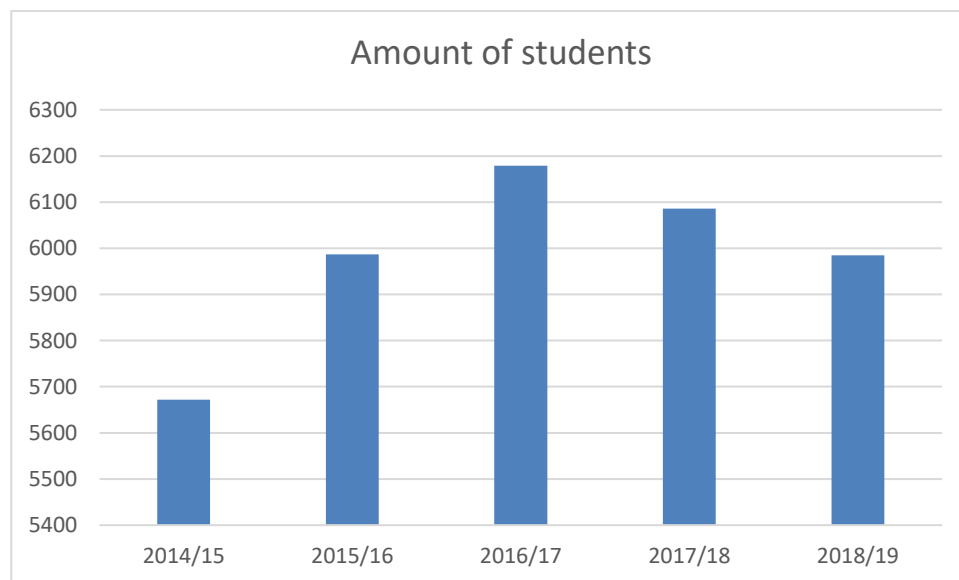


Fig. 5: Number of students in the last five years.

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At the university of Hannover a special event "SchülerTalent Akademie Geodäsie" (STAG 2020) is managed each year for interested students, curious and talented at the age of 15 or 16.

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FIG Working Week 2020

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Amsterdam, the Netherlands, 10–14 May 2020

They are taught about 3D-models and are invited for experimentation by scientific experts of surveying and geoinformation.

The efforts seemed to be successful in former years following the statistical material of the Federal Statistical Office in fig. 5. But the decreasing number of students gives another insight and needs to be increased in the near future.

Likewise public authorities give special information to young people to show the interesting working fields. The Working Committee of the Surveying Authorities of the Laender of the Federal Republic of Germany (AdV) collects statistical data of engineering degree graduates each year.

Their competencies lay in land surveying and cadastre and consist of three federal authorities and according to their data of bachelor and master alumni (fig. 6) there is no doubt in the need taking action against the downward trend.

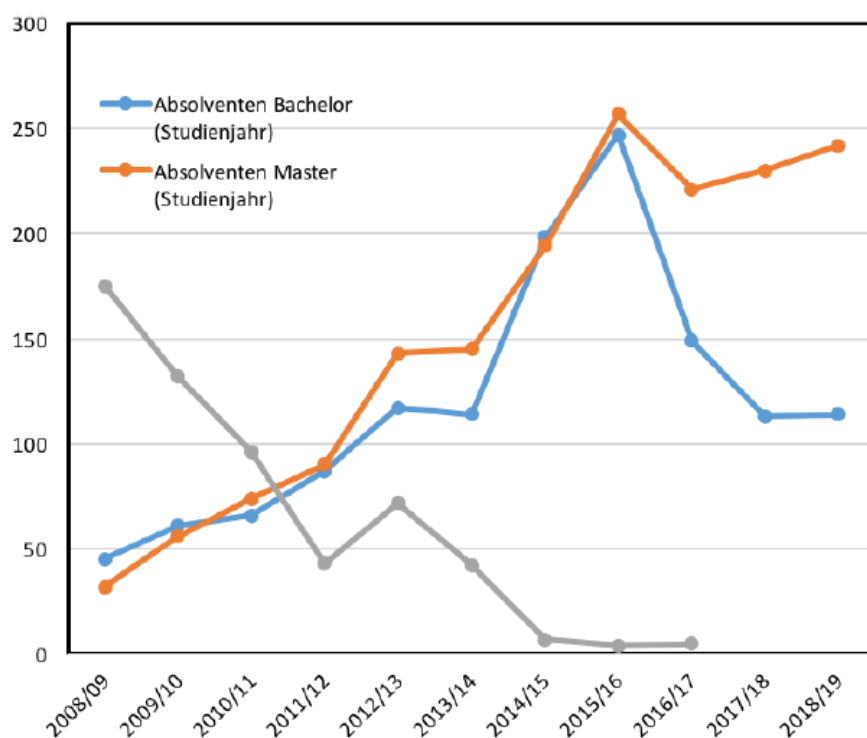


Fig. 6 Amount of university graduates. Source: DGK (2019), J. Flury, Chair Department Education

School students might be attracted to new technologies such as information systems, mobile phones, UAVs (drones) and further geodetic applications. On this account the community of surveyors provides specific information on occasions like school information fairs or the so called "days of geodesy" (Tag der Geodäsie).

It would be profound to have one specific day for geodesy of the year all over Germany, but different local circumstances lead to a deviation in dates. A day near to the summer school

holidays seems best for teachers and students and there are many useful initiatives around these dates.

Additional offers are internships either in public administration or in private companies. The experience of the daily work in surveying helps in the decision making progress. Corresponding projects and applications are organised frequently by many colleagues.

3. ACTIVITIES – WEEK OF GEODESY

Solitary days appear to be deficient for presenting every facet of surveying and attracting new students. Regional circumstances have to be considered, though best practice examples can be found in the federal states of Bavaria and Baden-Wuerttemberg (fig. 7 and 8). Each year the Bavarian authorities organise a whole week with special offers for young people in cooperation with the local universities and professional associations. Different places provide specific surveying topics and invite interested visitors and, above all, young school students to experience the fascinating projects in measuring and mapping the world.

Amberg, 17. Juli 2019 Bayerische Woche der Geodäsie



Fig. 7 Bavarian week of geodesy: “We are surveying the world – participate, experience, inform” © BVV



Fig. 8: Promotion week in Baden-Wuerttemberg – From virtual reality to measuring of body height

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The organisation of one whole week is done by a central agency with experts who collect and publish the wide range of technical offers on a special webpage. Together with announcements in print and social media people can find out about the provided themes located nearby.

The challenge to acquire interested young people wanting to study surveying can only be overcome if offers are widespread. Reaching the target group with different practical trainings is a main goal for all experienced surveyors. Best practice of the “week of geodesy” is catching on in other federal states, for example in North Rhine-Westphalia. Together with the associations – like the local DVW – the public administration offices prepare a week of surveying projects that best suits young peoples’ needs.

The aim is to get more people into the field of surveying, not only for university degrees but also for technicians and in every age and gender.

4. ACTIVITIES TO GET AND RETAIN MORE PERSONS INTO SPECIFIC JOBS

Provided that more students are reaching the university degrees in surveying and more educated people become technicians it should be kept in mind to have attractive positions for professional beginners. Earning good money is an important factor for the choice of a profession. But work-life-balance and enough time off are increasingly essential for future planning. Recruiting, for public administration jobs and other branches, reacts to these needs and gives more opportunities to do part-time work, further training during work and similar offers. The possibility to have a well-paid job with good conditions is of particular importance.

Classical surveying jobs like cadastre, land management, urban development etc. are competing increasingly against industrial jobs with laser scanning, photogrammetry, remote sensing etc. The prospect of better payment leads to more young people going into the industrial branch and less into the classical fields of surveying. Many administrations offer better salaries after recognising this development.

The shortage of young recruits is realised by many organisations such as the German Association of German Cities (DST) which published a recommendation for action to their member cities recently (DST 2019).

5. AT WHAT AGE DO WE START?

Since the surveying profession needs to be increasingly familiar among all, talk and activities should be offered to every age. A very successful example for starting with the youngest is the little booklet for kids (fig. 9), which was published by Gabriele Dasse in 2014. In a child-friendly and simple language it gives impressions about a surveyor’s daily work.



Fig. 9: PIXI book "I have a friend who is a geodesist" (DVW 2020)

Furthermore there are initiatives in the Kindergarten like in Rhineland-Palatinate (fig. 10).



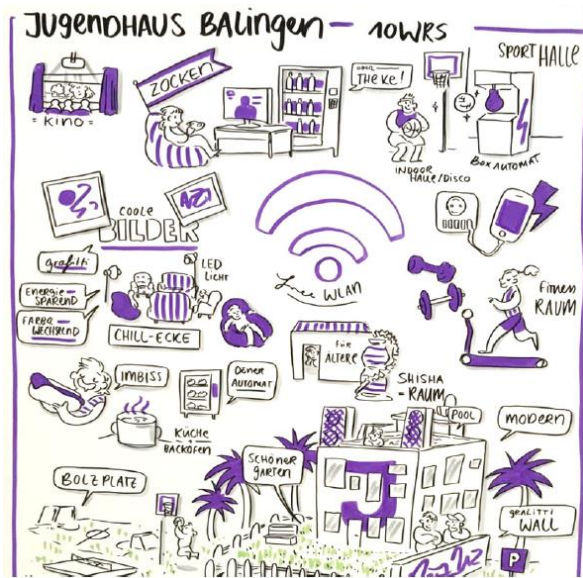
Fig. 10 Kids at the age of Kindergarten in Rhineland-Palatinate

Active participation of citizens in urban development projects is becoming increasingly important in times of climate change and public interest. This may start with kids as well and was performed as best practice in Stuttgart: 600 kids were involved in planning a new youth centre. Better acceptance for urban development projects and the recognition of the profession of surveyors, who managed this project have had a positive impact on the awareness towards surveying (STEG 2018, fig. 11).

Participation in a youth club in Balingen, Baden-Wuerttemberg

Phase 1: School workshops

- End of 2017: Visits of 25 school classes on 5 school days by the S&N communal consultation from Cologne (measuring up 600 youngsters).
- Goal: Clarification of the youth club's design in cooperation with pupils from year 8 to 11
- ideas and wishes from the young students were being visualized live during the event via Graphic Recording.



Source:

die **STEG**

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Fig. 11 Workshop in school about young people's individual needs for a youth centre

Coming to know the profession at a very early age may lead to more school graduates going into the education and studies of surveying. The results of these efforts can probably be seen in 10 – 15 years – it is worth going through with the initiatives although it takes time to reach the desired results.

6. OTHER COUNTRIES

Other countries have similar challenges to find more young talents to start training and to increase the number of surveyors. A very good example for starting with the youngest is Elaine Ball's initiative "Get kids into Survey, with Geo Ginger & Prof. Topo" in UK (fig. 12). With a special web page offering activities, posters, comic book, quizzes and coloring sheets young talents are attracted. Vividly designed advertising this early in childhood started as “a fun resource for the survey community to share with their children in order to help them understand what their parents did at work” (GET KIDS INTO SURVEY 2020).



Fig. 12 Get Kids into survey
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Switzerland and Austria prepared special webpages in close coordination to the German web page as “arbeitsplatz-erde.ch” and “arbeitsplatz-erde.at” to attract more students.

The Netherlands Centre for Geodesy and Geo-Information (NCG 2019) has launched a new initiative to stimulate the development of young talent in the field of Geo – NCG Talent program.

Many associations and organizations announce prizes for young talents and raise the awareness towards the work of surveyors to a greater public community.

FIG with the young surveyors (YS) is one of the best examples for promoting young people. This network gives opportunities for students and junior experts to get into contact, to communicate and transfer their experiences and knowledge to other young academics. Spreading the news about exciting talks and international contacts via social media platforms might lead to acquisition of new interested students not only because of the financial support given by the FIG Foundation.

7. CONCLUSION & OUTLOOK

New Subjects in the field of surveying like BIM, Smart Cities, autonomous driving, Copernicus, GNSS shall be performed by professionally trained experts. The lack of qualified personnel has to be counteracted with high efforts as described above. The cooperation of experts in Germany has to continue with suitable offers and resources. In 2019 the national press, FAZ Hochschulanzeiger, published a release highlighting a feature about how interesting surveying is as a job. When appearances like such are increased, the public awareness of surveying as a profession is raised.

One of the latest and hopefully successful activities is a social media campaign sponsored by many German surveying associations including universities and DGK, the German Geodetic Commission at the Bavarian Academy of Sciences and Humanities, BDVI (2020). The realisation of an Instagram account with special content and regular posts, fitting to the target group at the age of 14 to 25 years is accompanied by a professional media agency. Interesting stories will be prepared for two young students at the age of 17 and 22, giving technical input

free from specific terms and learning about surveying with short texts and photos. The effectiveness of this campaign is evaluated by rotation. The president of BDVI, Michael Zurhorst has initiated this project which will persist for 2 – 3 years. With active support of a lot of surveying organizations and in good cooperation it should make the desired effect come true – getting **more** kids into survey.

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BIOGRAPHICAL NOTES

M.Sc. Helen Blackler has earned her University Degree Master of Science in Geodesy and Geoinformatics in 2018 at the University of Stuttgart. Currently she works as a system engineer at the BOSCH Group in the area of highly automated driving and vehicle localization. She has been an active member of the DVW in Germany since 2015 and is involved in the working group 1 “Profession/Education” in which she takes part in activities concerning the development of Geodesy as a profession as well as acquiring new talent into the ranks of the surveyors.

Dipl.-Ing. Monika Przybilla received her University Degree in Geodesy based on studies at RWTH Aachen and Bonn University. She is project manager “Geoinformation Systems” at the Regional Association Ruhr (RVR) and a long-term active member of the DVW working group 1 “Profession/Education”; since 2015 she is chair of this working group.

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