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The Future Professionals in Geomatics

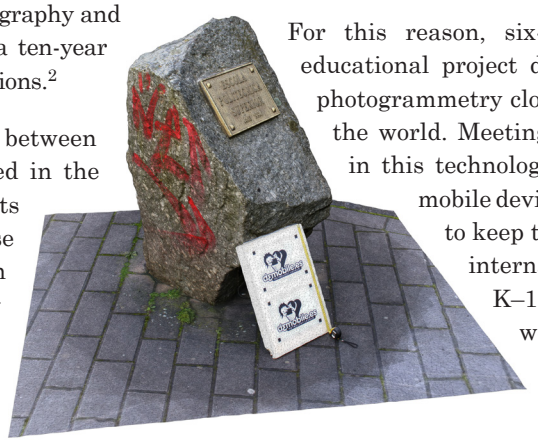
Graduates and skilled manpower in Geospatial sciences have never been in such high demand, as the role of spatial information in society is now well-defined. The integration of spatial information with computing has allowed the society to use huge volumes of Geospatial data to help complex decision making and analysis across all sectors. In parallel, the work of the professionals in Geomatics is shifting away from "boots on the ground" and is already far from the classical surveyor's conception. Now, Geomatics is a computer-based and crosscutting discipline that allows the practical application of science-technology advancements, in the same way that three-dimensional (3D) spatial skills are currently essential for many traditional jobs. The applications of Geomatics are varied and have been widely implemented in land planning, industrial design and manufacturing, precision agriculture, aerospace, environmental monitoring, video games, among others, all over the world. With a global estimated market size approximating US$ 300 billion, the Geospatial industry is likely to grow between 15 to 20% over the next few years.[1] This fact will have important employment implications. In the US, for example, only the jobs on the subdisciplines of cartography and photogrammetry are projected to grow 19% over a ten-year period, much faster than the average for all occupations.[2]

However, there is currently an overall concern between academics and international institutions involved in the field of Geomatics about the low number of students enrolling in a university degree program in those fields. Sadly, indicators remain even worse in the case of women.[3] The difficulty in attracting young people makes university programs less viable, and are often threatened with closure. For example, our own institution was obliged to close its Geomatics degree program a couple of years ago. Also, the construction industry has been severely affected by the recent world financial crisis, especially in some countries of southern Europe. Since then, the enrolment in associate degree programs has remained at minimal levels almost everywhere.

Although significant enhancements and modernization in educational programs have been driven by governments and academic institutions during the last decade, the provision of new opportunities for learners and innovative changes still remains necessary. The main international organizations in this field (i.e., the American Society of Photogrammetry and Remote Sensing (ASPRS), the International Society for Photogrammetry and Remote Sensing (ISPRS), the International Association of Geodesy (AGI), and the Geoscience and Remote Sensing Society (IEEE/GRSS)) also attempt to strengthen Geomatics education and training promoting initiatives within their programs. Under the umbrella of these societies, a wide number of activities have been carried out aiming to develop instruments and resources for Geospatial training and education at all levels. The boom of online courses in all its forms and the popular phenomenon of massive online open courses has also contributed to spread Geospatial technology knowledge.[4] However, the increasing need to attract more students to Geomatics and related branches has called for marketing efforts to be also focused on high schools.

Taking Action from Early Ages

It seems clear that efforts seeking to motivate students to develop the knowledge and skills required to pursue a future in the Geomatics industry are needed.



For this reason, six-years ago we started an educational project directly focused on bringing photogrammetry closer to students from around the world. Meeting the demands of the youth in this technology-driven era, we integrated mobile devices in the project as a key tool to keep them engaged. The *D3Mobile* international championship brings K–12 students closer to our field work through an e-learning methodology that teaches them to scan real objects with their smartphone camera. Participants gain experience in the scanning of physical objects and practice a range of techniques related to further 3D editing process, such as:

- photogrammetric principles,
- image acquisition procedures, camera settings, management of the illumination, and set up of the scene for 3D reconstruction
- dense point cloud reconstruction and meshing
- realistic texture generation
- 3D coordinate systems and transformations.




In our opinion, high school teachers play a vital, though undervalued, role in motivating and helping to foster the next generation of Geomatics engineers. Promoting projects like this, will encourage them to include alternative interactive experiences and class discussions to not only stimulate learning but to also infuse specific career information.

Results and Conclusions

Since the first edition of *D3Mobile* in 2013, the number of participants has increased over the years, resulting in more than 1400 students from 44 countries around the world participating in the last edition. As a result of six-years of hard work, our research group, CIGEO—Civil & Geomatics Research Group, was invited to present this project at SCIENTIX, the community for science education in Europe, and SPIN2016, Ibero-American network of entrepreneurship. During these past six-years, we have involved more than 40 partners in the project. *D3Mobile* has also been selected as a "Good Practice" by the European Commission by its initiative "Open Education Europe" for contributing innovative education.

Above all this, the project allowed us to improve the awareness and visibility of Geomatics, including subdisciplines like photogrammetry, thus changing participants' perceptions about them. 3D scanning and modelling were indicated on surveys by most students to be attractive professional fields for them in the future.

We invite you to visit our website (http://www.d3mobile.es/) for more details of the initiative. In the future, we would especially like to encourage the entire community involved in Geomatics to promote similar activities to support this field. The upcoming years look bright for the Geospatial sector and a new generation of professionals will be prepared to lead the change.

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1 GeoBuiz (2018). Report on Geospatial Industry Outlook & Readiness Index. Geospatial Media and Communication, on the Internet at https://geobuiz.com/geobuiz-2018-report.html (visited March 13, 2019).

2 Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, Cartographers and Photogrammetrists, on the Internet at https://www.bls.gov/ooh/architecture-and-engineering/cartographers-and-photogrammetrists.htm (visited March 13, 2019).

3 Aragón, A. D., Rura, M. J., & Morton, R. (2017). Geospatial Science Learning: In STEM and advocacy for Girls and Women. Photogrammetric Engineering & Remote Sensing, 83(2), 73-76.

4 Koenig, G. (2015). MOOCS-A Force to Be Reckoned With Or A Temporary Phenomenon. International Archives of the Photogrammetry, Remote Sensing & Spatial Information Sciences.

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