

## Appendix to item xx

### Report to the 45<sup>th</sup> General Assembly FIG Congress 2022, Warsaw, Poland

## FIG Commission 6 - Engineering Surveys

### Report of Activities 2021

#### 1. Introduction

2021 was the third year of activity for the commission elected for the term 2019-2022. Not a normal year, with the contacts (meetings and events) being established remotely.

FIG Commission Engineering Surveys (the 6<sup>th</sup> commission of FIG, for this reason known as C6) is coordinated by Maria Henriques, Portugal (chair) and Corinna Harmening, Austria (vice-chair). For the term 2019-2022 the following working groups (WG) were established:

6.1 – Deformation Monitoring and Analysis: Wolfgang Niemeier, Germany (chair) and Vassilis Gikas, Greece (vice-chair);

6.2 – Landslides monitoring: Gilbert Ferhat, France (chair);

6.3 – UAV in surveying: Hans Ni, China (chair).

This report is divided in four sections. After this introduction, the second section describes the activity of C6 in 2021. In the third section the activity developed by the working groups is described. This report ends with the sections dedicated to the Article of the Month.

#### 2. The activity of C6 in 2021

**2.1** In 2021, FIG [Working Week](#) (21 to 23 of June) and FIG [General Assembly](#) (20 and 25 of June) were organized again. These two major events to FIG had some sessions live, run from a studio in Apeldoorn, the Netherlands, the city where the headquarters of Kadaster are located. Kadaster was the main organizer of the 2021 FIG WW. Rudolf Staiger (FIG President), Louise Friis-Hansen (FIG Director), and Paula Dijkstra (Co-Conference Director) with the help of many (see the [report](#)) brought back to us, the participants that were following the assembly and the symposium online, almost normal events since the platform used allowed not only the “presence” in the plenary and technical sessions but also the possibility of networking and the participation in discussions.

The event had also a day (the 24th of June) reserved to workshops that could be attained by any participant. C6 organized a workshop “Augmented Reality in the Construction World”.

Concerning the technical sessions, the organizers asked the authors to prepare a video presentation to be included in the program. A few papers were selected for presentations alive, through the platform.

C6 was responsible for coordinating two joined [technical sessions](#) (Figures 1 and 2), as presented in the next Table. In the column “N.º of papers” the first number is the total of papers and, in brackets, the number of live presentations.

Title	Comm.	Chair	Rapporteur	Nºpapers
TS06.1 - Geohazards, Environment and Geo-resources - Surveying Techniques for Risk Mitigation and Sustainable Exploration	6 & 3 & 5	Corinna Harmening	Vassilis Gikas	9 (6)
TS06.2 - Geospatial technologies in structural monitoring	6 & 3	Maria Henriques	Werner Lienhart	12 (4)

After each presentation there was a period for the authors to answer questions that were typed by the participants in the Chat area. After the end of all the presentations, the speakers and the participants were invited to move to another session in the platform linked to the technical session. This session was known as “Ask Me Anything”. Very few participants (including the speakers) moved to this area and all the dynamic and interaction were lost.

During the WW there was also a period reserved to the Commission's Annual Meetings. Unfortunately, the meeting of C6 had few participants.

On the contrary, the workshop “Augmented Reality in the Construction World” attracted more participants. This workshop was possible with the help of Topcon and Trimble, two major enterprises with interesting solutions.

Concerning this workshop, after the introduction of the workshop made by C6 chair, Maria Henriques, two experts from Topcon, Adam Box and Bruno Fileno, made a presentation called “AR in Surveying, can you afford to ignore it?”: Topcon is increasingly aware of the convergence of previously unconnected industry sectors. From the impact of cloud technologies to the adoption of 3D gaming engines, the process of capturing and visualizing surveying data has never been in such a position of rapid change. One area where Topcon sees significant benefits is with Augmented Reality. Augmented Reality is a rapidly growing method of representing 3D data within the job site environment. During this session the concept, the benefits and some existing real-world solutions were presented.

Afterwards, Tor-Erik Djupos (TED), from Trimble, presented “Trimble SiteVision: Augmented Reality in Construction”: Trimble SiteVision is a high accuracy outdoor augmented reality system that enables users to interact with their spatial data in the context of the real world. It can be used in the field to visualize complex construction, road, rail and site designs with accuracy, and measure points, grades, areas, and cut/fill values using GNSS, Electronic Distance Measurement and Augmented Reality technology, as users explore the project site. From bulk earthworks to finished final grade surfaces, stakeholders can communicate and

problem-solve in real time. In addition to the Trimble SiteVision system, workflows, and various use-cases were presented.

The workshop had a period for discussion (Figure 3), that involved the three speakers and the C6 chair and co-chair. This one, Corinna, closed the workshop.

**2.2** 2022 is the last year of the term 2019-2022. This means that it was necessary to choose the next chairs of the commissions for the next term (2023-2026). During the session 2 of the General Assembly of 2021 all nominated chairs presented themselves. The candidate for the position of chair of C6 was Werner Lienhart, Professor and Head of the Institute of Engineering Geodesy and Measurement Systems of the Graz University of Technology. The nomination, presented by the Austrian Society for Surveying and Geoinformation (OVG), can be consulted [here](#).

The sessions of the General Assembly were recorded and are [available](#) at FIG website. The session 2 is available [here](#) and the presentation of Werner Lienhart starts at about 1h 27min (Figure 4).

### **2.3** Other activities.

C6 was invited by the Argentine Federation of Surveyors (FADA) to participate in the (web-)meeting “2ª Jornada Nacional de Docentes de [Mediciones Especiales 2021](#)” (2<sup>nd</sup> National Workshop of Teachers of Special Measurements), that took place from the 19<sup>th</sup> to the 22<sup>th</sup> of April. It was included in the Surveyors Week, an event organized annually by FADA. Maria Henriques made a presentation on the theme “Fotogrametría, drones y procesamiento de imágenes, aplicados al monitoreo de estructuras de obras civiles” (Figure 5).

Another activity of Maria Henriques within FIG is as a member of the Editorial board, representing C6. This group is responsible by the management of the peer-reviewed papers submitted to the FIG Working Weeks or Congresses and includes the choice of papers reviewers.

## **3. Working groups**

The working groups had activity related to the organization of events.

The WG 6.1 is deeply involved in the organization of the 5<sup>th</sup> Joint International Symposium on Deformation Monitoring (JISDM2022) that will happen in Valencia, Spain, on the 20, 21 and 22 of June (Figure 5). This joint FIG, IAG and ISPRS event, is organized by the Polytechnic University of Valencia. It is expected that this event attracts nearly as many papers and participants as the previous events.

Initially the symposium was programmed to occur in April 2022. It had to be postponed so that it could take place with the presence of the participants, in Valencia. None of the organizers wanted the event to be online. June and September were the two possible months. September, the month of FIG congress, was immediately rejected.

Some peer-reviewed papers that are going to be presented in the symposium and are considered outstanding may be published in relevant journals: the Applied Geomatics, the Journal of Applied Geodesy, and the Virtual Archaeology Review.

Link to the event website: <https://jisdm2022.webs.upv.es/>

Hans Ni (Figure 6), the chair of the working group 6.3, is the director of the Belt & Road Geospatial Information Training Course (BRGTC): <http://www.brgtc.com/>

This course started in 2021. The modules are presented online but there were also onsite training courses (in China and in Africa).

#### **4. Article of the month**

A paper submitted to WW 2020 was selected to be Article of the Month:

- March 2021: "[Macrotidal Beach Monitoring \(Belgium\) using Hypertemporal Terrestrial Lidar](#)" from Greet Deruyter, Lars De Sloover, Jeffrey Verbeurgt, Alain De Wulf (from Belgium) and Sander Vos (from The Netherlands) . The paper presents the results of the monitoring of 200 m long section of a beach in Belgium during a year by permanent long-range terrestrial laser scanning.



Maria João Henriques  
Chair of C6

## Figures

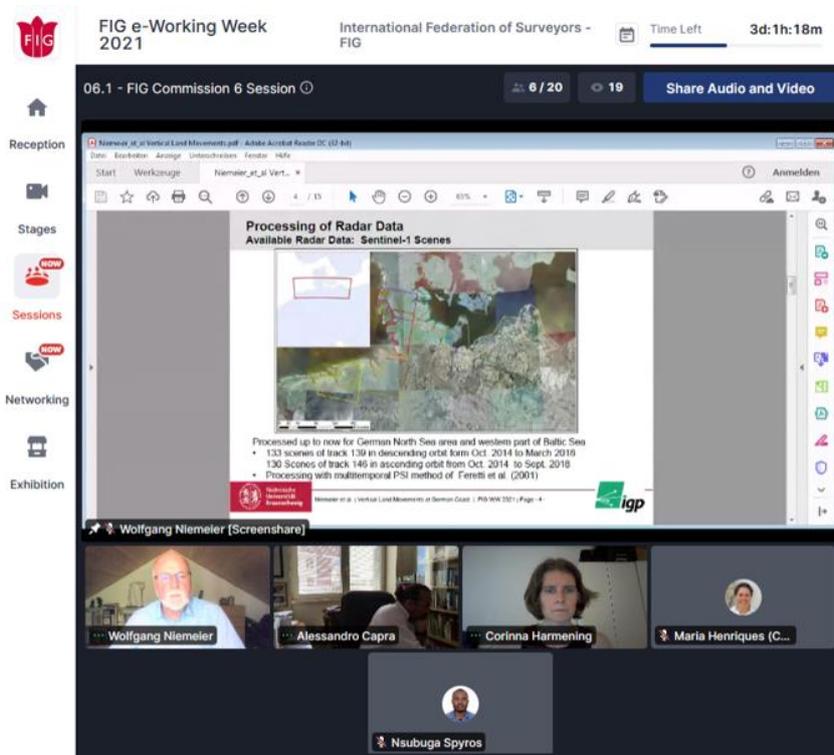


Figure 1 – Technical session of C6

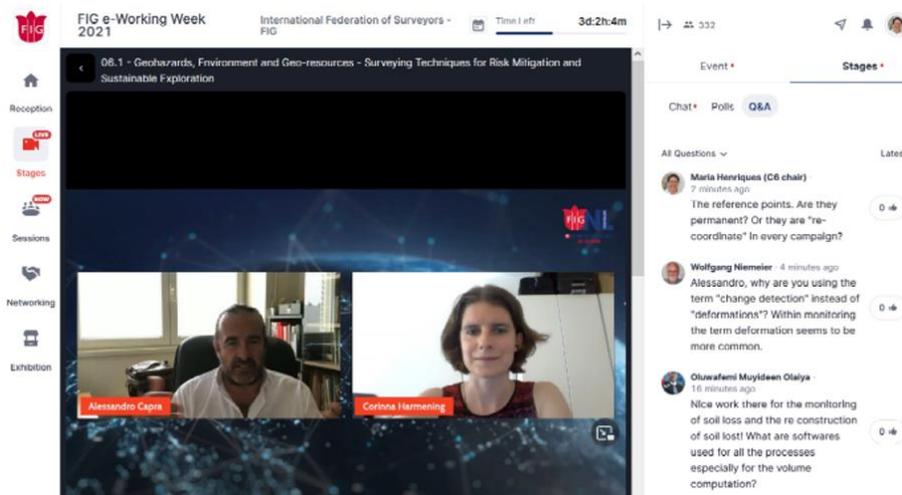


Figure 2 – Technical session of C6

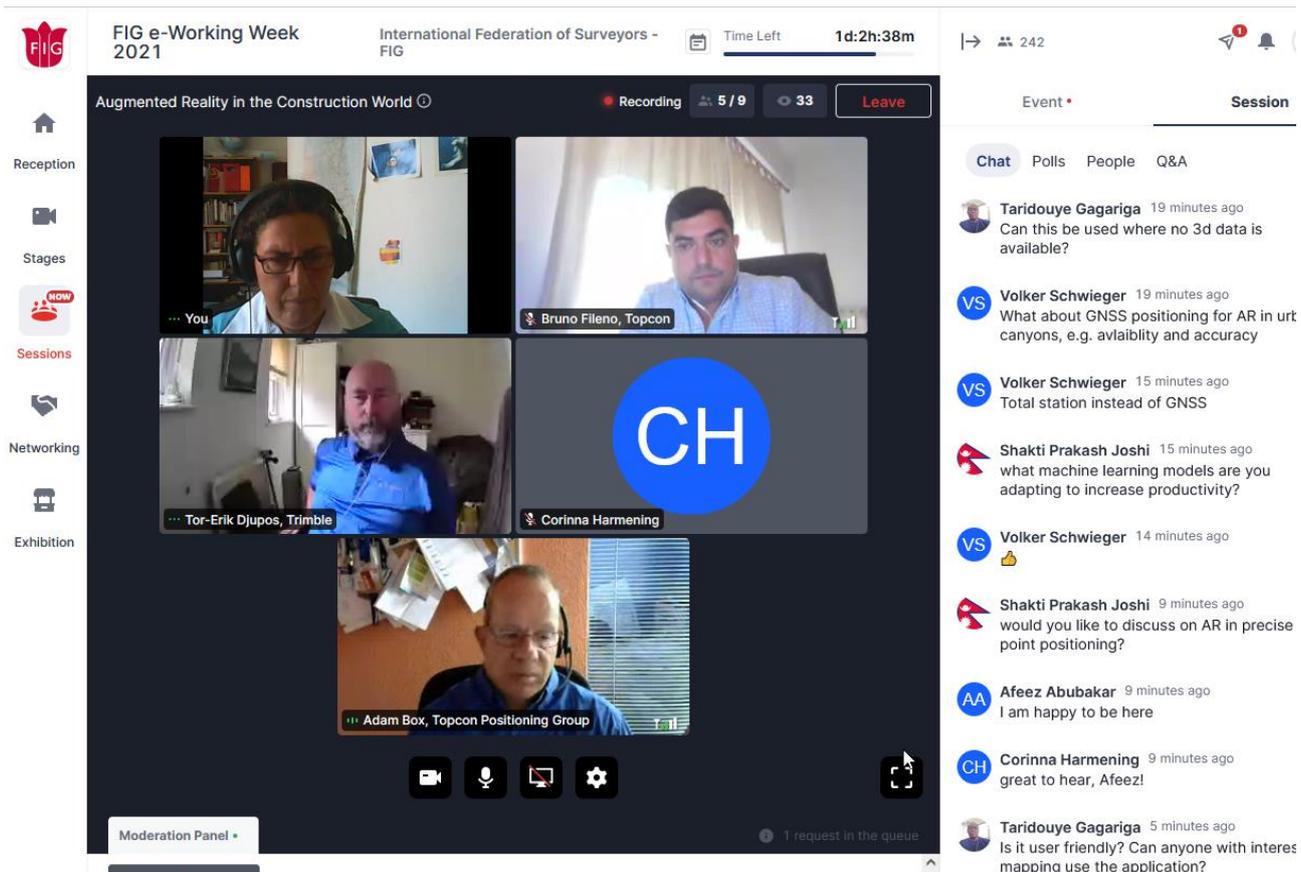


Figure 3 – Workshop “Augmented Reality in the Construction World “



Figure 4 – Werner Lienhart presenting himself during the General Assembly of 2021



Figure 5 – Presentation of Maria Henriques in the meeting “2ª Jornada Nacional de Docentes de Mediciones Especiales 2021” (Argentina)



Figure 6 – Hans Ni, chair of WG 6.3 and director of BRGTC, presenting a certificate to a participant in one of the onsite training courses