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Producing a Case-Study Webinar for Geotechnical Engineering Education

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ABSTRACT: The paper describes the phases needed to produce and promote a webinar aimed at presenting a geotechnical case-study, to be used by geotechnical instructors of engineering undergraduate courses as supplementary educational material for their students. The case-study webinar discussed herein deals with the consolidation process in fine-grained soils associated with the realisation of a well monitored test embankment, and it has been delivered by Carlo Viggiani, Emeritus Professor at the University of Naples Federico II in Italy. This paper addresses the process followed by the producer to support the presenter in the realisation of the webinar, i.e. to move from the webinar concept to its final realisation, including posting and promoting the material online as well as supporting follow-up initiatives. The paper is not addressing the educational purpose of the specific geotechnical aspects dealt with in the webinar.

Keywords: Webinar, Video lecture, Educational material

1 Introduction

The ISSMGE Technical Committee 306 on Geo-engineering education (TC306) focuses on the fundamentals of soil mechanics and geotechnical engineering, i.e. topics typically covered in undergraduate curricula. Its primary, but not exclusive, audience is currently active, past and future geotechnical engineering educators. In particular, as written in the terms of reference, the activities of TC306 aim at enriching the toolbox of geotechnical engineering instructors through: (i) debates on challenges of teaching fundamental concepts; (ii) recommendations for geotechnical curricula; (iii) reviews of resources for geotechnical laboratory classes, e-learning resources, other transferable/reusable geotechnical education material, and useful geotechnical engineering education references. The case-study webinar presented herein should be considered an educational resource that geotechnical engineering educators can add to their teaching toolbox. This initiative can also be considered as complying to one of the strategies suggested by Shulman (1993), i.e. teaching must be made visible through artifacts, to “put an end to pedagogical solitude”.

2 Scope of work

The paper describes the phases needed to produce and promote a webinar aimed at presenting a geotechnical case-study, to be used by geotechnical instructors of engineering undergraduate courses as supplementary educational material for their students. The initiative was conducted by the author (from here onwards, the producer), with a mandate from the ISSMGE Technical Committee 306 “Geo-engineering education”, as a pilot project aimed at setting the stage for a series of such webinars. The main aims of geotechnical case-study webinars promoted by TC306 are: present classical geotechnical concepts to students by means of real world geotechnical engineering projects; produce and promote the use of open-access reusable geotechnical educational material.

The case-study webinar discussed herein deals with the consolidation process in fine-grained soils associated with the realisation of a well-monitored test embankment, and it has been delivered by Carlo Viggiani, Emeritus Professor at the University of Naples Federico II in Italy (from here onwards, the presenter). The title of the case study is “Porto Tolle test embankment - A full scale experiment on the consolidation of a thick clay layer”. The main reference is a scientific article published in Italian (Bilotta and Viggiani 1975).

3 The production phase

The production phase started at the end of 2017, with the choice of the case-study to be presented and the definition of the main geotechnical educational aims of the webinar, and finished at the end of 2018, with the publication of the webinar online. After the definition of the scope of the work, the time needed to complete the production of the webinar involved: collecting the case-study material and creating various drafts of the webinar (presenter tasks); refining the draft slides and audio commentaries (discussions between presenter and producer); refine the audio and video quality of the final slides of the webinar (producer tasks); create the final video and supporting material (producer tasks); time needed to identify appropriate online outlets for the webinar; and post the material on the web (producer tasks).

3.1 Selecting the tools for preparing and recording the presentation

The first major technical choice a producer and a presenter need to make when preparing a webinar is agreeing on the tools to adopt, i.e. identifying the main software to prepare and record the presentation. To this aim, a preliminary discussion was conducted to decide whether to record the presenter while talking, to later include this video in some parts of the webinar. The producer and the presenter soon agreed that this feature would have had very limited added-value for the potential viewers of the webinar. Therefore, they decided to spare themselves the many technical difficulties that the realisation and the use of such a recording would have implied. Moreover, they both shared the opinion that, in many cases, the simultaneous presence of such a recording, together with the content of technical slides (for instance, as a small inlet on a corner of the frame), is detrimental for the viewers, as it may decrease the attention they should pay, as instructed by the presenter, to other important parts of the frame.

Concerning the presentation, to minimise the added burden a recorded webinar poses to the presenter with respect to a typical live lecture, it was decided to adopt a presentation software that the presenter was already familiar with. The choice of the tool to use for this purpose fell to Microsoft PowerPoint, a very widely used software to prepare and deliver live presentations (the version used herein was PowerPoint 2010). This choice was possible because PowerPoint has also embedded features that allow a user to: seamlessly record the audio commentary and the animations while presenting; easily activate, at any given time during the presentation, the recording of the mouse movements when the presenter wants to use it as a pointer to draw the viewers' attention to a part of a given slide. Although PowerPoint is a general-purpose presentation software not specifically designed to record webinars and it does not allow the combination of multiple audio and video tracks, it is relatively easy for the users to play, edit and export the presentation recordings after they are completed. Indeed, all the recorded audio tracks, animations, mouse movements, and adopted time intervals are saved in the same single file used for the slides (extension .PPTX). As a matter of fact, this single file is a compressed directory storing each element of the recorded presentation, slide by slide. For instance, the audio commentary is stored using a number of .WAV files equal to the number of slides, and the audio information is “attached” to the each slide so that if a user changes the recording of a given slide, the new audio track automatically replaces the old one. This characteristic can be profitably used if, after an initial recording of the entire presentation, one wants to change the recording of only a selected number of slides. The same principle holds for recorded audio tracks, animations and mouse/pointer movements. A negative side effect of breaking down the recorded audio in a number of separate audio tracks is that, whenever a presenter is talking during a transition between two slides, the final recorded audio ends up having a small break in the recorded voice in corresponding to that transition. Also in this case, however, post-recording editing is possible.

3.2 Defining the outline and the format of the presentation

An important issue discussed between the producer and the presenter at a very initial stage of the project was the proposed structure of the webinar. To this aim, the key points addressed were: format and style of slides, expected duration, and sections of the presentation. Straightforwardly, the 16:9 landscape format was identified as the most suitable format to adopt, whereas the choice of the style of the slides was discussed at some length. Starting from the “personal style” of a typical presentation by Prof. Viggiani (almost each professor has a preferred presentation style that he/she uses recurrently), we finally ended up with a purposefully-devised new style, after agreeing that slides intended to be used within a webinar needed a series of specific features, such as clearly readable fonts, relatively large font size, dark text on white background, consistent colour scheme, limited and consistent animation schemes. Assuming the text in the slides would have been mainly composed of headings, captions and brief sentences, ‘Calibri’ was selected as the single font to be used throughout the presentation because it is a standard, popular, general-purpose font with a good readability at all sizes. The sizes varied from 60pt for the large title slides to 28-40pt for most of the paragraphs and headings, with a minimum size of 14pt for legend items or text embedded in the figures. As most of the figures were to be derived from scanned versions of paper printouts in black and white, a white background was chosen, with the expectation that this would allow easier blending of the figures where they were to be combined with text. Accordingly, to maximise readability, dark blue was chosen as the main colour of the text, and red was selected as the secondary colour to be used to highlight specific words or sentences. Finally, it was agreed that the original black and white figures would be enriched, when needed, using coloured elements to highlight specific parts of the figure, such as data points or curves, with or without animations. In these cases, special attention was given to use a coherent set of colours and to consistently employ the same colour for the same element appearing in different slides, such as soil types.

Concerning the duration of the webinar, it was decided to set its length to less than 30 minutes, because a longer length would probably have limited its appeal to be used by other instructors in their classes. The possibility to subdivide the webinar in different videos was explored but then abandoned in favour of a compromise choice, with a clear subdivision of the presentation in sections within a single recording. It was decided that the sections to be adopted in this case were to be: the project, soil exploration, the test embankment, interpretation of results, lessons learned. It was decided that the different sections would be introduced by a standard format section title slide and a standard slide transition animation.

3.3 Preparing the slides

As already mentioned, the case study has been described in only one published article (Bilotta and Viggiani 1975), written in Italian and only available as a post-print. Moreover, given that both the engineering work addressed in this case study and the scientific article derived from it were more than 40 years old, the search for unpublished material from which to obtain additional data and higher quality figures and charts—at the time of the work available to the presenter—was unsuccessful. Therefore, the producer and the presenter agreed that an important part of the slides’ preparation should involve editing the original black and white figures of the article to adapt them to the format of the slides described in the previous section. Figure 1 shows, as an example, the comparison between the original and edited figure showing the index properties of the soil.

The composition of the presentation has been essentially performed by the presenter. During this phase, the role of the producer was limited to ensuring that the slides would comply with the agreed format. To this aim, the producer has been in charge of: creating the initial page, with the logo of the ISSMGE and a reference to TC306; creating the section title slides; helping the presenter with the animations to be used throughout the presentation.

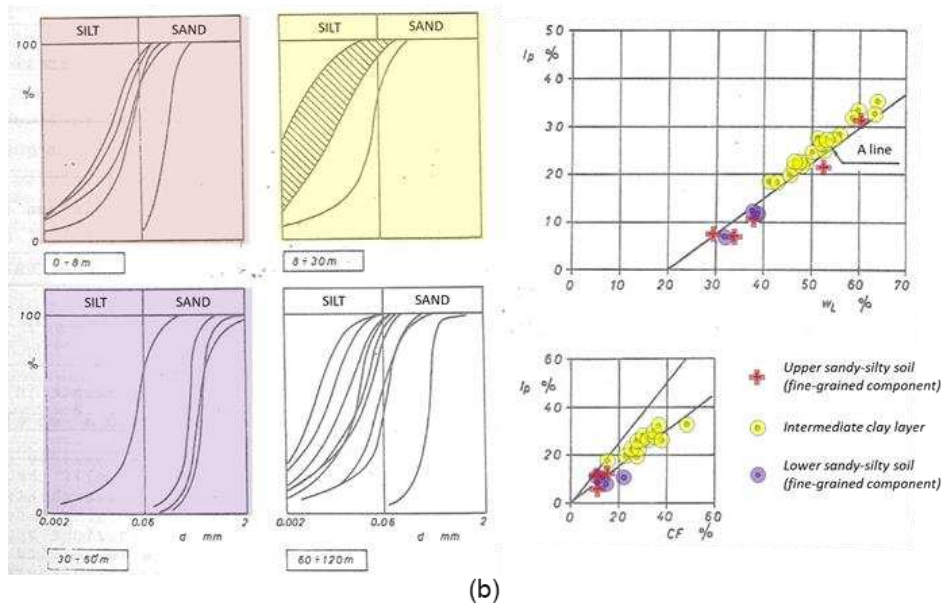
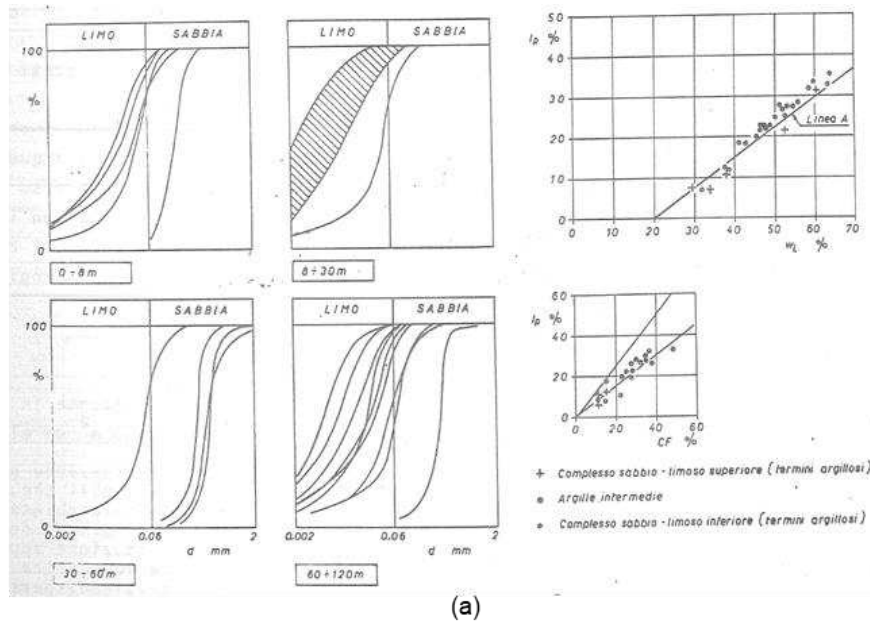


Figure 1. Example of (a) original figure from Bilotta and Viggiani (1975) and (b) modified figure used in slide 10 of the webinar

3.4 Recording and editing the audio-video material

Before a first complete draft of the presentation was available, the presenter recorded parts of it for quality checks of both the audio commentary and the visual aspects of the presentation, including animations and the use of the mouse as a pointer. Based on these recordings, a few corrections were performed to some parts of the presentation. Once the presenter and the producer agreed that the recording procedure was effectively working as it should have, and that there was no need to undertake a staged presentation, the final recording was performed by the presenter without the presence of the producer.

The final recording has been edited by the producer with the aim of improving: the quality of the recorded voice, the audio-video transition between some slides, the description of some charts by adding small animation-objects to the related slides. The quality of the audio recorded by the presenter, using the audio recording feature of PowerPoint, was improved by filtering out the existing ambient noise. To this aim, a freeware open-source software (Audacity version 2.1.0) was used. The

procedure followed was relatively straightforward, because removing the ambient noise is one of the main features of any sound editing software. Initially, the original .WAV audio tracks were extracted from the presentation .PPTX file, by changing its extension to .ZIP and then opening it with a software opening .ZIP files (audio tracks are stored in the 'media' directory and they are sequentially named with the slide numbers they refer to, Figure 2). The original .WAV tracks were imported in the sound editing software, processed one by one using the standard settings of the noise filter feature (Figure 3), and then saved with the same names. The new audio files were then pasted in the .PPTX, to replace the old audio files. The improvements to the transition between some of the slides was done directly in PowerPoint. The fixes concerned mainly the length of the audio tracks, at times few seconds too long (i.e. useless wait for the next slide to appear) or too short (i.e. insufficient time at the end or at the beginning of a slide) in relation to the length of the slide. When an audio track needed to be shortened, it was selected and trimmed to the desired length (Figure 4a). When the length of the slide, which by default it is set equal to the length of the audio track, needed to be increased, the transition features were used to specify a known fixed duration for the slide (Figure 4b). The same features were also used to specify standard animations—in this case slide rotation—for the transition between the last slide of a webinar section and the title page of the next section. Improvements to some of the animations were also conducted directly in PowerPoint. When needed, particularly for slides with long duration comments or presenting charts, some new graphical elements—such as arrows or semi-transparent coloured shapes—were added and were set to appear at specific times of the slide. Finally, all the audio tracks and the other multimedia clips were compressed to reduce the size of the final file, using the PowerPoint feature called 'compress media'.

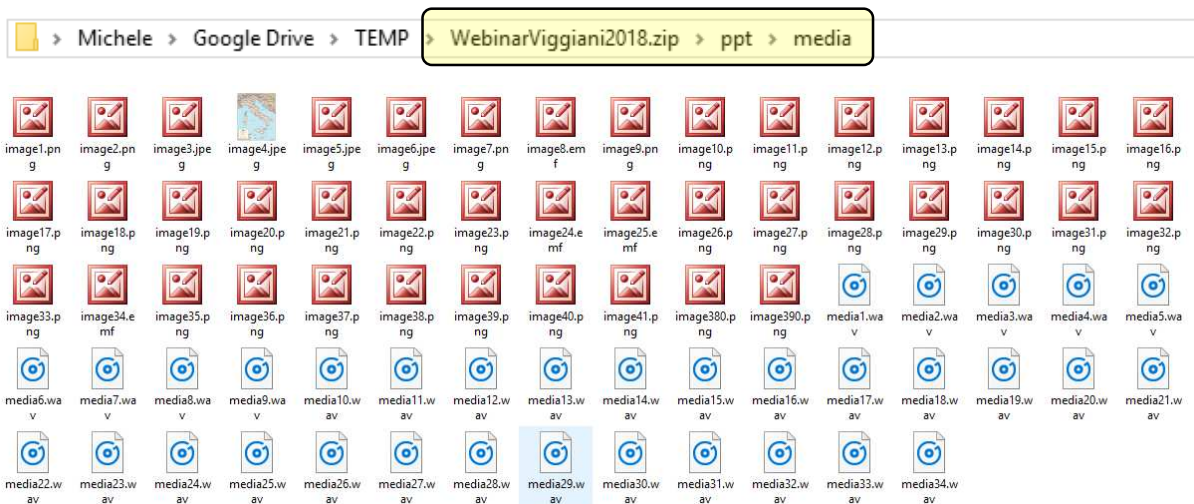


Figure 2. Files stored in the media directory of a PowerPoint .PPTX file, visible when the file is renamed employing a .ZIP extension

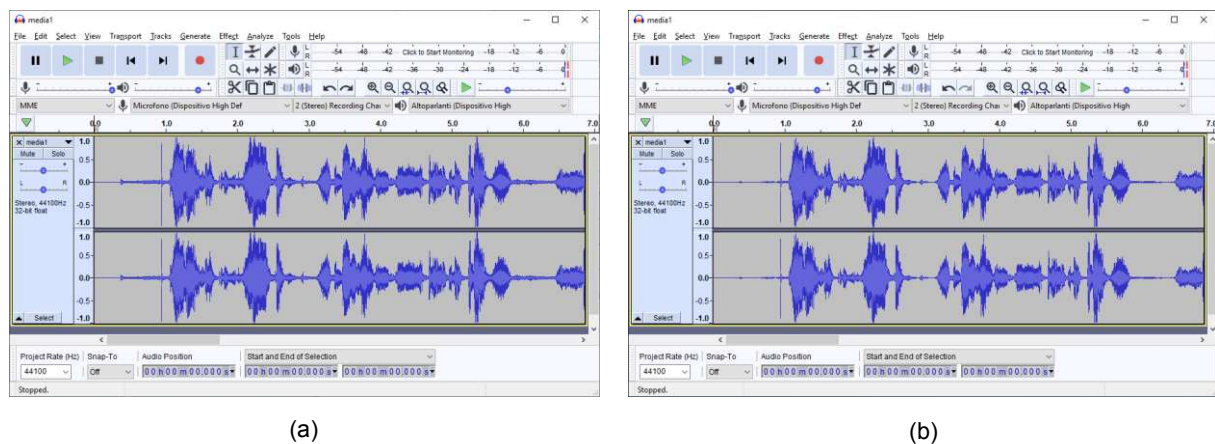


Figure 3. Example of WAV file (a) before and (b) after noise reduction filtering

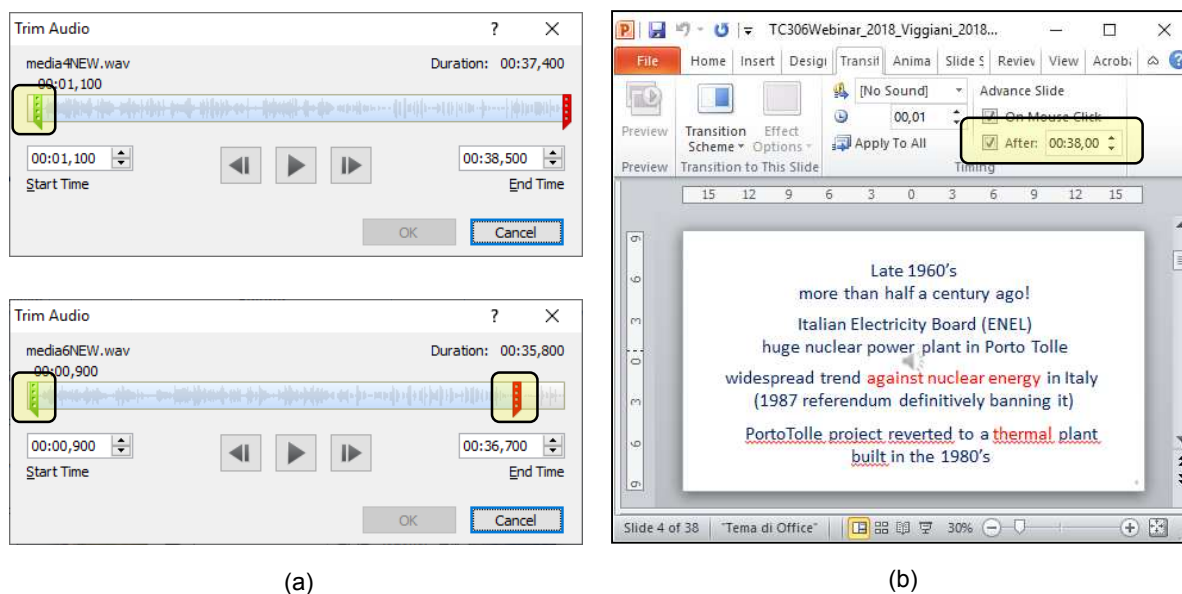


Figure 4. Example of (a) shortened audio tracks and (b) set duration of slide

3.5 Creating the webinar videos and the slides to share

The final edited PowerPoint presentation of the case study was exported in the following formats: slide show presentation (.PPSX), slides' printouts (.PDF), internet-quality and high-quality video files (.WMV). All these formats are standard output options in PowerPoint. In the first and second case, one has to simply save the presentation as either a .PPSX file or a .PDF file. In the third case, one has to export the presentation using the 'create a video' feature. Before exporting, the user has the option to define the video settings preferences in terms of video quality, video size and video type. For the latter, depending of the version of PowerPoint used, the available video formats are .WMV and .MP4. In this case, the two exported videos were both .WMV files with a video frequency of 30 frames per second and the following frame sizes: 852x480 (for the internet-quality video) and 1280x720 (for the high-quality video).

3.6 Interviewing the presenter

The webinar is accompanied by an interview of the presenter Prof. Carlo Viggiani, conducted by the producer, mainly aimed at introducing the scope of the webinar. As Prof. Carlo Viggiani says in the initial part of the interview, "This case study has the advantage of being extremely simple, it deals with a simple mechanical scheme, one-dimensional consolidation, yet it highlights very well how theory is a model of reality, the real world is much more complex, and by measuring and observing, one can understand a lot of things". The video of the interview was recorded by means of a free recording App (OpenCamera), using the camera of a smartphone conveniently placed on a tripod set close to presenter and interviewer. The interview was conducted in Italian, the native language of both the presenter and the interviewer, and the audio was recorded by means of a double microphone connected to the smartphone. To create the final video of the interview, the recording was edited by the producer with the aim of adding a short audio-visual introductory track to the video and, most importantly, to place subtitles in the lower part of the frame translating into English the spoken Italian words. The video editing was conducted on a Mac laptop using the software iMovie by Apple.

4 On-line deployment and dissemination

The case-study webinar "Porto Tolle test embankment - A full scale experiment on the consolidation of a thick clay layer" delivered by Prof. Carlo Viggiani is, as stated above, the first of a series of case-study webinars that TC306 intends to produce. Therefore, TC306 institutional web outlets were used to post online the video of the webinar and the other material related to it. The web portal of TC306 is hosted by ISSMGE at: <https://www.issmge.org/committees/technical-committees/impact-on->

[society/geo-education](#). As written there, the main dissemination venues include: 1) a web repository and forum for discussions on the GeoWorld website; 2) online access to proceedings of the TC306 conferences through the ISSMGE online Library; 3) a series of “case-study webinars” hosted on a YouTube channel.

The TC306 YouTube channel (<https://www.youtube.com/channel/UC9WYyOZWcbxPCkxQv7ANxEkw>) was created to host this first case-study webinar and the interview introducing it. At the moment it only features the following two videos:

- TC306 case-study webinar by Prof. Carlo Viggiani (October 2018)
<https://www.youtube.com/watch?v=hWpyswdgIBk>
- Interview with Prof. Carlo Viggiani (by Michele Calvello)
<https://www.youtube.com/watch?v=EPEDepTWTD8>

As written in the description of the webinar on YouTube, the slides of the presentation are available for download on the TC306 GeoWorld repository at: <https://www.mygeoworld.com/file/139609/tc306-case-study-webinar-by-prof-carlo-viggiani-october-2018>.

The presence of the case-study webinar online was advertised using the ISSMGE news section (<https://www.issmge.org/news/prof-carlo-viggiani-delivered-the-first-tc306-case-study-webinar>), and in a discussion topic on the GeoWorld TC306 group page (<https://www.mygeoworld.com/groups/geo-engineering-education-tc306/discussions/case-study-webinar-by-prof-carlo-viggiani-october-2018>).

5 Follow-up

The TC306 “Webinars & eLearning” task force is planning to distribute, along with each produced case-study webinar, a set of peer-reviewed annotations, a sort of 'Notes for Instructors', augmenting the webinar with additional material (e.g. clarifications, questions for the students, additional comments on the content of the slides) to be used during class discussion, for instance in a scenario where students are asked to watch the video before class. With this aim in mind, after the webinar delivered by Prof. Carlo Viggiani was posted online, the producer invited all TC306 members to watch the webinar and comment on it, considering a teacher's point of view and assuming that they would have wanted to use the case study in their own course. In particular, committee members were asked to think of clarification questions they would have liked to have an answer from the webinar presenter. Not many answers were received, yet the comments were nevertheless compiled and differentiated by categories as follows: request for clarification, request for supplementary material, suggested annotations, suggestions for teachers proposing the webinar in their classes, questions for students watching the webinar. The intention is to pass the annotated material to the presenter, asking him to provide replies to the different questions and requests, and then publish both the comments and the presenter's replies online, alongside with the webinar. Up to now, however, the compiled comments and requests have not been yet passed to the presenter. As a final remark on this issue, it is worth highlighting that, among the requests for clarifications received, perhaps the most important one is the wish to extend the final part summarising the main lessons learned. This indeed would help both teachers to better fit the case study in their courses and students to retain the most important learning messages highlighted by the case study.

Another follow-up initiative was promoted by the TC306 Chair, Prof. Marina Pantazidou. She prepared a problem inspired by the case study webinar, and she already used it within a written exam in her Soil Mechanics course at the National Technical University of Athens, Greece. Of course, the significance of this initiative does not simply lie on the webinar-inspired newly created exam problem for a single course, but on the overarching aim of having such homework/exam problems inspired by case-study webinars—together with detailed solutions—to provide incentives to other instructors to pay attention to and use the webinars in their courses. To this aim, the assignment has been posted on the TC306 GeoWorld repository as a PDF file (<https://www.mygeoworld.com/file/139634/tc306-case-study-webinar-by-prof-carlo-viggiani-assignment-for-students-october-2019>) and explicitly mentioned in the description of the Webinar on YouTube.

6 Concluding remarks

The webinar initiative presented herein should be seen as a pilot project for further case-study webinars to be produced by the ISSMGE Technical Committee on Geo-engineering education. The main aim of the article has thus been to describe, with an adequate level of detail, the work that a producer must carry out to help a presenter in preparing and delivering a webinar. In particular, to provide guidance for similar future endeavours, the paper included the detailed presentation of all the technical aspects associated with recording and creating the audio-video material and the supporting files for the webinar. To this aim, the paper identified and described the following main tasks: selecting the tools for preparing and recording the presentation; defining the outline and the format of the presentation; preparing the slides; recording and editing the audio-video material; creating the webinar videos and the slides to share.

It is worth highlighting herein some of the lessons learned during the production process of this webinar that can be proposed as general advice. The time commitment involved in the process must not be underestimated. Indeed, one must not forget that almost always (like in the case described) both the producer and the presenter work pro bono and that the commitment for the webinar tasks may end up having a low priority status in their work agenda for long periods of time; and it should also be considered that a webinar is surely a valid dissemination product but not a scientific product that can be easily used for career progress in Universities. The presenter and the producer must be familiar with the tools to be used to prepare and record the webinar. In this case, the choice to use a presentation software well known to both presenter and producer helped significantly in all the tasks requiring interaction between the two individuals. Setting a date for a staged presentation to be recorded, with the presence of the producer, may help reduce the burden on the presenter for delivering a first complete draft of the webinar. This was not the choice adopted in this case. Yet, in retrospect, it could have saved some time with the production process, also considering that the tool adopted to record the presentation easily allows for re-recordings single slides aimed at substituting parts of the staged presentation that do not comply with the required standards.

In the descriptions and discussions throughout the paper, the roles of presenter and producer have been clearly differentiated. However, it is worth highlighting that presenter and producer do not necessarily need to be distinct persons. Indeed, this article may be profitably used as a reference for presenters wanting or needing to produce their own webinar.

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Author's bio

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