How to organize a collaborative OSINT project for litigation purposes: Takeaways from Project Tollgate

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Background

In the fall semester of 2021, the University of Essex Digital Verification Unit ("DVU") was contacted by the legal representatives of persons affected by an incident at the Lekki Tollgate in Lagos, Nigeria on 20 October 2020. This incident is currently subject to proceedings before the Community Court of Justice of the Economic Community of West African States ('ECOWAS'), and as part of these proceedings the DVU was requested to review videos purportedly connected to the incident and produce a verification report for each video using open-source investigation methodologies. The task was internally dubbed Project Tollgate, led by the DVU's Co-directors (Dr. Matthew Gillett and Dr. Daragh Murray) and Project Managers (Wallace Fan and Sophia Mashadi).

With permission from the legal representatives, this blogpost recounts the experience of Project Tollgate and explains the methodology and workflow adopted by the DVU. Drawing from the challenges encountered by the DVU, we summarized some lessons learnt for future collaborative OSINT project in support of litigation.

Methodology and workflow

Planning and Development of methodology

At the outset, the DVU conducted online searches for potential precedents for similar collaborative open-source verification reports for submission to courts. However, none were located that were directly applicable in light of the requested parameters. As a result, we had to organically develop our own methodology as Project Tollgate progressed. We drew on: our institutional knowledge in conducting over 6 years of digital investigations, particularly Dr. Murray's experience across multiple OSINT projects; Dr. Gillett's professional background as a former legal practitioner in international criminal tribunals; the *Berkeley Protocol on Digital Open Source Investigations* and the reporting methodology of other formal open source investigations. Specifically, we referred to a verification report by the Cameroon Anglophone Crisis Database of Atrocities in determining the substantive issues to be analysed and verified – data sources, location, data and time, perpetrators, and victims. A **Report Template** was produced accordingly. We also decided to use the OSINT software Hunchly 2.0 for documenting our verification progress, in addition to the methodology typically used in DVU investigations.

Next, the project leads conducted an **initial review** of the videos procured by the legal representatives, which addressed three preliminary issues:

- Determining the scope of review: we were requested to undertake verification of 25 out of 130 available videos, taking into account factors such as turnaround time, available person power, and the length and quality of videos.

- Deciding division of labour and a timeline: in anticipation of the need to adjust our methodology, no overall deadline was put in place. We decided to first conduct an **initial round of verification** on six videos, one for each available team member, so we can incorporate feedback from members and legal representatives as well as newly discovered lines of inquiry into subsequent rounds. Each member was to prepare a prototype verification report on his/her assigned video, addressing indicia of its recording location and date, apparent victims and perpetrators. For the triage of videos, we picked videos that showed greater visual clarity and covered various parts of the Lekki Tollgate incident (e.g., the protest, the shooting, the aftermath, both daytime and night-time). Considering the time-sensitive nature of litigation, members were given five days to complete the report.

- Taking precautions against vicarious trauma: we added warning tags to videos with graphic content, so that team members would be on notice and could opt out of reviewing those videos and be re-assigned to other videos. We made a point to remind members of the importance of self-care and resilience.

A **Working Methodology** was created to document the goal of Project Tollgate, tasks, a tentative timeline, division of labour, and background notes with basic information about the Lekki Tollgate incident. The videos, verification reports, Hunchly case files, and all relevant documents were stored on a secure cloud drive; access was granted only to DVU members working on Project Tollgate and to the legal representatives.

Verification

The **initial round of verification** was finished on time. Team members shared experience and troubleshot via a group chat throughout and in a subsequent evaluation meeting. For example, we found that the free web tool Clideo could be used to brighten videos that were filmed in the dark, some members needed a tutorial/refresher on how Hunchly works, and bugs with InVID's keyframe extraction tool can be resolved by using URL links to submit videos. In addition, we identified the need to seek clarification from the legal representatives when the metadata of some videos were inconsistent with the videos or missing entirely. To improve consistency across verification reports going forward, and drawing on our initial experience, we constructed a **Sample Report**. All team members were instructed to remodel the presentation and language of their prototype verification reports after the **Sample Report**.

Two more rounds of verification were conducted using the refined methodology. Another six videos were reviewed during the **second round of verification**. Team members were open with communication about their increased workload as end-of-semester deadlines drew closer, so turnaround time was kept flexible within one week. Ultimately, the round was completed before the winter break as planned. A **third round of verification** began in January after classes resumed and was completed in 12 days. Six additional members were reassigned to Project Tollgate to finish verification of the remaining 13 videos.

A refined methodology was derived from the results of the three rounds of verification. The applicable techniques and presentation for each substantive issue was elaborated upon:

- Data sources: each verification report began with 1) a general description of the content of the video examined, including the length of the video, any intelligible words spoken within, estimated number of people appearing within, and any outstanding features; and 2) any metadata and the extraction tool used.

- Geolocation: the geolocation process was illustrated with screenshots of video keyframes that displayed unique identifiers. Overlaid boxes of the same colour were applied to the same unique identifiers across all videos to facilitate the court's analysis. If geolocation was successful, screenshots of satellite imagery and pins on Google Earth Pro were used to visualize the location of filming.

- Time and Date: we mainly relied upon video metadata since it was accessible through the legal representatives. Since metadata is not always accurate, external corroborating sources were also drawn upon to reinforce the conclusion. We cited official reports and contemporaneous media reports and social media posts. Any consistency in the time of filming with other videos was identified. If shadows were visible in the video, the online tool SunCalc was used to estimate the time of filming. On the other hand, the metadata of some videos indicated a different time of creation other than during the Lekki Tollgate incident. We emphasised in the reports for those videos that such discrepancies in the metadata could not conclusively disprove the video's connection to the Lekki Tollgate incident. We acknowledged possible explanations for the discrepancies, e.g., the original file having been transferred through services that stripped metadata and replaced with the time of receipt by the legal representatives. In addition, InVID was used for reverse image searches to identify recycled content. The number of extracted keyframes and search services used were stated in every report.

- Victims: identification of potential victims became relevant in videos that depicted injured persons. Any connection to the Lekki Tollgate incident was established mainly through the fact that a video was taken during or after the protests, at the protest site or at the Reddington Lekki Hospital where injured protesters were widely reported to have been taken.

- Perpetrators: although the vast majority of the videos had no indications of perpetrators (due to e.g., the surrounding darkness, the significant proximity of the cameraperson from the perpetrators), team members have been instructed to look for such indications, such as their uniforms, weapons used, and utterances.

Editing

All verification reports were edited and compiled by the Co-Directors and Project Managers of the DVU with three objectives:

- To standardize the techniques applied according to the refined methodology;

- To polish the reasoning and presentation of the analysis; and

- To apply a uniform standard of assessment, format, and language.

It is important to note that we did not apply a judicial standard of proof (e.g., beyond reasonable doubt, or balance of probabilities) to the videos, as that exercise falls properly on the court. Instead, we applied our own standard of being sufficiently satisfied that any particular video was verified, based on elements present within the video itself (e.g., unique identifiers, metadata, and other indicia). For the videos that could not be verified per se, we nonetheless indicated whether it was likely that they depicted the Lekki Tollgate incident based on matches with external sources.

We attached a **Cover Note**, which explained the background and methodology of the review and summarized the conclusion of each verification in a table for easier reference. To conclude Project Tollgate, we passed the compiled reports to an open-source investigation expert for independent advice, and to the legal representatives for feedback and corresponding final adjustments.

Lessons Learnt

In hindsight, the efficiency of verification and editing in Project Tollgate was impacted by difficulties that could have been avoided or mitigated. To help others avoid our mistakes, we have put together a list of lessons learned, in the hopes of facilitating future collaborative open-source investigations in support of litigation.

1. Uniformity

The applicable techniques, presentation, and format should be standardized across verification reports within the methodology from the outset. This ensures a more coherent analysis, a minimum level of analysis by all researchers, and greater accessibility of findings to the court. It is important to secure uniformity in advance to minimize the time needed for adjustments in editing. For example, a large part of the editing process of Project Tollgate was spent on filling in missing screenshots, reverse image searches, and shadow analysis as well as on applying a uniform format and language across reports.

The need for uniformity was identified and communicated at the outset, but efforts to ensure uniformity were insufficient. We found that it was not enough to rely on the **Sample Report** to communicate the basic components of a proper and consistent analysis; it only demonstrated the review of a video depicting the early protests within the Lekki Tollgate incident, and thus was not as helpful for the review of videos showing e.g., shootings in the evening or the treatment of injured persons at the hospital. Particularly, the original instruction to team members to use the same colours in applying overlaid boxes to the same objects across different videos was found to be difficult, precisely because 1) it was unclear which objects were identical until every video had been analysed, and 2) it was unrealistic for team members to read all preceding reports to find out what colour has been used, not to mention reports that were being written up concurrently. Eventually, a disproportionate amount of time was spent on adjusting the colours of overlaid boxes during editing.

Challenges with uniformity came to a head in the **third round of verification**, when less time was available for new members to get acclimated to the project methodology and logistics and to be briefed properly on the increased amount of resources and body of work available on the cloud drive. Beyond a short team meeting, they were simply instructed to refer to the Sample Report and verification reports produced by others and to apply their training from regular DVU work. As such, reports from the **third round** varied significantly in approach and presentation.

2. Incorporating a regular feed-back loop (Cyclicity)

Open-source investigations are best structured in cycles (see the Berkeley Protocol, p. 55). Project leads should proactively and regularly review the findings of an investigation and experience of its various stakeholders to reveal new insight that can in turn inform the investigation itself. During Project Tollgate, we reviewed verification reports mainly between rounds of verification, paying particular attention to elements that are internally consistent across multiple videos to facilitate verification.

- For example, one team member geolocated her video to the Reddington Lekki Hospital based on the name written on a carpet. By promptly reviewing her report, the project leads were able to connect the findings to other videos that showed a similar interior but with much fewer unique identifiers. It even enabled the geolocation of a video showing only a patient being tended to against a brick wall and wall-mounted air conditioners.
- In another review, the metadata of a video showed a date and time of creation which was well after the Lekki Tollgate incident but was identical to that of two other videos. This observation offered a plausible explanation of the discrepancies in metadata, i.e., the metadata reflected the time of transfer of the video, not its time of filming.
- In multiple videos, victims with the same clothes, injuries, and appearance could be seen, reinforcing the connection of these videos to the same incident.

We also identified several external corroborating sources that are commonly helpful, such as the official findings of the Nigerian Judicial Panel of Inquiry and a CNN investigative report. While these findings were openly discussed, we could have made better use of them if they had been documented more systematically in the **Working Methodology**.

The practice of regular review would also help to identify communication gaps regarding the proper approach to analysis and to avoid unnecessary inconsistencies. For example, more frequent reviews would have revealed the problems with ensuring uniformity earlier. Although we have occasionally reviewed verification reports as they came in, they were mostly done outside of team meetings and feedback was given irregularly and over the group chat, which offered less opportunities for members to interact and seek further clarification when compared to a meeting. A better measure going forward would be to update the **Working Methodology** more frequently to reflect the latest methodology as it developed. Generally applicable techniques and standard explanation for common issues should be specifically included.

The importance extends to communications with external parties. Splitting Project Tollgate into three rounds of verification proved to be very useful for clarifying and managing the expectations of the legal representatives. For example, it was explained to the legal representatives that we could not quantify the veracity of the reviewed videos in percentages since it should be a matter of a holistic assessment, unlike e.g., DNA evidence. It was also useful for retrieving missing

information from the legal representatives, e.g., video metadata. Indeed, some lawyers may not be familiar with OSINT and thus may not realize the relevance of some materials that they omitted to provide.

3. Accessibility and explainability

Accessibility and explainability of the process and findings is especially pertinent for presenting open-source evidence, the use of which is still nascent in some courts. We were aware of this need when we attached a **Cover Note** to the compiled report for Project Tollgate. The Cover Note set out the methodology adopted in all verification reports, listed the DVU's credentials, and addressed common issues, specifically explaining the characteristics of metadata that are relevant to their probative value. To this end, we also indicated clearly to the court our findings for each video in a table of summary, elaborating on the standard of assessment we applied, i.e., whether any particular video could be considered verified per se or remained to be assessed together with external sources.

Next, the use of **Hunchly** to record our verification process made our findings more explainable and thus reliable. Another viable measure is to maintain consistent formatting and presentation. For example, each video was referred to by their annex number (e.g., Annex 12); dates were presented in DD-Month-YYYY format, and time was presented in 12-hour format in Nigerian local time. Coordinates were presented in decimal format. Standard phrases were introduced in all verification reports to explain common issues, including metadata discrepancies, the need to brighten videos filmed in the dark etc.

4. Safety and security

Safety and security are crucial for preserving the confidentiality and sensitivity inherent in litigation. We restricted access to the cloud drive to team members who were assigned to Project Tollgate. Members were also bound not to discuss the content of their work with external parties by a non-disclosure agreement that they signed at the start of the academic year.

Security in another sense also concerns the integrity of the output. To this end, every piece of social media content referred to in the verification reports was preserved using the Internet Archive. We also refused any edits to the body of the verification reports suggested by the legal representatives, in order to maintain the independence of our assessment.

The most important aspect of safety addresses the mental resilience of researchers. All videos with graphic content were tagged at the outset of Project Tollgate. Team members have been allowed to be reassigned to non-graphic videos upon request.

Conclusion

Project Tollgate presented novel challenges for the DVU. It required the development of a more comprehensive methodology, more frequent communication, greater attention to presentation

and explanation, and strict adherence to analytical standards. Special thanks go to the DVU team members who participated in the project – they have been endlessly patient with the ambiguities in the investigative methodology, and they have worked on their assignments with great dedication and professionalism. Without their invaluable efforts and expertise, the project could not have been completed so quickly and with such detailed analysis. The experience of all parties involved in Project Tollgate culminated in the important lessons as described above, which will be applied by the DVU in all types of OSINT projects going forward. We hope that the lessons will also be a useful guide to anyone who is looking to conduct similar collaborative projects in the future.