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Questions

1. *1.1)* Can you kindly illustrate what are the main risks posed by the use of new technologies vis-à-vis the work of human rights defenders and, in particular, of relatives of disappeared persons? *1.2*) How can these risks be mitigated? *1.3*) Can you provide concrete examples on how new technologies have been used as a tool to hinder the families of disappeared persons and human rights defenders in their struggle for truth and justice (including through cyber bullying, sexual harassment, etc.)? *1.4*) How can the judicial system offer effective protection from this kind of harassment?

The principal risk posed by the use of new technologies vis-a-vis the work of human rights defenders and relatives of disappeared persons is that they might not be validated or reliable methods (and/or the analyst using the method is not skilled). It should be noted that this same risk exists for the authorities who might be pressured to adopt new technologies and methods that are not reliable or for which they do not have adequate training for use and accurate interpretation of results. This has the very negative result of raising expectations with a low probability of positive, reliable results. This can be mitigated by seeking consensus among leading *experienced* practitioners on which methods are likely to be useful and under which conditions. This process is currently underway in forensic science in the United States under the auspices of the American Standards Board of the American Academy of Forensic Sciences.

Another potential risk is when analysts do not consider the context of data used to deploy these technologies. This is because the information related to violence and human rights violations is usually incomplete and has various biases that can affect the validity or interpretation of the results. These biases are usually due to geographical, political, or economic factors that prevent organizations or authorities from comprehensively documenting the phenomenon (Manrique, 2013). That is, these data are usually "convenience" samples and not "random" samples in statistical terms (Ball, 2016). For this reason, analysts must be familiar with generating these data and be careful with interpreting the results that indicate possible search areas for missing persons or that try to show patterns such as the magnitude of the phenomenon.

For example, the use of Geographic Information Science (GIS) and related software to conduct spatial analysis and predictive modelling as used by the three authors of this commentary, is not well studied in the context of the analysis of disappearances and clandestine burial sites. We have conducted preliminary research on the Spanish Civil War (Congram 2010; Congram et al. 2016), in consultation with the International Committee of the Red Cross

(Congram et al. 2017); Mexico (Price and Ruiz Reyes 2021), Guatemala (Santillan et al. 2022); and Australia (Berezowski et al. 2022), and the non-governmental organization EQUITAS has produced a theoretical model for a region in Colombia. While preliminary results are promising, families and other stakeholders must understand from the beginning that this method is still being refined and is an investigative tool that will help make investigations more efficient, but will not indicate a precise location on a map (e.g., of a clandestine burial) with perfect reliability. As with all methods a degree of expertise is required for effective study design and interpretation of results.

New technologies can be used to hinder investigations by distracting from more productive - and often simpler, basic - methods if expectations and probable results are not made clear at the outset by the person or people using these methods. We have witnessed this in the field when, for example, the person operating geophysical equipment (e.g. ground penetrating radar) has a financial or other interest at stake and so communicates an unrealistic assessment about the utility of that method for a particular investigation. This can consume limited financial/temporal resources and unreasonably raise the hopes of families. To be clear, this is not to say that a method is not useful in certain contexts, only that a fair and reasonable assessment of its utility must be given and made clear at the outset so that stakeholders can decide if it is a method that they wish to employ. The same can be true of GIS analysis. Conversely, in Canada we see the widespread use of ground penetrating radar to locate possible unmarked burials at Indian Residential Schools. In this latter instance, the possible burials have not been excavated and experts and affected communities are being cautious in speaking about unproven results. Nevertheless, the press and others have been quick to use less cautious language, speaking with certainty of "mass graves" (which is distinct from many, individual unmarked or clandestine graves).

Response to Q7.

The indispensable tools depend on the context in which the investigations are being carried out and the capacities of the authorities, organizations, universities, or groups of families with missing persons using them. However, we recommend using specific tools to facilitate the collection, storage, and analysis of data that support the search for missing persons. Most of these tools are Open Source, which means that they are freely accessible, in addition to the fact that the original code under which they were developed is available.

Simple applications such as KoboToolbox and Uwazi, which have been used in humanitarian applications, can be used for data collection and storage. KoboToolbox is a survey tool for mobile phones that allows for taking testimonies, georeferencing information, and upload of information to secure servers in order to avoid detection on surveyors phones. Uwazi is a content management system that allows a public or private website to be built tostore data for different uses including criminal investigations, public advocacy, and generating statistical information for research.

For information analysis, we recommend using Geographic Information Systems (GIS). The most widely used software applications, given their ease of use and analysis capabilities, are ArcGIS (proprietary) and QGGIS (open source).

Knowledge inprogramming languages such as R programming language and the Python programming language can be used to perform spatial operations and even analyze satellite imagery. The advantage of using these languages is that the results can be reproduced and audited since the steps performed can be followed by analyzing the original code. However, they require greater technical expertise.

While there are many options for free and open source software packages, often the best sources of imagery and other forms of data may be financially costly and thus pose

significant hurdles to human rights groups and victim families. New developments in radar (such as high resolution SAR) and aerial optical imagery collection (satellites, drones, etc.) often happen in industry, thus radar and optical imagery can be costly. Agreements with industry partners that collect high resolution imagery and radar to provide human rights organizations with such data, or legal frameworks that require industry to provide imagery or radar that may show the commission of a crime to authorities may reduce costs of data acquisition.

Response to Q8.

In Mexico, machine learning and spatial analysis techniques have been used to support the search for missing persons during the last six years. Specifically, these tools have been implemented to identify potential search areas with clandestine graves in the country.

A first approach was implemented using machine learning to identify municipalities with high probabilities of graves that have not yet been observed or registered by authorities, journalists, or groups of families with missing persons (Price & Ruiz Reyes, 2021). For example, this tool showed that in 2011, 573 municipalities had a probability of 0.5 or higher of having a clandestine grave; in 2012, 30.5% of these 573 municipalities reported a hidden grave.

Although this first tool had limitations – specifically to the predicted geographic area – the results have been used by authorities, NGOs, and groups of families with missing persons to support context studies of disappearances and advocacy processes. In May 2020, the Argentine Forensic Anthropology Team (EAAF in Spanish) used the results to develop a forensic diagnostic of the state of Veracruz in the southeast of Mexico. Moreover, in September 2020, a report about the situation of disappearances in Guanajuato highlighted potential search areas that the National Search Commission later confirmed on Missing Persons.

A second approach has been implemented since 2022 in Baja California, Mexico, to support the search for hidden graves. This approach combines geographic information systems, spatial statistics, and remote sensing to identify potential search areas, using the information of 52 georeferenced graves provided by the Local Attorney's Offices of Baja California (Alegre Mondragón et al., 2022).

By combining three layers of information that consider the spatial distribution of hidden graves, the spatial visibility and accessibility of specific areas, and the accumulation of nitrogen identified through satellite images, the study has been able to reduce potential search areas in the state by 78%. These results are now being shared with groups of families with missing persons in the region to support their search and advocacy strategies.

Response to Q9.

The search for recent burials is generally conducted through witness testimony and a visual search. However, as time passes, witnesses are reduced and the visual signs of a burial invisible (Congram et al. 2022). In these instances, understanding spatial behaviour related to the modus operandi of those responsible for disappearances and burials and contextualizing this against physical and social barriers to hiding disappearance is valuable using GIS and spatial analysis. Increasingly, satellite imagery archives are useful for identifying possible burial sites, both in terms of their accessibility, quality, and quantity/coverage. Access is often open or imagery is available from commercial providers, though cloud or forest canopy coverage continues to be a challenge in some instances.

Q 10.

Refer to answer in question 7 for examples of effective tools.

11. What are the "evidences" that you would regard as essential to prove the crime of enforced disappearance and that can be retrieved through the use of new technologies? Do you see any specific problem in the preservation of the chain of custody here and in the admissibility of some specific pieces of evidence of this crime collected through the use of new technologies?

Spatial analysis can be critical as linkage evidence, which suggests coordinated, organized efforts to commit disappearances. This is clear from investigations in the former Yugoslavia where the close proximity of secondary mass graves (reburials by the perpetrators) show tight spatial clustering.

In terms of admissibility, GIS and spatial analysis is an investigative tool. As such, it will be indicative or suggestive of burial sites and as linkage evidence, but it must be validated by other lines of evidence (exhumations and identification of victims, witness testimony, etc.).

13. What are the main issues related to the subject of "new technologies and enforced disappearances" that should be covered in the findings and recommendations included in the thematic study of the Working Group?

That new technologies are complementary and should not be seen as replacing standard, basic techniques such as good witness interviewing, intelligence gathering, and conventional investigation practice. New technologies will complement other methods and can increase success rates and economize the search.

The potential tradeoffs between the immediate threats to human security and potential violations of privacy that comes from using data and technologies. As Latonero has stated, "there may come an inflection point in the situation where the immediate danger to human security is higher than the protection of an individual's privacy. When there is no longer an immediate threat to human security, there is every reason to uphold the integrity of the individual's privacy right at a high level" (Latonero, 2018). Nonetheless, these inflection points or thresholds between privacy and threats to human security can vary depending on the victim, time, and the social and political context of the disappearances. It is essential to develop further guidelines highlighting the potential risks and benefits of using these technologies and their implication for privacy and data protection.

Rather than identifying specific software, it might be useful to focus on workflows related to new technologies that result in specific evidence types and goals - such as advocacy, criminal evidence for prosecution, investigative evidence for new leads, or other goals. This may better indicate the existing and potential role of new technology in advancing approaches to specific ends.

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