Disaster Victim Identification in the Context of Information Science

Rodrigo Goncalves Teixeira
Expert in Forensic Science Applied to Crime Scenes, Academia Nacional de Polícia (ANP/PF), Brasília, DF, Brasil.
Federal Forensic Expert, Delegacia de Polícia Federal em Santos (DPF/STS/SP), Santos, São Paulo, Brazil.
http://lattes.cnpq.br/3274864610636523

Adilson Luiz Pinto
PhD in Documentation, Universidad Carlos III de Madrid, Getafe, Comunidad Autonoma de Madrid, Spain.
Associate Professor 4, Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, Brasil.
http://lattes.cnpq.br/4767432940301118

ABSTRACT

Disasters are topics of great sociological interest for several reasons, including the deaths that eventually occur and the serious damage caused. In disasters with multiple fatalities, forensic identification is essential for humanitarian, civil and criminal reasons. This identification process is internationally called Disaster Victim Identification (DVI). The DVI process dynamics requires protocol adoption aiming to minimize the damages resulting from the event and to maximize the available resources to accomplish the mission successfully. In this vein, it's imperative the definition of an effective communication structure that ensures critical information is transmitted to recipients. Objects of Information Science study are present in all activities developed in a DVI response, from the origin of information to its retrieval and use. The objective of this article is to demonstrate some aspects of Information Science in the DVI response, for this in the first section there is an introduction aiming to offer a first contact with the proposed theme, followed by a section with a literature review on DVI. The third section seeks to present the relationship and some aspects of Information Science in the DVI activity. In the fourth section, the dynamics of the activities are presented in a real case: the DVI response on the occasion of the rupture of the Brumadinho dam. The fifth and last section presents the final considerations.

Keywords: disaster victim identification; mass disaster; information science; Brumadinho; information management.

INTRODUCTION

Disasters are phenomena that generate great social interest, and are considered the result of adverse events, whether natural or man-made, on a (vulnerable) ecosystem, causing human, material and/or environmental damage and resulting in economic and social losses (Brasil, 1999).

The *United Nations Developed Program* (UNDP, 2004) defines natural disasters as a serious disruption triggered by a natural hazard that causes human, material, economic or environmental losses that exceed the ability of those affected to address it. According to this concept, if local resources are not sufficient to address the incident, the event is considered a disaster, therefore, this classification is not directly related to the number of possible casualties.

For example, in 2014, the crash of the plane carrying Presidential candidate Eduardo Campos in Santos/SP killed seven people in total, not a high number of deaths when compared to several other past disasters; however, due to the characteristics of such event, agencies from other cities and even other states participated in the service; therefore, the fact can be classified as a disaster.

Disaster management involves the actions of different actors, with different responsibilities and capabilities, for example, volunteers, agencies at different levels (local, state and federal), victims in a position to assist (Mattedi, 2017) and disaster victim identification (DVI). The main purpose of the DVI response is identifying bodies in mass disasters, with the aim of delivering the remains to the corresponding families, thus enabling funeral rituals according to each religion, as well as providing the resolution of legal aspects, such as, for example: death certificates and life insurance.

In the context of disaster management, DVI response must be guided by existing protocols aimed at minimizing damage resulting from the event and maximizing available resources so that the goals are successfully achieved. One important definition is the development of a communication structure that ensures that critical information is conveyed to recipients.

In view of the sociological aspects involving the proposed theme in light of the disaster victim identification paradigm, this paper aims to address concepts and research areas of Information Science in the DVI process, guided by the standardized procedures in the International Criminal Police Organization–INTERPOL DVI Guide (2018). As a specification, we will address a case study (Brumadinho Disaster) based on the DVI process and its four phases (1- Scene examination; 2- *Post mortem*; 3- *Ante mortem*, and; 4- Reconciliation).

The INTERPOL DVI Guide proposes to the member countries of this Community a working methodology, as well as tactical and operational guidelines to be used in multinational events. This manual aims to provide synchronization and alignment of conduct in a situation that requires the adoption of the DVI process, for a quick and efficient response.

For this article, a bibliographical review of concepts on topic DVI was conducted, emphasizing some points in this process regarding the timeliness and precision required in information flows. Subsequently, the relationship between Information Science, the topic

and the DVI process was outlined. Then, the case study was applied, working on the DVI process and how Information Science complements its understanding. At last, the final considerations of the study.

Methodologically, this study focused on establishing an applicable list of the contributions of Information Science in the DVI response protocol and did not follow a systematic review of the literature for a simple reason: there are few studies of this kind. Thus, the focus was, first, to gather texts that address disasters and, subsequently, to identify the nuances of the DVI protocol with Information Science and its classical studies in the reasoning.

This way, the entire relationship between DVI and Information Science seems extensive, however it seems logical to contemplate numerous representations, such as Information Retrieval in the Scene Examination phase process; the application of the Organization of Information and Knowledge in the *Post mortem* phase; the representation of the Information Service in the *Ante mortem* phase; of Technology and Information System in the Reconciliation phase, and; Information flow for the case study context in Brumadinho. Of course, indirectly, but present in the DVI context. Due to these relationships, these contributions were made clear.

The present study was based on the experience of one of the authors, a Federal Forensic Expert, of handling the DVI response in Brumadinho/MG, occasion on which he had the opportunity to participate in phase 1 (Scene examination) of the process and also becoming familiar with the routine of phases 2 (*Post mortem*), 3 (Ante mortem) and 4 (Reconciliation).

This work is presented so that readers can understand the dynamics of the DVI process and its conceptual relationship with Information Science, bringing to light fundamental concepts of the Organization and Representation of Knowledge and the need for Information to be objective for it to be useful. The idea of researching the topic arose as one of the authors, a Federal Forensic Expert, is pursuing his Master's degree in Information Science by means of an agreement between the Federal University of Santa Catarina and the Federal Police in a project called "Acordo MINTER" (MINTER Agreement), the other author being a researcher at the University.

DVI

Disasters have always generated great interest in society due to several factors linked to these phenomena. Aspects related to causes, consequences and effects motivate research every time an event occurs. Among the different areas of knowledge that research this topic, there are specific ones that focus on DVI response. The relevance of DVI can be seen in countless ways, as Almeida (2000, p. 29)[1] wrote:

---

1   Translation: "Identification therefore constitutes one of the main objectives of handling mass disaster casualties, having a medical-legal and sociological basis. Medical-legal reasons include factors as diverse as death certificate, succession and the right to take legal action for damages suffered, in addition to the payment of insurance policies. The sociological reasons are based on the unquestionable right to identity, which is common to all human beings, even after death, a fact corroborated by one of the clauses of the United Nations Declaration of Human Rights, as well as by the justified respect for the will of the deceased, traditionally respected, in the sense of carrying out their funeral ritual according to their wishes" (Almeida, 2000, p. 29, editorial translation).

A identificação constitui, portanto, um dos principais objetivos da manipulação das vítimas de desastres de massa, tendo fundamentação médico-legal e sociológica. As razões médico-legais compreendem fatores tão diversos quanto à certidão de óbito, a sucessão de bens e o direito de mover ações legais pelos danos sofridos, além do pagamento de apólices de seguro. Os motivos sociológicos têm base no inquestionável direito à identidade, que é comum a todos os seres humanos, ainda que após a morte, fato corroborado por uma das cláusulas da Declaração de Direitos Humanos da Organização das Nações Unidas, assim como pelo justificado respeito à vontade do falecido, tradicionalmente respeitada, no sentido de efetuar o ritual fúnebre consoante o seu desejo.

The DVI process is basically divided into four phases: scene examination, *post mortem*, *ante mortem* and reconciliation (Brasil, 2020):

scene examination: set of systematized procedures for searching, rescuing and storing bodies, carried out at the disaster site;

post mortem: collection and recording of the victims' data by means of a systematized process of internal and external examination of bodies and remains;

ante mortem: collection and recording of data on missing persons by means of a systematized process of searching for information from family members and other institutions, and;

reconciliation: carrying out primary and secondary identifications.

These four phases interact insofar as the activities carried out in phases scene examination, *post mortem* and *ante mortem* will produce the necessary information to encourage reconciliation with a view towards identification. In this context, specifically, the scene examination and *postmortem* phases are developed sequentially, and there must be a refined communication channel between them, defined by the coordination of the activity.

FIGURE 1 – DVI Process I
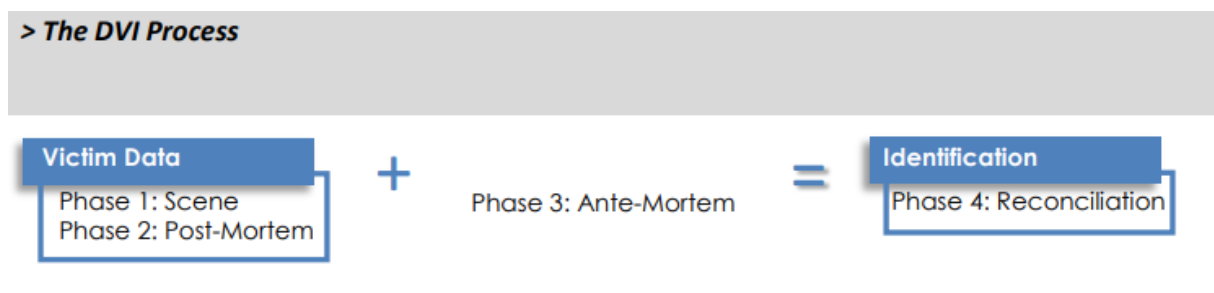
Source: Elaborated by the author based on the INTERPOL DVI Guide (2018).

The INTERPOL DVI Guide (2018) includes a suggestion for a management structure that aims to enable the coordination, control and monitoring of all phases of the process through pre-established channels for information flow, as well as enabling an effective connection with key members of the general disaster response command and other institutions participating in the event.

FIGURE 2 – Standard DVI Command Structure
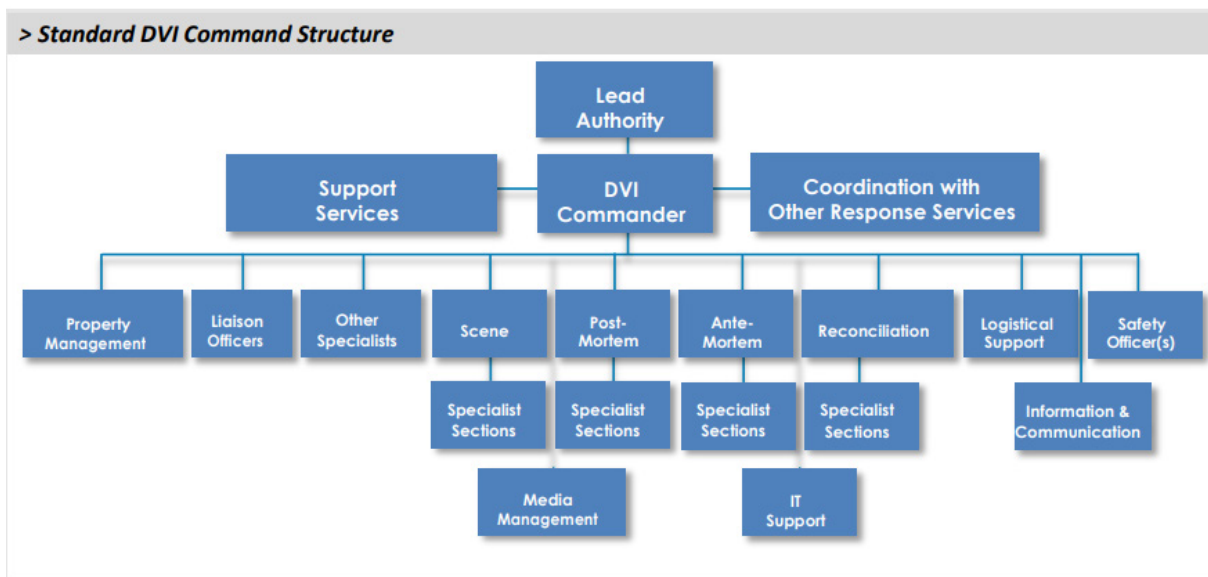
Source: Elaborated by the author based on the INTERPOL DVI Guide (2018).

Among the various functions of the DVI Commander listed in the INTERPOL DVI Guide (2018), two are of special interest to this research, namely: appointing DVI phase coordinators and implementing communication channels that facilitate the coordination and flow of information. DVI Phase Coordinators are expected to be able to monitor all aspects of their work area to ensure that procedures are being followed correctly, that issues are addressed proactively, and that the DVI Commander is accurately informed of the key questions.

Winksog, Tsokos and Byard (2012, p. 82, our translation)[2] emphasize:

> Um desastre quando ocorre requer intervenção profissional, coordenada e uma abordagem ponderada deve ser adotada, ao invés de *ad hoc* ou uma mobilização não autorizada de indivíduos treinados de forma variável ou equipes que atuaram algumas vezes no passado [...] e isso levará a uma melhor coordenação entre os profissionais de diferentes formações ao trabalharem juntos para objetivos mútuos importantes de localização da vítima, preservação, identificação e repatriação.

The accuracy of information and information flows is crucial for carrying out DVI activities. With accurate and timely information, for example, it is possible to optimize the locations of search and recovery teams (Cardoso, 2015).

As recommended in the INTERPOL DVI Guide (2018), in the scene examination phase, the scene must be treated as a crime scene, therefore all procedures generally used for this type of forensic examination must be used, such as isolating the area and preserving evidence traces until these are analyzed by forensic experts and DVI specialists. At this phase,

---

2   Original: "When a disaster occurs that requires professional intervention, a coordinated and considered approach should be adopted rather than ad hoc and unauthorized mobilization of variably strained individuals and teams that has sometimes occurred in the past [...] and that this will lead to better coordination between disciplines when working together towards the important mutual goals of victim location, preservation, identification and repatriation" (Winksog; Tsokos; Byard, 2012, p. 82).

DVI activities include photographic records, recordings, description, labeling, georeferencing, among others, which need to be coordinated and associated with the recovery, storage and transport of mortal remains.

Following existing protocols, forensic experts when working on DVI responses have the ability to guide less experienced forensic professionals, as well as other actors working on the incident. Observance of theoretical principles tends to increase interaction between all agents involved (Winksog; Tonkin; Byard, 2012).

As recommended in the INTERPOL DVI Guide (2018), in the *postmortem* phase, the processing, examination and storage of all recovered remains is carried out, and such remains must be kept under protection pending formal identification and release by the coroner or other established formal authority. Examination processes and methods applied during the *postmortem* phase include photography, papilloscopy (fingerprinting), radiology, dentistry, DNA sampling, and autopsy procedures. In addition to examining the remains, personal items such as clothing and jewelry must be thoroughly examined, cleaned, and stored.

Conceptual relationship of Information Science in the DVI process

Disaster scenarios can have different specificities, but, as a rule, chaos ensues at the scene of the event itself and can spread for kilometers. Lack of electricity, water, food, shelter, access (roads/streets) are examples of facts that may be present in these places. Therefore, the response of government agencies must be quick, first, preserving the physical integrity of the rescue teams so that they do not become rescuees, and immediately seek to rescue victims of the event. Information and information flows must be efficient and timely.

Many believed that Knowledge Organization would be restricted to Library Science and Information Science environments, however, research and studies developed in recent decades have shown its applicability to various types of knowledge and services that would require Organization and Knowledge Representation systems (Dahlberg, 1993), as is the case with the DVI process.

The relevance of information is associated with its timely provision, in an effective and efficient manner, capable of eliminating non-relevant information because "[...] se não é relevante, não é informação [...]" (Pinheiro, 2004)[3]. The quality of information is directly related to its reliability, relevance and consistency (Wu, 2018). The users' perception of the usefulness of the information will allow the evaluation of its quality.

Thus, we can cite the teachings of Borko (1968), who stated that Information Science investigates the informational properties and behavior, the forces that govern its flow, aiming to optimize accessibility and its use.

Borko (1968) also pointed out that Information Science studies the source, collection, organization, storage, retrieval, interpretation, transmission, transformation and use of information. Initially, what is sought in the DVI process is to obtain accurate information, both

---

3   Translation: "[...] if it is not relevant, it is not information [...]" (Pinheiro, 2004, editorial translation).

on the bodies and on the missing persons, which would be the sources of the information. Then, continuously, without a continuity solution, there is concern for all areas studied by Information Science.

"O propósito da Ciência da Informação é facilitar a comunicação de informações entre seres humanos" (Belkin; Robertson, 1976)[4]. So, if the purpose of the DVI process is to obtain precise information and refined information flows, Information Science is adhered to the process.

Regarding information retrieval, which is the most important component of Information Science (Saracevic, 1996), a practical example that takes place in the DVI process, and is of utmost importance, is the search in government databases for information on missing person reports. In Brazil, the State Law Enforcement Departments are required to submit the civil identification records of missing persons, since, as a rule, they include the fingerprints, which can enable papilloscopic comparisons, which is a quick and effective identification. Thus, it is clear that Information Science permeates the DVI process, and can offer opportunities for improvements in various activities and flows.

Capurro (2003, online)[5] addressed topic Information System as follows:

> Vê-se aqui claramente que a avaliação de um sistema de informação não está baseada meramente no *matching* de um dado de entrada (*input*) com outro dado previamente registrado, mas que esse dado registrado é concebido como uma oferta frente à qual o usuário desempenhe um papel eminentemente ativo. Tal atividade procede não só de sua consciência ou de seus "modelos mentais", mas seus conhecimentos e interesses prévios à busca estão de início entrelaçados nas redes social e pragmática que os sustentam.

The DVI process can be analyzed as an Information System, where the inputs would be the information on bodies and missing persons (sources of information) that allow identification, in this case the outputs (use of information). In this system, the collection, organization, storage, recovery, interpretation, transmission and transformation would occur during the various activities that permeate the process, such as, for example, the preservation of bodies, examinations by coroners and dentists, in the flows of information between teams and coordinations. Processes are the forms of interaction, coordination, communication and decision-making through which resource inputs, data on bodies and victims are transformed into products and services of greater value: identification (Christensen, 1997).

The training of actors involved in a DVI response can facilitate information flows, because, since several activities take place simultaneously, a leveling of prior knowledge is of paramount importance, as it allows "everyone to speak the same language" and have an idea of how the system mechanism works, and thus understand the context in which they are

---

4   Translation: "The purpose of Information Science is to facilitate the communication of information between human beings" (Belkin; Robertson, 1976, editorial translation).
5   Translation: "It is clear that the evaluation of an information system is not based merely on matching an input data with a previously recorded data, but that this recorded data is conceived as an offer against which the user performs an eminently active role. Such activity originates not only from their consciousness or their "mental models", as their knowledge and interests prior to the search are initially intertwined in the social and pragmatic networks that support them" (Capurro, 2003, online, editorial translation).

acting and how their attributions impact and are impacted by other actors. The message being enunciated, intentionally, in the transfer is not enough, it must reach compatible semantic spaces in sensitivity, understanding and acceptance (Barreto, 1999).

Capurro (2003, online)[6] addressed the issue of pre-understanding a specific field of knowledge in which the user is, in a certain way, inserted when addressing hermeneutics as a paradigm of Information Science:

> A hermenêutica como paradigma da ciência da informação postula justamente a diferença entre pré-compreensão, oferta de sentido e seleção, tomando como marco de referência, não a pré-compreensão de um sujeito ou usuário isolado, mas as de determinada comunidade assim como a de um campo específico de conhecimento e/ou de ação no qual o usuário está já implícita ou explicitamente inserido.

Training DVI teams is a relevant matter in the INTERPOL DVI Guide (2018), which recommends that "in order to maintain adequate competency standards in contemporary DVI practices, protocols and procedures, jurisdictions should consider maintaining training regimes that cover all DVI aspects and disciplines". In this sense, the value of information lies precisely within the possibility of applying knowledge to a practical demand (Capurro, 2003).

In several manuals, articles and books that address DVI, there is great concern for Information Management, present in all activities in this process, ensuring its availability to all areas involved and requiring appropriate spaces to store it (Araujo, 2014). This management is a key function for the main purpose to be achieved: identification (Morgan, 2009). Information management is the process in which accurate, adequate, timely information is sourced in an appropriate location aiming to employ resources to manage it within an organization (Ponjuán Dante, 2007).

DVI response in Brumadinho: information flow

In this section we intend to associate Information Science concepts with a real case, the DVI response in Brumadinho. In this event, one of the authors, a Federal Forensic Expert, worked in the scene examination phase over the course of twelve days, and had the opportunity to learn about activities carried out in the other three DVI phases: *post mortem*, *ante mortem* and reconciliation.

On January 25, 2019, around noon, the B1 Dam of the Córrego do Feijão Mine, located in the municipality of Brumadinho, in Minas Gerais, collapsed. This rupture triggered the displacement of a large mass of mud and waste from the mining process, which spread for kilometers from the epicenter of the event, killing 270 people and causing enormous environmental damage. In addition to the operational and administrative areas of mining

---

6   Translation: "Hermeneutics as a paradigm of information science postulates precisely the difference between pre-understanding, provision of meaning and selection, taking as a reference point, not the pre-understanding of an isolated subject or user, but that of a given community as well as that of a specific field of knowledge and/or action in which the user is already implicitly or explicitly inserted" (Capurro, 2003, online, editorial translation).

corporation Vale, the mud flowed into communities in the region, reaching the Paraopeba River, a tributary of the São Francisco River. Considering the extent of the disaster, the Law Enforcement Department of the State of Minas Gerais relied on the support of professionals from other states, as well as the cooperation of the Federal Police.

Scene Examination Phase

The scene itself was the region affected by the mudflow. In this region, access was restricted to professionals authorized to work in that area of interest. To support the operations carried out on site, an operational base was set up in a nearby region using the facilities of the Nossa Senhora das Dores Church, known in the theater of operations as Base Igrejinha.

At Base Igrejinha, an expert station was set up where forensic experts, coroners and investigators took turns. In addition to this unit, several professionals with different functions were assigned to work there, such as: sheriffs, police clerks, drivers, social workers, coordinators, IT technicians, administrative technicians, communication service and other professionals from the Civil Police of the state of Minas Gerais, integrated with firefighters, the military police, armed forces (army), civil defense and volunteers with the mission of organizing and managing the work process from location of the fatal victims to the proper disposal of the bodies (Rocha, 2020).

The operational recovery flow began from the time the search teams located a body or fragment of a body, which was treated as if it were a body. Mud removal was carried out in detail, in order to preserve all traces linked to the body, such as, for example, badges, wallets, cell phones, as these could be of great interest for the identification process. The next step was to place the body and related remains in a body bag and request the helicopter to transfer it from where the body was found to the forensic station at Base Igrejinha. The location from which the helicopter removed bodies was georeferenced and this data was passed to the Command Center. Each body removed also received a sequential number starting every work day, composed of the date and time stamp. This set of data (sequential numbering, date and time stamp, and coordinates) was made available by the Command Center to all the Institutions involved, thus enabling uniformity in control records.

As advised by the *postmortem* phase teams, a procedure that was adopted over the days by the search and recovery teams was the bagging of the heads and hands, aiming to preserve the dental and papilloscopic remains, from the site to processing at the Forensic Medicine Institute.

Special attention was given to traces not linked to bodies, but that could serve as a support in the identification process. Several backpacks were found, as well as badges, documents and cell phones. These traces were georeferenced, described, photographed and then collected for submission to the Forensic Medicine Institute.

Georeferencing the remains found at the scene helped determine the distribution of search and recovery teams, as the processing of this information allowed one to understand

the mudflow dynamics. For example, the Vale restaurant was one of the places where the largest number of people was expected to be found, as the event took place close to lunchtime. The location of traces from the restaurant led the search and recovery teams to work more intensively in that region.

Upon receiving the bodies at the forensic station at Base Igrejinha, the professionals described, labeled, photographed and associated them with data on the geographic coordinates of the recovery site, and associated them with the sequential number and date and time stamp using data from Command Center. After such procedures, the bodies were stored in a refrigerated container until they were transferred via hearse to the Forensic Medicine Institute, which would receive, in addition to the bodies, all the documentation produced on site.

Postmortem Phase

The *postmortem* phase activities were carried out at the Belo Horizonte Forensic Medicine Institute, approximately 70 kilometers from the scene of the incident. That is where coroners, dentists, papilloscopists, forensic anthropologists, autopsy assistants, among other professionals, worked. The exams aimed to identify, determine the cause of death, as well as define the harmful agent.

In order to deal with the large number of bodies and body fragments, logistics were necessary to adapt the Forensic Medicine Institute's procedures. In the first few days, technical discussions took place, and as the days went by, a work process focused on that specific demand started being reorganized (Rocha, 2020).

Upon receiving the bodies carried in hearses, the professionals working at the Forensic Medicine Institute registered, numbered and immediately refrigerated such bodies. The refrigerated bodies were subjected to radiological examinations, tomography scans, collection of genetic material and papilloscopic examinations, then were sent to await necroscopic and dental examinations.

Forensic anthropology handled bodies in an advanced state of decomposition. Identification by this branch of Science takes place through the validation of generic identity factors, called biological profile, which encompasses four parameters: ancestry; age at death (age group); sex and height (Cunha, 2019).

The great fragmentation of the bodies, due to the intensity of the destruction, generated obstacles to the provision of Death Certificates. How can one claim someone is dead when the only part that was found was their hand? A software was developed during the Brumadinho incident response to control the segments found, making it possible to know whether a given fragment was from an unidentified individual or not, and how many parts are missing to make up the full body. This software was recently presented at an INTERPOL[7] annual meeting on DVI in Singapore (Rocha, 2020).

---

7   INTERPOL: The International Criminal Police Organization.

Ante mortem Phase

The *ante mortem* phase activities were held at the Minas Gerais Police Academy (ACADEPOL/MG), where, among other professionals, social workers and psychologists provided support to the families of missing persons; such families were interviewed and subjected to a registry to facilitate the identification of fatal victims. In the interviews, family members provided information about the missing persons (particular skin spots, dental exams, congenital malformations, medical records, surgical information, use of orthoses and prostheses, among others), aiming to contribute to the identification of the bodies. Later, family members were called to take part in procedures to identify and release the bodies.

One of the initial problems was that persons were reported missing by more than one family member, generating repeated information. Initially, 517 families were registered with ACADEPOL/MG and reported missing family members in the tragedy (Rocha, 2020). Organizing the list of missing persons was one of the main activities of the *ante-mortem* teams, in order to generate a reliable list of missing persons.

Reconciliation Phase

The primary means of identification are papilloscopy, forensic dentistry and forensic genetics; through these, identification is carried out. Secondary means of identification (personal description, medical findings, tattoos, objects and clothing) were used to guide the identification using the primary means or as a way of excluding certain findings (Rocha, 2020).

One of the tools used for identification via papilloscopy was Alethia software, which made it possible to identify 47% of the rescued victims and considerably reduced the response time for their families. This system was developed by the National Identification Institute (INI) of the Federal Police, consisting of a portable Automated Fingerprint Identification System (AFIS) and a biometric kit (Souza *et al*., 2021).

Regarding identification by forensic dentistry, *software* PLASSDATA was used, as recommended by INTERPOL for managing DVI data. The system was fed with data from medical records using dental information provided by the relatives of the missing persons.

At this phase, the teams were also responsible for releasing the bodies and guarding materials for reconciliation examinations.

FINAL CONSIDERATIONS

In the DVI process, the main input is information. Information related to dead bodies, obtained at the site where they were found and by means of due processing carried out at the Forensic Medicine Institute. Information related to missing persons, obtained mainly from family members. Reconciling this information allows identification.

Actors involved in a DVI response must be prepared to work in inhospitable environments where sociological and humanitarian appeals cause great pressure for immediate responses. Psychological, physical and DVI training must be considered in this desired preparation.

Initially, a lot of data related to the event is offered by several different sources, such as, for example, people, audiovisual records and traces. This data must be treated accurately to be transformed into relevant information and feed the system that aims to identify fatal victims. Once the system is fed, actors involved in different activities taking place at the same time will be able to carry out the desired work within their attributions, producing new information and knowledge.

The INTERPOL DVI Guide proposes a work methodology divided into four phases that take place concomitantly. Information Science, with all its scientific apparatus, can add value to the DVI process by means of informational processing, filtering, data visualization, and sizing aimed at explaining the informational processes. Therefore, the combination of the DVI processes proposed by INTERPOL, with the frameworks that Information Science has to offer in a critical disaster situation, tends to be a branch of informational processing, which is also the research subject of this Science.

For future research, one may suggest research on the existence of Information Technology tools in other countries that can optimize the collection, storage and recovery of information from multiple casualties in disaster environments.

REFERENCES

ALMEIDA, C. A. P. **Proposta de protocolo para identificação odonto-legal em desastres de massa**. 2000. 79 f. Tese (Doutorado em Odontologia Legal e Deontologia) – Faculdade de Odontologia de Piracicaba da Universidade Estadual e Campinas, Piracicaba, 2000.

ARAUJO, C. A. Á. Fundamentos da Ciência da Informação: correntes teóricas e o conceito de informação. **Perspectivas em Gestão & Conhecimento**, João Pessoa, v. 4, n. 1, p. 57-79, jan./jun. 2014. Available at: https://periodicos.ufpb.br/ojs2/index.php/pgc/article/view/19120. Access on: 11 mar. 2022.

BARRETO, A. A. Os destinos da Ciência da Informação: entre o cristal e a chama. **Informação & Sociedade**: estudos, Paraíba, v. 9, n. 2, 1999. Available at: https://periodicos.ufpb.br/ojs2/index.php/ies/article/view/397. Access on: 06 jan. 2022.

BELKIN, N. J.; ROBERTSON, S. E. Information Science and the phenomenon of information. **Journal of the American Society for Information Science**, [*s. l.*], v. 27, n. 4, p. 197-204, jul/ago. 1976. DOI: 10.1002/asi.4630270402.

BORKO, H. Information science: what is it?. **American Documentation**, [*s. l.*], v. 19, n. 1, p. 3-5, jan. 1968.

BRASIL. Polícia Federal. Instrução Normativa nº 176-DG/PF, de 25 de agosto de 2020. [Institui a Comissão Permanente de Identificação de Vítimas de Desastres – CPDVI da Polícia Federal e disciplina o acionamento e a resposta em Identificação de Vítimas de Desastres – DVI no âmbito da Polícia Federal]. Brasília: **Ministério da Justiça e Segurança Pública**, 26 ago. 2020.

BRASIL. Resolução nº 3, de 2.7.99, do Conselho Nacional de Defesa Civil. Institui o Manual para a Decretação de Situação de Emergência ou de Estado de Calamidade Pública. Brasília: **Diário Oficial da União,** 1999. Available at: https://www.defesacivil.rs.gov.br/upload/arquivos/201511/04145516-02-manual-para-decretacao-de-situacao-de-emergencia-ou-de-estado-de-calamidade-publica-volume-1.pdf. Access on: 11 ago. 2021.

CAPURRO, R. Epistemologia e Ciência da Informação. *In*: V ENCONTRO NACIONAL DE PESQUISA EM CIÊNCIA DA INFORMAÇÃO, 5., 2003, Belo Horizonte. **Anais** [...]. Belo Horizonte: UFMG, 2003. Available at: http://www.capurro.de/enancib_p.htm. Access on: 30 set. 2021.

CARDOSO, D. **Enchentes**, deslizamentos e a sociedade em rede: um estudo sobre o fluxo de informação em desastres naturais a partir do caso de Petrópolis 2013. 2015. 65 f. Dissertação (Mestrado em Ciência da Informação) – Universidade Federal de Santa Catarina, Centro de Ciências da Educação. Programa de Pós-Graduação em Ciência da Informação, Florianópolis, 2015.

CHRISTENSEN. C. **O dilema da inovação**: Quando as novas tecnologias levam as empresas ao fracasso. São Paulo: MBooks, 1997.

CUNHA, E. Devolvendo a identidade: a antropologia forense no Brasil. **Ciência e Cultura**, São Paulo, v. 71, n. 2, p. 30-34, abr./jun. 2019. Available at: http://dx.doi.org/10.21800/2317-66602019000200011. Access on: 11 ago. 2021

DAHLBERG, Ingetraut. Knowledge Organization: Its: Scope and Possibilities. **Knowledge Organization**, v. 20, n. 4, p. 211-222, 1993.

INTERPOL. **Disaster victim identification guide**. 2018. Available at: https://www.interpol.int/How-we-work/ Forensics/Disaster-Victim-Identification-DVI. Access on: Access on: 11 ago. 2021.

MATTEDI, M. Dilemas e perspectivas da abordagem sociológica dos desastres naturais. **Tempo Social**, São Paulo, v. 29, n. 3, p. 261-285, dez. 2017.

MORGAN, Oliver. **La gestión de cadáveres en situaciones de desastre**: guía práctica para equipos de respuesta. Washington, D.C.: OPS, 2006. ISBN 92 75 32630 4.

PINHEIRO, L. V. R. Informação: esse obscuro objeto da Ciência da Informação. **Revista Morpheus**: estudos interdisciplinares em memória social, Rio de Janeiro, v. 3, n. 4, 2014. Available at: https://seer.unirio.br/morpheus/ article/view/4108. Access on: 06 maio 2021.

PONJUÁN DANTE, G. **Gestión de Información**: dimensiones e implementación para el éxito organizacional. Gijón: Trea, 2007. ISBN: 978-84-9704-324-3.

ROCHA, C. S. **Atuação da equipe multidisciplinar do Instituto Médico Legal de Belo Horizonte frente ao rompimento da Barragem B1, da Mina do Córrego do Feijão, em Brumadinho**. 2020. 72 f. Dissertação (Mestrado Profissional em Promoção de Saúde e Prevenção da Violência) – Faculdade de Medicina da Universidade Federal de Minas Gerais, Belo Horizonte, 2020.

SARACEVIC, T. Ciência da informação: origem, evolução e relações. **Perspectivas em Ciência da Informação**, Minas Gerais, v. 1, n. 1, p. 41-62, jan./jun. 1996.

SOUZA, M. A.; URTIAGA, G. O.; MELO, F. R.; DA SILVA, L. M. Identificação de vítimas de desastre por impressões digitais: o rompimento da barragem de Brumadinho. **Revista Brasileira de Ciências Policiais**, Brasília, v. 13, n. 7, p. 337–350, jan./abr. 2022. ISSN 2178-0013. ISSN Eletrônico 2318-6917. DOI: 10.31412/rbcp.v13i7.839.

UNITED NATIONS DEVELOPMENT PROGRAMME – UNDP. **Report Reducing Disastrer Risk**: a challenge for development a global report. New York: John S. Swift Co., Inc. 2004. p. 146. Available at: https://www.undp.org/publications/reducing-disaster-risk-challenge-development. Access on: 11 ago. 2021.

WINKSOG, C.; TSOKOS, M.; BYARD, Roger W. The progression from disaster victim identification (DVI) to disaster victim management (DVM): a necessary evolution. **Forensic Science, Medicine e Patholology**, [*s. l.*], v. 8, n. 2, p. 81-83, 2012. DOI: 10.1007/s12024-011-9295-9. Available at: https://link.springer.com/article/10.1007/s12024-011-9295-9. Access on: 11 mar. 2022.

WINKSOG, C.; TONKIN, A.; BYARD, R. W. The educational value of disaster victim identification (DVI) missions-transfer of knowledge. **Forensic Science, Medicine and Patholology**, [*s. l.*], v. 8, n. 2, p. 84-87, jun. 2012. Available at: https://link.springer.com/article/10.1007/s12024-011-9259-0. Access on: 11 mar. 2022.

WU, B. Patient continued use of online health care communities: web mining of patient-doctor communication. **Journal of Medical Internet Research**, Shanghai, v. 20, n. 4, p. 1-15, abr. 2018. Available at: 10.2196/jmir.9127.