

Digital Generation and Posthumous Interaction: A Descriptive Analysis in Social Networks

Juliana Micolino Cabral¹ ^a, Cristiano Maciel^{1,3} ^b, Vanice Canuto Cunha¹ ^c,
Jivago Medeiros Ribeiro^{1,2} ^d and Daniele Trevisan³ ^e

¹*Institute of Computer Science, Federal University of Mato Grosso, Brazil*

²*Graduate Program in Computer Science, Federal University of Rio de Janeiro, Brazil*

³*Graduate Program in Education, Federal University of Mato Grosso, Brazil*

Keywords: Digital Memorial, Posthumous Interaction, Social Networks, Digital Legacy, Digital Generation.

Abstract: The large number of data that can be left by someone when they die it's undeniable, mainly on social network profiles, which are fed for years with varied information by the users. These profiles can serve as a way of remembering loved ones, and the way users are interacting with posthumous profiles can help in discovering how to deal with this new sensitive topic. Thus, this research seeks to investigate and understand the positioning of the Digital Generation on posthumous interaction in social networks and what are the main features that users find important for the design of profile pre-configurations. From the methodological viewpoint, the research used bibliographic review, development and application of online questionnaire and descriptive statistical analysis with data crossing to obtain the results. The results are compared with other generations participating in the research and with other published research on the subject.

1 INTRODUCTION

In the digital age in which we live, it is to be expected that children born in this environment will become increasingly digital. Tapscott (Tapscott, 2010) named the generation born amid the growth of Digital Generation technology: those belonging to this generation do not know a world without internet and take advantage of it with great naturalness.


An important part of the advancement of the internet is social networks, which are widely used around the world, in which users share on a global scale the most varied information, such as photos, videos, comments and even status updates. For Carrol and Romano (Carroll and Romano, 2010) the technology increased the scale on which we produced data so that if asked the amount of digital creations per day we probably wouldn't be able to enumerate them all. This large accumulation of data, for Grimm and Chiasson (Grimm and Chiasson, 2014), is transformed into a


digital trail of our lives.


Thus, there is a need to develop existing tools or improve applications so that they become able to deal satisfactorily with this demand that will only grow over time. For this, it is necessary to overcome the barrier of taboos wrapped in this theme to discover, from the point of view of the user, what are the possible computational solutions considering values and social (Maciel and Pereira, 2012).


One of these taboo themes is death. In social networks, users' profiles can persist beyond their deaths, and can be transformed into digital legacies, through memorials (Maciel and Pereira, 2014). When a user of a social network chooses to keep their profile after death, it creates a space for new interactions, and is also a way to preserve the digital identity built during years of use and its functionalities gain new meanings, such as visits to view photos and the writing of farewell messages. In addition, these interactions can help during the grieving process and are a way to remember loved ones (Döveling et al., 2015).


Among the various users of social networks, the following research is asked: what are the perceptions of the Digital Generation, which was born in the midst of technology, about the legacies left in these net-

^a  <https://orcid.org/0000-0003-1751-6436>

^b  <https://orcid.org/0000-0002-2431-8457>

^c  <https://orcid.org/0000-0003-0986-3374>

^d  <https://orcid.org/0000-0003-4343-3415>

^e  <https://orcid.org/0000-0001-9328-5663>

works by deceased people? From the point of view of the objective, this work seeks to investigate and understand the positioning of this Digital Generation on posthumous interaction in social networks and what are the main functionalities that users find important for the design of profile pre-configurations in these networks. For this, the research used bibliographic review, development and application of online questionnaire and descriptive statistical analysis with data crossing to obtain the results. In this stage, the results are compared with other generations participating in the research and with other published research on the subject. The results can assist system designers in the systemic treatment of the digital legacy.

The article was structured as follows: after the introduction, the theoretical framework is presented, which introduces important concepts for the work. After that, the methodology used in the research is described, followed by the results found. Finally, we have the final considerations and references used during the development of the research.

2 THEORETICAL FRAMEWORK

To better understand the themes of this work, it is necessary to explain concepts about digital legacy, digital generation and posthumous interaction, treated below.

2.1 Digital Legacy and Social Networks

For Crocker and McLeod (Crocker and McLeod, 2019), a legacy can be considered anything (material, emotional or digital) that leaves behind a lasting effect, and can be considered a message for the future. According to the authors, a digital legacy "[...] it's a modern extension of what we leave when we die" (documents, music, photography, playlists, viewing history and social media profiles) and not just the physical devices on which we create the data.

Thus, the collection of digital assets, analogous to the collection of material assets, composes the legacy of an individual. It follows that the more people die, the more legacies end up being lost or become inaccessible to family members and loved ones due to ignorance or disinterest in their treatment in the digital world. The digital legacy and the means for the allocation of posthumous data (Maciel and Pereira, 2013) are part of the great challenges of research on Human-Computer Interaction (HCI) in Brazil (Baranauskas et al., 2014).

For Carroll and Romano (Carroll and Romano, 2010), "a digital legacy is the sum of the digital possessions you left for others. As the shift to digital con-

tinues, the digital possessions left will become most of its legacy." In this way, much of the memories and contributions left by someone at the end of their life can be found online. About how users expect a digital legacy-oriented design to behave Khalid and Dix (Khalid and Dix, 2014) did a study with Facebook users and concluded that these applications are expected to be more based on virtues, considering social and moral impacts, than on ensuring usability and effectiveness. Maciel and Pereira (Maciel and Pereira, 2014) indicate the inclusion of users in design processes and decision-making about the destination of the legacy, in research that seeks to address this theme.

Unlike the past legacy from generation to generation, through stories and physical documents, a digital legacy has the ability to stay much longer and be expanded. Family and friends, using the available technologies, will be able to follow legacies and ensure that it continues in a more practical way and without geographical barriers (Crocker and McLeod, 2019).

It is also important to remember that the data left on social networks is part of the legacy that users have created during their lifetime and need to be taken into account. Some social networks have a standard procedure if they detect the death of a profile, such as Facebook that memorialized the profile without an heir to manage it, if the user wants to specify whether they prefer their account to be deleted or indicate an heir contact for their memorial, they must configure these options to still live (de Toledo et al., 2019)(Viana et al., 2017b). For Carroll and Romano (Carroll and Romano, 2010), online memorials are particularly unique because they "transcend space and time", allowing visitation at any time and from anywhere, and can be considered a legacy and a way for the individual to be remembered. It is worth mentioning that there are some varieties of them, such as memorials in social networks, virtual cemeteries and sites dedicated to memorials. They keep memories and change people's relationship with grief, Walter (Walter, 2015) concluded in his studies that interactive social networks have made mourning again a community experience, rather than something private, and show that the practice of sharing losses online is enhanced by the most intense change in the culture of grief since the 19th Century.

For Döveling, Harju and Shavit (Döveling et al., 2015), one of the central areas in research on digital memorials and online mourning is the act of "remembering" the people we love. For them the loss of a loved one is a time when most people are looking for someone who can empathize with pain and share their experiences. Thus, digital memorials on social net-

works, such as those on the Facebook page, contribute to maintaining ties with the deceased and, for the authors (Döveling et al., 2015), "losing such a digital artifact can cause regret and should not be ignored". Regarding the problems presented in these memorials, Gach and Brubaker (Gach and Brubaker, 2020) pointed out that the difficulties in managing posthumous data are due to disconnect between how systems technically implement trust with people's expectations of the system. For Ueda, Verhalen and Maciel (Ueda et al., 2019), digital memorials lack, among others, sensitivity in the case of cultural aspects and, according to Pereira, Maciel and Leitão (Pereira et al., 2016), it is remarkable the lack of some data in a social network profile transformed into a memorial, such as the date of death.

Although we have works in the context of the legacies left in social media memorials, there is still a lack of studies that reveal what the different generations think about this issue, photo of this research.

2.2 Posthumous Interaction

Despite the taboos that exist around the culture of death, the living constantly interact with books, films, music and products that were created, in life, by someone who has already passed away. Thus, technology acts as a bridge, promoting interactions in a broader and more accessible way with the dead and their goods, in which often the user himself does not realize that he is already digitally interacting with death (Massimi et al., 2011).

For Maciel and Pereira (Maciel and Pereira, 2012), posthumous interaction is conceptualized as: "To this interaction of systems with data of dead people, or users with people killed via the system, we call it posthumous interaction, since it is said posthumous everything that happens after the death of someone" (Houaiss, 2001). One fact highlighted by the authors (Maciel and Pereira, 2012) is that posthumous characterized only the interaction with the data of those who have passed away. The data without itself is not posthumous, being produced by the user in life and left behind. Thus, the act of visiting the profile of someone who is no longer among us to remember the person or the simple feeling of longing already characterizes a posthumous interaction, in which the user will interact with data that has been left behind.

2.3 Digital Generation

There is in the literature the description of different generations, by different authors, which can be a little confusing since different studies, besides using differ-

ent nomenclatures, also use divergent time clippings, according to the criteria and events used to categorize generations.

Since the chronology and nomenclatures referred to each generation are not definitive, it is erroneous to state that a person has characteristics of a given generation or that he has inferior technological knowledge in relation to the generations after him. What is evidenced by Reeves and Oh (Reeves and Oh, 2008) is that the relativisation between generation and nomenclature is made in an attempt to distinguish each generation, but the predominant factor in this characterization process is the history of each subject, which makes it different perception if it is based solely on the dates.

The term "Digital Generation" is used by Tapscott (Tapscott, 2010) in his book 'The Hour of Digital Generation', in which he studies the Internet Generation, which grew in the midst of the digital boom that previous generations have not experienced since the early years of life, and how Information and Communication Technologies (ICT) have shaped the way they act, think, choose, and consume in the day-to-day life of these people. The author presents eight defining characteristics of this generation: i) they seek freedom in everything they do; ii) love to customize and customize; iii) are the new researchers; iv) seek integrity and business openness when deciding what to buy and where to work; v) want entertainment at work, in education and in personal life; vi) are the generation of collaboration and relationship; vii) need speed, mainly in communication and viii) are innovative.

In this work, we seek to understand how, these characteristics, shaped by the constant use of digital technologies since the first years of life by the Internet Generation (1977-1997), as described by Tapscott (Tapscott, 2010), influence the perception of this generation in relation to the digital legacy. Also, believing that many of these characteristics may be present in the generation following the Internet Generation; Generation Next or Z, beginning in 1998 to present for Tapscott (Tapscott, 2010) and beginning, in 2001 for Reeves and Oh (Reeves and Oh, 2008), we have included Generation Z in our studies at the same level as the Internet Generation. Considering, also, i) the age of the individuals of Generation Z, when the book (Tapscott, 2010) was released and its age in the development of this research and ii) Generation Z, although shaped differently from Y, also grew immersed in the TICs. Thus, in this work we will use the term Digital Generations to encompass two generations: Generation Y or Millennial (1981-2000) and Generation Z or Centennial (2001-current), both in the definition of

Reeves and Oh (Reeves and Oh, 2008).

3 METHODOLOGY

A quantitative approach of exploratory character was adopted, based on bibliographic research, with the purpose of acquiring greater knowledge of the researched themes. To find out how the Digital Generation relates to death, in the item social networks, it was needed to reach a diverse audience that preferably had frequent contact with technology. The online questionnaire proved to be the best option for achieving the goal, and Google Forms, the platform that provides conditions for questionnaire distribution and data collection.

Thus, the distribution in social networks favored a greater adherence of volunteers who fit the profile sought by the research. Furthermore, those belonging to the other generations were not denied the opportunity to participate in the research and reflect on the theme however their data will not be explored in this work, whose focus is only on the Digital Generation. Thus, of the 247 participants in total, the responses of 78 of them were removed, which belonged to generations X and Boom. It is worth noting that the generation definitions used here are the Reeves and Oh (Reeves and Oh, 2008): Boom Generation (1946-1964); Generation X or Xennial (1965-1980); Generation Y or Millennial (1981-2000); and Generation Z or Centennial (2001-current).

For the development of the questionnaire, an adaptation (and partial updating) of the instrument used and provided by researchers in the area (Maciel and Pereira, 2012), was made through modification and addition of questions to better represent the current state of the technologies and their possible treatments for posthumous data, however without modifying some pathways of the questions obtained from Maciel and Pereira (Maciel and Pereira, 2012), in order to allow comparison between studies. Another important contribution comes from the questionnaire prepared and applied by Grimm and Chiasson (Grimm and Chiasson, 2014), in order to investigate how participants would like their digital traces to be treated in the postmortem period and their feelings about an online service related to death.

Other studies were important to create questions, such as the work of Viana et al. (Viana et al., 2017a), which analyzes terms of use and privacy policies, which assisted in formulating questions about privacy of profiles on social networks and how users would like to modify it in cases of memorial profiles. The research by Ueda, Verhalen and Maciel (Ueda et al.,

2019), which compare aspects related to death in the real world with the design of digital memorials, based on issues related to pre-configuration of posthumous profiles. On immortality issues, the articles by Galvão et al. (Galvão et al., 2017) and Sas et al. (Sas et al., 2019), assisted in the introduction of this theme to the questionnaire.

The questionnaire has the following organization: general data, knowledge about information technology, religion, social networks, representation of death and digital immortality. For the purposes of this work, among 46 questions, only 20 are the object of analysis: only the questions related to general data and social networks. Regarding the content, the questions dealt with the use of posthumous data focused on social networks.

The questions were built on the online platform Google Forms, an application that can be used for the administration of searches. The online application proved to be the best option due to i) the greater reach of users; ii) guarantee of anonymity of the participants, due to the sensitive theme; iii) the number of questions of the instrument and iv) automatic tabulation of the data by the tool used. After completing the questionnaire, a pilot test was conducted with students who already had some familiarity with the subject, in order to receive feedback for the improvement of the questions and flow of the questionnaire.

The call to voluntary participation of the research was made by invitations fired to email lists and social networks. The questionnaire was available from 11/1/2020 until 7/2/2020 and, in total, 250 responses were collected. The consent form was accepted by 247 participants, who agreed to answer the entire questionnaire and authorized the use of the data for research. It should be noted that this research is part of the DAVI¹ (Dados Além da Vida - Data Beyond Life) project, which has approval from the Ethics Committee on Research with Human Beings of the Federal University of Mato Grosso. With the large amount of data collected during the application of the questionnaire, descriptive statistics were chosen to help interpret and present the data collected with the help of graphs and tables with percentage of relative frequency or absolute frequency.

For the realization of comparisons, the IBM Statistical Package for the Social Sciences (SPSS) tool was studied and applied to correlate the data obtained. The software has an extensive set of tools to perform advanced statistics, allowing the creation of charts, tables and decision trees. For the analysis, the questions were identified with the letter "P" (of questions) and the participants of the research with the letter "S" (of

¹<http://lavi.ic.ufmt.br/davi/publicacoes/>

subjects), being the letter "A" representing the participants who followed the first route, of transforming the profile into a memorial, and the letter "B" the second, choosing to delete the profile. All data were compared considering comparisons between the generations participating in the research and with other published research on the theme, especially the one in which the questionnaire was inspired (Maciel and Pereira, 2012).

4 RESULTS

In this section, we initially present the general data in which we bring the main information about the participants. Next, we present analyses on Social Networks and Posthumous Interaction, making comparisons with data collected from other generations and with other research. In particular, comparisons are made with the research carried out in 2012 (Maciel and Pereira, 2012), in which 78 young people from the Internet Generation participated in a similar study and whose questionnaire served as the basis for this study. Finally, we present a cross-reference of the information in order to allow a better interpretation of the data, analyzing them based on some research in similar contexts.

4.1 General Data

The mean age $P(x)$ and the median of the participants were 33 years, and the fashion was 23 years. As there is a coincidence of average and median, with both measures superior to fashion, it can be affirmed that there is positive asymmetry in the distribution. Among the participants, 68,4% of them, that is, 169 people fit the Digital Generation, and these data are used. The standard deviation found for the age variable was 11 years, indicating a large dispersion of ages in relation to the mean. Regarding gender, 49,7% identified themselves as female and 50,3% male.

Among the participants, 98,4% had a computer at home and have an average internet use per day of 5 to 8 hours with a median of 9 to 12 hours of use. Compared to the study done by Maciel and Pereira (Maciel and Pereira, 2012) done with the same generation, in which 73% of the participants marked a use of 1 to 4 hours, the time in which the Digital Generation dedicates itself to the Internet increased significantly.

4.2 Social Networks and Posthumous Interaction

About the use of Social Networks 94,3%, of the participants marked that they use, confirming that the questionnaire was able to reach an audience that uses this tool. In the aspect, which are the most used by participants 77,7% of them use both Instagram and Facebook, 38,6% of them use Twitter, 96,1% use Whatsapp or Telegram, 24% use Pinterest. 7,3% use relationship apps (Tinder and Grindr) and 3% of them LinkedIn.

About having some contact in their Social Network that has passed away (P16), 67,7% of the participants said yes. When asked in question P17 in what type of interaction they performed with the profile of this contact, participants can mark more than one option in this question:

- 65,6% scheduled to read the messages of other people left there;
- 60,1% visited the profile to review information of the deceased, such as photos;
- 49,7% accessed to find out the cause of death;
- 10,9% accessed to read the messages left by you to this person, and;
- 9,3% posted messages for the deceased.

In relation to the answers obtained in the open alternative, expressions related to mourning and condolences to the family and even farewell to the family were observed, such as the S159, which answered: "to disconnect me from the profile". Much of the posthumous interaction is in the visualization of data already provided in the profile, such as messages left by the deceased or by third parties, photos and videos, going, according to the ideas of Döveling, Harju and Shavit (Döveling et al., 2015) in how the profiles of deceased can help us remember loved ones and keep their memories alive.

The participants were, in P18, asked if they had any deceased whose profile was removed from a social network, 55,4% of them stated that they never observed this event and, the 23,9% who scored yes, were asked in P19 about what feelings they had when they noticed this removal, and 32,7% said they felt "Sadness"; 23,6% "Comfort"; 9,1% "Frustration" and 7,3% "Relief". Both the most recurrent feelings, "Sadness" and "Comfort", mark the duality that digital memorials bring in relation to how friends and family can feel. The feelings related to the death of someone close are never positive and the reminiscence of this person online can bring sadness, however maintaining a digital memorial for others is a

way to keep the memories of the deceased alive and assists in the mourning process as expressed by participant S90 in the open alternative who stated to feel "Apprehensive. To know that a part that represented someone's life is gone."

About the removal of profiles, 60,1% of the participants are aware that a user's profile can be removed (P20), and in the research conducted by Maciel and Pereira [(Maciel and Pereira, 2012), 78,2% of the young people of the Digital Generation did not know that a user's profile can be removed after his death, this demonstrates a growth in the dispersion of information about the destination of posthumous accounts.

Of the participants, 67,4% of them are in favor of family members or third parties indicating removal (P21). Participants were asked to justify their response if they wanted to, and many of them agreed that the family has the right to choose to remove the profile as demonstrated by the S188 "Any family decision is valid in view of the pain they feel for the loss" and S8 "The family should have the right to watch over the privacy and memory of the deceased". Others expressed similar preferences in exclusion as the S146 "I see no need for a profile of a dead person." and The S112 "If the person has passed away it makes no sense to have an account on social media". Many also claim that the account should only be deleted according to the wish of the deceased as the S34 "depends on what the person wished in life. Deleting the profile would delete part of your legacy." and S42 "The previous option has to be made by the profile owner". Participant S127 reported that "family members did, third parties do not."

Some participants also reported preferences in maintaining the profile on social networks such as S55 "Obviously the will of the family that suffers the most from the situation matters, but visiting the profile of a deceased reconnects us with a legacy left there, especially the human legacy of friendships and messages, which reconnects us with the deceased."; S93 "Leaving the social network of a deceased active is preserving memories and memories.", S90 "If the deceased posted things in life, it is because it was in his interest to record his publications. Removing the profile is ripping off someone's memory, and mostly going over your decision." and S144 "I think it's important to keep the memory of the deceased's life still available to your contacts."

When asked about the destination of their data in social networks (P23) 61,8% of the participants stated that they had never thought about it and 59,2% of them did not notice the existence of memorial profiles in some social networks (P25). It is interesting to

mention that, in the research conducted by Yamauchi, Maciel and Pereira (Yamauchi et al., 2018), when asked if they knew about what are digital legacy pre-management systems 29,9% answered yes and 70,8% did not.

In question P24, the participants chose up to 3 measures that they would like to be applied on their social networks after death, as can be seen in Table 1.

Table 1: Answers found in question P24.

Question Options	%
Your account should be immediately deleted if there was official notification of death to the social network. Until the confirmation was sent, your contacts could normally access your account.	31%
A user previously selected by you should receive your account login and password. However, he would have to follow the determinations you would leave in a digital will.	37,9%
An heir previously selected by you should receive your account, with the freedom to do whatever you want with your account and your details.	15,9%
An heir previously selected by you should receive the legacy of your account and would have to follow the determinations you would leave in a digital will.	24,1%
Your data should be sent to a Virtual Cemetery or a memorial profile, containing only some information of your choice, such as date of birth and death.	35,8%
A farewell message written by you should be displayed on your profile when you confirm your death.	42,7%
A copy (backup) of your social network account data should be sent to an heir chosen by you.	30,2%

An interesting fact was that more participants preferred to give their login and password to a third party than select an heir previously, even if both have to respect determinations left. This may indicate that participants do not have an understanding of what an heir means in the context of digital memorials. Considering that the heir has the function of managing the profile, he has a certain level of access within the memorialized account, on Facebook, for example, he can write a fixed post on the profile, update profile

picture and cover, and respond to friend requests. As opposed to handing over password and login to a third party, which would have full access to the account and all its features.

Another notorious indicator is that 42,7% of participants chose to leave a farewell message in the profile, demonstrating that they perceive their profile as a way to communicate and express themselves, even when it becomes posthumous it will still serve to deliver their last thoughts. This choice is in line with the social character of death indicated by Massimi et al. (Massimi et al., 2011), preserving the digital identity of the deceased. This fact was also noted in the research of Maciel and Pereira (Maciel and Pereira, 2013), in which the desire to leave a posthumous message was one of the options most chosen by the participants and, for them "the desire to leave a posthumous message shows that death in Social Networks is not a taboo that should be hidden."

When asked if they would prefer their profile to be removed or memorialized, 57,6% chose Transform to Memorial and 42,4% Profile Removal (P26). The number of participants who preferred to leave the profile as a memorial was higher than the removal option, this can demonstrate that the Digital Generation has more confidence and more attachment to digital media and their data stored in them.

In comparison, in the research by Maciel and Pereira (Maciel and Pereira, 2012), 57,7% of its participants chose to remove the profile, 39,7% for non-removal and 2,6% did not know how to give their opinion. This fact demonstrates an increase in participants who would maintain their profiles after death. Among the participants who preferred "Transform into A Memorial", 75,6% would pre-configure their profile with their preferences for their memorial profile (P26A3). Among them, 69,7% were belonging to the Digital Generation. Also in their research, 67,9% reported that they would like to pre-configure their memorial profile, this data obtained a slight increase and continues to indicate the will intention to customize the destination of their legacy and confirms the characteristic of customizing and customizing that Tapscott (Tapscott, 2010) indicated for the Digital Generation.

In P26A4, of the participants of the Digital Generation, 72,3% reported that they are aware and 36,1% of them have already defined an heir. It is notorious the largest numbers of participants aware of the possibility of choosing an heir and who have already chosen one when compared to the study by Pereira et al. (Pereira et al., 2019) that when questioning their participants, 80% stated that they had never configured specifications related to the destination of their data

and 20% could not say whether they had done it or not.

Question P26A7 questions participants about the permissions the heir may have to manage the digital memorial. Most participants, about 75,6% of them would like the heir to be allowed to add the date of death and 58% to manage tributes. Almost half of them, 48,9% of the participants, would also like the heir to be able to insert quotations or epitaph, characterizing the profile as a place of remembrance and homage, similar with cemetery tombstones, which for Ueda, Verhalen and Maciel (Ueda et al., 2019), characterizes an incorporation of offline death aspects into digital media.

Among the participants who chose to remove their account after death, 59,8% of them indicated that, in their opinion, the profile would not serve to support grief or posthumous tributes and 49% of them also indicated that they would like to maintain their posthumous privacy. About this, the participant S73 says "Because the social network is a lot of exposure" and the S217 "Yes, delete to avoid feelings of extreme longing ... what the eyes do not see the heart does not feel." For Gach (Gach, 2019), the decision to delete the profile, for the account owner, often seems the most desired, but removal is something that brings suffering to loved ones. After removal, all information created and maintained in the profile instantly disappears, and this loss can disrupt practices that other users have developed during mourning.

About the interaction with posthumous profiles, when asked about what sensations they had, 55,4% of the participants reported "Reflection on the meaning of life", 51,1% "Longing", 34,8% "Sadness", 25,8% "Discomfort", 12% "Comfort" and 3% "Stress". Thus, it can be said that most participants perceive the posthumous profile as a way of thinking about the life of that person and supplying the feeling of longing, as S19 said "I go in the profile of the deceased to kill the longing. Always!"

In question P28, participants selected up to 3 options for detecting death of users on social networks, the choice with greater acceptance was the option of selecting friends to notify the death in return for the option of any user notifying the system. Thus, it can be said that users are looking for security for the notification method, because by denying third parties the possibility of sending notifications and ensuring that only trusted friends can accomplish this task users ensure that the notification will only occur if the owner of the profile actually dies.

4.3 Data Crossing

The main objective of performing comparisons is to discover the existing association between variables and can also determine the level of dependence between them. Thus, by knowing the data of one variable, the result of the other can be better predicted. (Viali, 2010).

Table 2: Crossing between P26A1 and P26A8.

P26A1 Options	No	Yes
Open the profile to the audience, allowing any user to view the profile	13	26
Make the profile visible only to contacts already added	7	28
Keep profile privacy settings unchanged	11	45

First, questions 26A1 were compared "You would set up your social network, determining your preferences about what should be done with your profile after your death" and 26A8 "About your profile preview settings you would like to", with the intention of confirming that the participants who chose not to configure the memorial really wouldn't change anything. The results can be found in Table 2 above. Of the 31 participants who marked "No" for the profile setting, 64,5% of them marked a privacy configuration change option demonstrating that, even indicating previously that they would not be interested in changing their settings, when asked with options, they prefer to change something rather than leave the profile unchanged. It is important to remember that only participants who chose the route of memorialized the profile answered these questions.

Next, we try to find out the connection between how participants felt when they noticed that an acquaintance had their profile deleted from a social network and their choice to memorialize their own profile or remove it. For this, we cross-referenced the data of question P19 "what feeling did you have" with the question P26 "Would you prefer that your profile be removed from the social network after your death or be transformed into a memorial", the result of this crossing can be seen in Table 3.

It is notorious that all participants who reported negative sensations such as "Apprehension", "Despair", "Frustration" and "Stress" chose to turn their profile into a memorial, this fact can be explained due to the influence of negative emotions they had when encountering the profile of a known removed (P19), shown in Table 3 and, consequently, chose not to exclude their own profile.

In the participants who marked "Comfort" and

Table 3: Crossing questions P19 and P26.

P19 Options	Profile Removal	Turn to Memorial
Relief	2	2
Seizure	0	1
Despair	0	1
Frustration	0	5
Comfort	6	7
Indifference	2	2
I can't tell	0	1
Sadness	6	12
None	4	3
Stress	0	1

"Relief", although they reported positive sensations regarding the profile of an acquaintance having been removed, 50% of those who chose "Relief" and 54% of those who chose "Comfort" chose to turn their profile into a memorial. This can happen because these users have attachment to their own memories and would like to preserve them on the social network, although they feel better in the face of the removal of the profile of an acquaintance that has passed away. On the other hand, the participants who marked "Indifference", "None" or could not say, half of them chose to remove the profile and the other half to turn it into a memorial, indicating impartiality in relation to sensations. Additionally, the data obtained in the P2 "Gender" question were also compared with the question P3 "Do you think it is necessary to plan for the future?", with the intention of finding out how the participants fit into the question prepare for the future in relation to gender, the result of this crossing can be seen in Table 4.

Table 4: Crossing questions P2 and P3.

P3 question options	Female	Male
It is completely necessary	33	51
As far as possible, it is necessary	100	59
I see no need of doing that	2	0

When we cross-referenced the answers obtained, we can observe that 46,4% of the participants who declared themselves men also indicated that it is completely necessary to plan for the future, while in the participants who declared themselves as female only 25,6% of them marked the same level of concern. In both, the preference for the option "As far as possible is necessary" was noted, this indicates that the majority of participants, both men and women, have a certain concern in planning tomorrow, with a higher incidence on women.

5 FINAL CONSIDERATIONS

Realizing how the generation that was born in the middle of technology interacts with posthumous profiles in social networks is important for the development and improvement of configurations that deal with this sensitive topic. In the literature, there is a lack of data on such issues. Based on the data of this study, it can be concluded that Digital Generation already has contact with profiles of users who died, in this case, about 67,7% of them, and that the little concern it has with the planning of the future reflects on the management of its digital assets, and 58,9% of them had never thought about the destination of their data after they died. It is noteworthy that the research was carried out before the pandemic of the new Coronavirus Sars-Cov-2, an episode that has the potential for the occurrence of death and the perception of users regarding the profiles of deceased.

Even with the existence of digital memorials in social networks, most users are unaware of the functioning of these tools. Through the questionnaire it was possible to detect two different opinions: a) desire to remove the profile: users who preferred to remove their profile after death found that they do not see any use in maintaining the profile if they themselves are no longer able to manage it; and b) transformation into a memorial: the person shows interest in keeping the image of the person alive, both for reasons of memory and remembrance, and to preserve the identity that person built in his profile during years of use.

Most posthumous interactions performed by participants are in reading scraps left by others for the deceased, to review old information such as photos and videos and the search for the cause of death. This information goes against the results of Maciel and Pereira (Maciel and Pereira, 2012), who also find, in their research, that the most practiced posthumous interaction was to review old information and read messages left by other people.

In addition, in relation to Maciel and Pereira's research (Maciel and Pereira, 2012) there was an increase: a) the average internet use, from 1 to 4 to 5 to 8 hours, which was expected due to the increasing advance of the Internet, b) the number of participants who claimed that they had already had some contact in their social network that died, from 62,2% to 67,7% and c) of users who would like to turn their profile into memorial, and in the 2012 survey (Maciel and Pereira, 2012), 39,7 preferred this option and, in the current survey, about 57,6% opted for her. The most significant difference in data is among participants who are aware that a user's profile can be re-

moved, which went from 21,8% (Maciel and Pereira, 2012) to 60,1% in the current survey. From this sense, it is perceived greater concern of young people with the future of their data and a certain attachment to digital information.

It was noted the similarity between the characteristics most chosen by users for their posthumous profile and the characteristics found in tombstones in cemeteries identified in studies such as Ueda, Verhalen and Maciel (Ueda et al., 2019), name being: full name, full date of birth and death, and insertion of text/epitaph. It can be said that many of those who chose to keep their profile as a memorial see it as a place with functions similar to physical memorials. Friends and relatives can visit you to remember loved ones and when they miss you. The inclusion of photos in the posthumous profile is the predominant functionality that most differentiates the two forms of memorial. Still, users seek, in the pre-configurations of their posthumous profile, to leave a last message to friends and family, confirmed by the constant acceptance of the options regarding the inclusion of farewell message in the memorial profile. Thus, the social network is able to perform its function of providing and facilitating communication between people. As this work was focused on interaction in social networks, due to the large number of issues developed and, mainly, due to the limitation of time, there are still several possibilities of interpretation and analysis of data that can lead to new conclusions.

Moreover, although the data from the other generations have not been explored in this research, it is perceived in a preliminary analysis the need to investigate the theme with the focus focused on generation X and boom generation, considering that specificities perceived in these data may indicate hypotheses for future research, including comparisons with the data already studied from the Digital generation. In addition, the initial difficulties with the statistical analysis prevented a definition of sampling that allows the generalization of the results found, so for future studies it would be necessary to calculate the sample before the application of the questionnaire, which would improve the validation of the results. Another issue for future work is related to the cost of storing profiles, since the increase in profiles with deceased users is something inevitable, as this may affect companies is a valid question to be researched.

Finally, it is important to highlight that conducting research within the theme of posthumous interaction and social networks makes society think about the subject, and several of the participants commented that they had never thought about this theme before answering the questionnaire and after their participa-

tion began to consider their choices for their own data.

ACKNOWLEDGEMENTS

The authors would like to thank the volunteers participants and the institutions that offered us partial support to this publication in Brazil: the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq); the Pró-reitoria de Pesquisa (PROPeq) of the Federal University of Mato Grosso, and the Uniselva Foundation.

REFERENCES

- Baranauskas, M. C. C., Souza, C. d., and Pereira, R. (2014). I GrandIHC-BR - Grandes Desafios de Pesquisa em Interação Humano-Computador no Brasil. *Relatório Técnico. Comissão Especial de Interação Humano-Computador (CEIHC) da Sociedade Brasileira de Computação (SBC)*, pages 27–30.
- Carroll, E. and Romano, J. (2010). *Your digital afterlife: When Facebook, Flickr and Twitter are your estate, what's your legacy?* New Riders.
- Crocker, A. and McLeod, V. (2019). *Digital Legacy Plan: a guide to the personal and practical elements of your digital life before you die*. Self-Counsel Press.
- de Toledo, T. J., Maciel, C., Muriana, L. M., de Souza, P. C., and Pereira, V. C. (2019). Identity and volition in Facebook digital memorials and the challenges of anticipating interaction. In *Proceedings of the 18th Brazilian Symposium on Human Factors in Computing Systems*, pages 1–11.
- Döveling, K., Harju, A. A., and Shavit, V. (2015). Researching digital memorial culture and death online: Current analysis and future perspectives. *Medien Und Altern*, 6:76–81.
- Gach, K. Z. (2019). A case for reimagining the UX of post-mortem account deletion on social media. In *Proceedings of the CSCW*.
- Gach, K. Z. and Brubaker, J. R. (2020). Experiences of Trust in Postmortem Profile Management. *ACM Transactions on Social Computing*, 3(1):1–26.
- Galvão, V. F., Maciel, C., Garcia, A. C. B., and Viterbo, J. (2017). Life beyond the physical body: The possibilities of digital immortality. In *2017 XLIII Latin American Computer Conference (CLEI)*, pages 1–10. IEEE.
- Grimm, C. and Chiasson, S. (2014). Survey on the fate of digital footprints after death. In *Workshop on Usable Security (USEC), Internet Society*.
- Houaiss, A. (2001). *Dicionário eletrônico Houaiss da língua portuguesa*. Ed. Objetiva.
- Khalid, H. and Dix, A. (2014). Extended episodic experience in social mediating technology: Our legacy. In *International Conference on Social Computing and Social Media*, pages 452–461. Springer.
- Maciel, C. and Pereira, V. C. (2012). The internet generation and its representations of death: considerations for posthumous interaction projects. In *IHC*, pages 85–94. Citeseer.
- Maciel, C. and Pereira, V. C. (2013). Social network users' religiosity and the design of post mortem aspects. In *IFIP Conference on Human-Computer Interaction*, pages 640–657. Springer.
- Maciel, C. and Pereira, V. C. (2014). A morte como parte da vida digital: uma agenda de pesquisa em IHC. In *Proceedings of the 13th Brazilian Symposium on Human Factors in Computing Systems*, pages 441–444.
- Massimi, M., Odom, W., Banks, R., and Kirk, D. (2011). Matters of life and death: locating the end of life in lifespan-oriented HCI research. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, pages 987–996.
- Pereira, F. H., Tempesta, F., Pimentel, C., and Prates, R. O. (2019). Exploring young adults' understanding and experience with a digital legacy management system. *Journal on Interactive Systems*, 10(2):50–69.
- Pereira, V. C., Maciel, C., and Leitão, C. F. (2016). The design of digital memorials: scaffolds for multicultural communication based on a semiotic analysis of tombs. In *Proceedings of the 15th Brazilian Symposium on Human Factors in Computing Systems*, pages 1–10.
- Reeves, T. and Oh, E. (2008). Generational Differences, in *Handbook of Research on Educational Communications and Technology. Selected South African Students*, *The Business Review Cambridge*, 5:314–318.
- Sas, C., Schreiter, M., Büscher, M., Gamba, F., and Coman, A. (2019). Futures of digital death: Past, present and charting emerging research agenda.
- Tapscott, D. (2010). A hora da geração digital: como os jovens que cresceram usando a internet estão mudando tudo, das empresas aos governos. *Rio de Janeiro: Agir Negócios*, 445:110.
- Ueda, G. S., Verhalen, A., and Maciel, C. (2019). Um negócio de dois mundos: Aspectos da morte no mundo físico transpostos para memoriais digitais. In *Anais do X Workshop sobre Aspectos da Interação Humano-Computador para a Web Social*, pages 41–50. SBC.
- Viali, L. (2010). *Apostila de Estatística Descritiva. Porto Alegre*.
- Viana, G. T., Maciel, C., de Arruda, N. A., and de Souza, P. C. (2017a). Análise dos termos de uso e políticas de privacidade de redes sociais quanto ao tratamento da morte dos usuários. In *Anais do VIII Workshop sobre Aspectos da Interação Humano-Computador para a Web Social*, pages 82–93. SBC.
- Viana, G. T., Maciel, C., de Souza, P. C., and de Arruda, N. A. (2017b). Analysis of terms of use and privacy policies in social networks to treat users' death. In *Software Ecosystems, Sustainability and Human Values in the Social Web*, pages 60–78. Springer.
- Walter, T. (2015). New mourners, old mourners: Online memorial culture as a chapter in the history of mourning. *New Review of Hypermedia and Multimedia*, 21(1-2):10–24.
- Yamauchi, E. A., Maciel, C., and Pereira, V. C. (2018). An Analysis of Users' Preferences on Pre-Management of Digital Legacy. In *Proceedings of the 17th Brazilian Symposium on Human Factors in Computing Systems*, pages 1–5.