How Memory in History and Technology Shapes Perspectives on Safety and Security

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Spring 2024

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction:

Following World War II, European nations and their leaders confronted the formidable challenge of reconstructing their communities and infrastructure amidst extensive loss and devastation. The war had left scars everywhere, in families with losses and with cities reduced to rubble. Throughout this devastation, the common question that arose in everyone's mind was: How were they going to move forward from this catastrophe, and restore their lives and prosperity to its former glory? One approach that emerged, not necessarily due to raw intention or governmental interest, was the act of historical forgetfulness. To heal the wounds left by the war and make renewed progress as nations, European leaders chose to focus on creating paths forward based on newfound cooperation, integration, and mutual understanding. One example of this taking place was in the European Coal and Steel Community, a precursor to the European Union, whose goals were to bring together former enemy nations through economic interdependence. Other examples include the Council of Europe, and the European Convention on Human Rights, which aimed to promote values of integration and togetherness, critical aspects for forging new bonds in the changed world. Through this lens of post-World War II Europe, we can see how historical forgetfulness becomes necessary in many situations, and most importantly, strives for goals of peace and stability. This historical anecdote provides an example of how the lack of retention of information can have positive consequences for the parties involved. In other words, the long-term retention of information as opposed to the either conscious or unconscious collective forgetfulness of it can have negative consequences for a society. To show this, I will start by discussing how we can define information, in the context of our modern society of information technology. Then, I will discuss why large-scale data retention occurs and when it is necessary and unnecessary to retain information. Then, I will

discuss the effects that retention has on a society, both positive and negative. During this, I will provide historical anecdotes that show this issue does not only occur in a data-centric world like the current one, but throughout history. Then, I will discuss the tangible effects of the loss of data, the inefficiency of retention, and the collective act of historical forgetfulness. Finally, I will discuss the current state of regulation and legal codes on data retention, as well as propose a revised framework that takes into account what was previously mentioned.

Methods:

To learn how to define information in our modern world of technology, I consulted a study on the legal attributes of electronic data. It's important to narrow the scope of the survey, as information has a broader scope than data (Xiaying, 2019, p. 85). In the modern age of the internet and big data, electronic data is a critical resource for day-to-day life. Xiaying discusses the novel aspects of this medium of information that are introduced due to the nature of the Internet, and how electronic data can be considered both property and not, as well as both object or not.

To study the reasoning behind why large-scale data retention occurs, I conducted a brief survey of historical practices of record-keeping. Critical in this effort was *From Knots to Narratives*, a piece by Gary Urton, that studies the rapid evolution of ancient record-keeping methods such as the knotted-string devices used by the Inka empire to record quantitative data, among other methods to record historical information. Urton details the types of information that was recorded by these civilizations, and why they were important to the culture at the time. These connections provide a powerful stepping stone for comparisons to modern practices of record-keeping. To consult an example, I consulted a piece titled *To Record or Not To Record* by Allan Barsky, that describes the conflicts in record-keeping in the field of social work.

To learn how data retention can impact a society, I consulted *Data Retention and the Panoptic Society: The Social Benefits of Forgetfulness* by Blanchette and Johnson, which highlights how forgetfulness can impact the topics of juvenile crime records and credit reports. Blanchette and Johnson also discuss the much changed nature of social forgetfulness in our modern age of information. For the historical leaning effects, I leaned on David Reiff's *In praise of forgetting: historical memory and its ironies*, which provides examples of how forgetfulness is not just useful in modern society, but has throughout society helped in the progress of societies.

To learn about the current legal state of matters, I primarily consulted the General Data Protection Regulation, or the GDPR, and to develop a more relevant framework for the subject, I consulted the EU-U.S. Data Privacy Framework, which provides a precedent for building information on the subject. Blanchette and Johnson also provide policy strategies for data retention, which I use to shape the comprehensive approach to recommend for an improved data policy. I constructed three primary proposals based on both the existing legal precedent in the field as well as the proposals moved forward by Blanchette and Johnson. These proposals detail the necessary changes in order to positively impact the future of data retention and help society in the information age to preserve the historical act of social forgetfulness.

Results:

Information is a fundamentally vague concept that changes significantly over time. To narrow down the scope with which we will discuss it in regards to data retention and historical forgetfulness, we will focus on electronic data. Electronic data plays a huge role in our modern society, from storing Internet user's personal information to their virtual equipment in online games (Xiaying, 2019, p. 86). Additionally, electronic data is unique in that it is difficult to determine if it should be property or not. Legal precedent is hard to come by in the fast-changing

industry of information technology. Electronic data is inherently intangible as being bits flowing around on a server or computer, however it does not constitute an “intangible object” in civil law (Xiaying, 2019, p. 87). As such, it is difficult to quantify where the laws of privacy and transparency should exist with regards to electronic data, and who has the rights to such data. In this context, we will assume that electronic data can be regulated through guidelines on where this information is stored and for what length of time it is kept.

Now that we have an understanding of information, what it looks like, and how it is regulated, we can discuss why this information is retained to such an extent. To provide historical context, we can look at the history of record-keeping, and how it has changed over time. In the Inka empire, an ancient form of record-keeping utilizing knots to record quantifiable information was used in common practice. These are the main types of information that were kept using this method: the identification of tribute items, the quantity of each item, and the unit price, or value of each item (Urton, 1998, p. 417). The importance of trading or business records can be clearly seen here, a common narrative in the history of record-keeping (Urton, 1998, p. 425). This tendency to utilize record-keeping to keep track of business transactions carries over into the modern day in many industries, where records are used to keep track of individual transactions over time (Xiaying, 2019, p. 95). The power of a historical record can not be understated - very quickly interested stakeholders can access the source, quantity, and other information that might be necessary for their goals and use this information to power current decisions. In the field of social work, however, data retention is not so easily accepted (Barsky, 2017). The decision of “to record” or “not to record” is a difficult one, as while it is certainly convenient to record client information, sub-standard recording opens the practitioner to the possibility of malpractice lawsuits, disciplinary hearings, and agency discipline (Barsky, 2017).

In other words, while data retention is enormously important in many fields, and plays a key role in informing business decisions, it is also not always required or preferred, due to the possible unintended consequences of large-scale data retention.

Now that we understand the historical context and precedent of data retention, we can look at the effects of data retention as well as collective forgetfulness, which is more specifically the act of either consciously or unconsciously destroying or removing access to historical data and records. One such example of this exists in juvenile crime records. Juvenile justice exists as a much-different parallel to standard justice practices, as a popular sentiment exists that a juvenile should not be held accountable in the same way that an adult is for their actions (Blanchette & Johnson, 2002, p. 37). In the context of this sentiment, there exists legal precedent for juvenile court history, where for example, the Code of Virginia details the automatic expungement of juvenile records in the event where offenses are committed in a certain juvenile time frame, and enough time has passed. This is an important example of how the value of social forgetfulness is displayed in policies regarding juvenile crime records. A similar example is that of credit reports. Credit evaluation is predominantly based on the idea that actions in the past provide an example for future behavior (Blanchette & Johnson, 2002, p. 38). Due to this motivation, credit bureaus in the past would perform extensive investigation into the background of applicants, even going so far as to especially seek unfavorable information (Blanchette & Johnson, 2002, p. 38). With this in mind, Congress employed the Fair Credit Reporting Act, which prohibited the reporting of information predating the report by more than seven years. In other words, it embodied the values of social forgetfulness, understanding that actions in the past can not often be fairly brought up perfectly into the present. While these examples highlight how modern practices can require the act of social forgetfulness, it is not just modern society that

employs these acts. Following the Civil War, annual observances honoring the dead would occur. One such observance took place on Decoration Day, or what is now known as Memorial Day, and honored Union soldiers who had died in captivity in a prison camp (Rieff, 2016, p. 13). Now, Memorial Day serves as a broader day of patriotism and to honor the dead of all U.S. wars, putting behind the original motivation for the day (Rieff, 2016, p. 14). These acts prove to be necessary and a fundamental part of our progression as a society.

The current state of legal precedent on data retention is in much contention. Perhaps one of the most influential documents on the matter is the General Data Protection Regulation, or GDPR, an European Regulation on information privacy. Within the GDPR, there is Article 17, which details the "Right to erasure," or the right to be forgotten. It describes general regulations on the longevity of data, as well as the data subject's right for that data to be erased in a reasonable time frame. However, the GDPR is an EU document that has not been widely adopted in other countries (Blanchette & Johnson, 2002, p. 40). Additionally, there exist few documents relating to discrete domains, such as the medical industry (Blanchette & Johnson, 2002, p. 40). Instead, these cases must be handled individually, requiring specific domain knowledge and intricate case law pertaining to the subject (Xiaying, 2019, p. 96).

Analysis:

Within the context of the modern information age, we can study how electronic data and its associated practices have affected the trend of social forgetfulness. The previously discussed examples of juvenile records, credit reports, and the Civil War highlight the importances of social forgetfulness. However, recent trends indicate this consistency in social forgetfulness is waning (Blanchette & Johnson, 2002, p. 38). Historically, the positive trend of social forgetfulness has been achieved through the lacking methods of record keeping and data storage

existing in the times. As previously mentioned, ancient forms of record keeping were ineffective and inconsistent in their level of retention, as well as in their ability to consolidate large amounts of information. Pertaining to history, this meant that major events or changes in a societies government, daily happenings, or anything else that was recorded knowledge, would often be subject to forgetfulness in the eyes of the history books. Additionally, centralized authorities such as authoritarian governments took it upon themselves to relieve many of their population of historical documentation, which furthered the effect of collective forgetfulness. One example Rieff gives of this not happening in recent history is in the American South after 1865. Rieff describes how the conflict and struggle of the past sometimes lingers to the present day, and how these are never good with regards to a society's overall progress, neither for the affected party or the accused. Rather, to make substantial progress, old paths must be made anew and the conflict and struggle of the past must be truly forgotten. For one concept that Rieff seems to hammer down is that when something is still in the collective consciousness of a society, it cannot be ignored or shut down. It will always take its place in the collective goals or ambitions, and while that might look different from place to place, from individual to individual, it always root itself in resolving a situation through violence or a sufficiently drastic measure. The way to avoid this is to embrace collective forgetfulness and adopt a society in which the collective can move past major hurdles without pause.

The current negative trend of social forgetfulness is caused not by the lack of need, but rather the newfound scope and industry change with regards to electronic data. These four qualities describe that trend: quantity, granularity, cross-correlation, and predictive power (Blanchette & Johnson, 2002, p. 39). Quantity describes how a significantly higher amount of individual activities are taking place over the medium of electronic data, now including

interactions such as web-browsing, grocery shopping, among many others. Granularity illustrates how data can be much more specific - instead of a phone call being limited to a time, a source, and a destination, as it may have been in the past, every associated piece of information might be recorded, perhaps right down to the audio itself. Cross-correlation relates to the ever-growing field of data aggregation, where existing data metrics are used against one another to produce new data. This creates the massive paradigm of data analysis, with which data can be used to tailor advertisements to a user, or collect a comprehensive profile on an individual. Predictive power is similar to cross-correlation but pertains more to the potential of data to "predict the future," or more realistically provide metrics such as risk analysis, sales productivity, or behavioral patterns. In general, human activities that prior to the information age were never subject to the act of record-keeping can be, and are commonly, kept universally as records, in data storage around the world.

In the past, either ancient or recent, social forgetfulness was perpetrated by a matter of physical facilities - it was not practical to record literally everything by pen and paper, for example (Blanchette & Johnson, 2002, p. 34). However, in modern technology and practices, there seems to be little concern over the effects of data retention. In contrast, many large companies who collect and use these records of human activities hold in high value these data payloads, and wield them as a powerful asset, to be sold and profited upon. While there exist legal precedents in some cases, such as the juvenile court records, and the credit reports, and legal documents such as the GDPR, there are few legal documents that hold specific domain knowledge and can positively regulate these ever-changing industries. I've argued that social forgetfulness is important, but the question remains as to what can be done to aid in this issue of the wane of social forgetfulness in the face of modern data practices. The proposed solution

aligns closely with that of Blanchette and Johnson, as it aims to provide a general framework for the adoption of more modern data practices.

To institute major change in a massive industry such as that of data collection, it's important to adopt a comprehensive approach. Data retention is a money-making business, and without realistic initiative to enact change in practices, it would be impossible to regulate some of these industries. The following proposals are intended to shape the future when it comes to data retention. For one, there should be better legislation within specific domains on the topic of data retention. Secondly is the creation of a specific market that tailors to the topic of secondary information or electronic data. Thirdly and finally is the clear definition of the individual ownership of data. These elements of a comprehensive approach are fundamental in shaping a positive future in the world of data retention and data protection as a whole, and I'll now discuss each of them.

Specific legislation in individual domains for data retention would differ significantly from a legal document like the GDPR, which aims to provide a more general framework for data regulation. To help in more specific cases, there needs to be language and regulations that are appropriate for a specific domain. For example, an important document might be one pertaining specifically to social media, which details the amount of user information that is allowed to be collected and retained, as well as the permitted longevity of this information. I think most importantly is the specificity of the article. While a general approach may be easiest and quickest to implement in some cases, digging into the specifics of a situation and determining the realistic limits for data retention for a specific domain would prove much more effective at literally enacting the acts of social forgetfulness.

The creation of a specific market that tailors to the topic of secondary information or electronic data is a necessary advent of this framework. This would include derived metrics, tailored metrics, and anything that is a form of electronic data that relies on primary sources of information. This is a tall order, however there exists a dangerous paradigm in current data practices where individual data ownership is not clearly defined (Xiaying, 2019, p. 86). By separating individual data and its derived metrics, we can more clearly define where the ownership of an individual's data lives and where the products of a company's goals do. Additionally, derived metrics and tailored profiles drive huge industries that rely on the privatization of consumer data. This has led to a monopolization on data provenance that negatively affects the consumer, leaving them with all of the pains of dealing with the biased aggregation of their data, with none of the positives of the ownership of it (Pan et al., 2023, p. 2).

This leads into the third and final proposal, which is to clearly define the ownership of individual data. This would include being able to individually modify or delete individual data, as well as control the export and manipulation of that data. This is a significant change to the existing structure, where any collector of one's information merely has to disclose that collection. This does not entail a centralized source of authority for the storage of one's individual information, and market structure would dictate how the storage and collection of this individually owned data would work. However, the importance of individual ownership in a market reliant heavily on secondary means of data can not be understated. Ownership of one's data comes with specific benefits, for one that data subject would be able to individually distribute that data by whatever means they see fit - this would mean an end to huge industries such as tailored advertising, a controversial field that tailors specific products based on minutiae in one's online activity. Additionally, the adoption of personal data as private property would

allow for electronic data to be handled more effectively in court cases, as it could be considered to have more significant impacts on personal privacy and intellectual property (Xiaying, 2019, p. 89). These proposals to the world of data privacy and more specifically data retention are extremely important and while dramatic in terms of necessity of change, are more reasonable than loose and widely unadopted documents such as the GDPR.

Conclusion:

The ability of computing hardware to far surpass our ability to remember and catalog is certainly useful, this is obvious in fields of scientific research and the progress made through its capabilities is self-evident. Yet, our adoption of this technology has outpaced our capacity to adapt to its implications, and this is evident in the dangers that the lack of collective forgetfulness poses. There are existing legal precedents for this, such as the aforementioned GDPR Article 17, the Code of Virginia describing juvenile record data retention laws, and the Fair Credit Reporting Act. While regulations like these are positive in terms of their goals and effects, the change needed is larger in scope, and comes more from a shift in mentality than from a regulation imposed by a governing body. To continue the progress of society without hindrance, without danger or either repeating our past mistakes or remaining stuck on them, we need to reconsider fundamentally how we approach data storage and record keeping as a whole. Practically, this is immensely complicated, but there exists precedent and ability to make progress as a whole. While so many people are users of data collection technologies, and so many of these people contribute to these massive databases of user information, they are not aware of the extent or the time lengths that companies keep hold of their information (Goray & Schoenebeck, 2022, p. 22). The effects of this are deep rooted in society, as forgetfulness is inbuilt in us as humans, we are quite literally built to forget, and when we are intimately

involved with a technology that does not contain this ability, it can affect the way we look at the world. While legal precedent is powerful for enacting change in fields such as this, it can often be slow and ineffective if performed incorrectly. The fast moving pace of the data analytics industry is not responsive at all to bureaucratic movements made at a federal level, as the consumer base of many larger corporations doesn't respond to propaganda that conflicts with viewpoints aligned with the software that is responsible for the data collection.

I have described the importance of social forgetfulness and described its relationship with modern information technology practices. The previously explored examples of juvenile records, credit reports, and Civil War remembrances demonstrate how social forgetfulness is valued in our society, and how existing legal precedent has been able to enact real laws that can effect change into long-standing infrastructure. However, data retention can not be handled separately from other data policies. I have introduced a more comprehensive approach that details the major steps that need to be taken in order to enact a more effective and detailed approach to the issue of waning social forgetfulness. The current approach with regards to social forgetfulness and data protection and privacy as a whole is more small pieces welded together than an active plan to achieve safer data practices. This is why the proposed approach is more relevant and practical when data collection, aggregation, and analysis are becoming the norm, and our world is becoming evermore data-driven.

References

Barsky, A. (2017, January 2). *Ethics Alive! To Record or Not To Record: The Ethics of Documentation*. SocialWorker.com. https://www.socialworker.com/feature-articles/ethics-articles/to-record-or-not-to-record-the-ethics-of-documentation/

Bayliss, D. M., & Jarrold, C. (2015). How quickly they forget: The relationship between forgetting and working memory performance. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *41*(1), 163–177. https://doi.org/10.1037/a0037429

Blanchette, J.-F., & Johnson, D. G. (2002). Data Retention and the Panoptic Society: The Social Benefits of Forgetfulness. *The Information Society*, *18*(1), 33–45. https://doi.org/10.1080/01972240252818216

Bucerius, S. M., Thompson, S. K., & Dunford, D. T. (2022). Collective Memory and Collective Forgetting: A Comparative Analysis of Second-Generation Somali and Tamil Immigrants and Their Stance on Homeland Politics and Conflict. *Qualitative Sociology*, 553–556. https://doi.org/10.1007/s11133-022-09508-4

Cho, H., Li, P., Ngien, A., Marion Grace Tan, Chen, A., & Elmie Nekmat. (2023). The bright and dark sides of social media use during COVID-19 lockdown: Contrasting social media effects through social liability vs. social support. *Computers in Human Behavior*, 1–11. https://doi.org/10.1016/j.chb.2023.107795

Cinar, N., & Ateş, S. (2022). Data Privacy in Digital Advertising: Towards a Post Third-Party Cookie Era. *SSRN Electronic Journal*, 1–27. https://doi.org/10.2139/ssrn.4041963

EU. (2016, April 27). *Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC*

(General Data Protection Regulation). Europa.eu. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L:2016:119:TOC

Goray, C., & Schoenebeck, S. (2022). Youths' Perceptions of Data Collection in Online Advertising and Social Media. *Proceedings of the ACM on Human-Computer Interaction*, *6*(CSCW2), 1–27. https://doi.org/10.1145/3555576

Hu, W., & Barradas, D. (2023). Work in Progress: A Glance at Social Media Self-Censorship in North America. *IEEE Xplore*, 609–618. https://doi.org/10.1109/EuroSPW59978.2023.00072

Kleiner, M. M., Nickelsburg, J., & Pilarski, A. M. (2012). Organizational and Individual Learning and Forgetting. *ILR Review*, *65*(1), 68–81. https://doi.org/10.1177/001979391206500104

Kovanič, M., & Spáč, S. (2022). Conceptions of Privacy in the Digital Era: Perceptions of Slovak Citizens. *Surveillance & Society*, *20*(2), 186–201. https://doi.org/10.24908/ss.v20i2.14099

LePort, A. K. R., Mattfeld, A. T., Dickinson-Anson, H., Fallon, J. H., Stark, C. E. L., Kruggel, F., Cahill, L., & McGaugh, J. L. (2012). Behavioral and neuroanatomical investigation of Highly Superior Autobiographical Memory (HSAM). *Neurobiology of Learning and Memory*, *98*(1), 78–92. https://doi.org/10.1016/j.nlm.2012.05.002

Maha Dessokey, Saif, S. M., Hesham Eldeeb, Salem, S. A., & Saad, E. M. (2022). Importance of Memory Management Layer in Big Data Architecture. *International Journal of Advanced Computer Science and Applications*, *13*(5), 460–466. https://doi.org/10.14569/ijacsa.2022.0130554

Pan, B., Stakhanova, N., & Ray, S. (2023). Data Provenance in Security and Privacy. *ACM Computing Surveys*, *55*(14s), 1–35. https://doi.org/10.1145/3593294

Pauliina Hirvonen, & Kari, M. J. (2023). Building Situational Awareness of GDPR. *European Conference on Cyber Warfare and Security*, *22*(1), 575–583. https://doi.org/10.34190/eccws.22.1.1077

Rieff, D. (2016). *In praise of forgetting : historical memory and its ironies* (pp. 1–145). Yale University Press.

Schwartz, B. (2017). The Future of Memory. *Society*, *54*(5), 478–484. https://doi.org/10.1007/s12115-017-0176-z

Urton, G. (1998). From Knots to Narratives: Reconstructing the Art of Historical Record Keeping in the Andes from Spanish Transcriptions of Inka Khipus. *Ethnohistory*, *45*(3), 409. https://doi.org/10.2307/483319

Valentine, P. M. (2012). *A Social History of Books and Libraries from Cuneiform to Bytes*. Scarecrow Press.

Xiaying, M. (2019). The Legal Attributes of Electronic Data and the Positioning of Data in Civil Law. *Social Sciences in China*, *40*(1), 82–99. https://doi.org/10.1080/02529203.2018.1519208

Yang, J., Xiu, P., Sun, L., Ying, L., & Muthu, B. (2022). Social media data analytics for business decision making system to competitive analysis. *Information Processing & Management*, *59*(1). https://doi.org/10.1016/j.ipm.2021.102751

Zarouali, B., Strycharz, J., Helberger, N., & de Vreese, C. (2022). Exploring people's perceptions and support of data-driven technology in times of COVID-19: the role of

trust, risk, and privacy concerns. *Behaviour & Information Technology*, 2049–2060. https://doi.org/10.1080/0144929x.2021.2022208