

# VIDEO KILLED THE RADIO STAR, SO HOW IS THE FAX MACHINE STILL ALIVE? WHEN LAW CEMENTS OLD TECHNOLOGIES

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## *Abstract*

*'Fax it in' might be the most frustrating request a consumer can hear from its provider. There seems to be no clear justification in 2025 for one to be obligated to either fax or physically mail documents rather than use more readily available technologies. The requestors of these faxed documents, mostly in the health and financial sectors, will explain that this is the best way to protect your privacy and comply with regulations, but that is not the whole picture.*

*This paper offers a first-of-its-kind survey of 'old' technologies still entrenched in our commercial, national security, and governmental systems using the fax machine as its primary case study. It reviews the alleged benefits of these technologies, mostly claims of enhanced security and privacy protection, as a means to justify their survival in the current technological landscape. Three distinct players use these technologies via different levels of interactions: governments, businesses, and customers/citizens. The paper advocates for a change in the technologies deployed in the commercial context that preserves governmental discretion to sustain old tech regarding internal correspondences given national security concerns and business-to-business interactions due to established business practices.*

*Federal agencies advocating for consumer protection, such as the FCC, FTC, CFPB, and HHS, should spearhead shift into advanced technologies to benefit consumers who wish to access essential services. These consumers are experiencing communication*

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*barriers given how the system has been structured, despite the many benefits new technologies have to offer now and in the future. The paper gleans lessons learned from the fax case and offers insights concerning the adoption and commercial implementation of upcoming emerging technologies focusing on artificial intelligence (AI) and quantum technologies. Innovation is constantly changing, and consumers' ability to benefit from it should be a priority while navigating their interactions with their providers.*

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## I. INTRODUCTION

In 1964, the commercial fax machine was first put into use.<sup>1</sup> In 1979, the Buggles sang about the death of the radio star, given the technological advancements of the late 1960s.<sup>2</sup> Over fifty years later, the facsimile machine is still alive and kicking. “Fax it in” might be one of the most infuriating requests a customer can receive today, as most consumers don’t own or have easy access to a physical fax machine. These requests are especially prevalent when communicating with the health and financial sectors, though, to a lesser extent, with governmental agencies.<sup>3</sup> During a Congressional debate in 2019 discussing the federal electronic consent forms, which eliminated the need for constituents to fax “federal consent forms,”<sup>4</sup> Representative Katie Hill (D-CA) stated, “I will just note for the record that I believe faxes may or may not have ended their usefulness before I was born.”<sup>5</sup> Though this may seem like an overstatement, there is something fundamentally true about the unwelcome persistence of fax machines in our commercial lives. This legislative movement to reduce dependency on fax machines is also evident in other countries, such as Israel, Japan, and the UK, which all passed legislation to reduce fax reliance by public providers.<sup>6</sup>

Facsimile technology allegedly carries some benefits, mainly concerning privacy protection and secure communication. However, it is clear that new technologies, such as emails, post-quantum cryptography, and the World Wide Web, offer more efficient, convenient, and modern alternatives to fax communication with governments and businesses without forgoing privacy protection. Chiefly, the lack of a robust fax infrastructure for consumers renders

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<sup>1</sup> JONATHAN COOPERSMITH, *FAXED: THE RISE AND FALL OF THE FAX MACHINE* 113 (2015).

<sup>2</sup> THE BUGGLES, *Video Killed the Radio Star*, on *THE AGE OF PLASTIC* (Island Records 1979).

<sup>3</sup> Some federal agencies, such as the IRS, still use fax to an extremely high degree. See Lynn Jenkins, *The IRS is Still Using Fax Machines. It’s Time for a Makeover*, CNN (Mar. 26, 2018), [www.cnn.com/2018/03/26/opinions/irs-needs-to-work-for-americans-opinion-jenkins/index.html](http://www.cnn.com/2018/03/26/opinions/irs-needs-to-work-for-americans-opinion-jenkins/index.html) [https://perma.cc/4EZF-PFCS].

<sup>4</sup> Creating Advanced Streamlined Electronic Services for Constituents Act of 2019, 5 U.S.C. § 552(a).

<sup>5</sup> Craig Caplan, *Reps. Katie Hill and Joe Kennedy on Faxes*, C-SPAN (Feb. 11, 2019), [www.c-span.org/video/?c4779638/rep-katie-hill-joe-kennedy-faxes&editTime=1549980875](http://www.c-span.org/video/?c4779638/rep-katie-hill-joe-kennedy-faxes&editTime=1549980875) [https://perma.cc/UL9U-24GG].

<sup>6</sup> See Lee Gancman, *Israeli Ministries to Phase Out Fax Machines*, *TIMES OF ISRAEL* (Jan. 17, 2016), [www.timesofisrael.com/israeli-ministries-to-phase-out-fax-machine/](http://www.timesofisrael.com/israeli-ministries-to-phase-out-fax-machine/) [https://perma.cc/PL7Z-JBXW]; see also *infra* Part II.2.c.

this technology less attainable than other, more readily available technologies. This lack of availability also weakens the argument that these machines protect consumers' privacy, as online fax services, which have mushroomed in recent years, do not carry the same alleged privacy benefits traditional fax machines do.<sup>7</sup> This phenomenon also appears with other old technologies that are still in use today, such as the pager, floppy disks (e.g., the USA's nuclear system was partially controlled by 8-inch floppy disks until 2019),<sup>8</sup> analog television, print newspapers, telegraphs, morse code, and 'legacy software' deployed by governments. Most of these technologies currently have superior, savvy technological alternatives but still refuse to depart from our technological landscape. This phenomenon is primarily due to two reasons. First, the significant power of inertia upon businesses and governmental agencies' organizational culture, social practices, and norms, which are inherently slow to embrace changes, especially technological ones.<sup>9</sup> Second, and central to this paper, legislation and governmental practices are rooted in privacy concerns surrounding the potential negative consequences of the de-implementation of old technologies and the implementation of newer ones. This process of deinstallation and reinstallation could expose vulnerabilities in both old and new technologies and lead to privacy harm in the form of data breaches, leakage, and exposure of sensitive information.

This Article aims to survey the pervasive usage of archaic technologies due to regulation and governmental practices, using the fax as its primary case study. This practice can be roughly divided into two distinct categories based on the identity of the entity communicating information: (1) the government interacting within itself, as well as with business and its citizens; and (2) businesses interacting with each other as well as with consumers. On the first level, the Article argues that governmental agencies should be given greater discretion to continue relying on old technologies for national security and intelligence purposes when communicating internally. This is especially true given that consumers don't directly use these old technologies, and thus, there is less justification to replace them.

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<sup>7</sup> Lily Hay Newman, *Fax Machines Are Still Everywhere, and Widely Insecure*, WIRED (Aug. 12, 2018), [www.wired.com/story/fax-machine-vulnerabilities/](http://www.wired.com/story/fax-machine-vulnerabilities/) [<https://perma.cc/Q3FM-5D38>].

<sup>8</sup> U.S. GOV'T ACCOUNTABILITY Off., GAO-19-471, INFORMATION TECHNOLOGY: AGENCIES NEED TO DEVELOP MODERNIZATION PLANS FOR CRITICAL LEGACY SYSTEMS (2019).

<sup>9</sup> See *infra* notes 21–22 and accompanying text. Other factors that are not covered in this paper include consumer nostalgia and ethical considerations, such as job displacement when old technologies are retired.

The Article then focuses on businesses and governments interacting with consumers,<sup>10</sup> as these immensely affect an individual's ability to receive essential services from the government and business providers. Despite some benefits of these technologies, including compatibility, interoperability, and proven reliability, novel and more efficient technologies should replace long-standing ones. To do so, current legislation and federal agencies' practices should be adjusted to enable this transition and battle bureaucratic inertia.<sup>11</sup> Replacing antiquated technologies with newer tech is an essential part of advancing innovation, and it should also contribute to privacy protection via innovation.

This call for technological progress comes with two caveats. The first one is that newer is not always better, and adopting new technology too early could be unhelpful, for example, in the medical and surgical context, where such early adoption can increase unnecessary risks.<sup>12</sup> As presented below, older technologies have advantages in emergencies, given their reliability, and newer technologies have disadvantages in certain situations, given their dependency on fragile networks.<sup>13</sup> There are also areas in which worries persist about completely adopting newer technologies that could be hacked—such as voting. Since the disputed presidential election in 2000, voting technology has become controversial, and it is hard to advocate for its full adoption<sup>14</sup> despite the current crumbling condition of voting machines in the US.<sup>15</sup> In the context

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<sup>10</sup> As citizens can be seen as governmental consumers, the Article refers to them as consumers even when interacting with their representatives. For more information, see Margaret Scammell, *Citizen Consumers: Towards a New Marketing of Politics?*, in *MEDIA AND THE RESTYLING OF POLITICS: CONSUMERISM, CELEBRITY AND CYNICISM* 117–36 (John Corner & Dick Pels eds., 2003).

<sup>11</sup> Hazel Jovita & Achmad Nurmandi, *Bureaucratic Inertia*, in *GLOBAL ENCYCLOPEDIA OF PUBLIC ADMINISTRATION, PUBLIC POLICY, AND GOVERNANCE* (Ali Farazmand ed., 2018).

<sup>12</sup> For literature along these lines, see Meredith Albrecht & Jeanine Wiener-Kronish, *Newer Technology is Not Always Better*, 39 *CRITICAL CARE MED.* 591 (2011); Gail R. Wilensky, *Robotic Surgery: An Example of When Newer Is Not Always Better but Clearly More Expensive*, 94 *MILBANK Q.* 43 (2016).

<sup>13</sup> See *infra* note 97 and accompanying text.

<sup>14</sup> *Voting Technology*, MIT ELECTION DATA SCI. LAB, electionlab.mit.edu/research/voting-technology [https://perma.cc/ZK7E-2F7F].

<sup>15</sup> Turquoise Baker & Lawrence Norden, *Voting Machines at Risk in 2022*, BRENNAN CTR. FOR JUST. (Mar. 1, 2022), www.brennancenter.org/our-work/research-reports/voting-machines-risk-2022 [https://perma.cc/N45C-Z46J].

of adopting new technologies too early, recent attempts to integrate AI chatbots in schools have proven to be challenging, given the vulnerable populations and uncertainty of the technology.<sup>16</sup> This is to say that there are certain aspects of our lives in which technology yields other social, societal, and political considerations. Furthermore, as old technologies continue to be of value in emergencies as well as to specific populations,<sup>17</sup> they will continue to hold critical roles in our lives. As such, it is important that we be able to manage these technologies alongside encouraging progress and innovation to allow the latter to flourish.

The second caveat is that the state of a given technology is not binary. It is not strictly old or new. There are patches designed to update older technologies, combinations of the two, and different alterations that create cooperation between the old and the new.<sup>18</sup> Presenting it as either/or flattens the conversation. Given these two caveats, this Article focuses on consumer-facing technologies and argues that some combination or alteration of old and new technologies is necessary to ensure that consumers and citizens receive the services they need and deserve, even if those are not provided using the most cutting-edge technology available on the market.<sup>19</sup>

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<sup>16</sup> See, e.g., Dana Goldstein, *A.I. 'Friend' for Public School Students Falls Flat*, N.Y. TIMES (July 1, 2024), [www.nytimes.com/2024/07/01/us/ai-chatbot-los-angeles-schools.html](https://www.nytimes.com/2024/07/01/us/ai-chatbot-los-angeles-schools.html) [<https://perma.cc/NXW4-JU7D>].

<sup>17</sup> For example, old technologies, also called “dumb technologies” in this context, still have a vivid audience within the consumer market. So, companies have the financial incentive to continue to manufacture them. A prominent example can be found in religious communities that use old technologies to accommodate their religious faith and practices. Some ultra-orthodox Jewish communities use “kosher” or “dumb” phones. These phones are typically older phone models or smartphones modified to restrict functionalities like texting and internet access. Thus, non-technological normative justifications are always in the background. These nudge companies to adhere to older technologies and not completely remove them from our commercial market. See Mushfiq Rahman, *Kosher Phone Plans: Understanding the Basics*, US MOBILE (Dec. 8, 2023), <https://www.usmobile.com/blog/kosher-phone-plans-understanding-the-basics/> [<https://perma.cc/7S54-VKDL>].

<sup>18</sup> Allan Holmes, *Patching Holes*, GOV'T EXEC. (July 1, 2007), [www.govexec.com/magazine-advice-and-dissent/magazine-advice-and-dissent-managing-technology/2007/07/patching-holes/24775/?oref=ge-next-story](http://www.govexec.com/magazine-advice-and-dissent/magazine-advice-and-dissent-managing-technology/2007/07/patching-holes/24775/?oref=ge-next-story) [<https://perma.cc/DBH8-SH6J>].

<sup>19</sup> For more on the connection between old and new technologies, see Christina Haas, *On the Relationship Between Old and New Technologies*, 16 COMPUT. AND COMPOSITION 209 (1999).

Thus far, current literature hasn't delved into the legal framework surrounding old technologies. Many have criticized the problematic usage of fax, old software, print newspapers,<sup>20</sup> and others, as these are less attainable to consumers and less sustainable in the long term. Still, no meaningful discussion has been held about the legal infrastructure that cements these technologies and how to address this challenge. As the case of the fax machine demonstrates, outdated legislation and its interpretation by federal agencies and the private sector reinforce old technologies within its system or, at the very least, fail to provide incentives to innovate. This prevents society from adopting new and efficient technologies that benefit consumers and may hinder the adoption of upcoming emerging technologies, chiefly AI and quantum technologies, which can transform how we interact and how safe our data is. This Article offers a fragmented approach based on federal agencies operating in different commercial spheres to protect consumers and create a supportive legal framework for successfully integrating new technologies while maintaining essential safeguards. These agencies are well-positioned to guide consumers and businesses in adopting emerging technologies while complying with data security and privacy legislation.

The Article continues as follows: Part II provides an overview of the resilience of old technologies, focusing first on using older technologies in the legal realm and then on the case of the fax machine. It delves into the history of the fax machine and international endeavors to curtail this technology and details the reasons that have turned it into an essential part of our communication culture to this day. Part III reviews different interaction levels between governments, businesses, and customers. It provides various examples of old technologies that were essential, and sometimes still are, to interactions between these three players. These include the global shift from analog to digital TV, the pager, the telegraph, 'legacy software' (i.e., old programming languages), and more. Part IV examines the role of federal agencies in adopting new technologies for the benefit of governments, businesses, and consumers. It focuses on four central agencies: the Federal Communications Commission (FCC), the Federal Trade Commission (FTC), the Consumer Financial Protection Bureau (CFPB), and the Department of Health and Human Services (HHS). This Part reviews the actions these agencies can take to alleviate the burdens caused to consumers due to old technologies being entrenched in how they communicate with providers. It will then discuss the future implications of regulation that cements old

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<sup>20</sup> Lauren A. Rieders, *Old Principles, New Technology, and the Future of Notice in Newspapers*, 38 HOFSTRA L. REV. 1009 (2010).

technologies while focusing on the emerging technologies of AI and quantum technologies. It connects the adoption of these technologies to the abovementioned federal agencies' role and their responsibility to ensure these technologies' quick and secure implementation. Part V concludes.

## II. OLD TECHNOLOGIES REFUSE TO DIE

Historians and social theorists focusing on tech-related issues have long recognized that technology is highly path-dependent.<sup>21</sup> As a result, it is often extremely expensive to scrap away earlier technological habits and infrastructures to implement new technologies. In this sense, it should not be surprising that old technologies are persistent, regardless of their technological capabilities and available alternatives. This persistence is primarily attributed to the social, political, and cultural notions we hold as a society and as individual consumers. Technical decisions are inevitably interconnected with bureaucratic inertia and political choices; thus, the fact that there is a better means of technology is not always enough.<sup>22</sup> On top of that, humans are inherently reluctant to adopt new technologies, a phenomenon known as the status quo bias, which is the tendency to favor what is currently in place and fear

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<sup>21</sup> Alan Z. Rozenshtein, *Surveillance Intermediaries*, 70 STAN. L. REV. 99, 144 (2018). In the context of encryption and current cryptographic systems, see Chertoff Group, *The Ground Truth About Encryption and the Consequences of Extraordinary Access* 6 (2016), [<https://perma.cc/Q3LT-2N8N>] (“Beyond the technical and security challenges, the practical impact of this would be to break current best practices for secure key generation and storage. Most cryptographic systems used today would require redesign; given that these systems are embedded in most desktops, laptops, and mobile devices, the software used to manage cryptographic systems in billions of devices would have to be re-engineered, and in some cases the devices themselves would have to be replaced. In theory, this would be technically feasible; in practice, we believe it is highly unrealistic.”). See also JULIE E. COHEN, *CONFIGURING THE NETWORKED SELF: LAW, CODE, AND THE PLAY OF EVERYDAY PRACTICE* 181 (2012).

<sup>22</sup> See generally LANGDON WINNER, *THE WHALE AND THE REACTOR: A SEARCH FOR LIMITS IN AN AGE OF HIGH TECHNOLOGY* (1986) (discussing technology's political, social, and philosophical implications and how technical decisions can often be construed as political decisions). This also challenges the traditional process known as “technological obsolescence,” when technology becomes outdated and loses its usefulness due to advancements, changes in standards, or discontinuation of support, impacting its functionality and usefulness. See Song Ma, *Technological Obsolescence*, REV. OF FIN. STUD. (forthcoming 2025).

change.<sup>23</sup> For example, organizations often leverage existing information systems rather than adopt new ones.<sup>24</sup>

Though old technologies have privacy and cybersecurity issues, they also present surprising benefits.<sup>25</sup> For example, a failed software update may render washing machines and dryers unusable unless one finds enough quarters to get through the debugging phase. Another example presents itself in the automobile industry, where manual transmission cars are still being manufactured and sold worldwide, even though most young drivers, mostly Americans, don't bother to learn how to drive a stick.<sup>26</sup> Surprisingly, this has turned out to be an advantage to manual transmission car owners, as most of those who attempt to steal them don't know how to drive them.<sup>27</sup> However, when thinking about the majority of interactions in the consumer context, whether we interact with governments or businesses, these positive aspects seem to recede, given the challenge in accessing older technologies in consumer lives today.

Societies are in a constant race to achieve technological advancement. This race usually manifests via competition between companies or rival countries trying to dominate a certain field, whether it be the race to the moon, to nuclear capabilities, to artificial intelligence, or quantum computing.<sup>28</sup> During these races, new

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<sup>23</sup> Hee-Woong Kim, *Investigating User Resistance to Information Systems Implementation: A Status Quo Bias Perspective*, 33 MIS Q. 567 (2009).

<sup>24</sup> Cheng-Chieh Wu, *Status Quo Bias in Information System Adoption: A Meta-Analytic Review*, 40 ONLINE INFO. REV. 998 (2016); cf. Irfan Nasrullah, *The Status Quo Bias on Technology Adoption*, MEDIUM (Dec. 11, 2023), irfanasrullah.medium.com/the-status-quo-bias-on-technology-adoption-f61bd68d42c2 [https://perma.cc/P4UC-A6HQ].

<sup>25</sup> This is to be distinguished from “desirable inefficiency,” where the technology is made inefficient on purpose to serve a different normative goal. See Paul Ohm & Jonathan Frankle, *Desirable Inefficiency*, 70 FLA. L. REV. 777 (2018).

<sup>26</sup> Lauren Woolley, *Millennials and Manuals: The Slow Death of the Stick Shift*, DAILY UNIVERSE (Oct. 11, 2022), universe.byu.edu/2022/10/11/millennials-and-manuals-the-slow-death-of-the-stickshift/ [https://perma.cc/D7DG-S9BR].

<sup>27</sup> Gina Cook, *Watch: Teens Try to Carjack Man, But Can't Drive Manual Transmission*, NBC WASH. (Mar. 29, 2023), www.nbcwashington.com/news/local/watch-teens-attempt-to-carjack-man-but-cant-drive-manual-transmission-to-get-away/3316846/ [https://perma.cc/8WBF-DZY5].

<sup>28</sup> See, e.g., Paul Scharre, *Debunking the AI Arms Race Theory*, 4 TEX. NAT'L SEC. REV. 121 (2021); NAT'L SEC. COMM'N ON A.I., FINAL REPORT 157–70, 241–52 (2021); Raluca Csernatoni, *Beyond the Hype: The EU and*

technologies are discovered, which make old technologies obsolete or, at the very least, less attractive and relevant. This has already happened in the context of job-displacement technologies, such as bank tellers and elevator operators who were gradually replaced by mechanical alternatives for efficiency.<sup>29</sup> This job displacement fear is speculated to increase with the continuous entrance of AI into our market and its interference with the current labor force.<sup>30</sup>

From a consumer-facing perspective, this shift from the old to the new has happened in other aspects, as expected from a market that constantly seeks and encourages innovation. These include, for example, replacing the polyrod camera and vinyl records with more advanced alternatives. Nonetheless, both of these products are currently experiencing a rejuvenated period, given nostalgia and other societal reasons that have intrigued younger consumers.<sup>31</sup> Sometimes, it seems that consumer-facing technologies are “killed” prematurely. For example, Apple decided not to include HDMI ports in different versions of Apple MacBooks.<sup>32</sup> Apple consumers need to purchase adapters or other add-on devices to connect their devices to an HDMI port. On the one hand, this could be a legitimate attempt by Apple to create disruptive technology and offer a better, improved,

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*the AI Global ‘Arms Race’*, EUR. LEADERSHIP NETWORK (Aug. 21, 2019), [www.europeanleadershipnetwork.org/commentary/beyond-the-hype-the-eu-and-the-ai-global-arms-race/](http://www.europeanleadershipnetwork.org/commentary/beyond-the-hype-the-eu-and-the-ai-global-arms-race/) [<https://perma.cc/3CSP-4XNP>]; Adam Clark Estes, *Maybe Losing the AI Race to China Isn’t Such a Bad Idea*, VOX (Oct. 3, 2021), [www.vox.com/recode/22725044/china-ai-race-pentagon-wechat](http://www.vox.com/recode/22725044/china-ai-race-pentagon-wechat) [<https://perma.cc/ES5S-9FHK>].

<sup>29</sup> Evan J. Zimmerman, *Four Horsemen of Technological Change: Farmers, Elevator Operators, Coal Miners, Bank Tellers*, DAKOTA DIGIT. REV. (Mar. 13, 2023), <https://dda.ndus.edu/ddreview/four-horsemen-of-technological-change-farmers-elevator-operators-coal-miners-bank-tellers/> [<https://perma.cc/YZ98-ZF8F>].

<sup>30</sup> See MARTIN FORD, *THE RISE OF THE ROBOTS: TECHNOLOGY AND THE THREAT OF A JOBLESS FUTURE* (2016).

<sup>31</sup> Nick Bilton, *Why Vinyl Records and Other ‘Old’ Technologies Die Hard*, N.Y. TIMES (Mar. 16, 2016), [www.nytimes.com/2016/03/16/style/vinyl-records-books-film-cameras-die-hard.html](http://www.nytimes.com/2016/03/16/style/vinyl-records-books-film-cameras-die-hard.html) [<https://perma.cc/5LK6-X4VB>]. Some will strongly argue for other reasons to adhere to these technologies, such as better sound quality for vinyl records or the prestige involved with collectible cars. See *id.*

<sup>32</sup> Umair Ishrat Khan, *Why Apple Got Rid of USB And Other Ports in MacBook*, MEDIUM (May 30, 2021), [khanumair-9430.medium.com/why-apple-got-rid-of-usb-and-other-ports-in-macbook-32c2f527a6a5](http://khanumair-9430.medium.com/why-apple-got-rid-of-usb-and-other-ports-in-macbook-32c2f527a6a5) [<https://perma.cc/3WTZ-ZUXD>].

innovative technology to replace traditional HDMI ports.<sup>33</sup> On the other hand, a more cynical approach would argue that Apple, and perhaps other tech companies, is trying to further its already deep grasp on the market and make it harder for its consumers to purchase non-Apple products.<sup>34</sup> Either way, this is an interesting example of how sometimes older technologies don't go through their entire life cycle,<sup>35</sup> not because they have become obsolete but because technology companies have other underlying goals when interacting with consumers.

Still, sometimes old technologies refuse to die because the legal framework doesn't allow them to, even though a novel, more efficient technology might already be available. Aside from the prevalent example of the fax machine in a consumer context, this notion also exists in ample legal interactions, such as the duty to publish legal announcements in physical newspapers (i.e., notice by publication), the requirement for physical presence when testifying a will, and the ability of a plaintiff to give notice and service of process under civil procedure regulation. In this context, the conclusion is not necessarily that the usage of older tech is undesirable, but that there is an ongoing need to reevaluate these laws to ensure they operate for the benefit of the legal system's users. Below, I review the usage of old technologies in the legal realm, focusing on the above three examples.

#### A. OLD TECHNOLOGIES FOR LEGAL COMMUNICATIONS

*Notice by Publication:* Printed newspapers have been the traditional forum selected to disseminate legal notices and communicate with the public.<sup>36</sup> Allegedly, newspaper notices provide access to information and enable record keeping, though the former, at least, is problematic, given that accessibility doesn't mean people actually see it.<sup>37</sup> This might have had some merit in the past

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<sup>33</sup> *Id.* (“The most famous answer on [G]oogle was ‘Apple has a long history of killing old connectors to drive adoption of newer, better standards.’”).

<sup>34</sup> Apple is currently being sued by the F.T.C. for allegedly illegally monopolizing the smartphone market. *See United States v. Apple, Inc.*, 2:24-cv-04055 (D.N.J. Mar. 21, 2024).

<sup>35</sup> Margaret Taylor & Andrew Taylor, *The Technology Life Cycle: Conceptualization and Managerial Implications*, 140 INT. J. PROD. ECON. 541 (2012).

<sup>36</sup> Rieders, *supra* note 20, at 1010.

<sup>37</sup> Some might argue this is a means to bypass the “notice by publication” principle by giving public notice via a means that is inadequate to establish public awareness of a certain topic.

when printed newspapers were the efficient way to achieve wide-scope notification, but given the proliferation of online sources, this no longer seems to be the case.<sup>38</sup> There have been three main types of public notices. First is citizen participation, where governments are obligated to publish information on certain aspects of their activities and provide an opportunity for citizens to comment. These might include the publication of government budgets, notices of public hearings, and notices of intentions to change government-run or managed programs.<sup>39</sup> For example, the Federal Reserve states on its website, “Federal regulations require that notice of certain proposals be published in a newspaper of general circulation in the communities that will be affected to allow the general public an opportunity to comment.”<sup>40</sup> Second, business and commerce-related notices, such as government requests for bids for services, purchases, and other business-related activities. This also includes corporations and other business organizations that publish when they are incorporated and dissolved, and their intention to do business in a specific area.<sup>41</sup> For example, “Pennsylvania Code requires that incorporators advertise their intention to file, or advertise that they have formed a corporation with the Pennsylvania Department of State, to be published once in two newspapers of general circulation, one a legal newspaper.”<sup>42</sup> Third, court notices include an obligation of attorneys to publish a notice informing the public of the

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<sup>38</sup> Adam Grundy, *Service Annual Survey Shows Continuing Decline in Print Publishing Revenue*, U.S. CENSUS BUREAU (June 7, 2022), [www.census.gov/library/stories/2022/06/internet-crushes-traditional-media.html](http://www.census.gov/library/stories/2022/06/internet-crushes-traditional-media.html) [https://perma.cc/NJ5Y-D8AU].

<sup>39</sup> *About Public Notice*, PUB. NOTICE RES. CTR., [www.pnrc.net/about-2/about-public-notice/](http://www.pnrc.net/about-2/about-public-notice/) [https://perma.cc/B8UQ-99QG].

<sup>40</sup> *Electronic Applications and Applications Filing Information, Newspaper Notices*, BD. OF GOVERNORS OF THE FED. RSRV. SYS., [www.federalreserve.gov/supervisionreg/afi/regionalinfo.htm](http://www.federalreserve.gov/supervisionreg/afi/regionalinfo.htm) [https://perma.cc/SZ8S-HZJK].

<sup>41</sup> An interesting example in the context of commerce and business is that of unclaimed property: “Often, insurance companies and other businesses possess money or property that has been separated from the true property owner due to the rightful owner’s relocation or displacement. Businesses are required to keep these items for a specified continuous time, after which such property is surrendered to the state. Most states then publish public notices describing the property in the area where the true owner was last domiciled, in order to return the property to its rightful owner. Unclaimed property notices are some of the largest and most popular public notices that are printed.” PUB. NOTICE RES. CTR., *supra* note 39.

<sup>42</sup> *See, e.g., How To Publish Notice Of Your Pennsylvania Articles Of Incorporation*, NORTHWEST, [www.northwestregisteredagent.com/corporation/pennsylvania/publication-requirement](http://www.northwestregisteredagent.com/corporation/pennsylvania/publication-requirement) [https://perma.cc/24YX-S5P3].

appointment of an administrator of an estate being probated to allow the public to object and alert any unknown creditors to the situation.<sup>43</sup> For example, with regard to probate notice, the Pennsylvania code states that the representative of the decedent “shall cause notice thereof to be given in one newspaper of general circulation published at or near the place where the decedent resided . . . .”<sup>44</sup>

Many traditional newspapers have completely ‘gone online’ given the shift to news consumption on the internet and social media. This may lead to issues with compliance with publication obligations via printed newspapers, as the American printed news industry is allegedly dying.<sup>45</sup> On the other hand, some have argued that since newspapers have already survived fierce competition from the radio and television, they are also likely to weather the threat of the internet, especially given the support from legislators, who need them to enable “notice by publication.”<sup>46</sup>

*Attesting a Will:* The requirement to be physically present while attesting to a will, trust, and other testamentary documents has been adjusted for a short time via remote attestation laws through the use of audio-video technology, given the COVID-19 pandemic and the restrictions imposed on in-person interactions.<sup>47</sup> For example, in September 2020, an executive order issued by the British Lord Chancellor temporarily amended the Wills Act by defining the “presence” of witnesses to include “presence by means of videoconference or other visual transmission.”<sup>48</sup> This legislation is similar to other legislative enactments in the US that created “temporary exceptions to will execution rules as a way of lessening the impact of the coronavirus’s disruption of everyday life.”<sup>49</sup>

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<sup>43</sup> PUB. NOTICE RES. CTR., *supra* note 39.

<sup>44</sup> 20 PA. CONS. STAT. § 3162 (2024).

<sup>45</sup> See ROBERT W. MCCHESENEY & JOHN NICHOLS, *THE DEATH AND LIFE OF AMERICAN JOURNALISM: THE MEDIA REVOLUTION THAT WILL BEGIN THE WORLD AGAIN* 3 (2010) (“Daily newspapers are in free-fall collapse. The entire commercial news-media system is disintegrating.”). The total circulation of daily newspapers has steadily declined from 1950–2008. See *id.* at 32 tbl.2.

<sup>46</sup> See, e.g., Tony Jackson, *Paper Dinosaurs Refuse to Fold*, FIN. TIMES, Dec. 12, 1995, at 19.

<sup>47</sup> Richard F. Storrow, *Legacies of a Pandemic: Remote Attestation and Electronic Wills*, 38 MITCHELL HAMLIN L. REV. 826 (2022).

<sup>48</sup> The Wills Act 1837 (Electronic Communications) (Amendment) (Coronavirus) Order 2020, SI 2020/952, art. 2, ¶ 3 (Eng.), <https://www.legislation.gov.uk/ukxi/2020/952/article/2/made> [<https://perma.cc/B3WL-JX9K>].

<sup>49</sup> Storrow, *supra* note 47, at 828.

Although these enactments were temporary and aimed at eventually returning to the traditional method, where most states require that such testamentary documents be signed in the physical presence of two or more witnesses to be valid, there has been a call for remote will execution post-COVID.<sup>50</sup> Some states have even started this process by allowing other online services, such as remote online notarization.<sup>51</sup>

The combination of readily available technological means of communication with public health crises and necessities had created a rather extreme break from traditional common law in the field of wills, trusts, and estates. Though some of its residues can be seen in the form of online notarization, there seems to be a general withdrawal from using these technologies in ‘regular’ times, i.e., not during a crisis. This might be the right approach, given the importance of these legal instruments, which differ in nature from other types of communications. Whether the call to allow the usage of audio-video technology in this context will eventually be accepted is a matter of time, culture, and norms.<sup>52</sup>

*Service of Process:* The federal civil procedure does not include modern means of technology in its formal rules for service of process.<sup>53</sup> In federal court, Federal Rule of Civil Procedure Rule 5(b)(2)(E) provides that a person may be served “by other electronic means that the person consented to in writing,” and the Notes on Advisory Committee on the Rules to this provision state that facsimile transmission is included as an electronic means.<sup>54</sup> Yet, in most cases, a person must consent to service by fax in advance to establish adequate service of process. As most people going through the court system are legally represented, and fax machines are abundant at law firms, this doesn’t usually create an obstacle to plaintiffs and

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<sup>50</sup> See Jessie Daniel Rankin, *Socially Distant Signing: Why Georgia Should Adopt Remote Will Execution in the Post-COVID World*, 56 GA. L. REV. 391 (2021).

<sup>51</sup> See Michael A. Markowitz, *The Future Is Here: New York Approves Remote Online Notarization*, NYSBA (Apr. 11, 2023), [nysba.org/the-future-is-here-new-york-approves-remote-online-notarization/](https://nysba.org/the-future-is-here-new-york-approves-remote-online-notarization/) [<https://perma.cc/REL6-534J>]; Matthew Fiedler, *Post-Pandemic Estate Planning: Analyzing the Recent Changes in Remote Notarization Laws*, 45 SEATTLE UNIV. L. REV. 741 (2022).

<sup>52</sup> Another example is allowing video testimony in court post-COVID. See Ayyan Zubair, *Confrontation after COVID*, 110 CAL. L. REV. 1689 (2022).

<sup>53</sup> FED. R. CIV. P. 4.

<sup>54</sup> FED. R. CIV. P. 5.

defendants. Even if you are not represented, the rule generally requires consent to use this method.<sup>55</sup>

Furthermore, states have taken a proactive approach in this area and created additional methods enabling plaintiffs to give service of process via email, fax, social media, and other technological means. But these are also restricted. For example, New York authorizes service of process by e-mail or facsimile transmission;<sup>56</sup> however, to enjoy this method, the plaintiff must make an ex parte motion, otherwise, the service might be deemed invalid even if the defendant received the notice. Moreover, the plaintiff needs to show that service under all other traditional methods is impracticable.<sup>57</sup> Some states have even allowed service by social media.<sup>58</sup> For example, in Texas, one must receive advance court approval for service via social media or email. This method will only be allowed after showing that all in-person attempts have failed and that this service method will be “reasonably effective to give the defendant notice of the suit.”<sup>59</sup>

This overall movement, led by courts,<sup>60</sup> allowing the use of social media and other technological means for service of process, is

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<sup>55</sup> For example, California Code of Civil Procedure § 1013(e) provides that “service by facsimile transmission shall be permitted only where the parties agree, and a written confirmation of that agreement is made.”

<sup>56</sup> N.Y. C.P.L.R. 308 (McKINNEY 2024).

<sup>57</sup> *Process Service through Mail, Fax, FedEx, and E-mail*, SERVE INDEX, <https://www.serveindex.com/serving-process-by-mail-fax-e-mail-fedex/> [<https://perma.cc/3U52-3XQH>].

<sup>58</sup> See Emily Davis, *Social Media: A Good Alternative, for Alternative Service of Process*, 52 CASE W. RES. J. INT'L L. 573 (2020); Keely Knapp, *#serviceofprocess @socialmedia: Accepting Social Media for Service of Process in the 21st Century*, 74 LA. L. REV. 547 (2014); Christina Martinez, “You’ve Got Mail!” *Parties May Now Be Served via Email, Text, and Social Media*, PRINZ L. FIRM (Oct. 18, 2023), [www.prinz-lawfirm.com/our-blog/2023/october/-you-ve-got-mail-parties-may-now-be-served-via-e/](http://www.prinz-lawfirm.com/our-blog/2023/october/-you-ve-got-mail-parties-may-now-be-served-via-e/) [<https://perma.cc/28KQ-U74S>].

<sup>59</sup> John Millard, *Can You Be Served With a Lawsuit By Email or Social Media? Unleash the Power of Electronic Service of Process in Texas!*, ARMATYS MILLARD (July 7, 2023), <https://mediationjudges.com/can-you-be-served-with-a-lawsuit-by-email-or-social-media-unleash-the-power-of-electronic-service-of-process-in-texas/> [<https://perma.cc/9BTW-HZFN>].

<sup>60</sup> See, e.g., *ECHO Health, Inc. v. Echo Payments*, No. CV 23-741 (PAM/DTS), 2023 WL 5950802, at \*1 (D. Minn. Sept. 13, 2023); *Seaboard Marine Ltd., Inc. v. Magnum Freight Corp.*, 2017 WL 7796153, at \*1 (S.D. Fla. Sept. 21, 2017); see also Meghan Lewallen, *Service of Process by E-Mail and Other Alternative Methods Authorized Under Federal Law*, JD SUPRA (Aug. 9, 2023), [www.jdsupra.com/legalnews/service-of-process-by-e-mail-and-other-2051335/](http://www.jdsupra.com/legalnews/service-of-process-by-e-mail-and-other-2051335/) [<https://perma.cc/P4TN-VGVY>].

another example of slow but steady progress that is attentive to innovation while maintaining legal traditions to ensure justice and fairness. As the above three examples demonstrate, the legal realm and its way of communication with individuals and organizations are somewhat more justified in their restrictions and lack of innovation, given concerns over transparency, certainty, and justice.<sup>61</sup> These types of communications have relatively strong normative reasons for slowly adopting new technologies, given the identities of the parties involved and the legal context in which they operate, and they still adhere to a conservative approach. This is less apparent in other types of communications involving different types of parties with very different goals. Chief among these is this Article's primary case study that exemplifies the phenomenon of old technologies refusing to die – the fax machine.

#### B. THE CASE OF THE FAX MACHINE – THE USAGE OF FAX IN A CONSUMER ENVIRONMENT

Major shipping companies, such as UPS and FedEx, presently offer in-store fax services for those who need to send or receive a fax transmission but do not have a fax machine readily available.<sup>62</sup> There is a clear need for this type of service, given that different businesses and government agencies still highly rely on facsimilia to communicate with their customers. Moreover, multiple online services offer digital-based fax transmission instead of a physical fax machine, similar to how emails are sent.<sup>63</sup> However, the shift to digital-based transmission loses some of the alleged advantages embedded in traditional fax machines, mostly their privacy enhancement features, as they operate on landlines and are not connected online.

This subsection reviews the history of the fax machine from its inception in the early 1800s in Europe, through its development in the USA, and its flourishing in Japan. It delves into the advantages

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<sup>61</sup> Though this holds less force in the first example of notice by publication.

<sup>62</sup> *Faxing Services*, UPS STORE, [www.theupsstore.com/store-services/faxing-service](http://www.theupsstore.com/store-services/faxing-service) [<https://perma.cc/Q38N-MBFA>] (“We know that several businesses rely on faxes to send and receive reliable signatures, official documents and more. But a nearby accessible fax machine can sometimes be hard to find.”); *Fax Services*, FEDEX OFF., [www.office.fedex.com/default/fax-services](http://www.office.fedex.com/default/fax-services) [<https://perma.cc/98U3-XLBC>].

<sup>63</sup> See Melanie Pinola, *The Best Online Fax Services*, N.Y. TIMES (May 15, 2024), [www.nytimes.com/wirecutter/reviews/best-online-fax-services/](http://www.nytimes.com/wirecutter/reviews/best-online-fax-services/) [<https://perma.cc/HDF2-F63J>].

and disadvantages of the fax machine and tries to demystify its stronghold on communication methods in specific industries, primarily the health and financial sectors.

### 1. *From Patenting in 1843 to the Computer Era*

The fax machine's history is complex, filled with commercial failures and relatively late success. Its major success began in the 1980s and continued until its partial fall in the 2000s, with the beginning of the computer age. There are multiple reasons for its failures, but the principal ones were that the fax machine was cumbersome, costly, and difficult to operate. There was usually a cheaper means of communication than fax since its inception in the early 1800s, and its development for easy commercial use took an extremely long time to achieve.<sup>64</sup>

Its inception began with a feud over the proprietary rights of the invention of the fax machine between Alexander Bai's British patent in 1843 and Frederick Bakewell's similar invention.<sup>65</sup> Its first actual commercial application occurred in the 1890s-1900s when the first serious consumer of the fax machine appeared – newspapers seeking a faster way to deliver photographs. However, this only proved viable commercially in the 1920s-1930s.<sup>66</sup> Once this was feasible, the combination of sending words by telegraph and photos by fax transformed journalism as we know it today.<sup>67</sup>

World War I forcibly accelerated technological developments, which set the stage for the first large-scale and sustainable commercial application of the fax machine during the interwar period.<sup>68</sup> During that time, faxes were in constant competition with other communication technologies, and for the most part, they lost to television and the telegraph. After some success with photography and image faxing,<sup>69</sup> in 1934, engineers working in this sphere strived to develop a new market: faxing documents directly between offices.<sup>70</sup> Formidable technical and economic challenges seriously delayed the success of this endeavor, as faxes could not yet create a legible copy from fax images. This problem would only be solved in

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<sup>64</sup> See COOPERSMITH, *supra* note 1, at 1.

<sup>65</sup> *Id.* at 11.

<sup>66</sup> *Id.* at 27–28.

<sup>67</sup> There is much more to this story that lies beyond the scope of this article. *See id.* at 29–36.

<sup>68</sup> *Id.* at 36.

<sup>69</sup> In the coming years, weather maps faxing was a significant market for the fax industry. *See id.* at 88.

<sup>70</sup> *Id.* at 67–68.

the 1960s by the Xerox corporation, as will be elaborated below.<sup>71</sup> World War II provided technological advancements and the need to develop the fax technology, thus making it a bit faster, cheaper, and more reliable than other alternative technologies.<sup>72</sup> While America maintained its leadership role in developing this field between 1939 and 1965, “a vibrant Japanese fax industry also emerged.”<sup>73</sup> During that period, the US military essentially controlled the development of this technology while working in collaboration with the wider fax community via individual contracts.<sup>74</sup>

A lucrative market finally emerged for the fax in 1964 when Xerox introduced the first commercial version of the fax we know today. It was called Long Distance Xerography, or LDX.<sup>75</sup> The LDX was advertised to communicate directly between offices, where each business purchased and maintained its own fax machine. In 1966, Xerox cooperated with Magnavox to market the Magnafax Telecopier, which weighed 46 pounds and was significantly lighter than its competitors. It was easy to use and connected to a telephone line.<sup>76</sup> The fax market grew markedly after Xerox’s invention, and by the late 1970s, national and international companies started using faxes regularly, especially in Japan<sup>77</sup> and, to a lesser extent, Europe.<sup>78</sup>

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<sup>71</sup> *Id.* at 68.

<sup>72</sup> COOPERSMITH, *supra* note 1, at 73.

<sup>73</sup> *Id.* For the military’s role at the time, see *infra* Section III.4.

<sup>74</sup> COOPERSMITH, *supra* note 1, at 77. Many other fax failures occurred during this period, such as fax newspaper broadcasting and Ultrafax, which had greater information capabilities than its competitors. *Id.* at 81–86.

<sup>75</sup> *Id.* at 113; Gregory Pings, *Flashback Fridays: Looking Back in Time at Xerox History*, XEROX (Aug. 3, 2012), [digitalprinting.blogs.xerox.com/2012/08/03/flashback-fridays-looking-back-in-time-at-xerox-history/](https://digitalprinting.blogs.xerox.com/2012/08/03/flashback-fridays-looking-back-in-time-at-xerox-history/) [<https://perma.cc/HPQ2-CJQY>].

<sup>76</sup> COOPERSMITH, *supra* note 1, at 114; Phil Goldstein, *How the Xerox Magnafax Telecopier Helped Make ‘Fax’ a Verb*, BIZTECH (Sept. 27, 2016), [biztechmagazine.com/article/2016/09/how-xerox-magnafax-telecopier-helped-make-fax-verb](http://biztechmagazine.com/article/2016/09/how-xerox-magnafax-telecopier-helped-make-fax-verb) [<https://perma.cc/QGQ2-CF97>].

<sup>77</sup> Martin Fackler, *In High-Tech Japan, the Fax Machines Roll On*, N.Y. TIMES (Feb. 13, 2013), [www.nytimes.com/2013/02/14/world/asia/in-japan-the-fax-machine-is-anything-but-a-relic.html](http://www.nytimes.com/2013/02/14/world/asia/in-japan-the-fax-machine-is-anything-but-a-relic.html) [<https://archive.ph/K8F3H>]; COOPERSMITH, *supra* note 1, at 101–103, 137–141 (“The most important Japanese event was the creation of a community of engineers.”). Unlike the US, the army played a small role in developing this technology, and Japan’s extensive usage of this technology was only second to the US.

<sup>78</sup> For the European perspective, see *id.* at 141–143. This story lends itself, to some extent, to the common narrative of how regulation can stifle innovation and the very different approaches often taken by the US and the

Continuing innovation and technological advances in the fax machine and infrastructure in the 1980s led to a business environment where faxes were a must in every office.<sup>79</sup> This was largely due to the deregulation of the communication sector by the FCC, which encouraged a more competitive industry and reduced long-distance telephone charges,<sup>80</sup> an essential ingredient in making faxes cheaper.<sup>81</sup> 1965 to 1980 marked the period when faxing changed from a specialized market for specific purposes to an essential general-purpose machine for both government and business.<sup>82</sup> Installed machines in the US rose from 20,000 in 1970 to over 250,000 in 1980.<sup>83</sup>

The fax machine's popularity and commercial audiences peaked between 1980 and 1995 when issues with compatibility, cost, and capabilities were slowly resolved, mainly by Japanese engineers,<sup>84</sup> for the enjoyment of its enthusiastic consumers.<sup>85</sup> Fax machines became "faster, cheaper, smaller, and better."<sup>86</sup> By 1990, there were approximately 5 million fax machines in the US as they made their way into private homes, on top of businesses and governmental uses.<sup>87</sup> The network effect of this progress was significant and encouraged more individuals and entities to purchase their own fax machines. The negative aspects of fax machines, such as governmental eavesdropping, the lack of privacy, and the proliferation of junk faxes, were largely not discussed during this age.<sup>88</sup> The most significant security issues that clouded fax usage in the 1990s were "missent faxes, intercepted communications, usually by governments, and fraudulent faxes."<sup>89</sup>

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EU regarding technology regulation. In the AI context, see, e.g., Margot E. Kaminski, *Regulating the Risks of AI*, 103 B.U. L. REV. 1347 (2023).

<sup>79</sup> An interesting usage was signature verification for banks in the 1980s, as only sending the signature was fast and cheap. See COOPERSMITH, *supra* note 1, at 96.

<sup>80</sup> See *Institutional Change in Communications: Deregulation and Break-up of AT&T*, HIST. OF COMPUT. COMMUN., <https://historyofcomputercommunications.info/section/1.5/institutional-change-in-communications-deregulation-and-break-up-of-at&t/> [https://perma.cc/6AC7-YNMS].

<sup>81</sup> COOPERSMITH, *supra* note 1, at 107.

<sup>82</sup> *Id.* at 105.

<sup>83</sup> *Id.* at 106.

<sup>84</sup> *Id.* at 152–154.

<sup>85</sup> *Id.* at 145.

<sup>86</sup> *Id.* at 150.

<sup>87</sup> COOPERSMITH, *supra* note 1, at 146.

<sup>88</sup> *Id.* at 147.

<sup>89</sup> For more on these four issues, see *id.* at 175–179.

A significant aspect of embedding fax technology into the commercial culture and American culture was advertising.<sup>90</sup> In 1981, around 20% of Americans knew what faxing was. Companies working in this sphere used “advertising, articles, demonstrations, training, and social pressure” to change that.<sup>91</sup> During this time, cultural phenomena, such as fax art and faxing to Santa Claus, emerged as fax became a significant part of everyday life.<sup>92</sup> This period also marked the legal acceptance phase of the fax. Lawyers’ significant contribution in this context “was establishing the legal validity of faxed signatures and documents, thus giving faxes the same legal and contractual status as an original document.”<sup>93</sup> In November 1988, a trial court in Minnesota became the first in the nation to allow fax filing in Minnesota, and other federal and state courts quickly followed suit.<sup>94</sup>

The golden age of faxes lasted in the US until the early 2000s, when the digitalization of data, which became accessible via the internet, texting, and PDFs, provided information more efficiently and cheaper than fax.<sup>95</sup> Faxes were also booming in Japan during those years, as evidenced by Mr. Fujimori, former President of Peru, who fled to Japan in 2001 and shared his presidential resignation to the people of Peru via fax from a hotel in Tokyo.<sup>96</sup> In the pre-internet days, the fax machine symbolized a revolution, enabling far-distance communication within minutes. However, as the internet emerged, fax machines were mostly phased out in favor of more advanced online alternatives.

Still, the fax machine persisted around the world as a backup means of communication when disasters happen, such as the 9/11

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<sup>90</sup> See 1958 *Thermo Fax Copying Machine Old Print Ad*, PINTEREST, [www.pinterest.com/pin/1958-thermo-fax-copying-machine-old-print-ad--363736107374249248/](https://www.pinterest.com/pin/1958-thermo-fax-copying-machine-old-print-ad--363736107374249248/) [https://perma.cc/QNL9-U84C].

<sup>91</sup> COOPERSMITH, *supra* note 1, at 156. See also John Burgess, *Those Fax-tastic Machines Are Revolutionizing Office Communications*, L.A. TIMES (July 12, 1988), <https://www.latimes.com/archives/la-xpm-1988-07-12-fi-5721-story.html> [https://perma.cc/E7WF-HJ8N]; Calvin Sims, *Coast-to-Coast in 20 Seconds: Fax Machines Alter Business*, N.Y. TIMES (May 6, 1988), [www.nytimes.com/1988/05/06/business/coast-to-coast-in-20-seconds-fax-machines-alter-business.html](https://www.nytimes.com/1988/05/06/business/coast-to-coast-in-20-seconds-fax-machines-alter-business.html) [https://archive.ph/qczte].

<sup>92</sup> COOPERSMITH, *supra* note 1, at 165, 167.

<sup>93</sup> *Id.* at 174.

<sup>94</sup> *Id.*

<sup>95</sup> *Id.* at 183.

<sup>96</sup> Sewell Chan, *Alberto Fujimori, 86, Leader of Peru Imprisoned for Rights Abuses, Dies*, N.Y. TIMES (Sept. 13, 2024), [www.nytimes.com/2024/09/11/world/americas/alberto-fujimori-dead.html](https://www.nytimes.com/2024/09/11/world/americas/alberto-fujimori-dead.html) [https://archive.ph/ZO8Mo].

terrorist attack,<sup>97</sup> when traditional means of communication were compromised, such as in the 2011 Egyptian Revolution,<sup>98</sup> and when Federal laws and regulations encourage faxing,<sup>99</sup> such as the 1996 Health Insurance Portability and Accountability Act (HIPAA) and the 2002 Public Company Accounting Reform and Investor Protection Act (known as the Sarbanes-Oxley Act).<sup>100</sup> As will be elaborated below,<sup>101</sup> compliance with these Acts obligated, to varying degrees, to retain, encrypt, and track documents, all tasks that are easily performed via faxing. As always, the law tends to favor existing technology over new technology, so the acceptance of emails as a valid legal document was unsurprisingly delayed.<sup>102</sup> The Electronic Signatures Act of 2000 provided the same legal statutes for electronic contracts as those signed on physical paper.<sup>103</sup> The legal community's acceptance of a valid replacement to fax lagged behind the actual legal authorization, "reflecting institutional inertia, tradition," and concerns about security and authenticity.<sup>104</sup>

The long journey of the fax machine, from its inception in Europe to its development in the US until it reached its peak given Japanese innovation,<sup>105</sup> has yet to conclude. Ease of use and superior economics, which have pushed for its continued usage, are no longer siding with the fax as younger generations reject this unintuitive and inaccessible information communication method.<sup>106</sup> One would have imagined that the network effects of consumers' shift away from the

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<sup>97</sup> COOPERSMITH, *supra* note 1, at 200.

<sup>98</sup> Egypt rediscovered the fax during its revolution against then-President Mubarak. When internet services and social media were disrupted, allegedly by the regime, online activists turned to faxes to disseminate information. Linton Weeks, *Egypt's Protesters Rediscover The Fax Machine*, NPR (Feb. 4, 2011), [www.npr.org/2011/02/04/133490346/egypts-protesters-rediscover-the-fax-machine](http://www.npr.org/2011/02/04/133490346/egypts-protesters-rediscover-the-fax-machine) [<https://perma.cc/VX3A-TG47>].

<sup>99</sup> COOPERSMITH, *supra* note 1, at 201.

<sup>100</sup> Sarbanes-Oxley Act of 2002, Pub. L. No. 107-204, 116 Stat. 745.

<sup>101</sup> See Part II.2.b.

<sup>102</sup> COOPERSMITH, *supra* note 1, at 202.

<sup>103</sup> Electronic Signatures in Global and National Commerce Act, 15 U.S.C. § 7001 (2000).

<sup>104</sup> COOPERSMITH, *supra* note 1, at 202.

<sup>105</sup> *Id.* at 208.

<sup>106</sup> In a recent interview, Miley Cyrus mentioned that she still receives faxes from her godmother, Dolly Parton. She stated, "No one else faxes. I literally have to access my lawyer's office, because the lawyer is the only person who can still receive a fax." Alex Hawgood, *Miley Cyrus Finally Gets Her "Flowers"*, W (June 3, 2024), [www.wmagazine.com/culture/miley-cyrus-cover-interview-2024](http://www.wmagazine.com/culture/miley-cyrus-cover-interview-2024) [<https://perma.cc/ZX4S-KAGN>].

fax machine would render this technology dead as a dodo. However, regulations in the healthcare and financial sectors and their interpretations by the private sector have kept this technology alive.

## 2. *Fax's Dominance in the Business Sphere – Healthcare and Financial Sectors*

For several reasons, faxing is still a primary communication method in commercial spaces.<sup>107</sup> In fact, it is predicted that the global fax service market will grow at a remarkable pace of 11% per year between 2022 and 2027,<sup>108</sup> defying our assumption that faxes are a declining market. This Section delves into a couple of the reasons why businesses still use fax machines today, whether with other businesses or directly with their customers.<sup>109</sup>

First, standards of interoperability. Because fax transmissions operate on international technical standards agreed upon in 1968 and are updated periodically,<sup>110</sup> a fax machine in 2024 can still send and receive transmissions from a fax machine produced in the 1980s. This makes these devices particularly reliable. The benefits of interoperability and reliability are also evident in the broader context of technological transitions. Though it is clear that maintaining older systems ensures reliable communication across different organizations and jurisdictions, over time, our ability to offer technical support to these systems undermines this reliability assumption. Though maintaining this reliability is more justified when consumers are not involved (internal communication between governments and businesses to businesses B2B), the reliability

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<sup>107</sup> Mark Fairlie, *Why Businesses Are Still Sending Faxes in 2024*, BUSINESS.COM (Nov. 1, 2023), [www.business.com/articles/business-faxing/](http://www.business.com/articles/business-faxing/) [<https://perma.cc/EH6J-5FFZ>].

<sup>108</sup> *The Fax Services Market by Revenue is Expected to Grow at a CAGR of 11.03% During the Period 2022–2027*, GLOBALNEWswire (Apr. 2024), <https://www.globenewswire.com/news-release/2021/12/16/2353502/0/en/The-fax-services-market-by-revenue-is-expected-to-grow-at-a-CAGR-of-11-03-during-the-period-2022-2027.html> [<https://perma.cc/V97Q-A8LX>].

<sup>109</sup> Sophie Haigney, *The Fax Is Not Yet Obsolete*, ATLANTIC (Nov. 18, 2018), [www.theatlantic.com/technology/archive/2018/11/why-people-still-use-fax-machines/576070/](http://www.theatlantic.com/technology/archive/2018/11/why-people-still-use-fax-machines/576070/) [<https://perma.cc/NTU9-UANU>].

<sup>110</sup> The International Telecommunications Union (ITU) is the international standards body for telecommunications. In 1968, it published the standard for Group 1 (G1) fax protocol. In 1976, it published the Group 2 (G2) protocol; in 1980, it first published the Group 3 (G3) protocol. See *Fax Protocols*, DIALOGIC [www.dialogic.com/webhelp/NaturalAccess/Release9.0/NaturalFax\\_API\\_Dev\\_Manual/fax\\_protocols.html](http://www.dialogic.com/webhelp/NaturalAccess/Release9.0/NaturalFax_API_Dev_Manual/fax_protocols.html) [<https://perma.cc/E8NS-RSK5>].

argument loses its strength when consumers are involved, and other goals, aside from reliability, need to be more thoroughly considered.

Second, network effects, a phenomenon in which the more a service is used, the greater its value to the people and businesses who choose to use it, similar to social media today.<sup>111</sup> The network effect of fax still exists because millions of commercial fax machines are still operating worldwide, and today, you can also send and receive faxes via your personal email.

Third, international business. Countries such as Japan and Germany still use fax machines extensively.<sup>112</sup> For example, last year, the Berlin police ordered 60 new fax machines, and “it is still in use in 4 out of 5 companies in Europe’s largest economy.”<sup>113</sup> Thus, companies working internationally with local businesses might need to adhere to fax communications as part of the local norms still entrenched in some countries worldwide. Fourth, ‘confirm receipt.’ Fax offers a ‘confirm receipt’ once a message has been successfully sent. The ‘confirm receipt’ includes the date, time, and the receiving fax number. This feature is also currently available via digital faxing services.

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<sup>111</sup> Tim Stobierski, *What are Network Effects?*, HARV. BUS. SCH. ONLINE (Nov. 12, 2020), [online.hbs.edu/blog/post/what-are-network-effects](https://perma.cc/SA56-JTQ6) [https://perma.cc/SA56-JTQ6].

<sup>112</sup> For Japan, see Justin McCurry, *Japanese Fax Fans Rally to Defence of Much-Maligned Machine*, GUARDIAN (July 7, 2021), [www.theguardian.com/world/2021/jul/07/japanese-fax-fans-rally-to-defence-of-much-maligned-machine](https://perma.cc/XF65-2MFH) [https://perma.cc/XF65-2MFH] (“Ministers back down after hundreds of government offices insist banishing fax would be impossible”); for Germany, see Alex Berry, *Over 80% of German Companies Still Use Fax Machines — Survey*, DW (Apr. 5, 2023), [www.dw.com/en/over-80-of-german-companies-still-use-fax-machines-survey/a-65514581](https://perma.cc/5BTU-EBK8) [https://perma.cc/5BTU-EBK8] (“While the telegraph may be a thing of the past, but in Germany, its successor, the fax machine, is not. A full third of German companies ‘frequently’ use this technology, according to a new survey.”).

<sup>113</sup> Though the country attempts to phase out this device from public use, it is still entrenched in the private market. Esme Nicholson, *Germany has a Reputation for Efficiency. So Why Do Fax Machines Remain Popular?*, NPR (May 9, 2024), [www.npr.org/2024/05/09/1250136510/germany-has-a-reputation-for-efficiency-so-why-do-fax-machines-remain-popular](https://perma.cc/54GR-GCFL) [https://perma.cc/54GR-GCFL]; Esme Nicholson & Christine Arrasmith, *Germany’s Loong Love Affair with the Fax Machine May Be Coming to an End*, NPR (Apr. 26, 2024), [www.npr.org/2024/04/26/1196980647/germanys-reliance-on-the-fax-machine-may-be-coming-to-an-end](https://perma.cc/Y322-27DB) [https://perma.cc/Y322-27DB].

Fifth, and of high importance in the context of this paper, security. Fax transmissions provide secure connections, at least those not conducted via email. Traditional facsimile is a direct form of peer-to-peer communication and is thus harder to hack or intercept. For this reason, many health providers and legal firms choose to send sensitive information by fax. So much so that it is estimated that 70% of healthcare providers, especially nursing homes, share medical information by fax, even though they have access to highly-rated medical software.<sup>114</sup> Allegedly, e-faxing is also becoming more secure as several online fax vendors offer some encryption and ‘HIPAA compliance’ certificates to ensure security. The latter usually refers to a cover sheet arriving before the fax with the required information under HIPAA (e.g., a confidentiality statement, the name of the recipient, their fax number, and the sender’s name, organization, and contact information).<sup>115</sup> Nevertheless, there are still real privacy concerns when using online fax services.<sup>116</sup> Most of these services, especially those offered for free, use relatively easily hackable connections to transmit information. In their need to send faxes, people have turned to the internet to find online fax services,

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<sup>114</sup> Christopher Brown, *Health Care Clings to Faxes as U.S. Pushes Electronic Records*, BLOOMBERG L. (Nov. 4, 2021), [news.bloomberglaw.com/health-law-and-business/health-care-clings-to-faxes-as-u-s-pushes-electronic-records](https://www.bloomberglaw.com/health-law-and-business/health-care-clings-to-faxes-as-u-s-pushes-electronic-records) [<https://archive.ph/J8NHh>]; Skyler Kent, *It’s Time to Plan the Funeral for Fax in Healthcare*, MGMA (July 12, 2023), [www.mgma.com/articles/its-time-to-plan-the-funeral-for-fax-in-healthcare](https://www.mgma.com/articles/its-time-to-plan-the-funeral-for-fax-in-healthcare) [<https://perma.cc/25CS-A5TC>]; Brian Segal, *Here’s Why Hospitals Still Use Fax*, TELNYX (Aug. 14, 2024), [telnyx.com/resources/why-hospitals-use-fax](https://www.telnyx.com/resources/why-hospitals-use-fax) [<https://perma.cc/NF8N-7Y5K>]; Paul Hsieh, *The Perverse Persistence Of Fax Machines In American Medicine*, FORBES (Dec. 31, 2022), [www.forbes.com/sites/paulhsieh/2022/12/31/the-perverse-persistence-of-fax-machines-in-american-medicine/](https://www.forbes.com/sites/paulhsieh/2022/12/31/the-perverse-persistence-of-fax-machines-in-american-medicine/) [<https://perma.cc/3GD5-SAUL>].

<sup>115</sup> *HIPAA Compliant Fax FAQ*, WESTFAX, [westfax.com/hipaa-compliant-fax-faq/#:~:text=HIPAA%20compliant%20faxes%20containing%20protected,contact%20information%20of%20the%20sender](https://www.westfax.com/hipaa-compliant-fax-faq/#:~:text=HIPAA%20compliant%20faxes%20containing%20protected,contact%20information%20of%20the%20sender) [<https://perma.cc/W2CX-T3W2>]; *HIPAA Compliant Electronic Fax: 6 Best Tips and Practices*, IFAX, [www.ifaxapp.com/blog/hipaa-compliant-electronic-fax](https://www.ifaxapp.com/blog/hipaa-compliant-electronic-fax) [<https://perma.cc/GY6H-BELX>].

<sup>116</sup> Gizmodo International, *Beware Sending A Fax Online, It Might Not Be As Private As You Think*, GIZMODO (May 14, 2020), <https://www.gizmodo.com/beware-sending-a-fax-online-it-might-not-be-as-private-1843458066> [<https://perma.cc/742N-MS6F>] (“The internet is full of side-hustles that entrepreneurial developers quickly cobble together and publish for anyone with an internet connection to use—online fax services are no different.”).

preferably for free. This has generated a vast network of potential exploitation of phishing, data leakage, and downloading viruses. On top of that, some of these servers store all of the fax emails they receive on publicly available servers, making the information available to the public without any protection measurements.<sup>117</sup>

From a cybersecurity perspective, it seems that both analog and digital-based fax rely on a security through obscurity approach. This approach relies on non-recognition to protect the fax application from being hacked by unauthorized third parties,<sup>118</sup> which is misleading as well as heavily criticized in other applications.<sup>119</sup> This leads to a misconception that, because the fax is an outdated technology and not connected, it is inherently secure. Being obscure doesn't render the fax any safer than other alternative technologies. Fax doesn't use encryption and can be easily intercepted by anyone who has access to the landline.<sup>120</sup>

Focusing on the healthcare sector, fax transmissions are an environmental disaster as well as a financial burden.<sup>121</sup> It costs nearly \$250 billion to process 30 billion healthcare transactions yearly; \$15 billion of these costs are associated with faxes.<sup>122</sup> HIPAA compliance is an essential reason fax is still a primary means of communication between providers and customers. Title II of HIPAA, known as Administrative Simplification (AS) provisions, requires establishing national standards for electronic healthcare transactions to protect

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<sup>117</sup> *Id.*

<sup>118</sup> J. Christian Smith, *Effective Security by Obscurity*, ARXIV (2011), [arxiv.org/pdf/2205.01547](https://arxiv.org/pdf/2205.01547).

<sup>119</sup> Dusko Pavlovic, *Gaming Security by Obscurity*, NSPW, 125 (2011), [arxiv.org/abs/1109.5542](https://arxiv.org/abs/1109.5542).

<sup>120</sup> See *infra* note 134 and accompanying text.

<sup>121</sup> Sarah Kliff, *The Fax of Life*, VOX (Jan. 12, 2018), [www.vox.com/health-care/2017/10/30/16228054/american-medical-system-fax-machines-why](https://www.vox.com/health-care/2017/10/30/16228054/american-medical-system-fax-machines-why) [<https://perma.cc/NQ3X-DJ4U>]; April Compingbutra, *Axe the Fax: Save Money and Lower Your Climate Footprint*, MY GREEN DOCTOR (May 28, 2021), [mygreendoctor.org/axe-the-fax-save-money-and-lower-your-climate-footprint/](https://mygreendoctor.org/axe-the-fax-save-money-and-lower-your-climate-footprint/) [<https://perma.cc/A4U6-UYP9>] (“A busy office can send and receive 12,000 to 48,000 fax pages per year. One year’s faxes can mean consuming as much as a ton of wood to make the paper and releasing 4000 pounds of carbon dioxide as the result of burning fossil fuels to generate the needed electricity.”).

<sup>122</sup> *30 Healthcare Statistics That Keep Hospital Executives Up At Night*, REFERRAL MD (Aug. 30, 2016), [getreferralmd.com/2016/08/30-healthcare-statistics-keep-hospital-executives-night/](https://getreferralmd.com/2016/08/30-healthcare-statistics-keep-hospital-executives-night/) [<https://perma.cc/3NN2-WJK3>].

patient health information (PHI).<sup>123</sup> This Section governs how to handle electronic and administrative transactions and sets privacy and security standards for transmitting health information. This is done by developing and enforcing regulations that adopt standards, operating rules, unique identifiers, and code sets.<sup>124</sup> These oblige specific individuals and organizations, known as HIPAA-covered entities. The entities are required to use those standards when conducting administrative healthcare transactions, such as eligibility and benefits inquiries, prior authorizations, and claims payment. HIPAA-covered entities usually include providers, health plans, and clearinghouses.<sup>125</sup>

The HHS adopted standardized implementation specifications for electronic transactions used in the electronic exchange of healthcare data.<sup>126</sup> There are specific standards to be used for specific transactions and activities carried out by HIPAA-covered entities. For example, for healthcare claims or equivalent encounter information, entities must use a protocol known as 5010 of the ASC X12N 837, which focuses on exchanging information between businesses.<sup>127</sup>

These standards are of the utmost importance in ensuring that private health-related information will only be shared with patients and authorized entities, either by the patients or by law. The standards focus on business-to-business operations, such as clinics faxing over medical records related to their patients.<sup>128</sup> This is also reasonable,

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<sup>123</sup> *HIPAA and Administrative Simplification, Overview*, CMS.GOV, <https://www.cms.gov/priorities/key-initiatives/burden-reduction/administrative-simplification/hipaa> [https://perma.cc/BPV8-2NW6].

<sup>124</sup> *See id.*

<sup>125</sup> *Are You a Covered Entity?*, CMS.GOV, [www.cms.gov/priorities/key-initiatives/burden-reduction/administrative-simplification/hipaa/covered-entities](https://www.cms.gov/priorities/key-initiatives/burden-reduction/administrative-simplification/hipaa/covered-entities) [https://perma.cc/98FW-7R5J].

<sup>126</sup> *Health Care Transactions Basics*, CMS.GOV, <https://www.cms.gov/files/document/health-care-transactions-basics.pdf> [https://perma.cc/7KHP-9U72].

<sup>127</sup> *Health Care Claim or Equivalent Encounter Information*, CMS.GOV, [www.cms.gov/priorities/key-initiatives/burden-reduction/administrative-simplification/transactions/health-care-claim-equivalent-encounter-information](https://www.cms.gov/priorities/key-initiatives/burden-reduction/administrative-simplification/transactions/health-care-claim-equivalent-encounter-information) [https://perma.cc/D3ZG-EBK2]. For more on the standard itself and transaction types, see [x12.org](https://www.x12.org/); see also *Health Care Transactions Basics*, *supra* note 126.

<sup>128</sup> *See Can a Physician's Office Fax Patient Medical Information to Another Physician's Office?*, HHS, <https://www.hhs.gov/hipaa/for-professionals/faq/356/can-a-physicians-office-fax-patient-medical-information-to-another-physicians-office/index.html> [https://perma.cc/4H6P-YEP6]; *Does the HIPAA Privacy Rule Permit a*

given the vast faxing infrastructure in the healthcare sphere on the provider end.<sup>129</sup> However, it has little to do with HIPAA-covered entities' electronic transactions directly with their consumers. HIPAA compliance could also be achieved using other digital means of communication, including HIPAA-compliant emails,<sup>130</sup> which could be sent by either HIPAA-covered entities or patients and their representatives. No one is obligated to use the fax machine under HIPAA requirements.

In the financial sector, compliance with the 2002 Public Company Accounting Reform and Investor Protection Act (known as Sarbanes-Oxley) also encouraged increased fax usage.<sup>131</sup> The Act mandated practices in financial record-keeping and reporting for corporations. Its main goal was to protect investors from fraudulent financial reporting. Though it does not mention fax specifically, the actions mandated in the Act, such as encryption and recordkeeping of documents, were easily performed in 2002, the golden age of the fax machine. Furthermore, the Gramm-Leach-Bliley Act requires financial institutions to have reasonable procedures to ensure the security of personally identifiable information.<sup>132</sup> This Act had a similar effect to the Sarbanes-Oxley Act regarding fax usage. This practice is entrenched in public corporations that regularly use faxes to handle and manage documents.<sup>133</sup> Similar to HIPAA, there is no

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*Doctor, Laboratory, or Other Health Care Provider to Share Patient Health Information for Treatment Purposes by Fax, E-mail, or Over the Phone?*, HHS, <https://www.hhs.gov/hipaa/for-professionals/faq/482/does-hipaa-permit-a-doctor-to-share-patient-information-for-treatment-over-the-phone/index.html> [<https://perma.cc/TL5B-J9AZ>].

<sup>129</sup> Though, using the fax could still result in HIPAA violations. See *What's HIPAA, Are Your Faxes Breaking the Law?*, CENTRALIS HEALTH, [centralishealth.com/what-is-hipaa-why-your-faxes-could-break-the-law/](https://centralishealth.com/what-is-hipaa-why-your-faxes-could-break-the-law/) [<https://archive.ph/x3uaW>].

<sup>130</sup> Kapua Iao, *Can I Send a HIPAA Compliant Fax? Yes, But You Should Use Email Instead*, PAUBOX (Jan. 6, 2021), [www.paubox.com/blog/can-i-send-hipaa-compliant-fax-yes-but-you-should-use-email-instead](https://www.paubox.com/blog/can-i-send-hipaa-compliant-fax-yes-but-you-should-use-email-instead) [<https://perma.cc/XFE6-M6XJ>]; Hoala Greevy, *HIPAA Compliant Email: The Definitive Guide*, PAUBOX (Sept. 28, 2023), [www.paubox.com/blog/hipaa-compliant-email](https://www.paubox.com/blog/hipaa-compliant-email) [<https://perma.cc/D8DY-NSNE>].

<sup>131</sup> Sarbanes-Oxley Act of 2002, Pub. L. No. 107–204, 116 Stat. 745.

<sup>132</sup> Gramm-Leach-Bliley Act, Pub. L. 106–102, 113 Stat. 1338 (1999); see also *Gramm-Leach-Bliley Act*, FTC, [www.ftc.gov/business-guidance/privacy-security/gramm-leach-bliley-act](https://www.ftc.gov/business-guidance/privacy-security/gramm-leach-bliley-act) [<https://perma.cc/533Q-D58E>].

<sup>133</sup> Some fax-based companies still advertise themselves to public corporations as helping achieve compliance with Sarbanes-Oxley: *Sarbanes-Oxley Compliance*, ADVANTAGE TECHS.,

requirement to use fax to achieve compliance with financial-specific regulations. Nonetheless, the market has made it seem that the only viable and legal option healthcare and financial corporations have is the fax.

On top of that, fax machines possess inherent risks similar to other online services, and they don't present enhanced security benefits as the public is led to believe.<sup>134</sup> Faxes could be intercepted by tapping phone lines, and as those are not encrypted, they can be easily read.<sup>135</sup> This is even more dangerous today as one device encompasses several features, such as faxing, printing, scanning, etc., and is more vulnerable to hacking.<sup>136</sup> A study conducted by CheckPoint in 2018, dubbed the Faxploit,<sup>137</sup> showed that criminals

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rightfax.atechnologies.com/rightfax/sarbanes-oxley-compliance/  
[https://perma.cc/EEC5-XM3R ] (“RightFax helps corporations adhere to the strict guidelines for storage of their correspondence, electronic documents and faxes”); *SOX and GLBA Compliant Faxing for Financial Service Companies*, SFAX, www.scrypt.com/industries/financial-service/  
[https://archive.ph/XPUzf]; *Cloud Faxing that Meets the Finance Industry's Tough Regulations*, EFAX, enterprise.efax.com/resources/datasheets/sox-glba-compliance-datasheet  
[https://perma.cc/X8YQ-85HU].

<sup>134</sup> *Moving Away from Fax*, UO SERV. PORTAL, https://service.uoregon.edu/TDCClient/2030/Portal/KB/ArticleDet?ID=140485 [https://perma.cc/DP78-NAB8] (“Many people believe that fax is more secure than digital communications such as email. Although analog fax systems are not as vulnerable to the same kinds of attacks as digital systems, they are more vulnerable to data breaches than encrypted, cloud-based systems.”); Newman, *supra* note 7; Steve Alder, *Vulnerabilities in Fax Machines Can Be Exploited to Gain Network Access and Exfiltrate Sensitive Data*, HIPAA J. (Aug. 14, 2018), www.hipaajournal.com/fax-machines-exploited-network-access-exfiltrate-data/ [https://archive.ph/QDZOV].

<sup>135</sup> *Moving Away from Fax*, *supra* note 134 (“During transmission. Since the current fax system uses phone lines, faxes can be intercepted by tapping the phone lines. Information sent over our analog fax lines is not encrypted and can easily be read in transit by accessing phone lines. Sensitive financial, medical and personal information can be stolen by hackers if it is sent over the existing fax system.”)

<sup>136</sup> Nidal A. Al-Dmour, Umer Farooq, Irfan Sarwar, Muhammad Waseem Iqbal, Muhammad Aqeel & Wasim Ahmad Khan, *Cyber Security Threats on Multifunctional Devices and Mitigation Techniques*, 2023 INT'L CONF. ON BUS. ANALYTICS FOR TECH. AND SEC. 1, 1–6 (ICBATS) (2023), https://doi.org/10.1109/ICBATS57792.2023.10111138.

<sup>137</sup> *Faxploit: New Check Point Research Reveals How Criminals Can Target Company & Private Fax Machines to Take Over Networks and Spread Malware*, CHECKPOINT (Aug. 13, 2018), www.checkpoint.com/press-releases/faxploit-new-check-point-research-

can target companies and private fax machines, take over networks, and spread malware by obtaining a specific fax number. This is done by sending malicious faxes via its dedicated network, akin to malicious emails and phishing that can gather personal information from recipients of these types of cyberattacks.<sup>138</sup> Thus, though there is an aura of security surrounding the fax machine, it is not supported by evidence.

### 3. *Faxing Today: Navigating Privacy and Convenience*

Despite its many benefits, the fax machine cannot serve as a primary means of communication between businesses and their consumers, especially in crucial market sectors such as healthcare and finance.<sup>139</sup> The outbreak of COVID-19 exposed the heightened reliance of public health agencies on the fax machine when they could not manage the volume of faxes they received. This led them to hire “data entry technicians to help them with the influx of faxes.”<sup>140</sup> Moreover, “some public health officials tracked COVID outbreaks by fax machine.”<sup>141</sup> The thousands of pages pouring over office floors led to privacy violations and bureaucratic challenges, given the volume of faxed information and the receivers’ inability to manage it.<sup>142</sup>

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reveals-criminals-can-target-company-private-fax-machines-take-networks-spread-malware/ [https://perma.cc/UJ23-JX75]. For more on how Faxexploit works, see Arianna Etemadieh, *Danger Alert: Criminals Can Spread Malware Through Fax Machines*, PAUBOX (Sept. 5, 2018), www.paubox.com/blog/faxexploit-fax-machine-hack-malware [https://perma.cc/F3X2-7F86]; see also Newman, *supra* note 7.

<sup>138</sup> *Spoofing and Phishing*, FBI, https://www.fbi.gov/how-we-can-help-you/scams-and-safety/common-frauds-and-scams/spoofing-and-phishing [https://perma.cc/FKP5-N7E6].

<sup>139</sup> A cynical approach could argue that business and government organizations do not want to eliminate the fax machine because it increases transaction costs for consumers to communicate with them and is a one-way technology; thus, consumers do not expect an immediate answer.

<sup>140</sup> Seth Joseph, *(Part Of) What We Need To Battle Covid-19: A National Health Information Network To Replace The Fax Machine*, FORBES (July 21, 2020), https://www.forbes.com/sites/sethjoseph/2020/07/21/part-of-what-we-need-to-battle-covid-19-a-national-health-information-network-to-replace-the-fax-machine/?sh=3bce7c274d44 [https://perma.cc/87VA-84RS].

<sup>141</sup> Bram Sable-Smith, *How Some States Are Trying to Upgrade their Glitchy, Outdated Health Care*, NPR (Feb. 1, 2022), www.npr.org/sections/health-shots/2022/02/01/1075690142/how-some-states-are-trying-to-upgrade-their-glitchy-outdated-health-care-technol [https://perma.cc/ZUN6-LSZ4].

<sup>142</sup> Sarah Kliff & Margot Sanger-Katz, *Bottleneck for U.S. Coronavirus Response: The Fax Machine*, N.Y. TIMES (July 13, 2020),

As mentioned above, using the fax machine to communicate is considered in many aspects to be preferable to other, more modern methods. Among its benefits, the fax system can integrate with the internet; it can be isolated from the internet for privacy purposes; it is built in with proof of receipt, ensuring the other side receives your message; and many legal systems worldwide already use it. Though these justifications may be applicable in a business-to-business context, they lose their merit in a business-to-consumer context. In the latter case, using fax to communicate between a business and its customers has increasingly been considered obsolete, inconvenient, and, for lack of a better term, annoying. Furthermore, holding on to old technologies, such as the fax machine, assumes an infrastructure that is dying off. One is required to have a landline at home to use analog fax in a secure manner. Otherwise, they will resort to online faxing, which is also considered insecure.<sup>143</sup> However, barely a quarter of Americans still have landlines today.<sup>144</sup>

The primary current legislation addressing the usage of the fax machine in a consumer context is The Federal Telephone Consumer Protection Act,<sup>145</sup> which prohibits junk fax advertising and allows recipients to sue the advertiser for statutory damages of \$500 per ‘junk fax.’<sup>146</sup> Junk fax was a serious issue during the 1990s because

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[www.nytimes.com/2020/07/13/upshot/coronavirus-response-fax-machines.html](http://www.nytimes.com/2020/07/13/upshot/coronavirus-response-fax-machines.html) [<https://perma.cc/7FYW-QPAM>] (“Health departments track the virus’s spread with a distinctly American patchwork: a reporting system in which some test results arrive via smooth data feeds but others come by phone, email, physical mail or fax, a technology retained because it complies with digital privacy standards for health information. These reports often come in duplicate, go to the wrong health department, or are missing crucial information such as a patient’s phone number or address.”).

<sup>143</sup> See *infra* Part II.2.b.

<sup>144</sup> Felix Richter, *Landline Phones Are a Dying Breed*, STATISTA (Dec. 2, 2022), [www.statista.com/chart/2072/landline-phones-in-the-united-states/](https://www.statista.com/chart/2072/landline-phones-in-the-united-states/) [<https://perma.cc/4WD3-7NK5>].

<sup>145</sup> 47 U.S.C. § 227.

<sup>146</sup> Many law review articles have been written about this Act, representing the only current legal discussion in the context of faxing in a consumer environment. See Michael M. Parker, *Fax Pas: Stopping the Junk Fax Mail Bandwagon*, 71 OR. L. REV. 457 (1992); Yuri R. Linetsky, *Protection of “Innocent Lawbreakers”: Striking the Right Balance in the Private Enforcement of the Anti “Junk Fax” Provisions of the Telephone Consumer Protection Act*, 90 NEB. L. REV. 70 (2011); Michael R. Laudino, *To Fax or Not to Fax: Analysis of the Regulations and Potential Burdens Imposed by the Junk Fax Prevention Act of 2005*, 37 SETON HALL L. REV. 835 (2007); Adam Zitter, *Good Laws for Junk Fax? Government Regulation of Unsolicited Solicitations*, 72 FORDHAM L. REV. 2767 (2004);

it consumed the recipients' paper and tied up the telephone line, preventing transmissions from being sent or received.<sup>147</sup> However, fax presents a far more salient issue than spam. As noted, because of federal laws, many customers are asked to communicate with their healthcare and finance providers exclusively via fax or snail mail. In the healthcare context, shortly after the passage of HIPAA, fax providers retooled their transmission process and systems to comply with the Act and protect patients' records. On the other hand, other non-fax-based systems could not meet the same standards of administrative, technical, and physical security. Together, this renders the fax machine's usage pervasive and almost absolute when a patient wishes to communicate information to their healthcare providers or a customer wishes to receive financial information from their financial institution. A prominent example comes from the practice of oncology in the US.<sup>148</sup> Growing criticism is appearing in this field as medical practitioners claim that the fax machine "creates ripple effects that burden the health system" as information gets lost and patients suffer.<sup>149</sup>

Today's consumers are unfamiliar and uncomfortable with the fax machine, and this approach is very likely to continue.<sup>150</sup> Though it is possible today to send a fax using one's email account, many still consider it a hassle when other convenient, accessible, cheap, and secure alternatives are available. These may include encrypted emails, sending documents through a Document Management System, or even filling out online forms (e.g., reimbursement claims to health insurance providers).

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Jennifer A. Williams, *Faxing it in – How Congress Failed Consumers with the Junk Fax Prevention Act of 2005*, 72 BROOK. L. REV. 345 (2006).

<sup>147</sup> COOPERSMITH, *supra* note 1, at 179–180.

<sup>148</sup> Alicia Gallegos, *Time Warp: Fax Machines Still Common in Oncology Practice. Why?*, MEDSPACE (July 1, 2024), [www.medscape.com/viewarticle/time-warp-fax-machines-still-common-oncology-practice-why-2024a1000c6q?form=fpf](https://www.medscape.com/viewarticle/time-warp-fax-machines-still-common-oncology-practice-why-2024a1000c6q?form=fpf) [https://perma.cc/5AEF-BRNQ].

<sup>149</sup> *Id.* ("To me, it's like a blind spot," Lewis said. "Every time we use a fax, I see it actually as an opportunity for oversight and missed opportunity to collect data.").

<sup>150</sup> As one reporter adequately phrased in 2012, "[i]n the United States, the standard reactions if you ask someone to fax you something are despair, bemusement, and outright hostility." See Rebecca J. Rosen, *Japan: The Country Where 59% of Households Still Have a Fax*, ATLANTIC (June 8, 2012), [www.theatlantic.com/technology/archive/2012/06/japan-the-country-where-59-of-households-still-have-a-fax/258291/](https://www.theatlantic.com/technology/archive/2012/06/japan-the-country-where-59-of-households-still-have-a-fax/258291/) [https://perma.cc/8ZUV-82TJ].

Some legislative efforts have been made to abandon fax usage in a consumer context. Before the passage of the Creating Advanced Streamlined Electronic Services for Constituents Act of 2019 (the CASES Act),<sup>151</sup> constituents were required by law to fax, scan, or mail to their member of Congress a sheet of paper to “authorize the congressional office to work with relevant federal agencies on their behalf.”<sup>152</sup> According to the Overview of the Privacy Act: 2020 Edition, the Privacy Act of 1974 explicitly prohibits disclosure by Federal agencies of “any record which is contained in a system of records by any means of communication to any person, or to another agency, except pursuant to a written request by, or with the prior written consent of, the individual to whom the record pertains.”<sup>153</sup> This provision required offices to actively request written authorization before addressing relevant federal agencies, creating an undue burden on constituents and federal offices.

Congress passed the CASES Act with bipartisan support to amend this burdensome provision and enable agencies to access digital signatures. In this context, President Biden’s 2021 Executive Order (EO) on “Transforming Federal Customer Experience and Service Delivery to Rebuild Trust in Government”<sup>154</sup> is an essential step towards more efficient communication between governments and consumers. The EO states in its purpose section, “Government must also work to deliver services more equitably and effectively.” Eliminating the red tape involved with sending and receiving faxes can easily be regarded as a means to increase government efficiency. The EO also states:

“The Federal Government must design and deliver services in a manner that people of all abilities can navigate. We must use technology to modernize Government and implement services that are simple to use, accessible, equitable,

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<sup>151</sup> Creating Advanced Streamlined Electronic Services for Constituents Act of 2019, 5 U.S.C. § 552(a).

<sup>152</sup> Letter from H. Comm. on Oversight and Reform to U.S. Citizenship and Immigr. Servs. Director Ur Jaddou, (Jan. 12, 2022), [www.uscis.gov/sites/default/files/document/foia/Creating\\_Advanced\\_Streamlined\\_Electronic\\_Services\\_for\\_Constituents\\_Act-Chairman\\_Connolly.pdf](https://www.uscis.gov/sites/default/files/document/foia/Creating_Advanced_Streamlined_Electronic_Services_for_Constituents_Act-Chairman_Connolly.pdf) [https://perma.cc/8STW-TL8P].

<sup>153</sup> Privacy Act, 5 U.S.C. § 552a(b); *see* OFF. OF PRIV. AND C.L., OVERVIEW OF THE PRIVACY ACT: 2020 EDITION (2022), [https://www.justice.gov/opcl/overview-privacy-act-1974-2020-edition/disclosures-third-parties#:~:text=%E2%80%9CNo%20agency%20shall%20disclose%20any,%C2%A7%20552a\(b\)](https://www.justice.gov/opcl/overview-privacy-act-1974-2020-edition/disclosures-third-parties#:~:text=%E2%80%9CNo%20agency%20shall%20disclose%20any,%C2%A7%20552a(b)) [https://perma.cc/D73X-USY2].

<sup>154</sup> Exec. Order No. 14058, 86 Fed. Reg. 71357 (Dec. 16, 2021).

protective, transparent, and responsive for all people of the United States.”<sup>155</sup>

In Israel, the slow transition from governmental fax usage when interacting with consumers was addressed explicitly in 2019 in what was dubbed the “Fax Machines Law.”<sup>156</sup> This Act obligated government bodies to enable communication with consumers via digital communication devices, such as emails, and not just faxes. The Act applies to different governmental entities—public-facing departments of the Israel Defense Forces, the President’s Office, the Knesset Administration, the State Comptroller’s Office, courts, police, local authorities, the National Fire and Rescue Authority, prisons, hospitals and health clinics, and government-controlled companies—but excludes Shin Bet (the Israel Security Agency), the Mossad, the Atomic Energy Commission, and the National Cyber Authority. Banks, insurance companies, and credit card providers were also not obligated to provide digital means of communication.<sup>157</sup> Before the enactment of the law, government ministries and public bodies would usually require official forms to be submitted by fax “despite most Israeli homes no longer possessing a fax machine.”<sup>158</sup> The initiator of this Act, Knesset Member Sharren Haskel, stated, “It is time to move forward and adjust to today’s era of technology—we are in the Israel of 2019, everyone works with emails and faxes are a thing of the past.”<sup>159</sup>

The UK, Ontario, and Canada have both operated to decrease fax usage, though in different sectors. In 2018, the UK banned the use of fax machines in hospitals.<sup>160</sup> Health Secretary Matt Hancock forbade

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<sup>155</sup> *Id.*

<sup>156</sup> Its official name was the Law of Contacting Public Bodies Through Digital Means of Communication. See Eytan Halon, *Israel’s Era of Fax Communication Comes to an End*, JERUSALEM POST (July 28, 2019), [www.jpost.com/israel-news/israels-era-of-fax-communication-comes-to-an-end-596887](http://www.jpost.com/israel-news/israels-era-of-fax-communication-comes-to-an-end-596887) [<https://perma.cc/DCK8-K5KT>]. For the full law in Hebrew, see Law of Contacting Public Bodies Through Digital Means of Communication, 5778-2018, SH 2744 902 (Isr.), [https://www.chamber.org.il/media/161355/fax\\_law.pdf](https://www.chamber.org.il/media/161355/fax_law.pdf) [<https://perma.cc/ZSD6-26U9>].

<sup>157</sup> Mirav Kristal, *The End to Fax in Governmental Bodies, Including HMOs*, YNET (July 17, 2018), [www.ynet.co.il/articles/0,7340,L-5311851,00.html](http://www.ynet.co.il/articles/0,7340,L-5311851,00.html) [<https://perma.cc/6ZE4-VXJB>].

<sup>158</sup> Halon, *supra* note 156.

<sup>159</sup> *Id.*

<sup>160</sup> Erik Sherman, *U.K. National Health Service Signs Fax Machines’ Death Certificate*, FORTUNE (Dec. 11, 2018), [fortune.com/2018/12/11/uk-nhs-fax-machines/](http://fortune.com/2018/12/11/uk-nhs-fax-machines/) [<https://perma.cc/Y8NC-PASX>].

the purchase of new fax machines starting in 2019 and ordered the complete end of their use by April of the following year. Hancock said, “Because I love the NHS (National Health Service), I want to bring it into the 21st century and use the very best technology available. We’ve got to get the basics right, like having computers that work and getting rid of the archaic fax machines still used across the NHS when everywhere else got rid of them years ago.”<sup>161</sup> In 2021, in Ontario, Canada, the public service was directed to phase out the province’s 1,500 fax lines used by public agencies by the end of that year, but in practice, the phaseout was not completed.<sup>162</sup> This did not apply to the healthcare sector.<sup>163</sup> In 2023, however, the Ontario Ministry of Health committed to “axe the fax” as part of their new health care plan. The plan is to replace fax usage in Ontario by health care providers with digital communications alternatives within the next five years.<sup>164</sup>

Though the Israeli law did not manage to rid the Israeli consumer of faxes in the context of banks, communication companies, and credit card companies, most governmental bodies and their entities were obligated to provide an alternative to the fax machine. The same goes for the UK law, where only the healthcare sphere managed to ban this technology, and the Ontario law aimed to eliminate faxing in public services, eventually including healthcare. In all these cases, the emphasis was consumer-focused in light of the inconvenience of using faxes. Though this notion is present in Biden’s Executive Order, it seems that the necessary political will to obligate

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<sup>161</sup> In his statement, he refers to other fax machines used in the healthcare sphere. *British Move to Ban Faxing in Healthcare*, CANADIAN HEALTHCARE TECH. (Dec. 19, 2018), [www.canhealth.com/2018/12/19/british-move-to-ban-faxing-in-healthcare/](http://www.canhealth.com/2018/12/19/british-move-to-ban-faxing-in-healthcare/) [<https://perma.cc/3HWS-Y74W>].

<sup>162</sup> Thomas Daigle, *Ontario to (Finally) Pull the Plug on Fax Machines in Public Service*, CBC (Mar. 19, 2021), <http://www.cbc.ca/news/science/ontario-fax-machines-1.5955753> [<https://perma.cc/GQC3-HAXC>].

<sup>163</sup> CBC News, *Why Doctors Still Use Faxes, And Why Ontario Aims to Phase Them Out of Health Care*, CBC (Feb. 4, 2023), [www.cbc.ca/news/canada/toronto/ontario-fax-machines-health-care-1.6734810](http://www.cbc.ca/news/canada/toronto/ontario-fax-machines-health-care-1.6734810) [<https://perma.cc/R7BP-WNZN>].

<sup>164</sup> *Id.*; see also ONTARIO, YOUR HEALTH: A PLAN FOR CONNECTED AND CONVENIENT CARE 22 (2023), <https://files.ontario.ca/moh-your-health-plan-connected-convenient-care-en-2023-02-02-v3.pdf> [<https://perma.cc/K2LQ-ALYJ>]; Gowling WLG, “Axe the fax”: Ontario Privacy Commissioner pushes to discontinue fax machines in health care settings, LEXOLOGY (Mar. 17, 2023), [www.lexology.com/library/detail.aspx?g=f179e4e0-c10a-499a-a818-e6fc7ace3557](http://www.lexology.com/library/detail.aspx?g=f179e4e0-c10a-499a-a818-e6fc7ace3557) [<https://perma.cc/WL9L-NLNL>].

government and business entities in the US to provide alternatives to fax services is still lacking.

### III. THE BENEFITS AND COSTS OF OLD TECH IN TODAY'S CONSUMER WORLD

In her latest album, Taylor Swift asked, “Who uses typewriters anyway?” and sent the internet into a frenzy.<sup>165</sup> Society has an embedded curiosity towards the technologies of the past. Zooming out of the fax machine case study, a broader perspective and discussion of the evolution of technologies usually shows the substitution of old technologies with newer ones. For example, the typewriter was replaced by computers.<sup>166</sup> This is especially true concerning products and services provided to us as customers. Readily available examples of products sold to consumers include replacing vinyl records with CDs and eventually with audio and media streaming service providers, and the shift from VCRs to DVDs to today's online streaming services.

This Part delves into these technological transitions by surveying five different levels of interactions and communication methods used between different institutions and entities. This survey focuses on the positive and negative aspects of these old technologies in light of the entities and context in which they are used. It analyzes where relying on old technologies will be culturally and normatively acceptable and when new technologies are essential to our progress as consumers and as a society.

Progress from the old to the new is an essential part of advancing technology and developing our culture and legal systems. E-governance is a good example of the latter, where services that once required physical attendance in one of the many governmental offices are now available online.<sup>167</sup> Other examples include progress in evidence law, given the solid scientific foundation of different technologies, such as fingerprints and DNA. This enabled the court

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<sup>165</sup> This topic was prevalent on TikTok. See TIKTOK, [www.tiktok.com/discover/who-uses-typewriters-anyway](https://www.tiktok.com/discover/who-uses-typewriters-anyway) [https://perma.cc/8MRN-ZC76]. Swift's statement even resulted in related merch. See ETSY, [www.etsy.com/search?q=%09%20Who%20Uses%20Typewriters%20Anyway%3F&ref=search\\_bar](https://www.etsy.com/search?q=%09%20Who%20Uses%20Typewriters%20Anyway%3F&ref=search_bar) [https://perma.cc/T92C-ECC9].

<sup>166</sup> Frances Weller, *WECT'S 70th Anniversary: The 1980s Replace Typewriters with Computers in the Newsroom*, WECT NEWS 6 (Apr. 10, 2024), [www.wect.com/2024/04/10/wects-70th-anniversary-look-back-1980s/](https://www.wect.com/2024/04/10/wects-70th-anniversary-look-back-1980s/) [https://archive.ph/L0TRw].

<sup>167</sup> For more on this, see *infra* Part III.2.

system to identify people and establish long-tail tort cases, among many other achievements.<sup>168</sup> However, as the unique case of fax machines demonstrates, laws and their rigid interpretation can sometimes cement old technologies within the legal system and prevent society in general, and consumers specifically, from progressing and adopting new, beneficial, and more convenient technologies.

This Part focuses on technological usage for interactions between entities and institutions on different levels. This is in light of the utmost importance of “accessibility” in a liberal democracy from a consumer perspective.<sup>169</sup> Accessibility here means consumers’ ability to receive information and communicate with different providers concerning the latter services. This is true whether the consumer is facing its government or a business providing essential services such as healthcare, insurance, banking, or legal services. This holds particularly true in countries where the economy is based on capitalism, such as the US, where many services that were once considered public have been privatized for efficiency purposes.<sup>170</sup> This means that the individual consumer often needs to reach out to both businesses and the government to receive services they deem essential. The means of communication available to the consumer to access these systems is an important issue with significant effects on the day-to-day lives of all consumers and citizens. Thus, if a business or the government requires an individual to get access to a fax machine, either by purchasing it or finding a vendor who offers this service, it is imposing burdens on users who attempt to enforce their rights. Privileged communities, who have easy access via financial means or deeper technological education, would likely pass this

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<sup>168</sup> In the context of tort law and long-tail liability, see, e.g., Kenneth S. Abraham, *The Long-Tail Liability Revolution: Creating the New World of Tort and Insurance Law*, 6 U. PA. J.L. & PUB. AFFS. 347, 350 (2021) (“Ironically, then, both the causes of the harms at issue in long-tail liability actions, and the legal system’s capacity to address them, were grounded in the technological and scientific advances of the time.”).

<sup>169</sup> A prominent example in a technological context is the right to have access to the internet. See Sulan Wong, Eitan Altman & Julio Rojas-Mora, *Internet Access: Where Law, Economy, Culture and Technology Meet*, 55 COMPUT. NETWORKS 470 (2011); see also *Packingham v. North Carolina*, 582 U.S. 98, 107–09 (2017) (holding that a North Carolina statute prohibiting registered sex offenders from using social media websites unconstitutional under the First Amendment). This provided a right to access the internet and some of its platforms.

<sup>170</sup> See, e.g., DONALD COHEN & ALLEN MIKAELIAN, *THE PRIVATIZATION OF EVERYTHING: HOW THE PLUNDER OF PUBLIC GOODS TRANSFORMED AMERICA AND HOW WE CAN FIGHT BACK* (2021).

hurdle easily. Still, limited time and financial constraints of underprivileged communities might prevent under-resourced individuals from being able to exercise their rights.

#### A. GOVERNMENT INTERNAL INTERACTIONS

Government agencies and institutions, such as administrative and federal agencies and the military, use different types of methods to communicate internally. Most of them are considered old technologies.<sup>171</sup> These methods, older or newer, are very different from those used in a commercial setting, usually given the sensitivity of the content being communicated regarding public health and national security issues. These government communication methods might include telegraphy and Morse code, which are closely connected, as will be elaborated below, encrypted messaging, and the usage of floppy disks. This subsection delves into the telegraph and floppy disks.

Briefly returning to the fax case, it is worth noting that in the interwar period, different branches of the military, mainly the Navy and Air Force, experimented with fax machines only to conclude that it was too unreliable at the time for military communication.<sup>172</sup> World War II changed the trajectory of the fax machine in the military. The American military purchased hundreds of fax machines by the end of WWII and was the largest user of faxing until the 1960s.<sup>173</sup> In the 1970s, federal agencies dealing with national security issues were more likely to fax than use alternative means of communication. The space arms race and the Cold War encouraged faxing, incentivizing speed and accuracy over cost.<sup>174</sup>

Telegraphy, or electric telegraphy, is a point-to-point text messaging system enabling the transmission of information by coded signal over distances. This system was primarily used between the 1840s and the late 20<sup>th</sup> century.<sup>175</sup> It originated in Europe in the

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<sup>171</sup> See Tod Newcombe, *The Complicated History of Government Technology*, GOV'T TECH. (Oct. 2, 2017), <https://www.govtech.com/computing/the-complicated-history-of-government-technology.html> [<https://perma.cc/56VW-R9FC>].

<sup>172</sup> COOPERSMITH, *supra* note 1, at 69–71.

<sup>173</sup> *Id.* at 73–77 (“The war represented a tremendous opportunity for fax, providing it with a market: the military, whose rapidly expanding needs overwhelmed normal economic concerns.”).

<sup>174</sup> *Id.* at 123.

<sup>175</sup> See LEWIS COE, *THE TELEGRAPH: A HISTORY OF MORSE'S INVENTION AND ITS PREDECESSORS IN THE UNITED STATES* (2023)

1790s<sup>176</sup> and was eventually developed and improved by US-based innovators,<sup>177</sup> including the inventor of Morse code.<sup>178</sup> Morse code uses dots and dashes to represent Latin letters to deliver messages across distances.<sup>179</sup> In the 1830s, Morse code was officially introduced as a telecommunication method via the telegraph. After receiving funding from Congress to set up and test the telegraph system in 1843, the usage of the telegraph spread, and it was the primary means of communication in the US until the end of the 19th century when new technologies, such as the telephone, started to emerge.<sup>180</sup> 1851 marked the year when dispatching trains by telegraph first emerged.<sup>181</sup> As the telegraph advanced, Morse code was abandoned for more advanced and faster forms of communication via text.<sup>182</sup> In 1895, wireless telegraphy was invented by Guglielmo Marconi, who won the Nobel Prize in Physics for his

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(explaining in detail the genesis of Morse's invention from 1832 to the Civil War).

<sup>176</sup> This was the optical telegraph of Claude Chappe. See J-M. Dilhac, *The Telegraph of Clause Chappe – An Optical Telecommunication Network for the XVIIIth Century*, HOLY CROSS, mathcs.holycross.edu/~csci356/Dilhac.pdf.

<sup>177</sup> COE, *supra* note 175.

<sup>178</sup> JUDY ALTER, SAMUEL F. B. MORSE: INVENTOR AND CODE CREATOR (2003).

<sup>179</sup> *Morse Code*, CRYPTO MUSEUM, www.cryptomuseum.com/radio/morse/index.htm [https://perma.cc/ZHC7-5YF6].

<sup>180</sup> See *Morse Code & the Telegraph*, HISTORY.COM (Feb. 27, 2025) https://www.history.com/topics/inventions/telegraph [https://perma.cc/S3GB-5LML]. For a discussion about the liability of telegraph companies during that period, known as telegraph torts, see Evelyn Atkinson, *Telegraph Torts: The Lost Lineage of the Public Service Corporation*, 121 MICH. L. REV. 1365 (2023).

<sup>181</sup> Western Union was the first company to use it and spent the first fifteen years of its operations sending telegrams. See Cecilia Hendrix, *6 Fascinating Things about Western Union's History*, WESTERN UNION (Oct. 8, 2019), www.westernunion.com/blog/en/6-fascinating-things-about-western-unions-history/ [https://perma.cc/6453-847N]. For today's ASCII Table, see ASCII TABLE, www.cs.cmu.edu/~pattis/15-1XX/common/handouts/ascii.html [https://perma.cc/G5BG-NZ4G]. Western Union also played a significant role in the fax industry, though it viewed this technology as only ancillary to the telegraph. See COOPERSMITH, *supra* note 1, at 89–92.

<sup>182</sup> See *Baudot code*, STAN. UNIV., cs.stanford.edu/people/eroberts/courses/soco/projects/2008-09/colossus/ baudot.html [https://perma.cc/52PX-JU4H].

contributions to developing this technology.<sup>183</sup> Wireless telegraphy transmitted telegraph signals by radio waves rather than the traditional physical cables, which had to be meticulously deployed to ensure their operation.<sup>184</sup> Wireless telegraphs were essential for military communication.<sup>185</sup> Eventually, telegrams became a popular means of sending messages once telegraph prices were more affordable. Even today, some people still send telegrams for special occasions.<sup>186</sup>

The telephone was invented in the early 1870s; until then, all rapid long-distance communication depended on the telegraph. Patent litigation between Western Union and the new telephone system led to an agreement that separated the two services.<sup>187</sup> With the invention of the internet, telegraph applications were largely replaced by alternatives available online. The rising prevalence of modern communication systems like telephones rendered telegraphy mostly obsolete. The rise of the internet and emails in the 1990s essentially ended dedicated telegraphy networks.

It is also interesting to mention the Telex network, an “international message-transfer service consisting of a network of teleprinters connected by a system of switched exchanges.”<sup>188</sup> These systems originated in the UK during the early 1930s and were

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<sup>183</sup> *Guglielmo Marconi*, NOBEL PRIZE, [www.nobelprize.org/prizes/physics/1909/marconi/facts/](http://www.nobelprize.org/prizes/physics/1909/marconi/facts/) [https://perma.cc/AG25-GH7T].

<sup>184</sup> K V Tahvanainen, *Telegraphy for a New Era*, ERICSSON, [www.ericsson.com/en/about-us/history/communication/early-developments/telegraphy-for-a-new-era](http://www.ericsson.com/en/about-us/history/communication/early-developments/telegraphy-for-a-new-era) [https://perma.cc/HA57-BLGV].

<sup>185</sup> George Raynor Thompson & George I. Back, *The Advent of Electrical Signaling*, BRITANNICA (May 29, 2002), [www.britannica.com/technology/military-communication/The-advent-of-electrical-signaling](http://www.britannica.com/technology/military-communication/The-advent-of-electrical-signaling) [https://perma.cc/7ETN-LZBK] (“During World War I, wireless telegraph communication was employed extensively by the navies of the world and had a major influence on the character of naval warfare. High-powered shore and ship stations made wireless communication over long distances possible.”); Heidi J.S. Tworek, *Wireless Telegraphy*, INT’L ENCYC. OF THE FIRST WORLD WAR (Oct. 8, 2014), [encyclopedia.1914-1918-online.net/article/Wireless\\_Telegraphy](http://encyclopedia.1914-1918-online.net/article/Wireless_Telegraphy) [https://perma.cc/DU7Y-PS9W].

<sup>186</sup> For example, birthday telegrams. EBAY, [www.ebay.com/itm/380505460417](http://www.ebay.com/itm/380505460417) [https://perma.cc/Q9SU-2TEF].

<sup>187</sup> David Hochfelder, *Constructing an Industrial Divide: Western Union, AT&T, and the Federal Government, 1876-1971*, 76 BUS. HIST. REV. 705, 705 (2002).

<sup>188</sup> *Telex*, BRITANNICA (Dec. 3, 2009), [www.britannica.com/technology/telex](http://www.britannica.com/technology/telex) [https://perma.cc/WYA6-T2QB].

introduced in the U.S. shortly after by the American Telephone and Telegraph Company (AT&T). The Telex system was operated in the US by private corporations, while in most other countries, it was operated by government agencies responsible for postal, telegraph, and telephone services.<sup>189</sup> However, this system was largely abandoned by the introduction of – you guessed it – the fax. In the 1980s, fax offered higher-speed digital communications, which were impossible with the Telex network. In 2008, AT&T and British Telecoms announced that they would no longer directly provide Telex systems. Smaller companies obtained access to this network and continued to provide this service.<sup>190</sup> Today, Telex is still available to transmit data for applications that do not require high transmission speed and for areas where modern data equipment is less available. The verification protocols and messages sent via Telex,<sup>191</sup> render documents sent via it legally valid. Thus, this service is still used by some financial institutions and the aviation and maritime industries.<sup>192</sup>

Today, telegraph communication and Morse code are still used, though in a very limited way—mostly in military and national security applications, as well as the specified industries mentioned above. Consumers rarely use them in their day-to-day interactions, and they are used in scenarios where technical difficulties, combined with security concerns, render current means of communication impractical.<sup>193</sup> In the military context, in 2004, the Department of Defense (DoD) changed its official policy regarding Morse code, and operators were no longer trained in this communication technology.<sup>194</sup> Different military branches have been phasing out this technology. Nonetheless, the U.S. Navy and Coast Guard still use single lamps at sea to communicate in Morse code, which cryptologic technicians use to collect, analyze, and report on communication signals.<sup>195</sup> Because this code is so well known, it is not well-suited to

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<sup>189</sup> *Id.*

<sup>190</sup> *Id.*

<sup>191</sup> Little Car, *What's a Telex?*, YOUTUBE (Jan. 10, 2020), [www.youtube.com/watch?v=byMwNPj47X8&ab\\_channel=LittleCar](http://www.youtube.com/watch?v=byMwNPj47X8&ab_channel=LittleCar).

<sup>192</sup> NETWORK TELEX, [www.networktelex.com](http://www.networktelex.com) [<https://perma.cc/N3SQ-JB68>].

<sup>193</sup> Ryan Kennedy, *Top Emergency Communication Methods for Military Success*, CHASE TACTICAL (Dec. 4, 2024), <https://www.chasetactical.com/guides/emergency-communication-methods> [<https://perma.cc/4HL6-RQM7>].

<sup>194</sup> Tiffini Theisen, *Morse Code Explained*, MILITARY.COM (June 28, 2023), [www.military.com/history/morse-code](http://www.military.com/history/morse-code) [<https://perma.cc/GG29-W4DP>].

<sup>195</sup> *Id.*

communicate sensitive information within the military branches; instead, it is used when modern means of communication are not available or feasible, such as in submarines.<sup>196</sup> Overall, the use of the telegraph and Morse code has operated in a rather typical technological life-cycle in the US and worldwide commercial context. It has largely fallen out of use except for specific non-consumer-facing industries that still enjoy some benefits from its deployment.

As of writing this article, the floppy disk symbol is located at the top left corner of Word documents and is a symbol to “save” the document. However, younger generations have probably never used or even seen a physical floppy disc.<sup>197</sup> The IBM-invented floppy disk “was the primary means to store files, distribute software, create backups and transfer data between computers” in the 1990s.<sup>198</sup>

Today, similar to the fax machine, floppy disks refuse to die, and “a surprising number of industries, from embroidery to aviation, still use” them.<sup>199</sup> However, the supply of floppy disks is predicted to run out soon as the last prominent manufacturer of this product stopped making them in 2010.<sup>200</sup> In the aviation industry, floppy disks apply critical updates to older aircraft models, such as the Boeing 747-200, of which fewer than 20 are still operational worldwide in cargo or military configurations.<sup>201</sup> It is possible to upgrade these systems from floppy disks to USB sticks, SD cards, and even wireless transfer. However, doing so is expensive and means letting go of a

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<sup>196</sup> Kyle Maxey, *Why the Navy Sees Morse Code as the Future of Communication*, ENGINEERING.COM (July 18, 2017), [www.engineering.com/story/why-the-navy-sees-morse-code-as-the-future-of-communication](http://www.engineering.com/story/why-the-navy-sees-morse-code-as-the-future-of-communication) [<https://perma.cc/8TVY-Q9CH>]. For a colloquial use of the Morse code in the submarine context, see Laura Smith-Spark, *Swedish Peace Activists Deploy ‘Gay Sailor’ to Deter Russian Submarines*, CNN (May 15, 2015), [www.cnn.com/2015/05/14/europe/sweden-russia-gay-sailor-submarine](http://www.cnn.com/2015/05/14/europe/sweden-russia-gay-sailor-submarine) [<https://perma.cc/J7UT-MSJ3>].

<sup>197</sup> Scott Oliveri, *The Floppy Disk Save Icon: Visual Language of an Era Long-Gone*, MEDIUM (Aug. 19, 2020), <https://uxdesign.cc/the-floppy-disk-save-icon-visual-language-of-an-era-long-gone-93f74efc9f9> [<https://perma.cc/B5SQ-5X2S>].

<sup>198</sup> *Floppy Disk Storage*, IBM, [www.ibm.com/history/floppy-disk](http://www.ibm.com/history/floppy-disk) [<https://perma.cc/XK7K-ZJS9>].

<sup>199</sup> Jacopo Prisco, *Why the Floppy Disk Just Won’t Die*, WIRED (Mar. 6, 2023), <https://www.wired.com/story/why-the-floppy-disk-just-wont-die/> [<https://perma.cc/8MHK-4LSN>].

<sup>200</sup> *Id.*

<sup>201</sup> *Boeing 747-200*, BOEING-747.COM, [www.boeing-747.com/boeing\\_747\\_family/747-200.php](http://www.boeing-747.com/boeing_747_family/747-200.php) [<https://perma.cc/QT2U-M2T4>].

method that has proven reliable and workable, though archaic. For these reasons, some companies prefer to adhere to the floppy disk rather than advance to a new technology.

The above raises an interesting question regarding the criteria that make a technology ‘archaic’ and who makes those decisions. A combination of public demand and industry supply usually dictates this result and indicates when the life cycle of a given technology is ending. So, even if there is some demand, such as in the floppy disk case, it is just one indicator that, in this case, is being drowned out by the overall progress of technology.

In 2022, Japan declared that it would be updating current government procedures that still require businesses to use floppy disks when making applications or holding data. It will be transferring these requirements to online services.<sup>202</sup> Kono Taro, the Japanese Digital Minister and Minister for Administrative Affairs, criticized the country’s lingering use of other outdated technology, including the fax machine, which he plans to eliminate.<sup>203</sup> In the US, it was only in 2019 that the government finally shifted its reliance on floppy disks in its nuclear system. Up until then, this system was controlled by an 8-inch floppy disk.<sup>204</sup> The Air Force has used 8-inch floppy disks since the 1970s to broadcast emergency action messages to nuclear forces worldwide,<sup>205</sup> until 2019 when it replaced the old floppy disks with a “highly secure solid-state digital storage solution.”<sup>206</sup> Advocates of the floppy system say that though it is

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<sup>202</sup> Low De Wei, *Floppy Disks Are Still Used for 1,900 Government Procedures In Japan. They Must Go, Its Digital Minister Says*, TIME (Aug. 31, 2022), <https://time.com/6209881/floppy-disks-japan-obsolete-media/> [<https://perma.cc/SR6D-X3T8>].

<sup>203</sup> James FitzGerald, *Floppy Disks in Japan: Minister Declares War on Old-Fashioned Technology*, BBC (Sept. 1, 2022), <https://www.bbc.com/news/world-asia-62749310> [<https://perma.cc/A58A-MSDZ>]; see also Michael Fitzpatrick, *Why is Hi-Tech Japan Using Cassette Tapes and Faxes?*, BBC (Nov. 3, 2015), <https://www.bbc.com/news/business-34667380> [<https://perma.cc/Y3WW-PG4Z>].

<sup>204</sup> U.S. GOV’T ACCOUNTABILITY OFF., GAO-16-696T, FEDERAL AGENCIES NEED TO ADDRESS AGING LEGACY SYSTEMS 15–16 (2016), <https://www.gao.gov/assets/gao-16-696t.pdf> [<https://perma.cc/WPK2-NQAT>].

<sup>205</sup> Kyle Mizokami, *U.S. Air Force Finally Ditches 8-Inch Floppy Disks*, POPULAR MECHS. (Oct. 22, 2019), <https://www.popularmechanics.com/military/a29539578/air-force-floppy-disks/> [<https://perma.cc/HU8Q-4YNL>].

<sup>206</sup> Valerie Insinna, *The US Nuclear Forces’ Dr. Strangelove-Era Messaging System Finally Got Rid of its Floppy Disks*, DEFENSENEWS (Oct.

obsolete in nature, it is also unhackable. The age of the system provides higher security, as one cannot hack software that does not have an IP address.<sup>207</sup> This led to some inner resistance to replacing this system, especially given the sensitivity of the subject matter it was a part of.

Though floppy disks are not a traditional form of communication like faxes or telegraphs, they are still used to transmit information from one source to another in a way that can be considered communicating data. For this reason, this Article chose to review it as an old technology, mainly from the government context but also from a business perspective. Floppy disks are being slowly eliminated from a governmental perspective. Governments do not want to rely on a technology that is not being maintained routinely and might not be supported at all soon, given the dwindling number of disks still available for purchase.<sup>208</sup> This represents an exciting example where both governmental and industrial forces were combined to put this old technology to (partial) rest.

#### B. GOVERNMENT TO BUSINESS (G2B) AND GOVERNMENT TO CONSUMERS (G2C)

Governments often provide services to their citizens using “federal legacy systems.”<sup>209</sup> These refer to old software and hardware still used by the government for different reasons.<sup>210</sup> A report published in 2016 by the US Government Accountability Office (GAO) presented several examples of legacy investments and

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17, 2019), <https://www.defensenews.com/air/2019/10/17/the-us-nuclear-forces-dr-strangelove-era-messaging-system-finally-got-rid-of-its-floppy-disks/> [<https://perma.cc/KEV5-7YZ8>].

<sup>207</sup> *Id.*

<sup>208</sup> You can still purchase them on Amazon and some designated websites, but they are much more expensive given their scarcity. *E.g.*, FLOPPYDISK.COM, <https://www.floppydisk.com/> [<https://perma.cc/84P7-DRPB>].

<sup>209</sup> For example, NIST defines a “legacy environment” as: “A Custom environment containing older systems or applications that may need to be secured to meet today’s threats but often use older, less secure communication mechanisms and need to be able to communicate with other systems.” *Legacy Environment*, NIST, [https://csrc.nist.gov/glossary/term/legacy\\_environment](https://csrc.nist.gov/glossary/term/legacy_environment) [<https://perma.cc/A4RS-XQQF>].

<sup>210</sup> Even though these legacy systems are not consumer-facing technologies in the traditional way, they have a massive impact on consumers’ ability to access basic services via applications running on them. It is important to note, however, that these technologies are usually entrenched by inertia rather than by law.

systems still operated by federal agencies.<sup>211</sup> A 2019 GAO report identified the ten most critical legacy systems needing modernization.<sup>212</sup> As the table below presents, these legacy systems are used by various agencies for significantly different purposes and for varying amounts of time, sometimes more than 50 years, and with moderate to high-security risks.<sup>213</sup> Furthermore, the report states that “the majority of agencies lack complete plans for modernizing the most critical legacy systems” to address the difficulties associated with their legacy systems.<sup>214</sup>

An almost identical picture was painted by a following report published in 2021 by GAO, which identified the same ten most critical legacy systems needing modernization<sup>215</sup>, stating that “the majority of agencies lacked complete plans for modernizing the most critical legacy systems.”<sup>216</sup>

**Table 1: The 10 Most Critical Federal Legacy Systems in Need of Modernization**

Agency	System name <sup>a</sup>	System description <sup>a</sup>	Age of system, in years	Age of oldest hardware, in years	System criticality (according to agency)	Security risk (according to agency)
Department of Defense	System 1	A maintenance system that supports wartime readiness, among other things	14	3	Moderately high	Moderate
Department of Education	System 2	A system that contains student information	46	3	High	High
Department of Health and Human Services	System 3	An information system that supports clinical and patient administrative activities	50	Unknown <sup>b</sup>	High	High
Department of Homeland Security	System 4	A network that consists of routers, switches, and other network appliances	Between 8 and 11 <sup>c</sup>	11	High	High
Department of the Interior	System 5	A system that supports the operation of certain dams and power plants	18	18	High	Moderately high
Department of the Treasury	System 6	A system that contains taxpayer information	51	4	High	Moderately low
Department of Transportation	System 7	A system that contains information on aircraft	35	7	High	Moderately high
Office of Personnel Management	System 8	Hardware, software, and service components that support information technology applications and services	34	14	High	Moderately low
Small Business Administration	System 9	A system that controls access to applications	17	10	High	Moderately high
Social Security Administration	System 10	A group of systems that contain information on Social Security beneficiaries	45	5	High	Moderate

<sup>211</sup> U.S. GOV’T ACCOUNTABILITY OFF., *supra* note 204, at 3.

<sup>212</sup> U.S. GOV’T ACCOUNTABILITY OFF., GAO-19-471, INFORMATION TECHNOLOGY: AGENCIES NEED TO DEVELOP MODERNIZATION PLANS FOR CRITICAL LEGACY SYSTEMS 13 (2019), <https://www.gao.gov/assets/gao-19-471.pdf> [<https://perma.cc/2U2Z-B5GM>].

<sup>213</sup> *Id.* at 15.

<sup>214</sup> *Id.* at 16.

<sup>215</sup> U.S. GOV’T ACCOUNTABILITY OFF., GAO-21-524T, INFORMATION TECHNOLOGY: AGENCIES NEED TO DEVELOP MODERNIZATION PLANS FOR CRITICAL LEGACY SYSTEMS 9 (2021), <https://www.gao.gov/products/gao-21-524t> [<https://perma.cc/7PTZ-K8PF>].

<sup>216</sup> *Id.* at 10.

A prominent example of this type of communication focusing on the governmental use of legacy systems to provide consumer services was the dire need for COBOL (Common Business Oriented Language) programs during COVID-19.<sup>217</sup> COBOL is a programming language that was mostly used during the Eisenhower era but is still very much used today in the governmental sphere, by business, and the financial sector.<sup>218</sup> During COVID-19, the unique skills of COBOL programmers were in high demand due to a record number of people applying for unemployment benefits, as many states' unemployment systems run on COBOL. However, the lack of programmers with proficiency in this area led to older programmers who have already retired being called back to operate the systems and its many bugs.<sup>219</sup> This is an unsustainable model that might be somewhat manageable using AI to patch the holes in the code. However, in the long run, this system should be replaced with a programming language that is more commonly used and studied.<sup>220</sup>

The COBOL case highlights a broader issue concerning institutional knowledge and training costs. Some might argue that maintaining older systems preserves valuable expertise and avoids costly retaining programs. Though these claims are true, they are insufficient to justify the entrenchment of these old systems in perpetuity. In the long run, improved technologies contribute to economic performance and development. The COBOL case exemplifies that even when technology is in use, it will not necessarily mean it will be taught indefinitely. A sufficient transition

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<sup>217</sup> Bobby Allyn, 'COBOL Cowboys' Aim To Rescue Sluggish State Unemployment Systems, NPR (Apr. 22, 2020), [www.npr.org/2020/04/22/841682627/cobol-cowboys-aim-to-rescue-sluggish-state-unemployment-systems](http://www.npr.org/2020/04/22/841682627/cobol-cowboys-aim-to-rescue-sluggish-state-unemployment-systems) [<https://perma.cc/DF6Y-DG7K>].

<sup>218</sup> See, e.g., COBOL COWBOYS, [cobolcowboys.com/](http://cobolcowboys.com/); JD Sartain, *The World Depends on 60-Year-Old Code No One Knows Anymore*, PC MAG (Dec. 1, 2023), [www.pcmag.com/articles/ibms-plan-to-update-cobol-with-watson](http://www.pcmag.com/articles/ibms-plan-to-update-cobol-with-watson) [<https://perma.cc/NVQ3-H5YC>].

<sup>219</sup> Allyn, *supra* note 217; Charles R. Martin, *Brush up Your COBOL: Why is a 60 Year Old Language Suddenly in Demand?*, STACK OVERFLOW (Apr. 20, 2020), <https://stackoverflow.blog/2020/04/20/brush-up-your-cobol-why-is-a-60-year-old-language-suddenly-in-demand/> [<https://perma.cc/8PY9-63C3>].

<sup>220</sup> See, e.g., Anastasios Papalias, *The COBOL Cowboy Shortage*, MEDIUM (Jan. 3, 2024), <https://medium.com/@tasospapalias/the-cobol-cowboy-shortage-0fde7d715553> [<https://perma.cc/3XVP-GNJV>]; Sartain, *supra* note 218; Sheryl Estrada & Ben Weiss, *Wall Street's 'Cobol Cowboys' are Spread Thin Fixing Legacy Tech—But AI May Soon Ride to the Rescue*, FORTUNE (Oct. 13, 2023), <https://fortune.com/2023/10/13/wall-street-cobol-cowboys-legacy-tech-ai/> [<https://perma.cc/YKE9-LZFC>].

time should be put in place to ensure institutional knowledge will not be lost, but that should not prevent the adoption of more appropriate technologies.

The 2019 GAO report presented several success stories of how legacy systems were modernized<sup>221</sup> (which was especially lacking from the 2021 report). For example, the DoD and Social Security Agency (SSA) both modernized existing legacy systems by transforming millions of lines of COBOL code to Java code, in the case of the DoD, or a web-based application, in the case of SSA.<sup>222</sup> The migration enabled the agencies to save millions of dollars, increase efficiency, and improve users' ability to find data using their modernized systems.<sup>223</sup> This shows that modernizing legacy systems is possible and desirable for both government agencies and their users. The fact that converting code between languages is challenging is not a compelling reason not to do it.

E-governance is an important example of how governmental services for consumers changed with the emergence of the internet. The E-government Act of 2002 largely went into effect in April 2003.<sup>224</sup> Its declared purpose was to "Enhance the management and promotion of electronic Government services and processes."<sup>225</sup> The Act strived to establish a framework using "internet-based information technology to enhance citizen access to government information and services."<sup>226</sup> Following the Act, internet-based services were, and continue to be, essential to citizens' ability to easily and efficiently interact with governmental services, such as eRulemaking, where citizens can access electronic dockets and provide public comments electronically for proposed agency rulemaking.<sup>227</sup> Another example is USA.gov<sup>228</sup>, which provides essential information regarding core aspects of citizenship, including voter registration, passport management, and tax services.<sup>229</sup> The Act

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<sup>221</sup> U.S. GOV'T ACCOUNTABILITY OFF., *supra* note 212, at 20.

<sup>222</sup> *Id.* at 20–21.

<sup>223</sup> *Id.*

<sup>224</sup> E-Government Act of 2002, Pub. L. No. 107-347, 116 Stat. 2899.

<sup>225</sup> *Id.*

<sup>226</sup> *Id.*

<sup>227</sup> REGULATIONS.GOV, <https://www.regulations.gov/about> [<https://perma.cc/5F5E-QSJW>].

<sup>228</sup> GSA Blog Team, *Twenty Years of Making Government More Accessible Through the E-Government Act*, U.S. GEN. SERVS. ADMIN. (Dec. 29, 2022), <https://www.gsa.gov/blog/2022/12/29/twenty-years-of-making-government-more-accessible-through-the-egovernment-act> [<https://perma.cc/SA4S-9PVL>].

<sup>229</sup> See USA.GOV, [www.usa.gov](http://www.usa.gov) [<https://perma.cc/JM3J-WBPZ>].

also has important equality, equity, and accessibility aspects because it enables basic governmental services for marginalized and vulnerable communities.<sup>230</sup>

E-government and its worldwide implementation<sup>231</sup> is a remarkable example of how governments can embrace important technologies to provide better services to their citizens, even if the process is expensive and time-consuming.<sup>232</sup> It also shows legislation's important role in ensuring consumers can benefit from easier access to essential services and overall better services, especially when no alternative options can drive competition. Because governments operate as a monopoly with a captive audience, they inherently lack the incentive to improve their services as long as their infrastructure works. The COBOL example above exemplifies this. In this sense, legislation is an important driving force for consumers to receive better services.<sup>233</sup>

### C. BUSINESS TO BUSINESS (B2B)

The pager, invented in 1921, is an exciting example of businesses interacting with other businesses internally. It is still very much used

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<sup>230</sup> See, e.g., Paul T. Jaeger, *The Social Impact of an Accessible E-Democracy: Disability Rights Laws in the Development of the Federal E-Government*, 15 J. OF DISABILITY POL'Y STUD. 19 (2004), <https://doi.org/10.1177/104420730401500104>.

<sup>231</sup> Shailendra C. Jain Palvia & Sushil S. Sharma, *E-Government and E-Governance: Definitions/Domain Framework and Status around the World*, COMPUT. SOC'Y OF INDIA (2007), [csi-sigegov.org.in/1/1\\_369.pdf](http://csi-sigegov.org.in/1/1_369.pdf) [<https://perma.cc/DUV2-VDH7>].

<sup>232</sup> See, e.g., OFF. OF MGMT. & BUDGET, EXEC. OFF. OF THE PRESIDENT, FY 2015: ANNUAL REPORT TO CONGRESS – E-GOVERNMENT ACT IMPLEMENTATION 10 (2016), [obamawhitehouse.archives.gov/sites/default/files/omb/assets/egov\\_docs/egov\\_implementation\\_report\\_6\\_17\\_16.pdf](http://obamawhitehouse.archives.gov/sites/default/files/omb/assets/egov_docs/egov_implementation_report_6_17_16.pdf) [<https://perma.cc/65KP-YHF7>] (investing around 14.14 million dollars); OFF. OF MGMT. & BUDGET, EXEC. OFF. OF THE PRESIDENT, FY 2016: ANNUAL REPORT TO CONGRESS – E-GOVERNMENT ACT IMPLEMENTATION (2017), <https://trumpwhitehouse.archives.gov/sites/whitehouse.gov/files/omb/egov/documents/omb-fy-2016-egov-act-report.pdf> [<https://perma.cc/YW32-GQPU>].

<sup>233</sup> James Peck & Jeevant Rampal, *Non-Optimality of State by State Monopoly Pricing with Demand Uncertainty: An Example*, 183 ECON. LETTERS (2019), <https://doi.org/10.1016/j.econlet.2019.108561> (arguing that when a state monopoly can raise prices or output of goods and services it offers, without corresponding changes in its operating costs, and maintains these levels above market-clearing rates, it indicates its ability to ignore competitive pressures within the market).

in different industries, such as healthcare communication, and it seems like this old technology is here to stay.<sup>234</sup> There are a couple of reasons for that. First, hospitals are designed with thick walls that interfere with cell phone reception, not pager frequencies. This is a safety mechanism to reduce bystanders' exposure to ionizing radiation emitted from imaging devices (e.g., MRI). Second, potential reliability issues favor pagers over cell phones in a medical setting. This is because pagers are one-way communication devices; thus, there is not much traffic on their networks, unlike cell phones. This is especially true in emergencies where healthcare communication is critical, and cellular networks tend to collapse due to overwhelming traffic.<sup>235</sup>

The usage of pagers in hospital settings and other industries, such as manufacturing and construction,<sup>236</sup> is more appealing because pager companies are willing to provide Service Legal Agreements guaranteeing delivery within a couple of minutes at the risk of potentially heavy fines. These agreements are feasible in light of the stability of the technology and the frequencies with which it operates. Cell phone companies, on the contrary, refuse to offer such a guarantee, given the vulnerability of their underlying network.<sup>237</sup> In this sense, it seems preferable to allow B2B communications to continue as agreed upon in a given industry and as custom dictates.

#### D. BUSINESS TO CONSUMERS (B2C)

The most prominent example of an old means of communication in a business-to-consumer (B2C) setting is the fax, which I have already discussed. Honing again on the healthcare sector, there has

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<sup>234</sup> Max Feinstein, *Why Doctors Still Use Pagers (It's Not What You Thought)*, YOUTUBE (Sept. 9, 2023), [www.youtube.com/watch?v=uAwW9arTxGo&ab\\_channel=MaxFeinstein](https://www.youtube.com/watch?v=uAwW9arTxGo&ab_channel=MaxFeinstein) [https://perma.cc/QNV7-G9AU]; Jen A. Miller, *Why the Hospital Pager Withstood the Test of Time*, HEALTHTECH (June 21, 2019), [healthtechmagazine.net/article/2019/06/why-hospital-pager-withstood-test-time](https://healthtechmagazine.net/article/2019/06/why-hospital-pager-withstood-test-time) [https://perma.cc/4G3R-RCWQ].

<sup>235</sup> Natalie Zfat, *What Happens to Mobile Communications During a Major Emergency Response?*, INSIGHTS (Sept. 13, 2018), [insights.samsung.com/2018/09/13/what-happens-to-mobile-communications-during-a-major-emergency-response/](https://insights.samsung.com/2018/09/13/what-happens-to-mobile-communications-during-a-major-emergency-response/) [https://perma.cc/82R8-JHKY].

<sup>236</sup> See, e.g., *Wireless Paging Systems for Construction & Industrial Sector*, SIGNALGRYD [signalgryd.com/industries/construction-industrial/](https://signalgryd.com/industries/construction-industrial/) [https://perma.cc/99CZ-J8WA].

<sup>237</sup> See, e.g., *Pager Service Terms*, NC.GOV, <https://it.nc.gov/documents/files/915b-web-summary-2019-01-17/open> [https://perma.cc/4RN3-PB9Y].

been a shift to electronic health records systems thanks to the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009.<sup>238</sup> Under this Act, the Obama Administration's HHS spent over \$30 billion to promote and expand the adoption of health information technology,<sup>239</sup> focusing on electronic health records.<sup>240</sup> The Act created financial incentives for covered entities, which include healthcare providers, health plans, and healthcare clearinghouses, to adopt electronic health records under the "meaningful use" standard.<sup>241</sup> The program was successful in some aspects. In 2008, only nine percent of hospitals used electronic records. In 2015, it was 83 percent.<sup>242</sup> However, the Act did not consider the need to share between different hospitals and physicians who cannot transfer their electronic health records to each other. As a result, despite the billions of dollars invested, hospitals, physicians, and clinics are printing out their documents and faxing them to each other – "And so the fax machine remains medicine's dominant method of communication."<sup>243</sup> Furthermore, it seems that a significant obstacle to the successful implementation of this Act was, and continues to be, the investment of time required to transition to an electronic system.<sup>244</sup>

Some might claim that the challenge raised by the HITECH Act is more of a business-to-business issue and not a business-to-

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<sup>238</sup> Health Information Technology for Economic and Clinical Health Act, 42 U.S.C. §§ 300jj–300jj-52, 17901 et seq. (2009).

<sup>239</sup> John Thune, Lamar Alexander, Pat Roberts, Richard Burr & Mike Enzi, *Where Is HITECH's \$35 Billion Dollar Investment Going?*, HEALTH AFFS. (Mar. 4, 2015), [www.healthaffairs.org/content/forefront/hitech-s-35-billion-dollar-investment-going](http://www.healthaffairs.org/content/forefront/hitech-s-35-billion-dollar-investment-going) [<https://perma.cc/TQS5-TFXL>].

<sup>240</sup> Brian Schilling, *The Federal Government Has Put Billions into Promoting Electronic Health Record Use: How Is It Going?*, COMMONWEALTH FUND, [www.commonwealthfund.org/publications/newsletter-article/federal-government-has-put-billions-promoting-electronic-health](http://www.commonwealthfund.org/publications/newsletter-article/federal-government-has-put-billions-promoting-electronic-health) [<https://perma.cc/83R3-8QPY>].

<sup>241</sup> "In 2011, the Centers for Medicare and Medicaid Services (CMS) established the Medicare and Medicaid Electronic Health Record (EHR) Incentive Programs to encourage eligible professionals (EPs), eligible hospitals, and critical access hospitals (CAHs) to adopt, implement, upgrade, and demonstrate meaningful use of certified electronic health record technology (CEHRT)." U.S. Cent. for Medicare & Medicaid Servs., U.S. Dept. of Health, *Promoting Interoperability Programs*, CMS.GOV (Dec. 12, 2024), [www.cms.gov/medicare/regulations-guidance/promoting-interoperability-programs](http://www.cms.gov/medicare/regulations-guidance/promoting-interoperability-programs) [<https://perma.cc/Y9JX-NT4J>].

<sup>242</sup> Kliff, *supra* note 121.

<sup>243</sup> *Id.*

<sup>244</sup> Schilling, *supra* note 240.

consumer one, as patients are spared from the jaws of the fax machine. However, receiving the information patients need directly from their hospitals and physicians is only partially helpful to consumers if they struggle to transfer their documents from one facility to another, even if they themselves are not the ones faxing.

Though this Act made significant progress in dragging the healthcare sector into the modern age, some covered entities chose not to pursue the financial incentives associated with it. Thus, significant portions of this sector still view the fax machine as the best option to communicate with patients in compliance with current legislation, on top of businesses communicating via fax with each other. The HITECH Act's approach does not mandate but provides financial incentives for businesses to move their records online, which should benefit all parties involved. However, given the deep roots of the healthcare sphere, which tends to adhere to old practices, it did not achieve maximum success. Still, this method of opting for a carrot instead of a stick could be implemented in other contexts to ensure businesses will be financially encouraged to adopt new technologies sooner rather than later. Another example of a successful technological change through regulatory intervention is the global shift from analog to digital television, detailed below.

#### E. CROSS-LEVELS: THE SHIFT FROM ANALOG TO DIGITAL TV

The case study of digital TV exemplifies the regulator's underexplored ability to cultivate successful technological transformation via agreed-upon legislation. This last category was created to accommodate the digital television transition from analog to digital TV, led in the US by the Federal Communications Commission (FCC).<sup>245</sup> Given the vital role TV has in our lives as consumers and the fact that it operates as a communication platform between businesses, governments, and individual consumers, this means of communication is viewed as a cross-level technology.

The digital television transition represents a global legal, cultural, and technological shift, where analog television broadcasting technology was converted and replaced by the new technology.<sup>246</sup> This transition was conducted by individual nations operating on

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<sup>245</sup> FCC, *Digital Television*, Consumer and Government Affairs Bureau (Aug. 9, 2016), [www.fcc.gov/general/digital-television](http://www.fcc.gov/general/digital-television) [https://perma.cc/6F5D-AEKK].

<sup>246</sup> Jérôme Addaa & Marco Ottaviani, *The Transition to Digital Television*, INSTITUT D'ÉCONOMIE INDUSTRIELLE (Sept. 2004), [idei.fr/sites/default/files/medias/doc/conf/ecm/ottaviani.pdf](http://idei.fr/sites/default/files/medias/doc/conf/ecm/ottaviani.pdf) [https://perma.cc/4CPB-MYW7].

different schedules. This transition involved the conversion of analog terrestrial television broadcasting infrastructure to digital terrestrial. A couple of benefits associated with this mandated process were receiving extra frequencies on the radio spectrum, lower broadcasting costs, and improved viewing qualities for consumers.<sup>247</sup> From a public perspective, the shift has freed valuable broadcast spectrum to be used for public safety purposes and the communication of police, fire departments, and rescue squads. Moreover, parts of the spectrum that have been freed up have been auctioned to companies that can now provide consumers with advanced wireless services, such as wireless broadband.<sup>248</sup>

The 2006 Geneva Agreement, hosted by the International Telecommunication Union, was signed by most of Europe, Africa, and Asia and set June 17, 2015, as the date after which countries may use frequencies that were previously assigned for analog television usage only. Thus, this date marked the internationally mandated analog switch-off date.<sup>249</sup> In the US, June 13, 2009, was the date when full-power television stations nationwide were required to broadcast exclusively in a digital format.<sup>250</sup>

Though the process has encountered some setbacks,<sup>251</sup> this is a fascinating example of how the legislator, if they set their mind to it, can proactively implement newer, more efficient technologies and de-platform older technologies. Digital TV offers numerous advantages to consumers, businesses, and governments across the

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<sup>247</sup> *The Digital Television Transition: Government and Industry Perspectives: Hearing before the S. Comm. on Com., Sci., and Transp.*, 110th Cong. (2007).

<sup>248</sup> FCC, *supra* note 245.

<sup>249</sup> See Int'l Telecomm. Union, *FINAL ACTS of the Regional Radiocommunication Conference for planning of the digital terrestrial broadcasting service in parts of Regions 1 and 3, in the frequency bands 174-230 MHz and 470-862 MHz (RRC-06)* (2006), <https://search.itu.int/history/HistoryDigitalCollectionDocLibrary/4.129.43.en.100.pdf> [<https://perma.cc/X3XB-D7GJ>].

<sup>250</sup> FCC, *supra* note 245. President Bush signed the Deficit Reduction Act of 2005 bill to end analog television by February 17, 2009.

<sup>251</sup> See, e.g., Joel Brinkley, *Digital TV Era Still Remains Out of Reach*, N.Y. TIMES (Aug. 7, 2000), [www.nytimes.com/2000/08/07/business/digital-tv-era-still-remains-out-of-reach.html](http://www.nytimes.com/2000/08/07/business/digital-tv-era-still-remains-out-of-reach.html) [<https://perma.cc/Q4LM-7K6E>]; Jon Hart & Jim Burger, *Can the FCC Fix the Transition To Digital TV? Please Stay Tuned*, WALL ST. J. (Jan. 11, 2021), [www.wsj.com/public/resources/documents/SB979142461229012934.htm](http://www.wsj.com/public/resources/documents/SB979142461229012934.htm) [<https://perma.cc/3HV4-Q8UX>].

world. These types of shifts are bound to be met with resistance and a lack of awareness from consumers, especially when the government is forcibly replacing older technologies. A vast amount of money was invested in increasing consumers' awareness. The awareness project mostly focused on low-income, elderly, disabled, inner-city, immigrant, and rural Americans because these groups used analog antenna TV more than others. Preparing them for this transition's benefits and challenges was essential to its success.<sup>252</sup> This also highlights a broader issue of exacerbating digital divides via technological transition. As was evident in the case of digital TV, forcing the adoption of new technologies might affect vulnerable populations, such as the elderly or low-income individuals. This issue should be managed as part of the transition preparation, similar to the case here. This is an important concern to keep in mind as technological transitions happen throughout time. Ensuring these populations are accompanied by educational awareness campaigns and professionals are crucial components of any digital transition endeavor.

The shift to digital TV also shows that similar technological transitions can be possible in the future, despite inherent cultural and societal difficulties, assuming all parties involved have something to gain. The analog-to-digital TV shift proves that an important path to cut through large bureaucracy inertia to stick with existing technology is to force it by law.<sup>253</sup> Scaling up this approach to other forms of older technologies would be necessary in a future where innovation requires room to grow.

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<sup>252</sup> U.S. GOV'T ACCOUNTABILITY OFF., GAO-08-1040, DIGITAL TELEVISION TRANSITION: IMPLEMENTATION OF THE CONVERTER BOX SUBSIDY PROGRAM IS UNDER WAY, BUT PREPAREDNESS TO MANAGE AN INCREASE IN SUBSIDY DEMAND IS UNCLEAR (2018); Glenn Fleishman, *Converting Your TV From Analog to Digital*, SEATTLE TIMES (Mar. 19, 2008), [www.seattletimes.com/entertainment/tv/converting-your-tv-from-analog-to-digital/](http://www.seattletimes.com/entertainment/tv/converting-your-tv-from-analog-to-digital/) [<https://perma.cc/9WQK-JJ84>]; Jeffery A. Hart, *The Transition to Digital Television in the United States: The Endgame*, 1 INT'L J. OF DIGIT. TELEVISION 7 (2010).

<sup>253</sup> A nonregulatory way to enable transition, which lies beyond the scope of this paper, is to buy the consumers off or shove them off. Companies do this by retiring old support and providing an incentive (e.g., a new device) for consumers to upgrade. Or by retiring old support forcing consumers to upgrade. See, e.g., Tribune Web Desk, *Apple to Shut its Services on Devices Running Older Software*, TRIBUNE (Apr. 7, 2023), [www.tribuneindia.com/news/science-technology/apple-to-shut-its-services-on-devices-running-older-software-495121/](http://www.tribuneindia.com/news/science-technology/apple-to-shut-its-services-on-devices-running-older-software-495121/) [<https://perma.cc/Z4RX-LFMH>].

Furthermore, the economic implications of forcing technological transition could be daunting to governments and businesses across all levels of interactions. This financial burden, combined with inertia and red tape, disincentivizes governments and businesses from adopting new technologies. However, similar to the examples presented throughout this part, with the appropriate carrots and sticks presented by the legislator and consumers, this financial burden could be better managed to encourage needed technological transitions. Implementing improved technologies is associated with better economic performance and development.<sup>254</sup> Governments and businesses that decide to bypass this financial burden will eventually pay for it by losing customers and heading into a future where their technological systems are unsupported and undesired. Though these economic implications must be considered, they cannot inhibit technological progress.

#### IV. THE ENDLESS CYCLES OF TECHNOLOGIES

The story of the fax machine and most of the technologies described in Part III represent a broader pattern and evolution of old and new technologies.<sup>255</sup> It signifies a tendency for history to repeat itself for mostly social and political reasons, not technical ones. This inquiry is even more pressing these days when society slowly embraces a new generation of emerging technologies, led by AI and quantum technologies. We might be unable to stall their implementation despite obsolete infrastructure and societal resistance. These technologies are predicted to save thousands of lives in different spheres, from transportation to medicine,<sup>256</sup> leading to a vital need for their quick adoption.

If the government and businesses' organizational culture remains as it has in the last couple of decades, society will suffer from its inability to embrace proven technologies that are better suited for

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<sup>254</sup> David Alfaro-Serrano, Tanay Balantrapu, Ritam Chaurey, Ana Goicoechea & Eric Verhoogen, *Interventions to Promote Technology Adoption in Firms: A Systematic Review*, 17 CAMPBELL SYSTEMATIC REVIEWS. 1 (2021) (discussing direct and indirect financial support to promote technology adoption).

<sup>255</sup> An interesting question that lies beyond the scope of this paper is whether cash can be considered an old technology that should be eliminated. Eswar Prasad, *Cash Will Soon be Obsolete. Will America be Ready?*, BROOKINGS INST. (Aug. 25, 2021), [www.brookings.edu/articles/cash-will-soon-be-obsolete-will-america-be-ready/](http://www.brookings.edu/articles/cash-will-soon-be-obsolete-will-america-be-ready/) [https://perma.cc/5R58-GZVB].

<sup>256</sup> See, e.g., ORLY LOBEL, *THE EQUALITY MACHINE: HARNESSING DIGITAL TECHNOLOGY FOR A BRIGHTER, MORE INCLUSIVE FUTURE* (2022) (describing AI's many benefits in different aspects of our lives).

consumers.<sup>257</sup> Regulation and federal agencies play a significant role in this process, as they can delay or accelerate the implementation of innovation into our commercial market.<sup>258</sup> In the past, federal agencies had an important role in facilitating technological transitions, such as in the case of digital TV discussed above, and the adoption of 5G technologies.<sup>259</sup> This Part first reviews the role of the federal agencies, focusing on the FCC, FTC, CFBP, and HHS to accelerate information communication innovation rather than delay it. Then, it reflects upon today's emerging technologies, focusing on AI and quantum technologies, and examines current legal impediments to their implementation. This Section provides insights from the technologies described above to ensure past mistakes are not repeated.

#### A. THE ROLE OF FEDERAL AGENCIES

Government and business practices involving older technologies do not violate existing regulations. On the contrary, they usually zealously and blindly adhere to such regulations. In the areas of law described above, there seems to be a misunderstanding of the law combined with over-enforcement of current regulations, requiring measurements the law does not mandate. In so doing, federal agencies and the private sector are imposing unnecessary burdens and difficulties on consumers seeking basic services such as healthcare, services related to the financial sector, and governmental services (such as unemployment benefits).<sup>260</sup> They frustrate trust in these institutions and obstruct the proper information flow between consumers and third parties. Federal administrative agencies focusing on consumer protection, such as the FCC (in the communication sector), FTC (in all sectors involving consumers),

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<sup>257</sup> The same resistance happened in the fax context in the early days of the internet. See COOPERSMITH, *supra* note 1, at 192 (“As Tom Jenkins, a TeleChoice consultant, stated, ‘Fax has been so successful that people are scared of messing with something that works. Fax is cheap and fax works.’”).

<sup>258</sup> This paper focuses on appropriate regulation and action on the federal level. Though there is much to say in the context of state-level operations and their interaction with federal frameworks, these lay outside the scope of this project and will hopefully be the topic of further research.

<sup>259</sup> *America's 5G Future*, FCC, [www.fcc.gov/5G](https://www.fcc.gov/5G) [<https://perma.cc/TA6E-EYTF>].

<sup>260</sup> Patrick McGeehan, *He Needs Jobless Benefits. He Was Told to Find a Fax Machine*, N.Y. TIMES (Apr. 4, 2020), [www.nytimes.com/2020/04/04/nyregion/coronavirus-ny-unemployment-benefits.html](https://www.nytimes.com/2020/04/04/nyregion/coronavirus-ny-unemployment-benefits.html) [<https://perma.cc/VK28-J2LJ>] (“Thousands of newly unemployed New Yorkers desperate to stay afloat are being frustrated by the state’s 1970s-era technology.”).

CFPB (in the financial sector), and HHS (in the health sector), play an important role in breaking this pattern and enable a more efficient and accessible communication path for consumers.<sup>261</sup>

It is important to note that even though creating a new agency for evaluating old and new technologies focused on succession planning sounds promising, it seems less practical for two main reasons. First, the GAO already does a significant portion of this via its reporting and tracking of “legacy systems.”<sup>262</sup> The GAO’s declared goal is to provide “Congress, the heads of executive agencies, and the public with timely, fact-based, non-partisan information that can be used to improve government and save taxpayers billions of dollars.”<sup>263</sup> The streamlining the GAO seeks is embedded in the transition from old technologies to newer ones. Second, the agencies discussed below have unique expertise in their field, which can provide the necessary credibility to better handle the usage of old technologies in their specific sectors. Having a one-stop solution in the shape of a dedicated federal agency might disregard the nuances each sector needs to consider.

### 1. *The Federal Communications Commission (FCC)*

The FCC’s mission is to regulate “interstate and international communications by radio, television, wire, satellite, and cable.” It is the federal agency responsible for implementing and enforcing the US’s communications laws and regulations.<sup>264</sup> As such, regulating existing and emerging communication technologies is an essential part of its mission. One of the FCC’s core missions is to manage and license “the electromagnetic spectrum for commercial users and non-commercial users, including state, county, and local governments. This includes public safety, commercial and non-commercial fixed and mobile wireless services, broadcast television and radio, satellite and other services.”<sup>265</sup> This indicates this agency’s critical role in the

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<sup>261</sup> The future implications of the recent precedent set in *Loper Bright Enters. v. Raimondo*, 603 U.S. 369 (2024), overruling *Chevron v. Nat. Res. Def. Council*, 467 U.S. 837 (1984), are still unclear. This shift should not weaken the role of the agencies as detailed in this section, given their wide range of responsibilities, not just interpretation, in the context of adopting new technologies.

<sup>262</sup> See *supra* Part III.2.

<sup>263</sup> *What GAO Does*, GAO, [www.gao.gov/about/what-gao-does](https://www.gao.gov/about/what-gao-does) [<https://perma.cc/R7DD-CLKK>].

<sup>264</sup> *About the FCC*, FCC, [www.fcc.gov/about/overview](https://www.fcc.gov/about/overview) [<https://perma.cc/4GGY-7SNH>].

<sup>265</sup> *Licensing*, FCC, [www.fcc.gov/licensing](https://www.fcc.gov/licensing) [<https://perma.cc/8VKB-DFR6>].

future, given the constant innovation and improvement of satellite use and mobile wireless services.<sup>266</sup>

On its website, the FCC states that one of its objectives is to revise “media regulation so that new technologies flourish alongside diversity and localism.”<sup>267</sup> The FCC indeed held a significant role in the regulation and implementation of the fax machine, as well as in the transition from analog to digital TV.<sup>268</sup> As innovations enter the market, the FCC is likely an important factor in the regulation landscape. Current FCC initiatives include 5G leadership and enabling better telehealth care, focusing on low-income consumers living in rural areas that lack access to affordable broadband.<sup>269</sup> All of these position the FCC as a critical gatekeeper of innovation. Given this, the FCC should adhere to its explicit goal to enable new technologies to flourish via its rulemaking process while prioritizing the benefit and well-being of its users. It should encourage the implementation of new technologies in all aspects facing consumers. Though its ability to control fax usage was eventually limited, given data privacy and security regulations, this does not diminish its overall stance as a pillar in innovation adoption.<sup>270</sup>

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<sup>266</sup> Gerard J. Waldron, Jocelyn Jezierny & Corey Walker, *FCC’s “Supplemental Coverage from Space” Rules Take Effect May 30; New Licensing Framework Expands Satellite-to-Smartphone Coverage*, INSIDE GLOBAL TECH (Apr. 30, 2024), <https://www.insideglobaltech.com/2024/04/30/fcc-acts-to-expand-satellite-to-smartphone-coverage-supplemental-coverage-from-space-rules-will-enable-partnerships-between-satellite-operators-and-wireless-network-providers-in-the/> [https://perma.cc/3DGK-WP98].

<sup>267</sup> *What We Do*, FCC, [www.fcc.gov/about-fcc/what-we-do](http://www.fcc.gov/about-fcc/what-we-do) [https://perma.cc/4UXW-RYAE].

<sup>268</sup> For the fax, see COOPERSMITH, *supra* note 1, at 39 (“In the United States, the Federal Communications Commission (FCC) provided the regulatory framework within which radio, including fax broadcasting, and television developed.”). For the TV, see *supra* Part III.5.

<sup>269</sup> *FCC Initiatives*, FCC, [www.fcc.gov/about-fcc/fcc-initiatives](http://www.fcc.gov/about-fcc/fcc-initiatives) [https://perma.cc/9WTK-LPDS].

<sup>270</sup> Shane Tews, *The FCC’s Work on Light-touch Regulation and Spectrum Allocation Continues to Enable the Internet and Technologies of the Future*, AM. ENTER. INST. (Oct. 29, 2020), [www.aei.org/technology-and-innovation/the-fccs-work-on-light-touch-regulation-and-spectrum-allocation-continues-to-enable-the-internet-and-technologies-of-the-future/](http://www.aei.org/technology-and-innovation/the-fccs-work-on-light-touch-regulation-and-spectrum-allocation-continues-to-enable-the-internet-and-technologies-of-the-future/) [https://perma.cc/23K6-ZBHJ].

## 2. *The Federal Trade Commission (FTC)*

One cannot discuss consumer protection in today's technological landscape without acknowledging the ongoing work of the FTC.<sup>271</sup> This agency is already making moves in the AI context regarding consumer protection. In October 2023, the agency published a blog that detailed a few key areas of harm suffered by consumers using AI.<sup>272</sup> The blog raises concerns such as copyright violations, fear of privacy violations concerning biometric data, bias, inaccuracies, and the human urge to talk to a fellow human.<sup>273</sup> The FTC is indeed operating in the AI world, trying to protect consumers from its harms.<sup>274</sup> However, there is comparatively little discussion regarding AI as a means of communication between consumers and businesses.

At its core, under section 5 of the FTC Act, the FTC holds the authority to act against “unfair or deceptive acts or practices” carried out by businesses.<sup>275</sup> An unfair act or practice is considered as such if it causes or is likely to cause substantial injury to consumers; consumers cannot reasonably avoid it, and it is not outweighed by countervailing consumer benefits or the notion of competition. An act or practice is considered deceptive if it is a representation, omission, or practice that misleads or is likely to mislead the consumer, a consumer's interpretation of said representation, omission, or practice is considered reasonable under the circumstances, and the misleading representation, omission, or practice is material.<sup>276</sup>

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<sup>271</sup> See e.g., David McCabe, *Federal Trade Commission Launches Inquiry into A.I. Deals by Tech Giants*, N.Y. TIMES (Jan. 25, 2024), [www.nytimes.com/2024/01/25/technology/ftc-ai-microsoft-amazon-google.html](https://www.nytimes.com/2024/01/25/technology/ftc-ai-microsoft-amazon-google.html) [<https://perma.cc/52YJ-CFM7>].

<sup>272</sup> Simon Fondrie-Teitler & Amritha Jayanti, *Consumers are Voicing Concerns About AI*, FTC (Oct. 3, 2023), [www.ftc.gov/policy/advocacy-research/tech-at-ftc/2023/10/consumers-are-voicing-concerns-about-ai](https://www.ftc.gov/policy/advocacy-research/tech-at-ftc/2023/10/consumers-are-voicing-concerns-about-ai) [<https://perma.cc/Z86Y-WXCB>].

<sup>273</sup> *Id.*

<sup>274</sup> Regarding price fixing, the FTC recently published a joint legal brief with the DOJ stating that “your algorithm can't do anything that would be illegal if done by a real person.” Hannah Garden-Monheit & Ken Merber, *Price Fixing by Algorithm is Still Price Fixing*, FTC (Mar. 1, 2024), [www.ftc.gov/business-guidance/blog/2024/03/price-fixing-algorithm-still-price-fixing](https://www.ftc.gov/business-guidance/blog/2024/03/price-fixing-algorithm-still-price-fixing) [<https://perma.cc/VB22-SP4E>].

<sup>275</sup> 15 U.S.C. § 45.

<sup>276</sup> FED. RSRV. BD., CONSUMER COMPLIANCE HANDBOOK: FEDERAL TRADE COMMISSION ACT SECTION 5—UNFAIR OR DECEPTIVE ACTS OR PRACTICES (2004). For an interesting analysis of these standards in the robotic context, see Woodrow Hartzog, *Unfair and Deceptive Robots*, 74 MD. L. REV. 785 (2015).

The deceptive standard seems unlikely to apply in the context of the examples presented in this paper, as using these old technologies is not misleading. However, one can possibly argue that the lack of accessibility, convenience, and ease of access to these older technologies might amount to an unfair practice, especially if that is the prime means of communication to access essential services. Herrine discussed a recent shift in the understanding of what amounts to unfairness in the administrative context. He claims that administrative agencies are retreating from a “consumer sovereignty” framework to an “antidomination” framework.<sup>277</sup> The latter focuses “on the many ways that market structure can create problematic power imbalances between sellers and consumers”<sup>278</sup> rather than focusing on informed consumer choices. A claim that the power imbalance between service providers mandating the usage of the fax and consumers who lack access to it should be more acceptable under the antidomination framework. The bar of a “substantial injury” might be hard to prove as that depends on the services being provided and the available alternative means of communication detailed by the provider. However, under the antidomination framework, focusing on a legally protected interest that might have been invaded can make it easier to prove that the fax has “invaded an interest that U.S. law recognized as in need of protection,”<sup>279</sup> examining the scenario from a social lens. Either way, it is fair to assume that the usage of older technologies will not be outweighed by consumer benefits or enhanced competition. The opposite is true, as modern means of communication will assist consumers and contribute to a more competitive market.

Even if we step outside the scope of Section 5, the FTC can influence the adoption of new technologies to benefit US consumers. It could do so by ensuring effective law enforcement in the healthcare and financial sectors by encouraging businesses in these spheres to replace older technologies with new ones to assist their consumers. It could also do so by sharing consumers’ experiences with federal and state legislatures to nudge legislation that incentivizes and even obligates adopting tools to benefit consumers and their ability to better communicate with their providers. Lastly, as the FTC explicitly declares, it can create “practical and plain-language educational programs for consumers and businesses in a global marketplace with

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<sup>277</sup> Luke Herrine, *Unfairness, Reconstructed*, 42 YALE J. ON REG. 95 (2025).

<sup>278</sup> *Id.* at 101.

<sup>279</sup> *Id.* at 168.

constantly changing technologies.”<sup>280</sup> The latter includes training both sides of the commercial landscape to more quickly adapt to new technologies that could provide a better customer experience on the one hand and increase business success on the other.

### 3. *The Consumer Financial Protection Bureau (CFPB)*

In the consumer finance context, the CFPB “implements and enforces Federal consumer financial law and ensures that markets for consumer financial products are fair, transparent, and competitive.”<sup>281</sup> The agency offers educational resources for consumers of monetary services such as loans and bank services, including a consumer complaint database from 2011 with over 5 million complaints.<sup>282</sup> The CFPB has a rulemaking authority regarding topics under its scope of responsibilities, and it also “implements and enforces federal consumer financial laws to ensure” that consumers have access to financial products and services that are “fair, transparent, and competitive.”<sup>283</sup>

As the financial sector tends to stick to older technology, as presented by the increasing usage of fax machines in its ambit, this agency could be critical in encouraging financial institutions to adopt better communication methods. Through its rulemaking and enforcement functions, compliance resources, and research, it can influence users and financial institutions to implement more efficient means of communication while still preserving privacy and securing sensitive data. Given its unique expertise in this market, it can better clarify how businesses should communicate with consumers while adopting innovative technologies.

As discussed below,<sup>284</sup> the CFPB is already reviewing the implementation of new technologies, such as AI chatbots, and how they affect financial consumers. However, it currently fails to offer resources to ensure these technologies will be compatible with current federal financial regulations. In doing so, it is not fulfilling its full potential to enable the beneficiary and safe adoption of

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<sup>280</sup> *About the FTC*, FTC, [www.ftc.gov/about-ftc](http://www.ftc.gov/about-ftc) [https://perma.cc/XBZ4-B947].

<sup>281</sup> *About Us*, CONSUMER FIN. PROT. BUREAU, [www.consumerfinance.gov/about-us/](http://www.consumerfinance.gov/about-us/) [https://perma.cc/9SP7-AZNC].

<sup>282</sup> *Consumer Complaint Database*, CONSUMER FIN. PROT. BUREAU, [www.consumerfinance.gov/data-research/consumer-complaints/](http://www.consumerfinance.gov/data-research/consumer-complaints/) [https://perma.cc/F8RY-96XN].

<sup>283</sup> *Rules and Policy*, CONSUMER FIN. PROT. BUREAU, [www.consumerfinance.gov/rules-policy/](http://www.consumerfinance.gov/rules-policy/) [https://perma.cc/L5MD-D6JC].

<sup>284</sup> See *infra* Part IV.2.

innovation, where both sides have something to gain. That should be more strongly integrated into the CFPB's explicit goals and mission, given the important role financial institutions have in our lives and the high confusion most Americans experience as they navigate this system.<sup>285</sup>

#### 4. Department of Health and Human Services (HHS) Office for Civil Rights (OCR)

In the healthcare sphere, different sections of HIPAA require the HHS to publish national standards for the security of electronically protected health information (e-PHI), electronic exchange, and the privacy and security of health information. This led HHS to create the Privacy Rule,<sup>286</sup> the Security Rule,<sup>287</sup> and the Enforcement Rule.<sup>288</sup> Within the HHS, the HHS OCR enforces federal civil rights laws, including HIPAA, privacy, security, and breach notification rules.<sup>289</sup> The office defines its core mission to complete this goal as “investigating complaints and conducting compliance reviews, requiring corrective and remedial action, promulgating policy and

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<sup>285</sup> Doug McMillon & John Hope Bryant, *Financial Literacy Education Could Help Millions of Americans*, TIME (June 10, 2022), [www.time.com/6186290/americans-financial-literacy/](http://www.time.com/6186290/americans-financial-literacy/) [<https://perma.cc/L5F8-2NAG>].

<sup>286</sup> “Sections 261 through 264 of HIPAA require the Secretary of HHS to publicize standards for the electronic exchange, privacy and security of health information. Collectively these are known as the *Administrative Simplification* provisions.” *Summary of the HIPAA Privacy Rule*, HHS, [www.hhs.gov/hipaa/for-professionals/privacy/laws-regulations/index.html](http://www.hhs.gov/hipaa/for-professionals/privacy/laws-regulations/index.html) [<https://perma.cc/68PS-MABD>].

<sup>287</sup> “The Administrative Simplification provisions of HIPAA requires the Secretary of HHS to adopt standards to ensure that covered entities maintain reasonable and appropriate administrative, physical, and technical safeguards for the security of certain individually identifiable health information.” *Summary of the HIPAA Security Rule*, HHS, [www.hhs.gov/hipaa/for-professionals/security/laws-regulations/index.html](http://www.hhs.gov/hipaa/for-professionals/security/laws-regulations/index.html) [<https://perma.cc/2QLS-D9VB>].

<sup>288</sup> “The HIPAA Enforcement Rule contains provisions relating to compliance and investigations, the imposition of civil money penalties for violations of the HIPAA Administrative Simplification Rules, and procedures for hearings. The HIPAA Enforcement Rule is codified at 45 CFR Part 160, Subparts C, D, and E.” *The HIPAA Enforcement Rule*, HHS, [www.hhs.gov/hipaa/for-professionals/special-topics/enforcement-rule/index.html](http://www.hhs.gov/hipaa/for-professionals/special-topics/enforcement-rule/index.html) [<https://perma.cc/K7UG-9UP8>].

<sup>289</sup> *About Us*, HHS, [www.hhs.gov/ocr/about-us/index.html](http://www.hhs.gov/ocr/about-us/index.html) [<https://perma.cc/5ADY-BATT>].

regulations, and providing technical assistance and public education for the American people.”<sup>290</sup>

As the federal agency in charge of HIPAA compliance, the HHS has broad authority regarding communications with patients and the security of their data. It provides information for individuals about their HIPAA rights and their ability to file a HIPAA complaint via HHS’s website.<sup>291</sup> The agency also provides services for professionals to discuss their HIPAA obligations and answer their inquiries. Some of them specifically discuss different means of communication and their HIPAA compliance.<sup>292</sup>

In the context of communication, providing more clarity regarding the Security Rule is important. This rule requires entities covered under HIPAA to maintain appropriate technical and physical safeguards for protecting electronic protected health information. Covered entities must, among others, “identify and protect against reasonably anticipated threats to the security or integrity of the information.”<sup>293</sup> This requirement incentivizes covered entities to opt for older technologies to ensure the integrity and security of electronically protected health information rather than new technologies they perceive as more susceptible to hacking and cybersecurity issues, which the HHS itself has discussed.<sup>294</sup> However, unlike other agencies discussed above, the HHS seems to ignore the integration of innovation that can benefit both providers and consumers. In doing so, the HHS is failing both sides by not clarifying HIPAA demands that require safeguards but must also encourage an easier and more communicative path between the parties operating in the healthcare sphere. Pushing for this transition in the healthcare sector is essential to ensure consumers have access to essential services in America and, in the process, de-root technologies that have no meaningful contribution to either. The HHS has an important role in achieving this but is thus far lagging.

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<sup>290</sup> *OCR Mission & Vision*, HHS, [www.hhs.gov/ocr/about-us/mission-vision/index.html](https://www.hhs.gov/ocr/about-us/mission-vision/index.html) [https://perma.cc/WY5V-UERR].

<sup>291</sup> *HIPAA for Individuals*, HHS, [www.hhs.gov/hipaa/for-individuals/index.html](https://www.hhs.gov/hipaa/for-individuals/index.html) [https://perma.cc/P9BN-B4A2].

<sup>292</sup> *HIPAA for Professionals*, HHS, [www.hhs.gov/hipaa/for-professionals/index.html](https://www.hhs.gov/hipaa/for-professionals/index.html) [https://perma.cc/A3RW-HE8T]. For an FAQ addressing fax usage issues, see HHS, *supra* note 128.

<sup>293</sup> 45 C.F.R. § 164.306(a).

<sup>294</sup> HHS, HEALTHCARE SECTOR CYBERSECURITY: INTRODUCTION TO THE STRATEGY OF THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES (2023), [aspr.hhs.gov/cyber/Documents/Health-Care-Sector-Cybersecurity-Dec2023-508.pdf](https://aspr.hhs.gov/cyber/Documents/Health-Care-Sector-Cybersecurity-Dec2023-508.pdf) [https://perma.cc/G6UX-4WC2].

## B. BREAKING NEW GROUND: EMBRACING THE NEXT GENERATION OF INNOVATION

We must learn from our past mistakes to avoid repeating them. AI and quantum technologies are the most promising and meaningful emerging technologies in the upcoming years. Given today's regulations, these might face legal challenges in the consumer context. This subsection delves into the applications of these technologies and the regulations that might prevent their beneficial adoption.

In the consumer services world, AI, especially large language models such as OpenAI's ChatGPT and Google's Gemini, are slowly but steadily being integrated into the methods businesses and governments use to interact with consumers.<sup>295</sup> Chatbots and voice assistants are prime, and many would say annoying,<sup>296</sup> examples. They present various legal and social issues to businesses deploying them and consumers using them. These chatbots and voice assistants could lead to liability issues, job displacement,<sup>297</sup> data bias, privacy violations,<sup>298</sup> and misinformation, to name only a few potential risks.<sup>299</sup> Three examples could help illuminate these challenges. First,

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<sup>295</sup> Pranshu Verma, *ChatGPT Provided Better Customer Service Than His Staff. He Fired Them.*, WASH. POST (Oct. 3, 2023), <https://www.washingtonpost.com/technology/2023/10/03/ai-customer-service-jobs/> [<https://perma.cc/J7CE-CNKF>].

<sup>296</sup> Johannes Boegershausen, Noah Castelo, Christian Hildebrand & Alexander P. Henkel, *Creating Customer Service Bots That People Don't Hate*, HARV. BUS. REV. (Oct. 30, 2023), [hbr.org/2023/10/creating-customer-service-bots-that-people-dont-hate](https://hbr.org/2023/10/creating-customer-service-bots-that-people-dont-hate) [<https://perma.cc/YU2T-UTGH>]; Martin Adam, Michael Wessel & Alexander Benlian, *AI-Based Chatbots in Customer Service and Their Effects on User Compliance*, 31 ELECTRON MKTS. 427 (2021).

<sup>297</sup> Blake Morgan, *What Impact Will AI Have On Customer Service?*, FORBES (Aug. 16, 2023), [www.forbes.com/sites/blakemorgan/2023/08/16/what-impact-will-ai-have-on-customer-service/?sh=382859c76aa6](https://www.forbes.com/sites/blakemorgan/2023/08/16/what-impact-will-ai-have-on-customer-service/?sh=382859c76aa6) [<https://perma.cc/9H2G-KS2M>] (“Although Goldman Sachs says AI could replace the equivalent of 300 million full-time jobs, most experts agree that customer service jobs will be augmented and automated but not replaced.”).

<sup>298</sup> Mengmeng Song, et al., *Will Artificial Intelligence Replace Human Customer Service? The Impact of Communication Quality and Privacy Risks on Adoption Intention*, 66 J. RETAILING AND CONSUMER SERVS. (2022).

<sup>299</sup> Paul R. Daugherty, H. James Wilson & Karthik Narain, *Generative AI Will Enhance — Not Erase — Customer Service Jobs*, HARV. BUS. REV. (Mar. 30, 2023), <https://hbr.org/2023/03/generative-ai-will-enhance-not-erase-customer-service-jobs> [<https://perma.cc/D6GS-MTXX>].

in February 2024, Air Canada attempted to shrug off a commitment for a discount made by their AI chatbot to a customer,<sup>300</sup> arguing that its chatbot is a separate legal entity responsible for its *own* actions. A Canadian tribunal in the case of *Moffatt v. Air Canada* rejected this argument.<sup>301</sup> The tribunal obligated Air Canada to provide the promised discount, thus asserting that liability could not rest with the AI itself but the entity that provided it to the consumer.<sup>302</sup> Second, a chatbot used for a delivery service “used profanity, told a joke, wrote poetry about how useless it was, and criticized the company as the ‘worst delivery firm in the world’ after prompting by a frustrated customer,”<sup>303</sup> and was eventually taken offline by the company. Also, a different chatbot, used by the National Disorders Association, was taken down after users complained of ‘harmful’ advice.<sup>304</sup> These chatbots show how AI can lead to different types and scopes of liability for those who deploy it and harm consumers interacting with it.

In 2018, Google revealed Google Duplex, an AI-based technology that mimics the human voice. It can conduct services for its users, such as making a reservation for a restaurant or making an appointment for a hair salon, by calling the facility and directly talking with them without the involvement of the Google user.<sup>305</sup> Following ethical controversies resulting from its reveal, Google added features such as letting the business on the other end know they are talking with an AI assistant, being recorded, and allowing

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<sup>300</sup> Kyle Melnick, *Air Canada Chatbot Promised a Discount. Now the Airline Has to Pay it*, WASH. POST (Feb. 18, 2024), <https://washingtonpost.com/travel/2024/02/18/air-canada-airline-chatbot-ruling/> [<https://perma.cc/26FZ-YPM6>].

<sup>301</sup> *Moffatt v. Air Canada*, 2024 BCCRT 149.

<sup>302</sup> *Id.*

<sup>303</sup> Mallory Monech, *Delivery Firm’s AI Chatbot Goes Rogue, Curses at Customer and Criticizes Company*, TIME (Jan. 20, 2024), [time.com/6564726/ai-chatbot-dpd-curses-criticizes-company/](https://time.com/6564726/ai-chatbot-dpd-curses-criticizes-company/) [<https://perma.cc/E8R9-2Y4T>].

<sup>304</sup> Catherine Thorbecke, *National Eating Disorders Association Takes its AI Chatbot Offline after Complaints of ‘Harmful’ Advice*, CNN (June 1, 2023), [www.cnn.com/2023/06/01/tech/eating-disorder-chatbot/index.html](http://www.cnn.com/2023/06/01/tech/eating-disorder-chatbot/index.html) [<https://perma.cc/6TBG-SFZJ>].

<sup>305</sup> Google Duplex: *A.I. Assistant Calls Local Businesses To Make Appointments*, YOUTUBE (May 8, 2018), [www.youtube.com/watch?v=D5VN56jQMWM](https://www.youtube.com/watch?v=D5VN56jQMWM) [<https://perma.cc/ZH4R-XY9W>]; Yaniv Leviathan, *Google Duplex: An AI System for Accomplishing Real-World Tasks Over the Phone*, GOOGLE RSCH. (May 8, 2018), [research.google/blog/google-duplex-an-ai-system-for-accomplishing-real-world-tasks-over-the-phone/](https://research.google/blog/google-duplex-an-ai-system-for-accomplishing-real-world-tasks-over-the-phone/) [<https://perma.cc/QS5U-AJYS>].

businesses to opt out of this service entirely.<sup>306</sup> Currently, users use the Google Duplex, more commonly known today as Google Assistant, for the “Hold For Me” feature, which holds their place in a phone queue.<sup>307</sup> This eliminated ethical issues as no one unknowingly interacts with the AI. This feature is an interesting method of commercial communication involving AI that most of society is simply not ready for due to the ‘uncanny valley’ phenomenon.<sup>308</sup> Even though it might hold many benefits for both consumers and businesses, in the future, as the ethical issues are mitigated, it will make more sense to encourage the implementation of this feature to ensure a better consumer experience.<sup>309</sup>

Following up on our CFPB discussion, in the consumer finance context, research conducted by the agency in 2023 found that “financial institutions are increasingly using chatbots as a cost-effective alternative to human customer services.”<sup>310</sup> However, as problems become more complex, the usefulness and effectiveness of these chatbots decline. Most importantly, the agency stated that there is a risk of legal violations and consumer harm when financial institutions use chatbots.<sup>311</sup> Chatbots interacting with consumers must comply with all the applicable federal consumer financial laws that apply when a human is interacting with financial consumers.

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<sup>306</sup> John Callaham & Roger Fingas, *What is Google Duplex and How do you Use it?*, ANDROID AUTH. (Apr. 4, 2024), [www.androidauthority.com/what-is-google-duplex-869476/](https://perma.cc/3WQA-MQPS) [https://perma.cc/3WQA-MQPS].

<sup>307</sup> *Use Hold for Me*, GOOGLE ASSISTANT HELP, [support.google.com/assistant/answer/10071878?hl=en](https://perma.cc/U78K-6RGT) [https://perma.cc/U78K-6RGT].

<sup>308</sup> See e.g., Bernard Marr, *The Uncanny Valley: Advancements and Anxieties of AI That Mimics Life*, FORBES (Feb. 7, 2024), [www.forbes.com/sites/bernardmarr/2024/02/07/the-uncanny-valley-advancements-and-anxieties-of-ai-that-mimics-life/?sh=6cec1bb95f96](https://perma.cc/P6XG-74T3) [https://perma.cc/P6XG-74T3].

<sup>309</sup> *The Next Frontier of Customer Engagement: AI-Enabled Customer Service*, MCKINSEY & CO. (Mar. 27, 2023), [www.mckinsey.com/capabilities/operations/our-insights/the-next-frontier-of-customer-engagement-ai-enabled-customer-service](https://perma.cc/7TSH-BMSM) [https://perma.cc/7TSH-BMSM] (“AI-enabled customer service is now the quickest and most effective route for institutions to deliver personalized, proactive experiences that drive customer engagement.”).

<sup>310</sup> *Chatbots in Consumer Finance*, CFPB (June 6, 2023), [www.consumerfinance.gov/data-research/research-reports/chatbots-in-consumer-finance/chatbots-in-consumer-finance/](https://perma.cc/ELW9-WHJC) [https://perma.cc/ELW9-WHJC].

<sup>311</sup> *Id.*

These chatbots could also raise privacy and security risks.<sup>312</sup> The same could be said in the medical context, given current regulations, mostly HIPAA, holding covered entities to a high standard of privacy and security when personally identifiable information (PII) is involved.<sup>313</sup> Nonetheless, the CFPB, in its review, failed to fully acknowledge the benefits of this innovation and how it can comply with current regulations to serve financial consumers better. This shows that federal agencies still have a long way to go to help facilitate new technologies such as AI. They should be encouraged to provide compliance services to enable the adoption of these technologies, not just warn about their potential pitfalls. It is undoubtedly true that these bots could lead to consumers' frustrations, as noted by the CFPB Director,<sup>314</sup> but so could existing technologies used for communications. Frustration is not enough to render a communication technology as inapt; if it were, the fax would have been long gone by now.

That said, AI has many advantages when interacting with customers in different fields.<sup>315</sup> It enables consumers to access information more easily.<sup>316</sup> In the medical sphere, it frees medical professionals' time to focus on more complex tasks and provides a cost-effective method for companies to offer on-demand services faster.<sup>317</sup> This could also apply to experts in the financial field. Thus,

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<sup>312</sup> *Id.* (“Financial institutions run the risk that when chatbots ingest customer communications and provide responses, the information chatbots provide may not be accurate, the technology may fail to recognize that a consumer is invoking their federal rights, or it may fail to protect their privacy and data.”).

<sup>313</sup> For a discussion about legal issues in the medical context. See Ibraheem Altamimi, Abdullah Altamimi, Abdullah S. Alhumimidi, Abdulaziz Altamimi & Mohamad-Hani Tamsah, *Artificial Intelligence (AI) Chatbots in Medicine: A Supplement, Not a Substitute*, 15 CUREUS 1 (2023).

<sup>314</sup> Nina Raemont, *Bank Customers Aren't Happy with AI Chatbots. Here's Why*, CNET (June 10, 2023), [www.cnet.com/personal-finance/bank-customers-arent-happy-with-ai-chatbots-heres-why/](https://www.cnet.com/personal-finance/bank-customers-arent-happy-with-ai-chatbots-heres-why/) [<https://perma.cc/GW6R-54YQ>].

<sup>315</sup> Tony Bradley, *How AI Is Revolutionizing Customer Experience*, FORBES (Oct. 11, 2024), [www.forbes.com/sites/tonybradley/2024/10/11/how-ai-is-revolutionizing-customer-experience/](https://www.forbes.com/sites/tonybradley/2024/10/11/how-ai-is-revolutionizing-customer-experience/) [<https://perma.cc/CSJ5-VY4H>].

<sup>316</sup> Michelle Clark & Sharon Bailey, *Chatbots in Health Care: Connecting Patients to Information*, AGENCY FOR DRUGS & TECHS. IN HEALTH (2024), [www.ncbi.nlm.nih.gov/books/NBK602381/](https://www.ncbi.nlm.nih.gov/books/NBK602381/) [<https://perma.cc/973Y-DAZA>].

<sup>317</sup> See e.g., George Vlahakis, *Chatbots Can Ease Medical Providers' Burden, Offer Trusted Guidance to Those with COVID-19 Symptoms*, KELLY SCH. OF BUS. (July 9, 2020),

federal agencies in different spheres should have a clear incentive to facilitate the safe and quick implementation of these AI consumer services.

Furthermore, AI can help alleviate current difficulties caused by old technologies entrenched in our systems.<sup>318</sup> Tennr, a new AI startup, recently raised \$18 million to bridge the communication issues in the healthcare sphere by working with fax machines, not against them.<sup>319</sup> Tennr's software reads the documents received via fax and "automates the work associated with processing them."<sup>320</sup> This process of locating and ensuring a better, more accurate, and quicker flow of information resolves many of the issues digital faxes cause in healthcare. As AI continues to evolve, other valuable applications should appear to alleviate bureaucracy difficulties presented by old technologies in our communication systems. Again, federal agencies, especially the HHS, can support and encourage these types of innovation.

The commercial applications of quantum technologies are being rapidly developed<sup>321</sup> as part of a new geopolitical arms race.<sup>322</sup> Quantum technologies refer to a range of capabilities that are based on the principles of quantum mechanics—a branch of physics that focuses on the behavior of matter and energy at the atomic and

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blog.kelley.iu.edu/2020/07/09/chatbots-can-ease-medical-providers-burden-offer-trusted-guidance-to-those-with-covid-19-symptoms/ [https://perma.cc/EZ3W-BR8G].

<sup>318</sup> Hannah Nelson, *How DirectTrust is Embracing Fax for Health Data Exchange*, TECHTARGET (June 25, 2024), www.techtarget.com/searchhealthit/feature/How-DirectTrust-is-embracing-fax-for-health-data-exchange [https://perma.cc/27MR-B6L5] ("the cloud fax industry could adopt AI to help route faxes to the correct department within a hospital. Currently, staff must sort through fax inboxes manually, which can sometimes take 15 to 30 minutes per document.").

<sup>319</sup> See TENNR, www.tennr.com/; *Tennr Puts Fax Machines Back in Vogue for Healthcare Organizations Using AI, As It Secures \$18m from a16z*, STARTUPHUB.AI (Mar. 26, 2024), www.startuphub.ai/tennr-puts-fax-machines-back-in-vogue-for-healthcare-organizations-using-ai-as-it-secures-18m-from-a16z/ [https://perma.cc/C47S-DWR6].

<sup>320</sup> *Id.*

<sup>321</sup> James Andrew Lewis & Georgia Wood, *Quantum Technology: Applications and Implications*, CSIS (May 25, 2023), www.csis.org/analysis/quantum-technology-applications-and-implications [https://perma.cc/5WCU-2YCP]. In the context of quantum computing, see Francesco Bova, Avi Goldfarb & Roger G. Melko, *Commercial Applications of Quantum Computing*, 8 EPJ QUANTUM TECH. (2021).

<sup>322</sup> Shira Shturman, *The Quantum Cold War: Redefining the Legal Standard for the Adoption of Quantum Computing Technologies* (unpublished thesis) (on copy with author).

subatomic levels (such as electrons, photons, and protons).<sup>323</sup> Leveraging quantum principles (e.g., superposition and entanglement)<sup>324</sup> enables the development of new technologies and speeds up processing power exponentially in the next decade.<sup>325</sup> Within the field of technologies, quantum Communications uses these quantum principles to enhance security and improve long-distance communications. It could revolutionize the interaction methods used by consumers, businesses, and governments.<sup>326</sup> Furthermore, quantum communication holds the potential to establish extremely secure communication networks that should be the basis of a future quantum internet that should be extremely difficult to hack.<sup>327</sup> This will not replace our traditional internet as it operates for a different goal, mainly to ensure that valuable data is secured and can be safely sent online. Quantum communications could enable hack-safe communications that will be significantly more secure than traditional communication methods.<sup>328</sup> Furthermore, and more generally, quantum technologies can enhance our privacy and better secure our digital communication methods. They can be leveraged to create unbreakable, or at least stronger, encryption than traditional encryption methods we use today to ensure data confidentiality.<sup>329</sup> All of these make quantum

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<sup>323</sup> Anat Lior, *A Quantum of Privacy*, 25 NEV. L.J., 1, 9 (2024).

<sup>324</sup> *Id.* at 10.

<sup>325</sup> Andrea Willige, *Explainer: What is Quantum Technology and What are Its Benefits?*, WORLD ECON. F. (July 3, 2024), <https://www.weforum.org/stories/2024/07/explainer-what-is-quantum-technology/> [<https://perma.cc/FF3S-DQCX>].

<sup>326</sup> Martin Giles, *Explainer: What is Quantum Communication?*, MIT TECH. REV. (Feb. 14, 2019), [www.technologyreview.com/2019/02/14/103409/what-is-quantum-communications/](http://www.technologyreview.com/2019/02/14/103409/what-is-quantum-communications/) [<https://perma.cc/MC83-BFY4>]

<sup>327</sup> Lior, *supra* note 323.

<sup>328</sup> For more on quantum communications, see Nicolas Gisin & Rob Thew, *Quantum Communication*, ARXIV (Feb. 1, 2008), [arxiv.org/pdf/quant-ph/0703255](https://arxiv.org/pdf/quant-ph/0703255) [<https://perma.cc/P5MY-KKQS>]; Daniele Cozzolino, Beatrice Da Lio, Davide Bacco & Leif Katsuo Oxenløw, *High-Dimensional Quantum Communication: Benefits, Progress, and Future Challenges*, ADV. QUANTUM TECH. (2019); Jasminder S. Sidhu, et al., *Advances in Space Quantum Communications*, 2021 IET QUANTUM COMMUN 182 (“Concerted efforts are underway to establish an infrastructure for a global quantum internet to realize a spectrum of quantum technologies. This will enable more precise sensors, secure communications, and faster data processing. Quantum communications are a front-runner with quantum networks already implemented in several metropolitan areas.”).

<sup>329</sup> R. Ramya, P. Kumar, D. Dhanasekaran, R. Satheesh Kumar & S. Amithesh Sharavan, *A Review of Quantum Communication and*

technologies a fascinating and underexplored emerging innovation with vast implications for consumer communications, even though it is too early to predict how it will be commercially implemented.<sup>330</sup>

Call for increasing implantation of emerging technologies, such as AI and quantum communication, in a consumer context is increasing as these technologies are already being developed. It will improve the more it is used, making our lives as consumers much easier.<sup>331</sup> However, legislators should encourage or at least not disrupt their implementation to enjoy these benefits and gain a more amicable consumer experience. This is not a call for the government or business to be the first adopter of these new technologies but rather a call not to unreasonably delay an attempt to implement newer technologies due to inertia.

Bearing in mind future technological developments we cannot yet anticipate, an approach advocating for the implementation of technological progress, once proven as mature enough in the market, should be adopted to ensure innovation along consumer protection. At the very least, once the infrastructure of an existing technology becomes unattainable, governments and businesses should not delay the adoption of new technologies due to inertia or fear of change. They should always watch for emerging technologies that have proven to be reliable and could enhance users' experience. The lessons learned from the prevalence of the fax machine in our commercial culture today are important to better prepare, and advocate, for the implementation of future technologies as soon as the market is ready. Federal agencies will have an important role in ensuring consumers can communicate with their providers in a way that is both secure and accessible, and they need to be proactive about it.

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*Information Networks with Advanced Cryptographic Applications Using Machine Learning, Deep Learning Techniques*, 10 FRANKLIN OPEN 100223, 1, <https://www.sciencedirect.com/science/article/pii/S2773186325000131> [https://perma.cc/5QN3-2Q94]. For more on this, see Anat Lior, *A Quantum of Privacy*, 25 NEV. L. J., 1, 18–20 (2024).

<sup>330</sup> Scott Buchholz, Kate Abrey & Joe Mariani, *Sensing the Future of Quantum*, DELOITTE (Feb. 22, 2023), <https://www2.deloitte.com/us/en/insights/industry/public-sector/future-of-quantum-technology-public-sector.html> [https://perma.cc/2454-U5VF].

<sup>331</sup> In healthcare, more generally, see Leaders, *The AI Doctor Will See You...Eventually*, TIME (Mar. 27, 2024), [www.economist.com/leaders/2024/03/27/the-ai-doctor-will-see-youeventually](http://www.economist.com/leaders/2024/03/27/the-ai-doctor-will-see-youeventually) [https://perma.cc/GLY2-CMW8].

## V. CONCLUSION

It has been colloquially argued that “If it isn’t broken, don’t fix it.”<sup>332</sup> The phrase is mainly attributed to Thomas Bertram Lance, the Director of the Office of Management and Budget in Carter’s 1977 administration. He explained, “That’s the trouble with government: Fixing things that aren’t broken and not fixing things that are broken.”<sup>333</sup> Today, many would argue fiercely against this approach, opting for the opposite mantra, “out with the old and in with the new.” It seems that the case for holding on to old technologies is not a strong one, as it is almost always driven by inertia and not by any kind of rational decision to prefer the old tech over the new. It essentially thwarts innovation and prevents the development of new ideas because of the inherent fear of change we have as humans.<sup>334</sup> Holding on to old technologies seems to create a wasteful cycle in which the resilience of old technologies prevents society from investing in business continuity approaches that should ultimately lead us to a better future.<sup>335</sup>

As mentioned above, new is not always better from the consumer’s perspective. Consumer demand for “dumb” or “old” technology will significantly affect the life cycle of new and old technologies. This is a natural aspect of any technology in our commercial market. Legislators should not forcibly phase out technologies that are still in demand. Instead, they should collaborate with consumers to ensure these technologies remain relevant as newer options become available. If that is not the case, they should act to amend the situation.<sup>336</sup> Finding an optimality point for when technology entrenchment is no longer welcomed depends on various social and technological factors. Those should be kept flexible to ensure optimality and should not be sacrificed on the altar of inertia.

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<sup>332</sup> Gary Martin. *If It Ain’t Broke, Don’t Fix It*, PHRASE FINDER, [www.phrases.org.uk/meanings/if-it-aint-broke-dont-fix-it.html](http://www.phrases.org.uk/meanings/if-it-aint-broke-dont-fix-it.html) [<https://perma.cc/7NXY-VUHY>].

<sup>333</sup> *Id.*

<sup>334</sup> Johnny T. Nguyen, *Why “If It Ain’t Broke, Don’t Fix It” Is the Worst*, MEDIUM (June 12, 2022), <http://medium.com/stoicism-philosophy-as-a-way-of-life/why-if-it-aint-broke-don-t-fix-it-is-the-worst-4996e5a0c679> [<https://perma.cc/GQ7P-25PK>].

<sup>335</sup> More generally, when adopting a more advanced technology, we inherently assume that these more advanced technologies will also be eventually replaced. Being aware of this necessary cycle could help the industry and government prepare for the upcoming transition.

<sup>336</sup> It is clear that from a competition perspective, it is better to have multiple options for consumers to pick from, but these options must be realistic and accessible to be considered valid alternatives.

A recent example of old and new tech combination comes in the age of post-*Roe v. Wade*, where red states are hurrying to restrict abortions.<sup>337</sup> Despite this, abortions are performed at an increasing rate in the US,<sup>338</sup> an important factor being pills prescribed online, which now make up one in six abortions.<sup>339</sup> As The New York Times report phrased this – “The dynamic encapsulates a broader trend: The combination of a relatively new technology (the web) and an old one (the mail) has made it easier for Americans to bypass laws that they don’t like.”<sup>340</sup> Other than abortions, this trend has risen in the context of shipping narcotics from Chinese and Indian drugmakers to the US, as well as the emergence of untraceable firearms from parts made with 3D printers.<sup>341</sup> This shows how consumers can sometimes evade legislation they disagree with, for better or worse, using old and new technologies. Though this issue presents a fascinating legal challenge, it lies outside of the scope of this paper and presents an exciting follow-up research. As illustrated throughout the paper, old technologies will contribute to have a critical role in our lives. As a result, there is an urgent need to manage them better to allow for progress and innovation, which are essential building blocks in US society and its geopolitical stance.<sup>342</sup>

The paper puts forward the argument that government agencies, especially the four that were presented above, which are most oriented toward consumer protection, should proactively strive to support the transition to newer technologies in the context of B2C and G2C communication. However, given the unique circumstances surrounding these types of interactions, they should provide more

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<sup>337</sup> *Roe v. Wade*, 410 U.S. 113 (1973), *overruled by Dobbs v. Jackson Women's Health Org.*, 597 U.S. 215 (2022).

<sup>338</sup> Claire Cain Miller & Margot Sanger-Katz, *Despite State Bans, Legal Abortions Didn't Fall Nationwide in Year After Dobbs*, N.Y. TIMES (Oct. 24, 2023), <https://www.nytimes.com/2023/10/24/upshot/abortion-numbers-dobbs.html> [<https://archive.ph/kBTHM>].

<sup>339</sup> Claire Cain Miller & Margot Sanger-Katz, *One in Six Abortions Is Done With Pills Prescribed Online, Data Shows*, N.Y. TIMES (Feb. 28, 2024), [www.nytimes.com/2024/02/28/upshot/abortion-pills-prescribed-online.html](http://www.nytimes.com/2024/02/28/upshot/abortion-pills-prescribed-online.html) [<https://archive.ph/dybBb>].

<sup>340</sup> German Lopez, *How Technology Has Outpaced the Law*, N.Y. TIMES (May 2, 2024), [www.nytimes.com/2024/05/02/briefing/abortion-pills-online.html](http://www.nytimes.com/2024/05/02/briefing/abortion-pills-online.html) [<https://archive.ph/NQPue>].

<sup>341</sup> *Id.*

<sup>342</sup> See RAY DALIO, *PRINCIPLES FOR DEALING WITH THE CHANGING WORLD ORDER: WHY NATIONS SUCCEED AND FAIL* (2021) (forecasting the near fall of the US as the leading global power to China given technological and innovative differences).

discretion for internal government, G2B, and B2B communications. Tasking them with this goal will ensure legislative efforts will be taken for the benefit of consumers, similar to the legislation that enabled the shift from analog to digital TV. These agencies are adequately suited, given their authority and knowledge, to encourage the adoption of new technologies when they serve the interests of all parties involved.

Innovation often faces social and political challenges more than technological ones, especially governmental implementation and regulation.<sup>343</sup> The fax machine had the same issues in the 1970s when it started rising significantly in the business world.<sup>344</sup> This shows more generally that the “best” technology is often what users need and desire and not the most technologically advanced approach available.<sup>345</sup> This also applies to communication methods that are not the most technologically advanced but do not meet users’ needs anymore. A prime example of that is indeed the fax, but not just that. There is a real worry that society will be trapped using technological approaches that neither fit their needs nor justify their support given other, more superior technological and societal alternatives. At this point, legislators and federal agencies are essential in ensuring the welfare of their consumers.

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<sup>343</sup> See generally JENNIFER PAHLKA, RECODING AMERICA: WHY GOVERNMENT IS FAILING IN THE DIGITAL AGE AND HOW WE CAN DO BETTER (2023) (arguing that the government doesn’t need more money or tech as it is hamstrung by a rigid industrial-era culture preventing it from creating its own nuanced policy).

<sup>344</sup> COOPERSMITH, *supra* note 1, at 125.

<sup>345</sup> *Id.* at 146.