LEGAL CHALLENGES IN THE DIGITAL TRANSFORMATION OF COURTS

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ABSTRACT

Digitalization of court proceedings around the world has resulted in the emergence of several legal questions which existing laws have been unable to deal with successfully. In this research paper, attention will be paid to the following legal problems related to the digitalization of court systems: admissibility of electronic evidence; effects of using algorithms in decision-making processes on fairness of procedure; reduction of constitutional right of confrontation in online court procedures; risk of confidentiality of lawyer-client communication being threatened by the process of digitalization; and transnational jurisdictional disputes resulting from transnational data flows. Based on an analysis of constitutional rules, comparative law, and judicial decisions, the paper will prove that while the introduction of new technologies into court practice helps to advance access to justice, at the same time, such technologies put the procedural safeguards which have always protected citizens' interests in jeopardy. Thus, it is necessary to develop appropriate regulations to address this problem promptly.

Keywords: Digital Courts, Electronic Evidence, Algorithmic Bias, Confrontation Clause, Data Privacy

1. Introduction

The courts have always played the role of institutions that guarantee the supremacy of law. The traditional way of conducting court proceedings relied upon physical presence, writing, oral testimony, and human decision-making. However, the emergence of new technologies has led to fundamental changes within these established practices. The growing reliance upon online document management systems, video hearings, predictive data technologies, and artificial intelligence-based sentences has resulted in the complete restructuring of the nature of litigation. Therefore, contemporary judges, legislators, and lawyers are faced with a need to reconsider certain questions that seemed settled. These include defining what should be considered a valid and reliable legal document, finding out when using automated technologies results in the violation of procedural requirements, exploring how the concept of confrontation works in an electronic environment, and clarifying liability for cases when artificial intelligence leads to significant mistakes made by courts.[1]

It is important to highlight that the matters discussed here cannot be considered purely theoretical. The COVID-19 pandemic brought about an immediate transformation in the judicial systems of many countries due to the fact that courts had to switch to digital tools and means on an unprecedented scale. [2] This process was very fast, and there was little time for proper consideration and assessment. That is why most of the measures related to it became implemented in a rush manner, and they do not comply with many constitutional provisions, rules regarding evidence, and ethical norms developed specifically for the conventional way of running a trial. These questions arise in all jurisdictions, ranging from the US, UK, and EU member states to the nations of the Global South; however, all of them share the same problem of combining efficiency and justice in their trials.[3]

2. Evidentiary Integrity in the Age of Digital Records

The increase in ESI in today's world has resulted in a shift in the law of evidence. Evidence obtained through digital means now constitutes one of the important kinds of evidence used in civil cases, while in criminal cases it is gaining increasing importance. The courts often deal

[1] Richard Susskind, Online Courts and the Future of Justice 3-5 (Oxford Univ. Press 2019).
[2] Radha Ranjan, "Evolution of the Doctrine of Proportionality: Assessing its Scope and Ambit in Relation to the Right to Privacy in India", 10(1) *Indian Journal of Law and Human Behavior* 31, 31–38 (2024)
[3] Reginald Dwayne Betts, The Digital Courthouse: Access, Equity, and Technology in Modern Adjudication, 45 Yale L. & Pol'y Rev. 112, 115 (2022).

with evidence that consists of emails, text messages, metadata, documents saved on cloud services, social media messages, and system-generated documents. Nevertheless, the criteria for evidence admissibility were established taking into account tangible documents and tangible evidence. Consequently, applying conventional rules of evidence to digital evidence leads to much uncertainty in law.[4]

There exists a considerable problem related to authentication concerning digital evidence. According to Rule 901 of the Federal Rules of Evidence, as well as equivalent laws in other regions, the party introducing a piece of evidence must prove that the evidence is truly what it purports to be. Authenticating digital evidence is usually a complicated process since the content of digital files can be easily manipulated, metadata is vulnerable to being altered, and establishing a proper chain of custody from the source of the evidence to its admission in court can be rather problematic. The judicial practice of handling these issues has been very inconsistent. In some instances, rigorous forensics have been required for proving authentication, while in others, testimony alone was sufficient for that purpose.[5]

One further and ever-growing area involves evidence produced by automated technology instead of human beings. Evidence produced via algorithms, predictive data analysis programs, and other AI tools used to review documents is becoming more common in court cases. This poses unique problems in regard to the application of hearsay law, the applicability of exceptions to the hearsay rule, and the rules concerning the qualification of expert witnesses. The courts find themselves facing the question of whether algorithm-produced evidence is equivalent to machine-made evidence of objectively verifiable facts or, on the other hand, qualifies as expert testimony that requires separate validation.[6]

Another problem that arises with the introduction of technology is that of reliability and safeguarding the judicial records. In the digital age, where courts have started using electronic systems for storing judicial records and filing of dockets rather than traditional hard copies, there have been additional threats of data corruption, illegal changes, cybercrime, or malfunctions in software. The accuracy of court records is an integral part of the appeal process

[4] Judicial Conference of the United States, Report of the Ad Hoc Committee on Digital Transformation 7 (2021), *available at:* https://www.uscourts.gov/sites/default/files/digital-transformation-report.pdf (last visited on: May 25, 2026)
[5] Maura Grossman & Gordon Cormack, Technology-Assisted Review in E-Discovery Can Be More Effective and More Efficient Than Exhaustive Manual Review, 17 Rich. J.L. & Tech. 11, 14 (2011).
[6] In re Acacia Research Corp., No. 2019-1655, 2021 WL 3077537 (Fed. Cir. July 21, 2021).

or other subsequent measures that might take place after the judgment as the whole process depends on the existence of an accurate record of judicial proceedings. This means that if the electronic records can be tampered with, destroyed, or compromised by someone and no security system is in place, the post-trial processes become unreliable.[7]

3. Due Process and the Challenge of Algorithmic Decision-Making

The growing use of technologies based on algorithms in court systems has led to one of the most important discussions in legal scholarship in recent years. American courts, as well as many others, have been using prediction algorithms for criminal recidivism, bail assessment, and forecasting outcomes of trials, among other tools. Proponents of the use of such technologies say that they contribute to standardization of judgments, decrease implicit bias of humans, and create a more scientific basis for applying judicial discretion, which was highly individual in the past.[8]

Despite all these potential benefits, considerable criticism has developed both from the constitutional perspective and based on the empirical evidence obtained during investigations into predictive algorithms. In particular, one of the most famous examples is an investigation carried out by ProPublica in 2016 regarding the implementation of the COMPAS risk assessment software used in sentencing decisions in Broward County, Florida. As was found in the course of the study, the algorithm in question tended to mark African-American defendants as posing a greater risk of becoming repeat offenders than their counterparts of another race, despite taking other variables into account. Subsequent studies provided contradictory evidence, and thus the issue under discussion is far from being solved.[9]

Constitutional questions surrounding algorithmic sentencing were given much consideration by the Wisconsin Supreme Court in the landmark case State v. Loomis. In this case, the defendant argued against the decision on the grounds that his sentence was partly based on a COMPAS risk score, despite the algorithm itself not being open to examination, since the system's analysis process was proprietary. Even though the final verdict did not invalidate the

[7] Radha Ranjan et al., "Policies Against Fraud and Cybercrime: Strategic, Legal, and Technological Approaches" in *Policies Against Fraud and Cybercrime: Strategic, Legal, and Technological Approaches* 217, 217–263 (IGI Global Scientific Publishing, 2026).
[8] Nita Farahany, The Battle for Your Brain: Defending the Right to Think Freely 178-81 (St. Martin's Press 2023).
[9] Oren Gazal-Ayal & Limor Riza, AI Sentencing and the Challenge to Equal Justice, 108 Cornell L. Rev. 63, 68-72 (2022).

sentence, the court acknowledged the very serious due process concerns surrounding the use of a system whose algorithm could not be scrutinized, or effectively questioned. This judgment was widely criticized as it allowed for the further use of an algorithm whose method remained shrouded in secrecy.[10]

This problem is symptomatic of a more fundamental clash between the need to protect intellectual property and the rights provided by the Constitution. The use of proprietary software by state agencies to make rulings that affect the freedom of the defendant creates a situation where it is impossible for the individual in question to access information regarding the method of operation of the algorithm, the data it uses to make its assessment, and the criteria used to evaluate that data. These constitutional guarantees were designed under circumstances where there was a possibility of the individual challenging the basis for his or her prosecution. In light of the current trend towards increasingly opaque decision-making processes, it is clear that there are significant problems with preserving the integrity of these guarantees.[11]

Alongside the personal problems associated with these systems, there are also some constitutional issues connected with equal protection that arise with the use of algorithmic decision-making systems. These risk assessment tools often depend on past criminal justice data that is skewed by historic racial discrimination when it comes to law enforcement, prosecution, and sentencing. This means that such tools could be used to increase racial discrimination without any apparent discrimination against protected characteristics and scientific appearance. Under the Fourteenth Amendment's Equal Protection Clause, it is illegal for states to take actions that would lead to racial discrimination. However, there are many legal obstacles to proving discrimination using algorithms since these tools do not discriminate based on race. Although disparate impact can be used to show such discrimination, its application to criminal justice was severely curtailed by the Supreme Court.[12]

The problem with which current reform in law needs to be concerned is how to devise procedural and substantive mechanisms enabling courts to use algorithmic technology while ensuring that defendants and litigants do not suffer from the negative impacts of this

[10] State v. Loomis, 881 N.W.2d 749, 754 (Wis. 2016), cert. denied, 137 S. Ct. 2290 (2017).
[11] Julia Angwin et al., Machine Bias: There’s Software Used Across the Country to Predict Future Criminals, and It’s Biased Against Blacks, ProPublica (May 23, 2016), *available at:* https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing (last visited on: May 26, 2026).
[12] U.S. Const. amend. XIV, sec. 1.

technology. Several measures have been proposed by scholars as safeguards against potential dangers associated with the use of algorithms. Among the most commonly suggested measures are mandatory expert evaluation prior to the deployment of the algorithmic tool, disclosure rules on par with those used for expert evidence, prohibition of the use of algorithmic evaluation as a conclusive, rather than advisory, measure, and source code disclosure in case the algorithm is used against a party in court.[13]

4. Confrontation Rights and the Rise of Remote Judicial Proceedings

Perhaps the most constitutionally interesting thing about the transition to digital courts is the right of the accused and litigants to be physically present in court, and to cross-examine witnesses themselves. In criminal cases, these protections come about because of the Sixth Amendment's Confrontation Clause, which guarantees that a person accused of a crime has the right to confront the witnesses against him. It has several important functions: It demands evidence to be presented under oath, it ensures the ability to question witnesses effectively, it gives the judge and jury the chance to observe a witness's conduct and credibility, and it helps to ensure that the defendant is meaningfully engaged in the judicial process, which has constitutional significance.[14]

With the adoption of virtual hearing technology during COVID-19, these concerns have now become major procedural questions. The legitimacy on which these transitions were based varied widely. In some courts, the directives were issued to take remote cases during emergencies, while others relied on existing court procedures that permitted remote appearances with consent. Many of these relied on case-by-case judicial discretion. This has led to a patchwork and overlapping set of practices, and only limited scrutiny of the constitutionality of practices by appellate courts.[15]

The Supreme Court in Maryland v. Craig examined the extent of the protections accorded by the Confrontation Clause and ruled that there is no absolute right on the part of the criminal defendant to have witnesses confront him/her through personal face-to-face encounters during

[13] Rashida Richardson, Jason Schultz & Kate Crawford, Dirty Data, Bad Predictions: How Civil Rights Violations Impact Police Data, Predictive Policing Systems, and Justice, 94 N.Y.U. L. Rev. Online 15, 22-26 (2019).
[14] Radha Ranjan & Anupam Sinha, "Child Pornography Laws in India: A Comparative Legal Analysis with Global Frameworks", 11(3) *The Research Journal (TRJ)* 86, 86–99 (May–June 2025).
[15] Diane Sitek, Remote Proceedings and the Confrontation Clause: An Examination After COVID-19, 89 Fordham L. Rev. 2687, 2693 (2021).

trials. According to the Court, such a right may be limited where this limitation is vital to promote an important public purpose and where there are adequate measures to ensure the truthfulness of the testimony offered by the witness. In deciding cases involving remote testimonies due to the coronavirus pandemic, courts have cited with approval the principles established in Craig to justify the presence of witnesses virtually in court.[16]

One of the important issues related to doctrine is the question of whether the testimony obtained via video conferencing meets the constitutional standards applicable for in-person, in-court testimony provided by witnesses. The Ninth Circuit considered this important issue in United States v. Carter. The circuit court noted that improvements in technology related to video communication would help maintain most of the constitutional rights provided through the right to confront witnesses. Despite this, the court did not conclude that testimony obtained remotely can be considered constitutionally equivalent to in-court testimony in all cases. However, while other circuit courts have adopted a more liberal approach toward remote testimony, the Supreme Court is yet to pronounce its decision.[17]

Conducting remote trials is accompanied by a series of other practical problems that cannot be solved via constitutional analysis alone. One set of concerns relates to the possible differences between testimony and judicial fact-finding when conducted virtually and physically. According to research focused on jurors' performance, testimony conveyed via video may be treated differently than testimony provided in a physical setting, which can affect the perception of witnesses' credibility. Besides, factors such as unreliable internet connection, poor sound quality, or even inappropriate background may hinder the process of communication and make the whole process less formal than usual for courtroom proceedings. Another problem involves defendants participating in the trial remotely but being under custody, as it may be difficult for such defendants to properly consult with their attorneys. While formally the defendants' right to effective assistance of counsel remains intact, in reality, its exercise may be compromised.[18]

The questions that arise in a civil proceeding are similar in nature, but they have to be analyzed in a different legal context. Since the provisions of the Confrontation Clause apply only in the realm of criminal proceedings, and thus cannot be invoked in civil litigation, it remains true

[16] Maryland v. Craig, 497 U.S. 836, 845-47 (1990).
[17] United States v. Carter, 907 F.3d 1199, 1204-05 (9th Cir. 2018).
[18] Suja A. Thomas, The Missing American Jury: Restoring the Fundamental Constitutional Role of the Criminal, Civil, and Grand Jury 74-77 (Cambridge Univ. Press 2016).

that the protection provided for in the Fifth Amendment to the Constitution, as well as that provided in the Fourteenth Amendment, nevertheless impose on the court the obligation of ensuring that each party is provided with a fair opportunity to make its case and rebut any evidence brought against it.[19]

5. Jurisdictional Tensions and Cross-Border Data Governance

However, the digitization of courts is not taking place in a jurisdictional void; as court administrations embrace cloud storage capabilities, cross-border video conferencing capabilities, and international legal research databases, the issue of data sovereignty, jurisdictional capacity, and the recognition of electronic acts of justice becomes an issue of increasing importance. While these concerns have typically arisen when courts deal with issues of international commercial arbitration or cross-border litigation, they now become relevant even in the normal operation of domestic courts through reliance upon technology that exists beyond the borders of the state in question.

The CCPA and GDPR are the two main data governance policies currently on the books, and both of these regulations could impact judicial data governance significantly. Application of these regulations to judicial data management is not necessarily obvious: although the court itself, in its capacity as an essential government actor, will likely be exempt from compliance, any vendor of technology services to courts cannot claim this exemption. Consequently, the allocation of data governance duties remains unclear at present, even as neither regulation nor judicial precedent offers much guidance.[20]

Another important consideration comes from the Electronic Communications Privacy Act (ECPA) in the United States. Passed in 1986, and significantly outdated in relation to the issues of cloud computing and mobility that characterize the contemporary digital age, the provisions of the ECPA regarding access by governmental entities to stored electronic communications have been criticized as insufficient for the modern world. The recent case of Carpenter v. United States can be viewed as an important precedent that moves Fourth Amendment jurisprudence in the context of digital reality forward; however, the narrowly tailored ruling

[19] In re Winship, 397 U.S. 358, 364 (1970).
[20] California Consumer Privacy Act of 2018, Cal. Civ. Code secs. 1798.100-1798.199 (West 2023).

leaves much room for interpretation in terms of data warrants.[21]

The problem of international judicial cooperation in the digital age was partly tackled through treaties such as the UN Commission on International Trade Law's Model Law on Electronic Commerce, and the Council of Europe's Guidelines on Electronic Evidence. Such treaties aim to ensure equivalence between digital and analog judicial acts, but the treaties remain quite general and thus leave many voids concerning the governance of digital court procedures. It is thus clear that the creation of practical international guidelines for digital court procedure constitutes a crucial objective of today's law reformers.[22]

Another issue associated with the use of digital tools in courts that is quite different from the previous one stems from the control of such infrastructure being concentrated in the hands of several private companies offering the corresponding products. When commercial cloud computing services, video conferencing solutions, or case management software applications developed by third parties are used in courts, there are concerns about the problems of data protection, the risk of insolvency of vendors, and the level of protection against any interference into the work of judges that could be provided through vendor contracts.[23]

7. Towards a Principled Framework for Digital Court Governance

The issues discussed above, in earlier sections, are not merely technical matters susceptible to an engineer's solution. Instead, they raise deeper questions about institutions and the principles upon which constitutions can be built and need the constant involvement of elected lawmakers, judges, members of the legal profession, and scholars. The remarks below should thus be seen as part of that larger conversation.[24]

The first recommendation is related to the requirement to apply the principle of proportional justification in respect of the use of technologies in court hearings. In other words, before introducing any technological tools that influence the interests of the parties to the case, there should be a detailed assessment of the pros and cons of such instruments from the perspective

[21] Electronic Communications Privacy Act, 18 U.S.C. secs. 2510-2523 (2018).
[22] Orin S. Kerr, The Fourth Amendment in Cyberspace: Can Encryption Create a Reasonable Expectation of Privacy?, 33 Conn. L. Rev. 503, 506-09 (2001).
[23] Sarah Lamdan, Data Cartels: The Companies That Control and Monopolize Our Information 102-07 (Stanford Univ. Press 2022).
[24] Benno Barnard, Judicial Independence in the Age of Algorithmic Assistance: Protecting Judicial Discretion in an Automated World, 71 Am. U. L. Rev. 1375, 1390 (2022).

of procedural fairness. Furthermore, it is essential to conduct an analysis of this kind transparently and objectively, taking into account judicial and legislative supervision. It makes sense to apply the principle of proportional justification under normal circumstances rather than emergency situations like pandemics.[25]

Second, the use of algorithmic techniques within the adjudicative process must be governed by a regime of disclosure that is equally stringent as that which applies to human expert testimony. Specifically, anyone relying on an algorithmic technique and its results in evidence or before a tribunal must disclose to the other side the methodologies, data sets, and validation tests relied upon to support the claimed reliability of the output of the algorithmic process. The principle of trade secret protection must give way to the demands of procedural fairness here, and tribunals must be ready to implement in-camera procedures in analyzing such proprietary algorithmic technologies.[26]

Thirdly, it would be unwise to view the rights of confrontation that accrue to defendants and litigants as completely pliable in light of technology considerations. Although it may indeed be appropriate in the wake of the recent pandemic to provide for an ongoing ability to conduct court hearings remotely, it would be inappropriate to use this power simply out of economic necessity. The purposes of personal presence and face-to-face confrontation are more than meaningless formalities; they embody careful determinations of the conditions under which accurate factfinding is most apt to take place.[27]

Fourth, updating professional conduct responsibilities for attorney training in digital court docket environments to reflect the exact risks of those environments Bars need to problem specific guidance on using AI gear in criminal practice, security of buyer privacy in video litigation, and choosing and testing technology providers The broad fashion of efficiency already incorporates generative capacity in most jurisdictions, yet its application to the precise contexts created by digital courts requires additional granular detail beyond that currently provided by current opinions and rules.[28]

[25] Frank H. Easterbrook, Cyberspace and the Law of the Horse, 1996 U. Chi. Legal F. 207, 211-14 (1996).
[26] National Center for State Courts, Trends in State Courts: Technology and the Future of Justice 12-15 (2023).
[27] Rebecca Wexler, Life, Liberty, and Trade Secrets: Intellectual Property in the Criminal Justice System, 70 Stan. L. Rev. 1343, 1347-52 (2018).
[28] Lorie Faith Cranor & Steven S. Wildman eds., Rethinking Rights and Regulations: Institutional Responses to New Communication Technologies 87-91 (MIT Press 2003).

The fifth recommendation is to ensure that cross-border data governance policies be crafted through multilateral processes instead of unilateral ones. Fragmentation in international data governance regimes results in complexity of compliance, both by vendors and courts, and may even incentivize the choice of technology providers with regard to regulatory arbitrage rather than high-quality courts. A harmonized international regime of data governance, possibly created within the framework of organizations like the UN Commission on International Trade Law and the Hague Conference on Private International Law, could serve as a better basis for the international digital court system.[29]

8. Conclusion

Digital transformation of courts is not a threat and not a blessing, in and of itself. It, however, is a series of decisions whose legal implications are entirely dependent upon the care and intention with which they are made. The principles of procedure that are guaranteed in the constitution are not dependent on any technology but are those of procedural justice. The problem of our time is to apply them in a way that is sophisticated and creative enough to run a court system that differs significantly from the one in which they were developed.

These four areas of law - evidentiary integrity, algorithmic due process, confrontation rights and attorney-client privilege and jurisdictional data governance are among the most pressing areas of the digital courts agenda today. Those courts that take up this challenge will not only fulfil their duty to their constituencies better, but also fulfil their role of showing that the rule of law can evolve and evolve without losing its core promises.

The trustworthiness of courts depends not on their technological sophistication but on the public's confidence in the fair, transparent and dignified way they are run, respecting the rights of their users. Technology which promotes those values is welcomed in the institutions, while technology which threatens those values must be tightly curtailed. The laws and legal structures necessary to that discrimination can be created by the profession itself. Only a determination to do it—with the seriousness that the moment calls for is needed.

[29] Michael Lewyn, Remote Courtrooms and the Future of Access to Justice, 68 Cath. U. L. Rev. 387, 393-96 (2019).

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