MODERNIZING JUSTICE: IMPLEMENTING BLOCKCHAIN TECHNOLOGY INTO THE CRIMINAL JUSTICE SYSTEM TO REDUCE MASS INCARCERATION

MARIA ROJAS*

I.   INTRODUCTION

"It has long been said that a society's worth can be judged by taking stock of its prisons."[1] The United States, then, yields a grim judgment: although it houses only four percent of the world's population, it incarcerates twenty percent of the global prison population.[2] The United States has the highest incarcerated population by housing nearly two million prisoners as of 2022.[3] Technology used in our criminal justice system is generally outdated despite an abundance of tools available to uphold the administration of justice.[4] A dependence on manual data management and outmoded IT systems has led to a duplicative and costly method of operating.[5] Most importantly, this system continues to produce broader margins of error, higher volumes of lost evidence, and vulnerabilities within the chain of custody—with defendants bearing the burden of unnecessary and prolonged incarceration.[6] Instead of modernizing, the outmoded system has fallen far behind.[7] Currently, inefficient and insecure file management practices directly contribute to lengthy pretrial detention processes and wrongful convictions.[8] Accordingly, over twenty-three percent of people

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        1.   Ariane de Vogue, *Covid-19 Cases Concerning Prisoners' Rights Hit the Supreme Court*, CNN (May 21, 2020, 7:01 AM), http://edition.cnn.com/2020/05/21/politics/covid-19-supreme-court-prisoners-rights/index.html (quoting Valentine v. Collier, 140 S. Ct. 1598, 1601 (2022)).
        2.   *See Mass Incarceration*, ACLU, http://www.aclu.org/issues/smart-justice/mass-incarceration (last visited Feb. 2, 2023).
        3.   *See* Wendy Sawyer & Peter Wagner, *Mass Incarceration: The Whole Pie 2022*, PRISON POL'Y INITIATIVE (Mar. 14, 2022), http://www.prisonpolicy.org/reports/pie2022.html.
        4.   *See* LIZ CROWHURST, THE POLICE FOUND., Reforming Justice for the Digital Age 1 (2017).
        5.   See id.
        6.   See id.
        7.   See id.
        8.   *See id.*; Kristine Denman, The Univ. of N.M., Pretrial Detention and Case Processing Measures: A Study of Nine New Mexico Counties 17 (2017).

behind bars in the United States are merely awaiting trial, while as many as six percent have been wrongfully incarcerated.[9]

Blockchain, originally implemented by and historically used predominantly for cryptocurrencies, has the potential to expedite pretrial operations, enhance the security of sensitively stored documents, enable tracing of documentation, and expose sources of evidence falsification by overhauling the justice system's storage and sharing of information.[10]

This Comment will analyze blockchain in light of the inherent characteristics and risks associated with its integration into the United States criminal justice system to combat mass incarceration.[11] Part II will discuss mass incarceration in the United States, focusing on pretrial detention and wrongful convictions as partial drivers of incarceration rates.[12] Part III will introduce blockchain technology and its varieties, as well as analyze current applications of the technology within different industries across the United States, and progressive legislation relating to its implementation.[13] Part III will also propose potential uses of blockchain technology in the criminal justice system, focusing on applications that yield a reduction in incarceration rates as well as the risks and challenges that state agencies will face in the implementation of the distributed ledger.[14] Lastly, Part IV will analyze why states should consider implementing blockchain into their agencies in furtherance of public policy— specifically the Sixth Amendment right to a speedy trial and the Due Process Clauses of the Fifth and Fourteenth Amendments.[15]

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9.   *See* Sawyer & Wagner, *supra* note 3; Halle Ostoyich, *Wrongful Convictions: The Facts*, W. VA. INNOCENCE PROJECT (Oct. 2, 2020), http://wvinnocenceproject.law.wvu.edu/innocence-project-blog/our-voices/2020/10/02/wrongful-convictions-the-facts.

10.   *See* CROWHURST, *supra* note 4, at 12; Rob Marvin, *Blockchain: The Invisible Technology That's Changing the World*, PCMAG., http://www.pcmag.com/news/blockchain-the-invisible-technology-thats-changing-the-world (Aug. 29, 2017).

11.   *See* discussion *infra* Parts III–IV.

12.   *See* discussion *infra* Part II.

13.   *See* discussion *infra* Part III.

14.   *See* discussion *infra* Part III.

15.   *See* discussion *infra* Part IV.

II.   MASS INCARCERATION: AN EPIDEMIC

A.   *From Then to Now: Incarceration in the United States*

The United States' incarceration rate has continuously surpassed every other nation for over half a century.[16] Prior to President Lyndon Johnson's declaration of a "war on crime" in 1965, and President Richard Nixon's declaration of a "war on drugs" in 1971, the United States' incarceration rate plateaued for nearly fifty years at .2% of the male population.[17] In the thirty-five years following these declarations, a growing affinity for tougher sentencing for old and new crimes resulted in a 400% increase in incarceration.[18] Today, "[t]he United States incarcerates more of its population than any other nation–including nations that have similar or higher rates of crime," at a rate of 664 per 100,000 of the national population.[19]   Out of the staggering two million people incarcerated in the United States, nearly 1.1 million are held in state prisons and over 500,000 are held in local jails.[20] "Not only does the [United States] have the highest incarceration rate in the world; every single U.S. state incarcerates more people per capita than virtually any independent democracy [in the world]."[21] Florida's incarceration rate—795 per 100,000—surpasses not only the United States average but also that of the country with the next-highest incarceration rate: the United Kingdom at a comparatively minuscule rate of 129 per 100,000 of the national population.[22]

While the rates themselves are heavyweight, the burden of incarceration nationwide and individually are no lighter.[23] In 2020, the average annual cost of housing a single prisoner in a federal facility was $39,158, or $120.59 per day.[24]

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16.   *See* James F. McHugh III, *A Smarter Path to Public Safety*, 100 MASS. L. REV. 81, 81 (2019).

17.   *Id.*

18.   See id.

19.   Emily Widra & Tiana Herring, *States of Incarceration: The Global Context 2021*, PRISON POL'Y INITIATIVE, http://www.prisonpolicy.org/global/2021.html (last visited Jan. 30, 2023).

20.   Sawyer & Wagner, *supra* note 3.

21.   Widra & Herring, *supra* note 19.

22.   *Id.*

23.   *See* Beatrix Lockwood & Nicole Lewis, *The Hidden Cost of Incarceration*, THE MARSHALL PROJECT (Dec. 17, 2019, 5:00 AM), http://www.themarshallproject.org/2019/12/17/the-hidden-cost-of-incarceration.

24.   Annual Determination of Average Cost of Incarceration Fee (COIF), 86 Fed. Reg. 49,060 (Sept. 1, 2021).

In the aggregate, the United States spends more than eighty billion dollars each year to keep its imprisoned population behind bars.[25] Additionally, a multitude of hidden costs are often shouldered by the families of those behind bars often bear the costs of providing food, clothing, health care, and hygiene items for their loved ones, as well as maintaining communications through phone calls and emails sent through a prison's system.[26] Families spend an estimated $2.9 billion a year on commissary accounts and phone calls.[27] In 2015, the average family paid $13,000 in court fees, restitution, and fines.[28] The financial burden on families, coupled with the removal of wage earners from families, shifts costs back onto the state because of increased demands for publicly funded social services.[29]

B.   *Pretrial Detention*

1.   The Problem

Congestion in the present criminal justice system largely encumbers judicial administration—this is uncontested.[30] The situation is amplified by the dramatic rate of court filings throughout the United States.[31] In fiscal year 2020-2021 alone, the trial courts in Florida processed over three million cases.[32] Moreover, about sixty-five percent of the jail population and thirty-four percent of the total incarcerated population have not been convicted of a crime—they are presumed innocent and simply awaiting trial.[33] After an individual is arrested and booked into jail, the court will hold an initial hearing and make a decision regarding the pretrial release, whether that includes being held on bail or released

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25.   Lockwood & Lewis, *supra* note 23.
26.   *Id.*
27.   *Id.*
28.   *Id.*
29.   McHugh III, *supra* note 16, at 82.
30.   *See* F. YORICK BLUMENFELD, CQ RSCH., CONGESTION IN THE COURTS (1960), http://library.cqpress.com/cqresearcher/cqresrre1960111600 (on file with author).
31.   *See* Blumenfeld, *supra* note 30; *e.g.*, *State Courts System*, OFF. OF PROGRAM POL'Y   ANALYSIS   &   GOV.   ACCOUNTABILITY, http://oppaga.fl.gov/ProgramSummary/ProgramDetailPrint?programNumber=1072 (last visited Feb. 2, 2023).
32.   See State Courts System, supra note 31.
33.   *See* PATRICK LIU ET AL., HAMILTON PROJECT, THE ECONOMICS OF BAIL AND PRETRIAL   DETENTION   3   (2018), http://www.hamiltonproject.org/assets/files/BailFineReform_EA_121818_6PM.pdf; Sawyer & Wagner, *supra* note 3.

on recognizance.[34] While some detainees are held because they were ruled a significant flight or safety risk to the public, most are held because they cannot afford the high bail cost: a set amount of money the defendant must provide in exchange for pretrial release.[35] The average detention period for someone unable to afford bail ranges from 50 to 200 days,[36] with the median bail for felony offenses nearing $12,000—far exceeding the liquid savings of a typical household.[37]

Even on the shorter end, such as a fifty-four day pretrial detention for someone accused of a traffic felony, indefinite periods of pretrial detention reflect months of separation from a person's family, work or school duties, and a source of income, which exacerbates financial burdens.[38] Often, a person who is detained cannot afford the set bail amount or bond fees, leaving him or her detained for weeks or even months until trial.[39] Wage workers who cannot afford to pay bail or to miss work while awaiting trial behind bars are more likely to plead guilty and be released on probation rather than exercising their constitutional right to trial by jury where they can raise legitimate defenses.[40] A tangible harm is also imposed on society generally and the criminal justice system as a whole: by looking at the compensation of large private corrections companies, it is estimated that the pretrial detainee population costs taxpayers nearly twelve billion dollars each year.[41] Adding to that number the indirect cost of lower output due to imprisonment, the cost rises to an estimated fifteen billion dollars each year.[42] The harm done to defendants who remain incarcerated on pretrial detention, who have taken on financial strains to pay high bail costs, and who have accepted guilty pleas in exchange for their release has significantly damaged the integrity of the courts.[43] All this contributes to the growing sentiment that courts are not places of justice, but rather injustice and abuse.[44]

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34.   *See* LIU ET AL., *supra* note 33, at 3.
35.   See id.
36.   *Id.* at 5.
37.   *Id.* at 7, 8.
38.   *See id.* at 5, 7.
39.   LIU ET AL., *supra* note 33, at 3.
40.   Tristan Greene, *This Blockchain Mining System Helps People Who Can't Afford Bail*, TNW (Nov. 15, 2017, 7:21 PM), http://thenextweb.com /news/help-blockchainify-people-out-of-jail-by-mining-cryptocurrency-for-bail; *see also* Cindy Grace Thyer, *Is It Time for Arkansas to Consider Pretrial Reform?*, 42 U. ARK. LITTLE ROCK L. REV. 511, 525–26 (2020).
41.   *See* LIU ET AL., *supra* note 33, at 13.
42.   *See id.* at 12, 13.
43.   Thyer, *supra* note 40, at 526.
44.   See id.

2.   The Causes

While the direct and indirect costs for the actors in the criminal justice system and society generally imply an emergency, few steps have been instituted to reform pretrial detention practices.[45]   A special committee examining pretrial release practices in Utah determined that "[a] significant obstacle affecting the [state]'s ability to enact reforms in this area is a lack of data. The collection and retention of pretrial release and supervision data in the state is unfortunately inconsistent and incomplete."[46]   Many states lack a uniform system of data collection and monitoring of pretrial information, with "different data systems in different branches designed to accomplish different things."[47]   The Arkansas Department of Correction, for example, does not require its law enforcement agencies to monitor or report information regarding the amount of time a pretrial detainee remains in custody awaiting trial.[48]   Rather, to obtain this information, a jail-by-jail inquiry takes place.[49]   Even then, because local "jails typically keep data only on a day-to-day basis and do not retain this information . . ." for long time periods unless requested, pulling this data from each county for each detainee to calculate pretrial detention periods would be an inaccurate reflection of the entirety of those periods.[50]   The Craighead County Sheriff's Office of Washington reported that determining an average stay for pretrial inmates is near impossible, citing lack of a report in their booking system that can be pulled that would provide a detailed breakdown.[51]

The presence or absence of a prior criminal record is crucially relevant information that weighs heavily on a judge's decision of "whether and under what conditions to release a person on bail pending trial."[52]   Prosecutors need "[c]omplete and accurate criminal history record information . . . to provide input and make decisions regarding bail," among other things.[53]   Currently, states use manual data entry, data transformations, ongoing audits, and quality-control

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45.   *See id.* at 513.
46.   *Id.* at 549 (quoting UTAH STATE COURTS, REPORT TO THE UTAH JUDICIAL COUNCIL ON PRETRIAL RELEASE AND SUPERVISION PRACTICES 30 (2015), http://legacy.utcourts.gov/resources/reports/docs/Pretrial%20Release%20and%20Supervision%20Practices%20Final%20Report.pdf).
47.   *Id.* (quoting UTAH STATE COURTS, *supra* note 46, at 52).
48.   Thyer, *supra* note 40, at 548.
49.   *Id.*
50.   *See id.* at 548–49.
51.   *Id.* at 548 n.241.
52.   Bureau of Just. Stat., U.S. Dep't of Just., Use and Management of Criminal History Record Information: A Comprehensive Report 14 (1993), http://bjs.ojp.gov/content/pub/pdf/CCHUSE.PDF.
53.   *Id.* at 15.

efforts to update and maintain accurate criminal histories.[54] Yet, in many cases, failure to maintain full and complete records of persons tried has contributed to increased delays in criminal proceedings.[55] As a result of the absence of updated criminal proceeding records, "representatives appearing in the federal courts have not been fully advised of all facts relevant to the disposition of the case," causing rescheduling of court dates and further pretrial delays.[56]

C.   *Wrongful Convictions*

1.   The Problem

The disparity of spending months behind bars is multiplied into years for those who are innocent but ultimately convicted of a crime they did not commit.[57] Approximately three to six percent of the incarcerated population in the United States has been wrongfully convicted.[58] Of those exonerated—or had their convictions overturned—an average of 8.9 years of their lives were spent in prison before release.[59] "One of the most troubling statistics is that, from 1973 to late August 2008, 130 people in [twenty-six] states were released from death row with evidence of innocence."[60] Wrongful convictions present a multitude of consequences.[61] People imprisoned once in their lives "experience homelessness at a rate nearly [seven] times higher than the general public."[62] "[F]ormerly incarcerated people are unemployed at a rate of over [twenty-seven percent],"

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54.   Merritt Francis, *Blockchain as Best Practice: The Benefits of the Criminal Justice System Implementing Blockchain Technology*, THE RICH. J. OF L. & TECH.: BLOG (Jan. 6, 2022),   http://jolt.richmond.edu/2022/01/06/blockchain-as-best-practice-the-benefits-of-the-criminal-justice-system-implementing-blockchain-technology/.

55.   *See* United States *ex rel.* Frizer v. McMann, 437 F.2d 1312, 1317 (2d Cir. 1971) (in banc).

56.   *See id.*

57.   *See* Clare Gilbert, *Beneath the Statistics: The Structural and Systemic Causes of Our Wrongful Conviction Problem*, GA. INNOCENCE PROJECT (Feb. 1, 2022), http://www.georgiainnocenceproject.org/2022/02/01/beneath-the-statistics-the-structural-and-systemic-causes-of-our-wrongful-conviction-problem/.

58.   Ostoyich, *supra* note 9.

59.   *Id.*

60.   Myrna S. Raeder, *Introduction to Wrongful Convictions Symposium*, 37 SW. U. L. REV. 745, 746 (2008).

61.   *Id.* at 747.

62.   Lucius Couloute, *Nowhere to Go: Homelessness Among Formerly Incarcerated People*, PRISON POL'Y INITIATIVE, http://www.prisonpolicy.org/reports/housing.html (last visited Feb. 26, 2022).

five times higher than the unemployment rate of the general population.[63] Inequalities between the general public and formerly incarcerated people begin with the disparities in education: formerly incarcerated people are nearly twice as likely to have no high school credential and are eight times less likely to complete college.[64] On a broader level, if four to six percent of individuals behind bars are innocent, that means one out of every twenty criminal cases result in a wrongful conviction, driving incarceration rates higher with each one and enabling the freedom of real offenders within communities.[65] This, along with delayed trials, "creates what New York's Chief Judge Jonathan Lippman calls the 'worst of all worlds: You have people who are dangerous who are out on the street and people who are no threat to the public who have jobs and families who are sitting in jail.'"[66]

2.   The Causes

Keeping in mind that many wrongful conviction cases have multiple contributing causes beyond the scope of this Comment, one of the factors documented as contributing to wrongful convictions is official misconduct.[67] Official misconduct contributed to fifty-four percent of all known exonerations in 2019.[68] Generally, misconduct covers instances where the police or prosecutors have "taken steps to ensure a defendant is convicted despite weak evidence or even clear proof of innocence."[69]

Official misconduct takes several forms; a few that contribute to wrongful convictions are evidence tampering, concealment of exculpatory

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63.   Lucius Couloute & Daniel Kopf, *Out of Prison & Out of Work: Unemployment Among Formerly Incarcerated People*, PRISON POL'Y INITIATIVE, http://www.prisonpolicy.org/reports/outofwork.html (last visited Feb. 26, 2022).

64.   Press Release, Lucius Couloute, Prison Pol'y Initiative, Getting Back on Course: Educational Exclusion and Attainment Among Formerly Incarcerated People (Oct. 2018).

65.   *See* Gilbert, *supra* note 57.

66.   Daniel Hamburg, Note, *A Broken Clock: Fixing New York's Speedy Trial Statute*, 48 COLUM. J.L. & SOC. PROBS. 223, 228 (2015) (quoting Ray Rivera, *Freed by the Bronx Legal Logjam, and Adding to the List of Victims*, N.Y. TIMES (June 21, 2013), http://www.nytimes.com/2013/06/22/nyregion/freed-by-bronx-legal-logjam-and-adding-to-list-of-victims.html).

67.   *See* NAT'L REGISTRY OF EXONERATIONS, GOVERNMENT MISCONDUCT AND CONVICTING THE INNOCENT: THE ROLES OF PROSECUTORS, POLICE AND OTHER LAW ENFORCEMENT 8 (Samuel R. Gross et al. eds., 2020).

68.   *Id.* at 11.

69.   John Shaw, Note, Exoneration and the Road to Compensation: The Tim Cole Act and Comprehensive Compensation for Persons Wrongfully Imprisoned, 17 TEX. WESLEYAN L. REV. 593, 599 (2011).

evidence, and witness tampering.[70] Two types of officials who play key roles in criminal convictions are prosecutors—who account for one-third of the misconduct in exonerations—and police officers—who account for over one-third.[71] Specifically, police officers committed misconduct in nearly thirty–seven percent of exoneration cases since 1989.[72] "The primary means of police misconduct comes in the form of suppression of exculpatory evidence, coerced confessions, and evidence fabrication."[73] "Often, when police misconduct is [revealed] in a wrongful conviction case, a subsequent review of that officer's other cases reveals several more wrongful convictions and a litany of complaints related to street encounters with law enforcement."[74] Unfortunately, twenty-one states currently maintain police disciplinary records confidentially.[75] Lack of transparency around officer misconduct and complaint records prevents "public or external oversight of how complaints and allegations against officers are handled," making it difficult for law enforcement internal affairs departments to discipline and correct harmful behaviors.[76] These harmful behaviors lead to unfair and inaccurate outcomes for individuals facing life-altering criminal charges.[77] The "[p]resenting [of] false evidence against a defendant, concealing [and] distorting true evidence that might have cleared them, or planting false evidence" occurred in three percent of wrongful convictions since 1989.[78] Concealing exculpatory evidence—done by both police and prosecutors—such as criminal records and histories of dishonesty that would have impeached prosecution witnesses occurred in seven percent of wrongful convictions.[79]

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70.   *See* NAT'L REGISTRY OF EXONERATIONS, *supra* note 67, at 8.

71.   *Id.* at 11.

72.   *What You Need to Know About Police Misconduct and Wrongful Convictions*, INNOCENCE PROJECT (Sept. 30, 2020), http://innocenceproject.org/police-misconduct-wrongful-convictions-what-you-should-know/.

73.   Shaw, *supra* note 69, at 599.

74.   Rebecca Brown, *It's Time to Make Police Disciplinary Records Public*, INNOCENCE PROJECT (July 2, 2020), http://innocenceproject.org/its-time-to-make-police-disciplinary-records-public/.

75.   *What You Need to Know About Police Misconduct and Wrongful Convictions*, *supra* note 72.

76.   *Id.*

77.   *Id.*

78.   Ctr. for Pros. Integrity, *One-Third of Wrongful Convictions Involve Police Manipulation of Evidence*, SAVE (Jan. 21, 2021), http://www.saveservices.org/2021/01/one-third-of-wrongful-convictions-involve-police-manipulation-of-evidence/.

79.   *Id.*

III.   MOVING TOWARDS DIGITIZATION WITH BLOCKCHAIN TECHNOLOGY

A.   *What Is Blockchain Technology?*

1.   Blockchain Technology

"Blockchain is a shared digital ledger [containing a series] of connected blocks stored on a decentralized distributed network that is secured through cryptography."[81]   A *distributed ledger* is a type of database that permanently records, in a chronologically-ordered chain of blocks, the history of asset or data transactions among participants in a specific network.[82]   Each connected block individually contains encrypted information and hashed pointers—a time-stamped link[83]—to a previous block.[84]   The ledger is decentralized, meaning that "[n]o central authority or third-party mediator, such as a financial institution . . . is involved."[85]   Instead, participants in the network govern and agree on the updates to the records through validation—a consensus protocol to agree on ledger content.[86]   Once a new block of information is validated by the participants of that network, it is created and added to the chain, creating a permanent, recorded source of that interaction, hence the name blockchain.[87]   The result of the blockchain system is "transactions that cannot be altered or reversed, unless the change is agreed to by all members in the network in a subsequent transaction."[88]   The Bitcoin blockchain model is briefly explained as:

> Bitcoin or other digital currency isn't saved in a file somewhere; it's represented by transactions recorded in a blockchain—kind of like a global spreadsheet or ledger, which leverages the resources of a large peer-to-peer bitcoin network to verify and approve each bitcoin transaction.   Each blockchain, like the one that uses bitcoin, is distributed: it runs on computers provided by volunteers around the

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81.   TIMOTHY LEONARD, TWM, BLOCKCHAIN FOR TRANSPORTATION: WHERE THE FUTURE STARTS 2 (2017), http://logisticsandfintech.com/wp-content/uploads/2017/11/TMW-Whitepaper-Blockchain-for-transportation-LaF-Nov-2017.pdf.

82.   Sloane Brakeville & Bhargav Perepa, *Blockchain Basics: Introduction to Distributed Ledgers*, IBM DEV., http://developer.ibm.com/tutorials/cl-blockchain-basics-intro-bluemix-trs/ (June 1, 2019).

83.   LEONARD, *supra* note 80, at 2; Marvin, *supra* note 10.

84.   LEONARD, *supra* note 80, at 2.

85.   Brakeville & Perepa, *supra* note 81.

86.   *Id.*

87.   *Id.*

88.   *Id.*

world; there is no central database to hack. The blockchain is public: anyone can view it at any time because it resides on the network . . . [a]nd the blockchain is encrypted: it uses heavy-duty encryption involving public and private keys (rather like a two-key system to access a safety deposit box) to maintain virtual security.[89]

2.   Types of Blockchain: Public, Private, & Permissioned

Blockchain technology encompasses various design models.[90] The types of blockchain technologies are distinguished based on their uses and accessibility.[91] A public blockchain is a fully decentralized network that enables anyone and everyone to participate in the consensus process that the blockchain uses to validate transactions and data.[92] Public blockchains, like Bitcoin, have a self-governed network.[93] Being decentralized, "the [public] blockchain enables high-trust transactions without the need for an intermediary or third party since [several] parties are verifying each transaction."[94] Its large number of participants means it is highly resistant to censorship.[95] Some disadvantages to a public blockchain include the heavy power consumption needed to maintain the network, lack of complete privacy and anonymity amongst user identities, and network clogging.[96] In addition to digital currency trading, public blockchains can be used in areas such as file storage mediums for the public, donations, and crowdfunding.[97]

For entities that only want a selected entry of verified participants to join the network, a private blockchain allows a participant to join through an authentic

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        89.   DON TAPSCOTT & ALEX TAPSCOTT, BLOCKCHAIN REVOLUTION: HOW THE TECHNOLOGY BEHIND BITCOIN AND OTHER CRYPTOCURRENCIES IS CHANGING THE WORLD 6–7 (1st Portfolio/Penguin trade paperback ed. 2018) (emphasis omitted).
        90.   Toshendra Kumar Sharma, *Permissioned and Permissionless Blockchains: A Comprehensive Guide*, BLOCKCHAIN COUNCIL (Mar. 24, 2022), http://www.blockchain-council.org/blockchain/permissioned-and-permissionless-blockchains-a-comprehensive-guide/.
        91.   *See id.*
        92.   *See* Shobhit Seth, *Public, Private, Permissioned Blockchains Compared*, INVESTOPEDIA, http://www.investopedia.com/news/public-private-permissioned-blockchains-compared/ (July 28, 2022); Brakeville & Perepa, *supra* note 81 (explaining that the consensus model is used to validate and confirm transaction blocks).
        93.   Seth, *supra* note 91; Alan Cohn et al., *Smart After All: Blockchain, Smart Contracts, Parametric Insurance, and Smart Energy Grids*, 1 GEO. L. TECH. REV. 273, 279 (2017).
        94.   Cohn et al., *supra* note 92, at 279.
        95.   Sharma, *supra* note 89.
        96.   Seth, *supra* note 91.
        97.   Sharma, *supra* note 89.

and verified invitation.[98] In a private blockchain, one owner or operator has the right to authorize participants and to override, edit, or delete entries on the blockchain as necessary.[99] It is centralized because it has one authorizing figure and operates as a closed and secured database based on cryptography properties.[100] Private blockchains are suitable for entities and companies where data security is a high priority, such as confidentiality in record keeping.[101]

For private entities and companies that wish to enable limited activities amongst a network, blockchains can also be permissioned.[102] Permissioned blockchains allow a customizable mix of the properties between the public and private blockchains.[103] Participation in the network is allowed to anyone after suitable verification of their identity and is limited depending on an allocation of select and designated permissions to perform only certain functions, such as viewing, accessing, and writing information on the blockchains.[104] Entities in a permissioned blockchain are able to "selectively place restrictions while configuring the networks, and control the activities of the [users in their assigned] roles."[105] Permissioned blockchain's characteristics make it an attractive model for use in areas such as supply chains, confidentiality compliance in record keeping, verification of identities, and claim settlements.[106]

3.   Blockchain's Current Applications

Before 2016, blockchain technology was known only as the data structure that allowed Bitcoin and other cryptocurrencies to securely store their exchanges.[107] In the past few years, however, its myriad of practical uses has extended blockchain technology into fields beyond cryptocurrency transactions.[108] "In supply chains, [for example,] blockchain networks allow the flow of goods and payments to be tracked and logged in real time."[109] Home Depot uses blockchain technology in stores across the United States, Canada, and Mexico to expedite the reconciliation process by allowing its receiver team and

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98.   Seth, *supra* note 91.
99.   *Id.*
100.   *Id.*
101.   *See* Sharma, *supra* note 89.
102.   Seth, *supra* note 91.
103.   *Id.*
104.   *Id.*
105.   *See id.*; *Accounting on Blockchain*, CR SQUARE FIN., http://crsquare.finance/accounting-on-blockchain/ (last visited Feb. 2, 2023).
106.   *See* Sharma, *supra* note 89.
107.   *See* Marvin, *supra* note 10.
108.   *Id.*
109.   Brakeville & Perepa, *supra* note 81.

vendors to access shared near-real time data of packages and shipments across its supply chain. [110]   The real-time visibility allows both Home Depot and its vendors to quickly identify supply-chain issues if a variance occurs at some point on the chain versus waiting months down the road.[111]   Additionally, the technology's permanency and transparency have improved communication with vendors while maintaining confidentiality because role-based access means vendors see only their shipment information.[112]   Healthcare organizations have begun utilizing blockchain technology's ability to manage data to enhance healthcare services for both patients and healthcare professionals.[113]   "[S]toring health records on the blockchain gives [individuals] a transparent and accessible view of medical history," reducing the amount of time and mistakes caused by human error that result from manual record-keeping.[114]

BurstIQ, a software company located in Colorado, uses blockchain to enable healthcare organizations to manage an extensive amount of patient data securely by ensuring HIPAA compliance while enabling the safekeeping, sharing, selling, and licensing of data.[115]   BurstIQ's blockchain technology turns patient data into digital assets, governed and managed through smart consent contracts to ensure the patient is in control of their data and how it can be used.[116]   Similarly, Patientory, a blockchain solution corporation located in Atlanta, Georgia, allows the secure storing and transfer of medical information.[117]   Patientory explains that the current legacy software that healthcare providers use to store patient data can lead to frustration among medical providers due to inefficient record-keeping methods.[118]   The problem is compounded by growing concerns about healthcare cyber-security data breaches.[119]   With the goal of transparency and efficiency in mind, Patientory uses end-to-end encryption with

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110.   Brittany King, *Faster Invoicing Resolutions Build Stronger Relationships*, IBM, http://www.ibm.com/case-studies/the-home-depot/ (last visited Feb. 2, 2023).

111.   *Id.*

112.   *Id.*

113.   Akash Takyar, *Developing a Healthcare Blockchain Solution*, LEEWAYHERTZ, http://www.leewayhertz.com/healthcare-blockchain-how-medical-records-secured-blockchain/ (last visited Feb. 2, 2023).

114.   *Id.*

115.   Frank Ricotta, *How Can BurstIQ Help You Build Your Trust and Improve Patient Satisfaction by Protecting Human Health Data?*, BURSTIQ (Apr. 20, 2022), http://burstiq.com/how-can-burstiq-help-you-build-your-trust-and-improve-patient-satisfaction-by-protecting-human-health-data/; *see also* Takyar, *supra* note 112.

116.   Ricotta, *supra* note 114.

117.   *Patientory*, STARTUP HEALTH, http://startuphealth.com/patientory (Sept. 3, 2022); *see also* Takyar, *supra* note 112.

118.   *See Patientory*, *supra* note 116.

119.   *Id.*

the providers' pre-existing Electronic Health Records ("EHR") systems to create a secure platform for the transmission of health data.[120] Patients are able to keep tabs on their healthcare records while allowing for a HIPAA-compliant, secure, and decentralized record system.[121] Government entities have been hesitant to incorporate blockchain technology into the industry, but the tide is slowly turning.[122] "The U.S. Health and Human Services (HHS) department has developed an application called *Accelerate* . . . that utilizes blockchain . . ." for improvement in the management of contract billing, including "the HHS portfolio of 100,000 contracts worth around [twenty-five billion dollars] across about [fifty] systems."[123] By dispersing data across the bureaucracy through the replication of data, *Accelerate* has become "the first federal blockchain-based application to be certified by a designated approving authority, an internal senior management official, as having the authorization to [possibly] operate . . . in government applications."[124] Further, in 2018, Tennessee passed Senate Bill 1662, "recogniz[ing] the legality of blockchain-based smart contracts."[125] "Blockchain-based smart contracts set parameters that parties must agree upon before executing a transaction," but the transaction is only initiated once all pre-negotiated conditions are met.[126] The bill "grants legal authority to those using smart contracts when conducting electronic transactions, protecting ownership rights and securing certain private information."[127] Lastly, a move towards digital voting was pushed forward in 2020 when a resident in Utah County used the Voatz app to vote in the presidential election, making him "the first person to cast a vote for president in the U.S. general election via a blockchain-based voting app on a personal cellphone."[128] But even before the presidential election, Utah County utilized Voatz as a means to give military voters a secure voting option other than email.[129] Later, the county "allowed voters with disabilities to use the app in a local election."[130]

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120.   *See id.*; Takyar, *supra* note 112.

121.   *See Patientory*, *supra* note 116.

122.   *See* James Clavin et al., *Blockchains for Government: Use Cases and Challenges*, *in* 1 DIGIT. GOV'T 22:1, 22:13 (Soon A. Chun & Beth S. Noveck eds., 2020).

123.   *Id.* at 22:08.

124.   *Id.* at 22:09.

125.   *See* Sam Daley, *Blockchain in Government: Applications and Examples*, BUILT IN, http://builtin.com/blockchain/blockchain-in-government (Sept. 15, 2022); Act of Mar. 22, 2018, ch. 591, sec. 1, §§ 47-10-201 to -202 (2018) (codified as TENN. CODE ANN. §§ 47-10-201 to -202).

126.   Daley, *supra* note 124; *see also* §§ 47-10-201 to -202.

127.   Daley, *supra* note 124; *see also* §§ 47-10-201 to -202.

128.   Jed Pressgrove, *Utah County Makes History with Presidential Blockchain Vote*, GOV'T TECH. (Oct. 20, 2020), http://www.govtech.com/products/utah-county-makes-history-with-presidential-blockchain-vote.html.

129.   *Id.*

130.   *Id.*

B.   *Blockchain Technology as a Proposed Mechanism of Mass
Incarceration Reform*

   1.   Blockchain Technology as a Record-Keeping Method in Criminal
Cases

          Blockchain technology is a way to store, carry, and fix the current
electronic data management system in the criminal justice system.[131]   Perhaps
"[t]he most identifiable benefit of blockchain technology is its real-time,
immutable record-keeping ability" coupled with its resistance to tampering.[132]
The current method of keeping land records on cloud-based databases run by
several different government agencies leads to poorly kept records subject to
alterations and hacks in a system of low security and trust among its
intermediaries and users.[133]   Since blockchain does not exist in one place, rather
it is connected through algorithms of peer-validated networks amongst connected
computers, "it offers two distinct advantages over a central server: both broader
access and greater security."[134]
          A permissioned blockchain-based record-keeping system would be used
"from the moment local law enforcement cites or arrests a criminal defendant"
and, thereafter, the "participants in the disposition of those criminal charges—
including prosecutors, courts, and criminal-history repositories—would update
the single [b]lockchain record with the actions [taken]."[135]   This change would
alleviate the current efforts and the amount of time taken to manually maintain
accurate, up-to-date criminal histories while offering verifiable integrity.[136]   The
permissioned blockchain's customizable characteristic reaps beneficial and
versatile uses in criminal case management.[137]   Police departments, courts, and
law enforcement agencies could play key roles in recording data through a
consensus protocol, the digitally signed data will be verified by those with
permission on the chain, the data will be encrypted and stored onto a
cryptographically-secured blockchain specific to a defendant in real-time, and

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          131.   *See* Francis, *supra* note 54.
          132.   *Id.*; *see also* Di Graski & Paul Embley, *When Might Blockchain Appear in Your
Court?*, *in* TRENDS IN STATE COURTS 2018, at 28, 29 (2018).
          133.   *See* Cohn et al., *supra* note 92, at 275.
          134.   Graski & Embley, *supra* note 131, at 29.
          135.   *Id.* at 30.
          136.   See id.
          137.   *See* Seth, *supra* note 91; Francis, *supra* note 54.

any attempt to transmit data onto the chain from an unauthorized party will be ignored by the system.[138]

More importantly, preventing evidence in a blockchain network from being tampered with can be helpful to reduce the likelihood of official misconduct that contributes to incarceration rates from wrongful convictions.[139] In a permissioned network, the data on the chain is secured through cryptography.[140] Network participants who have been delegated specific roles based on the phase in which a defendant's case sits, could potentially use their own private keys that are assigned to the actions made on the chain.[141] For example, in the investigation phase of a criminal case, the specific role of an investigator can be authorized to create records of evidence on the blockchain, and if a record is altered by an unauthorized user, the peer network is made aware of the attempts in real-time, invalidating the signature.[142] "This makes it difficult to tamper with a single record . . . ."[143] Thus, it decreases the likelihood that evidence and data already on the chain would be changed by officials attempting to fabricate evidence in one party's favor and prevents an oversaturation of the chain caused by unrelated data inputs.[144] As a case moves to the case management phase, verifiable transfers can be made only by authorized users to provide clear case management and prevent conflict apparent in current record-keeping systems where the trail of evidence handling becomes ambiguous and lacks the requisite trust.[145] The immutability of blockchain's records is also of high benefit to the criminal justice system.[146] Each record, once linked into the chain, becomes a permanent block.[147] The only way to reverse it, or conceal evidence that has already been recorded, is by having all parties in that

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138.   *See* Seth, *supra* note 91; Francis, *supra* note 54.

139.   *See* Francis, *supra* note 54.

140.   Curtis Miles, *Blockchain Security: What Keeps Your Transaction Data Safe?*, IBM (Dec. 12, 2017), http://www.ibm.com/blogs/blockchain/2017/12/blockchain-security-what-keeps-your-transaction-data-safe/; *see also* Cohn et al., *supra* note 92, at 278; Bo Zhang, *Research on the Judicial Expertise of Electronic Evidence Based on Blockchain*, MATEC WEB CONF. 2 (2022), http://www.matec-conferences.org/articles/matecconf/pdf/2022/06/matecconf_isc-fte2022_01022.pdf.

141.   *See* Miles, *supra* note 139.

142.   *See id.*; King, *supra* note 109; Zhang, *supra* note 139, at 1.

143.   Miles, *supra* note 139.

144.   *See* Francis, *supra* note 54; Zhang, *supra* note 139, at 3, 4.

145.   *See* Cohn et al., *supra* note 92, at 275; Francis, *supra* note 54.

146.   Francis, *supra* note 54.

147.   Mark Fisk, *Improving Business Networks in Government with Blockchain*, IBM, http://www.ibm.com/blockchain/resources/government-smartpaper/#section-0 (last visited Feb. 2, 2023).

blockchain to agree to another, opposite transaction to undo the previous one.[148] Further, because officials would have to report the condition of the evidence as it is submitted, any person receiving the evidence in a chain of custody thereafter would immediately be able to compare the state of the evidence as received with the original state of the evidence on the blockchain.[149] Any indication of fabrication would be spotted and reported in real-time as opposed to waiting days, weeks, months, or even years before the issue is brought to light.[150]

2.   Blockchain Police Disciplinary Data System

A permissioned blockchain could yield greater transparency in police misconduct by creating a public blockchain-based police disciplinary data system.[151] As long as information about misconduct is kept hidden from the public, wrongful convictions will continue unabated.[152] A permissioned database that includes criminal charges or civil complaints filed against an officer, all disciplinary actions, and a record of the reason an officer left the police force means that hiring departments will be held to a higher degree of accountability.[153] The risk of an overly saturated record of faulty complaints by unverified users would be eliminated because a permissioned network would allow anyone to join only after suitable verification of their identity and allocation of select and designated permissions to perform certain activities on it.[154] A police disciplinary database can utilize permissioned-based roles to delegate hiring agencies the ability to check a potential new hire's background before making an offer, as well as add to an officer's disciplinary record.[155] The database could be entirely viewable by the public to discourage departments from hiring troubled officers and calling out bad hires who have developed disciplinary records after the fact.[156] A proposal for a permissioned, blockchain-based platform that records, stores, and tracks police personnel and misconduct can encourage states

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148.   *Id.*
149.   Francis, *supra* note 54.
150.   See id.
151.   *See* Brown, *supra* note 74; Leonard, *supra* note 80, at 3; Sharma, *supra* note 89.
152.   Brown, *supra* note 74.
153.   *See* Stephen Caruso, *Pa. Has a New Hiring Database to Weed Out Bad Cops: Will It Do What It Needs to Do?*, Pa. Capital-Star (July 19, 2020, 8:05 AM), http://www.penncapital-star.com/criminal-justice/pa-has-a-new-hiring-database-to-weed-out-bad-cops-will-it-do-what-it-needs-to-do/.
154.   *See* Seth, *supra* note 91.
155.   *See* Caruso, *supra* note 152.
156.   See id.

to adopt greater measures and a transparent database to both discourage police misconduct that leads to wrongful convictions and the hiring by agencies of officers with troubling records.[157]

3.   Blockchain Uniform Statewide Collection System for Pretrial Data

Without a statewide database to determine the number of inmates being held pretrial in each state, the reason for being held, and the average length of pretrial detention, it is impossible to grasp an accurate picture of pretrial detention across the country to reform the pretrial justice system.[158]   Its customizable property makes a permissioned blockchain a suitable platform for a statewide pretrial data collection system in which participants, based on their duties, could be authorized to perform different tasks.[159] Adopting a statewide permissioned blockchain-based collection system, with limited view access by the public, would allow states to assess the current pretrial detention situation and measure its progress in the future.[160] A requirement that the data be summarized and generated on a specific time basis, such as quarterly, by state agencies with authorization to access and edit the records could alleviate the painstaking duty of individually pulling records and manually calculating the time between arrests and dispositions across different county systems.[161] Forming a cohesive record of pretrial information will allow for in-depth evaluations of a state's pretrial system to determine the areas where improvements could be made.[162] Blockchain's ability to record-keep in real time means this information would be accessible for consideration once a pretrial detainee is arrested, their charges are disposed of, and once they are released or imprisoned to reduce the amount of time a detainee spends in detention, potentially lowering incarceration rates across states.[163]

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157.   *See id.*; Seth, *supra* note 91; Sharma, *supra* note 89.
158.   Thyer, *supra* note 40, at 540.
159.   *See id.* at 543, 549; Seth, *supra* note 91; Sharma, *supra* note 89.
160.   *See* Thyer, *supra* note 40, at 549; Caruso, *supra* note 152.
161.   *See* Thyer, *supra* note 40, at 548–49.
162.   *Id.* at 541.
163.   *See* Francis, *supra* note 54; Zhang, *supra* note 139, at 3, 4; Graski & Embley, *supra* note 131, at 30.

C.   *Challenges & Considerations*

1.   Security

Blockchain technology's security qualities are inherent in its principles of cryptography, decentralization, and consensus.[164] Consensus mechanisms—validation and agreement by participants of the chain—ensure trust in accurate transactions.[165] Cryptography, or digital signatures and formulas, ensures early notification if a record is altered and accurate identification of where the alteration happened.[166] Further, because blockchain networks are not contained in a central location, blockchains cannot be changed from a single computer.[167] However, different varieties of blockchain technologies differ in their critical security aspects.[168] As a result of a permissioned or private blockchain network's closed loop of trusted nodes, these networks likely stand at a greater risk for a security breach that might compromise the whole network.[169] On the other hand, some public blockchain networks run on mining operations.[170] "[I]f a miner, or group of miners, . . . could attain more than 50% of a blockchain network's mining power[, the miner(s) could control] the ledger and the ability to manipulate it."[171] However, "[p]rivate blockchains are not vulnerable to 51% attacks."[172] Additionally, a blockchain's security qualities cannot protect against individuals with ill intent that can manipulate known vulnerabilities in the network's infrastructure, as has been observed in cases of code exploitation and stolen keys.[173]

While the structure of data inherent in blockchain technology minimizes the risk of security breaches, "networks are not immune to cyberattacks and fraud."[174] This echoes the importance of infrastructure security and enforcement

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164.   *What Is Blockchain Security?*, IBM, http://www.ibm.com/topics/blockchain-security?mhsrc=ibmsearch_a&mhq (last visited Feb. 25, 2023).

165.   *Id.*

166.   *See* Miles, *supra* note 139.

167.   *Id.*

168.   What Is Blockchain Security?, supra note 163.

169.   PwC, ESTABLISHING BLOCKCHAIN POLICY: STRATEGIES FOR THE GOVERNANCE OF DISTRIBUTED LEDGER TECHNOLOGY ECOSYSTEMS 15 (2019).

170.   See What Is Blockchain Security?, supra note 163; Miles, supra note 139.

171.   What Is Blockchain Security?, supra note 163.

172.   *Id.*

173.   *Id.*

174.   *Id.*

of standard security controls across all participants.[175]   Poor underlying technology methods used by entities that implement blockchain platforms can lead to exposure of their vulnerabilities through data security risks.[176] Particularly with government data, "blockchain solutions' decentralized nature . . . require strong controls on decision criteria, governing policies, identity and access management."[177] To ensure that all measures are in place to adequately secure data on a blockchain network, it has been advised that administrators should develop and process a risk model that highlights any and all technological vulnerabilities in its infrastructure.[178] After an additional evaluation of perceived threats to the blockchain solution, administrators should advance measures to mitigate the risk of threats through standardization and enforcement of security controls personalized to that blockchain.[179] Additionally, entities are advised to carefully guard encryption keys using high-grade security methods to avoid misappropriation and prevent unauthorized users from accessing sensitive information.[180]

2.   State Agencies & Governmental Adoption

In implementing blockchain technology, policy makers are presented with challenges in data governance, security regulations, and privacy compliance.[181] To better understand these issues, states can invest in assessing and gaining experience with the technology.[182] States have shown a growing affinity towards better understanding and incorporating the technology by introducing legislation to help tackle the complexities of blockchain technology.[183]   Many states that have taken on blockchain technology implementation have begun with the studies and recommendations of a task force or study group.[184] In May of 2019, Florida Governor Ron DeSantis signed Senate Bill 1024—also known as the Florida Blockchain Bill—into law, establishing the

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175.   PwC, supra note 168, at 15; see also What Is Blockchain Security?, supra note 163.

176.   What Is Blockchain Security?, supra note 163.

177.   *Id.*

178.   See id.

179.   See id.

180.   Miles, *supra* note 139.

181.   Clavin et al., *supra* note 121, at 22:13.

182.   *Id.*

183.   *See* Heather Morton, *Blockchain 2021 Legislation*, NAT'L CONF. OF STATE LEGIS.   (Mar.   16,   2021),   http://www.ncsl.org/research/financial-services-and-commerce/blockchain-2021-legislation.aspx.

184.   *See id.*; *e.g.*, H.B. 622, 2021 Leg., 31st Sess. (Haw. 2021).

Florida Blockchain Task Force.[185] The Florida Blockchain Task Force will study the potential benefits to state, county, and municipal governments from a blockchain-based system for record keeping, data security, and other transactions.[186]   Through its research and plan development, the Florida Blockchain Task Force will make policy recommendations for the expansion of blockchain technology across industries within the state.[187] With the passing of the Florida Blockchain Bill, Florida is one of a number of states committed to expanding the technology's usage within its borders.[188] For example, in 2021, Hawaii's Legislature introduced a series of legislations for the advancement of blockchain in state agencies.[189] Hawaii's Senate Concurrent Resolution 93, for example, requested "the office of enterprise technology services to conduct a study on the potential benefits and value of blockchain technology to state government administration and affairs."[190]   The New York State Senate introduced AB 3862 and SB 4195, a series of legislation that, combined, "[e]stablishes a task force to study and report on the potential implementation of blockchain technology in state record keeping, information storage, and service delivery."[191] Similarly, in March 2022, the Governor of Utah signed a bill into law that created the Blockchain and Digital Innovation Task Force set to develop knowledge and expertise about blockchain technology and make policy recommendations related to their findings.[192] Evidently, implementing task forces comprised of individuals with knowledge and experience in blockchain technology could yield greater knowledge and trust in the technology itself to determine viability for industries across a state, including the criminal justice system.[193]

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185.   Carl A. Fornaris et al., *Florida Creates Blockchain Task Force to Study Benefits of Blockchain Technology*, GREENBERG TRAURIG 1 (June 13, 2019), http://www.gtlaw.com/en/insights/2019/6/florida-creates-blockchain-task-force-to-study-benefits-of-blockchain-technology; S.B. 1024, 2019 Leg., Reg. Sess. (Fla. 2019).

186.   Fornaris et al., *supra* note 184, at 1; Fla. S.B. 1024.

187.   Fla. S.B. 1024; *see also* Fornaris et al., *supra* note 184, at 2.

188.   Fornaris et al., *supra* note 184, at 1.

189.   *See, e.g.*, H.B. 622, 2021 Leg., 31st Sess. (Haw. 2021); S. Con. Res. 93, 2021 Leg., 31st Sess. (Haw. 2021); Morton, *supra* note 182.

190.   Haw. S. Con. Res. 93; Morton, *supra* note 182.

191.   Morton, *supra* note 182.

192.   H.B. 335, 2022 Leg., Gen. Sess. (Utah 2022); Heather Morton, *Blockchain 2022 Legislation*, NAT'L CONF. OF STATE LEGIS. (June 7, 2022), http://www.ncsl.org/research/financial-services-and-commerce/blockchain-2022-legislation.aspx.

193.   *See* Fornaris et al., *supra* note 184, at 1.

IV.   PUBLIC POLICY JUSTIFICATION FOR THE IMPLEMENTATION OF
BLOCKCHAIN TECHNOLOGY

A.   *Due Process & the Sixth Amendment: The Right to a Speedy Trial*

The Due Process Clause of the Fifth and Fourteenth Amendments and the Speedy Trial Clause of the Sixth Amendment cohesively uphold every citizen's right to a fair and speedy trial.[194] The Sixth Amendment to the United States Constitution guarantees all defendants in a criminal prosecution the right to a speedy trial.[195]   More specifically, three main interests that the Sixth Amendment right to a speedy trial protects are: "(1) to prevent undue and oppressive incarceration prior to trial; (2) to minimize anxiety and concern accompanying public accusation; and (3) to limit the possibilities that long delay will impair the ability of an accused to defend himself."[196]   The Speedy Trial Clause of the Sixth Amendment, however, does not explicitly protect the liberties of individuals before an official accusation, such as an arrest or indictment.[197] On the other hand, the Due Process Clause of the Fifth and Fourteenth Amendments protects individuals "from the prejudicial effects of deliberate government delays in accusing, charging, and indicting on criminal offenses."[198]

Some courts have emphasized that, although post-accusation delay is harmful to a defendant, the due process protection is only violated when the defendant suffers prejudice by the delay.[199]   However, even short-term delays may impair a defendant's case.[200]   As the Supreme Court of the United States explained, "[t]he time spent in jail is simply dead time"—if a defendant [is behind bars, his ability to prepare an adequate defense by contacting witnesses and gathering evidence is hindered.[201]   The harm bears greater weight when those who were locked up awaiting trial are ultimately found to be innocent.[202]   In any event, the right to a speedy trial protects the basic value of liberty.[203]   Thus, this

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194.   U.S. CONST. amends. V, VI, XIV; Daniel P. Shaver, *Restoring the Promise of the Right to Speedy Trial to Service Members in Pretrial Arrest and Confinement*, 147 MIL. L. REV. 84, 86 (1995); Barker v. Wingo, 407 U.S. 514, 515 (1972).

195.   U.S. CONST. amend. VI; Shaver, *supra* note 193, at 84.

196.   Shaver, *supra* note 193, at 89 (quoting Smith v. Hooey, 393 U.S. 374, 378 (1969)); U.S. CONST. amend. VI.

197.   United States v. Lovasco, 431 U.S. 783, 788 (1977).

198.   U.S. CONST. amend. V; *id.* amend. XIV, § 1; Shaver, *supra* note 193, at 86; *see also* Pointer v. Texas, 380 U.S. 400, 406 (1965).

199.   *Lovasco*, 431 U.S. at 789–90.

200.   *See* Barker v. Wingo, 407 U.S. 514, 526, 532–33 (1972).

201.   *Id.* at 532–33.

202.   *Id.* at 533.

203.   Shaver, *supra* note 193, at 88.

constitutional guarantee is imperative to individuals restrained in pretrial confinement and is plainly more important to an individual who, due to unfair circumstances, is wrongfully convicted and restrained.[204] As such, the right to a speedy trial not only protects the accused from the cathartic effects of an indefinite trial and detention, but also works to protect the innocent person, whether presumed in the context of pretrial or legitimate in the context of a wrongful conviction, from being arbitrarily deprived of their fundamental right to liberty.[205] In a system that values upholding its constitutional rights, delays and false convictions caused by outdated methods of case management and record keeping should be corrected to keep up with technological advancements, such as the readily available blockchain technology.[206]

V.   CONCLUSION

An overly saturated prison population drastically undermines American principles of justice.[207] While the causes of mass incarceration are copious and oftentimes overlap, it remains uncontested that detainees held in pretrial detention, and those who are wrongfully convicted, significantly contribute to the growing statistic.[208] The adverse societal and individual harms imposed by spending time behind bars, especially absent an actual or legitimate indictment, should serve to encourage reform.[209] A technical innovation in the form of a blockchain-based platform is needed to thrust the criminal justice system into the realm of the Digital Age that will improve the efficiency of inter-governmental cooperation, reduce human error, strengthen security of judicial information, and enhance transparency of criminal procedures.[210]

Moreover, the benefits of blockchain technology in the criminal justice systems across the country are clear.[211] Blockchain records provide accurate and up-to-date criminal histories, verifiable integrity, and an immutable history of case and evidence handling in an effective manner.[212] Blockchain records would reduce the need for copious amounts of paperwork, manual data entry, and

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204.   *See id.* at 84.
205.   *Id.*
206.   *See* Francis, *supra* note 54.
207.   *See* discussion *supra* Part I.
208.   *See* Sawyer & Wagner, *supra* note 3; Ostoyich, *supra* note 9.
209.   *See* Sawyer & Wagner, *supra* note 3.
210.   *See* Zhang, *supra* note 139, at 3.
211.   *See* discussion *supra* Section III.B.
212.   Graski & Embley, *supra* note 131, at 28, 30.

control efforts that hinder the current criminal justice system.[213] With fewer administrative barriers, delays that contribute to lengthy pretrial detention, as well as errors and misconduct that result in wrongful convictions, could be alleviated, reducing the use of incarceration in our society.[214]

Technology, however, is a double-edged sword, and like any technological innovation, the inherent risks and challenges are merely barriers to overcome.[215] Developing blockchain platforms that are accurate and efficient is not a simple task.[216] Engineering the cryptographic systems that allow consensus protocols to function requires expertise in the technology of distributed systems.[217] Thus, to utilize blockchain technology's benefits to the fullest extent, expert review and recommendations based on the theory and implementation of a blockchain platform in the criminal justice system are needed.[218] More work is still required to address the technical challenges of blockchains that have not been fully solved.[219] As implementation of blockchain technology into different industries across the nation becomes inevitable, states have increasingly shifted attitudes and established forces equipped to tackle all the potential benefits, as well as the drawbacks, of the new technology head-on.[220] Blockchain technology is not an unattainable theory of technology, it is real and able to offer effective benefits to the criminal justice system.[221] State agencies have an obligation to keep up with advancements in technology that have an effect on the administration of justice, especially when it relates to upholding the right to a speedy process of justice.[222]

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213.   *See id.* at 30.
214.   *See* discussion *supra* Parts II–III.
215.   *See* discussion *supra* Parts II–III.
216.   Clavin et al., *supra* note 121, at 22:14.
217.   See id.
218.   See id.
219.   *See id.* at 22:16.
220.   *See* Morton, *supra* note 182.
221.   *See* discussion *supra* Section II.B.
222.   Chantell Bergquist, *Virtual Hearings and Blockchain Technology Solutions in Criminal Law*, 47 MITCHELL HAMLINE L. REV. 1248, 1249 (2021).