



## ESSAY

**Blockchain's Big Hurdle**

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Blockchain technology can maintain accurate chains of title to securities and other legal instruments in a reliable electronic form. As private industries begin to recognize the cost-saving and risk-reducing potential of this technology, state legislatures are responding.

Arizona's H.B. 2417<sup>1</sup> is a prototypical state solution. In essence, the law requires parties to treat blockchain-secured records, signatures, and smart contract terms as "electronic signatures" under Arizona's version of the Uniform Electronic Transactions Act (UETA),<sup>2</sup> which prohibits parties from denying electronic signatures legal effect because of their electronic form.<sup>3</sup> This important categorization lends the infant technology legal legitimacy and invites world-changing innovation.

But while the promise of the Arizona law is undeniable, its constitutional validity is precarious. By amending its version of the UETA to define blockchain-based records as "electronic signatures," Arizona placed its law within the crosshairs of the federal Electronic Signatures in Global and National Commerce Act (ESIGN),<sup>4</sup> which preempts certain state departures from the original version of the UETA while enshrining much of the UETA at the federal level.<sup>5</sup> As this Essay shows, whether Arizona's law is in fact preempted is a very difficult question. It is also an important one, for if Arizona's law can avoid federal preemption, other states can confidently follow its lead. This Essay offers an early opinion on this matter and ultimately urges Congress to

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1. H.B. 2417, 53d Leg., 1st Reg. Sess. (Ariz. 2017).

2. Ariz. Rev. Stat. Ann. tit. 44, ch. 26 (2017).

3. *Id.*; see also UNIF. ELEC. TRANSACTIONS ACT (NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS 1999) [hereinafter UETA].

4. Pub. L. No. 106-229, 114 Stat. 464 (codified as amended at 15 U.S.C. §§ 7001-7006, 7021, 7031 (2016)).

5. *Id.*

fill the gaps in ESIGN that have been exposed by the unforeseeable invention of blockchain.

## I. A Primer on Blockchain Technology

### A. General Background

In simple terms, a blockchain is a distributed ledger—that is, “a list of transactions that is shared among a number of computers, rather than being stored on a central server.”<sup>6</sup> Blockchain technology was originally developed in conjunction with the virtual currency Bitcoin.<sup>7</sup> In the Bitcoin context, blockchain “replaces [the] trusted third party” that would otherwise be needed to ensure that a transferor’s title to virtual Bitcoin is valid—that is, to ensure that the Bitcoin has not been illegally replicated or stolen.<sup>8</sup> In Bitcoin transactions, blockchain functions as “[a] database that contains the payment history of every bitcoin in circulation” and “provides proof of who owns what at any given juncture.”<sup>9</sup>

The strength and security of the blockchain database is guaranteed by an elaborate “consensus mechanism” by which various computers in the system must agree to update the blockchain after any legitimate Bitcoin transfer.<sup>10</sup> Through blockchain’s “mixture of mathematical subtlety and computational brute force,” computers on a peer-to-peer network alert one another to shoddy transactions and respond to legitimate transactions by updating the blockchain permanently.<sup>11</sup> Because legitimate transactions are irreversibly recorded, illegitimate transactions can be spotted and rooted out.<sup>12</sup>

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6. Anthony Lewis, A Gentle Introduction to Blockchain Technology 4, <https://perma.cc/H3AX-XJXX> (archived Oct. 27, 2017).

7. See *Blockchains: The Great Chain of Being Sure About Things*, *ECONOMIST* (Oct. 31, 2015), <https://perma.cc/P6NL-Q83P>.

8. *Id.*

9. *Id.*

10. For a complete description of this process, see generally Lewis, *supra* note 6.

11. *Blockchains*, *supra* note 7.

12. For example, blockchain could prevent a party from passing off another party’s security as its own. If Party A attempts to sell a security it does not rightfully own to Party B, Party B can save itself the hassle of acquiring illegitimate title to the security by looking at the blockchain associated with the security and discovering that Party A is not the security’s true owner. See *id.* While parties have performed this type of due diligence in high-value transactions for centuries, doing so has not typically been feasible in the much wider world of securities and financial instruments. *Id.* Blockchain makes this verification process reliable and cost-effective, and its successful application in the Bitcoin context has shown its ability to succeed on a massive global scale. *Id.*

## B. Blockchain's Practical Applications

### 1. Enhancing Reliability & Authenticity in Financial Transactions

Blockchain's primary value lies in its potential to record and secure an immense volume of trades and financial transactions on a perpetual basis.<sup>13</sup> While "costly middle men" have policed such transactions in the past, blockchain empowers the network of traders to perform this function itself.<sup>14</sup> As Goldman Sachs has noted:

Despite the relatively low transaction costs for securities such as equities, up to 10% of trades are subject to various errors, leading to manual intervention and extending the time required to settle trades.

By applying blockchain to the clearing and settlement of cash securities—specifically, equities, repo, and leveraged loans—we estimate the industry could save \$11-\$12 billion in fees, OpEx, and capital charges globally by moving to a shorter, and potentially customized, settlement window. . . . [B]lockchain could also potentially eliminate significant additional costs across FX, commodities, and OTC derivatives.<sup>15</sup>

The Federal Reserve explored blockchain's potential applications in a thorough 2016 report and concluded, unsurprisingly, that blockchain "has the potential to . . . drive change to the financial market structure" while acknowledging that "the industry's understanding and application of this technology is still in its infancy."<sup>16</sup>

This potential lies principally in blockchain's ability to record changes to a security's true owner in a very short period of time. Under the present system, "nearly all publicly traded equities and a majority of bonds are owned by" the Depository Trust Company (DTC), a "depository that holds securities for some 600 broker-dealers and banks."<sup>17</sup> When buyers and sellers make a trade, they essentially swap IOUs against the true owner of the security, which does not change.<sup>18</sup> Discrepancies are therefore unavoidable, as such "attenuation of property rights [makes] it impossible to keep perfect track of who owns

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13. See, e.g., James Condos et al., *Blockchain Technology: Opportunities and Risks* 19 (2016), <https://perma.cc/9TKH-V4KN> (observing that blockchain "provides a reliable way of confirming the party submitting a record to the blockchain, the time and date of its submission, and the contents of the record at the time of submission, eliminating the need for third-party intermediaries in certain situations").

14. Oscar Williams-Grut, *Goldman Sachs: 5 Practical Uses for Blockchain—From Airbnb to Stock Markets*, BUS. INSIDER (May 28, 2016, 3:22 AM), <https://perma.cc/B7ZY-Y36X>.

15. *Id.*

16. David Mills et al., *Distributed Ledger Technology in Payments, Clearing, and Settlement* 34 (Fed. Reserve Bd. Fin. & Econ. Discussion Series, Working Paper No. 95, 2016), <https://perma.cc/UUU6-R2SY>.

17. Brian Patrick Eha, *You Don't Really Own Your Securities; Can Blockchains Fix That?*, AM. BANKER (July 27, 2016, 3:29 PM EDT), <https://perma.cc/KBX2-2TPB>.

18. See *id.*

what.”<sup>19</sup> The risk and inefficiency produced by this system is magnified by the present mode of “settlement,” which forces securities to “travel through the balance sheets of multiple intermediaries” during the three-day period required for securities transactions to settle. This time period can create disasters,<sup>20</sup> and these problems are directly responsible for many of the costs and fees that accompany financial transactions.<sup>21</sup>

## 2. Other Practical Applications

Commentators have observed blockchain’s potential to make a positive impact in a variety of other areas as well—including providing financial services to the global poor,<sup>22</sup> enhancing disruptive peer-to-peer services such as Airbnb,<sup>23</sup> fighting money laundering,<sup>24</sup> facilitating peer-to-peer transfers of electricity,<sup>25</sup> and strengthening title to property while curbing the administrative costs of doing so.<sup>26</sup>

## C. Legislative Developments

As blockchain has taken the private sector by storm,<sup>27</sup> it has also earned the attention of several state legislatures. Arizona, Nevada, and Vermont have led the way in embracing blockchain. In March 2017, legislators amended Arizona’s Electronic Transactions Act (the AETA) to clarify that “electronic records, electronic signatures, and smart contract terms secured through blockchain technology and governed under UCC Articles 2, 2A and 7 will be considered to be in an electronic form and to be an electronic signature under AETA.”<sup>28</sup> The legal significance of this move stems from the underlying thrust of the AETA,

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19. *Id.*

20. *Id.* (observing as a disaster scenario the possibility that if an intermediary “goes bust—as Lehman Brothers did, as MF Global did—somebody who thought he was buying 1,000 shares of Apple, say, instead winds up being a creditor of a bankrupt firm”).

21. *See supra* notes 1314–15 and accompanying text.

22. *See, e.g.,* Elizabeth Woyke, *How Blockchain Can Bring Financial Services to the Poor*, MIT TECH. REV. (Apr. 18, 2017), <https://perma.cc/FBQ3-TJDZ>.

23. *See* Williams-Grut, *supra* note 14.

24. *Id.*

25. *Id.*

26. *Id.*

27. *See, e.g.,* Joe McKendrick, *Enterprises Have Extremely High Hopes for Blockchain Technology*, FORBES (May 22, 2017, 12:56 PM), <https://perma.cc/47PK-NC7D> (reporting that among 3,000 surveyed executives, 33% are “actively engaged” in or “considering” using blockchain, while 78% are investing in blockchain).

28. Jeffrey Neuburger, *Arizona Passes Groundbreaking Blockchain and Smart Contract Law—State Blockchain Laws on the Rise*, PROSKAUER: NEW MEDIA & TECH. L. BLOG (Apr. 20, 2017), <https://perma.cc/FHR8-JTD2>; *see* Act of Mar. 29, 2017, ch. 97, 2017 Ariz. Sess. Laws; H.B. 2417, 53d Leg., 1st Reg. Sess. (Vt. 2017).

which—like other state laws and the federal ESIGN Act—is designed to ensure that signatures cannot be denied legal effect merely due to their electronic form.<sup>29</sup>

A similar bill passed the Nevada Senate unanimously in April 2017.<sup>30</sup> The Nevada bill tracks the Arizona amendment, but also prohibits local governments from taxing blockchain usage.<sup>31</sup> A Vermont law welcomed blockchain's use in the courtroom by defining certain blockchain-based records as "business records" under the Vermont Rules of Evidence.<sup>32</sup>

Congress and other states have begun to follow suit. Delaware, Illinois, and others have established blockchain initiatives,<sup>33</sup> and a Congressional Blockchain Caucus has formed on Capitol Hill.<sup>34</sup> In Delaware specifically, lawmakers are considering, among other things, "amendments to Delaware General Corporation Law that would permit corporations to use blockchain for stock ledgers and other business records."<sup>35</sup> This follows proactive steps that have been taken on Wall Street, where blockchain-type software will soon be used to track trades of credit default swaps<sup>36</sup> and where Nasdaq touted its first blockchain-aided share transaction more than a year ago.<sup>37</sup>

It seems, then, that the groundswell generated by blockchain is not an aberration but is here to stay. Indeed, one commentator boldly predicted that blockchain's future impact will "compare to that of the internet,"<sup>38</sup> and the rapid responses by Congress and state legislatures suggest that he may be right.

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29. See, e.g., Neuburger, *supra* note 28.

30. Stan Higgins, *Nevada Senators Unanimously Advance Blockchain Tax Ban*, COINDESK (Apr. 26, 2017, 4:24 PM), <https://perma.cc/GB68-URVH>; see S.B. 398, 2017 Leg., 79th Sess. (Nev. 2017).

31. Higgins, *supra* note 30.

32. Neuburger, *supra* note 28; see H. 868, 2016 Leg., Reg. Sess. (Vt. 2016).

33. Neuburger, *supra* note 28.

34. Mike Orcutt, *Congress Takes Blockchain 101*, MIT TECH. REV. (Mar. 15, 2017), <https://perma.cc/53HP-U5LS> ("The heads of the Congressional Blockchain Caucus want their colleagues to know the technology has many uses besides currency.").

35. Neuburger, *supra* note 28.

36. Nathaniel Popper, *Wall Street Clearinghouse to Adopt Bitcoin Technology*, N.Y. TIMES: DEALBOOK (Jan. 9, 2017), <https://perma.cc/ZS7E-TXRP>.

37. Bradley Hope & Michael J. Casey, *A Bitcoin Technology Gets Nasdaq Test*, WALL ST. J. (May 10, 2015), <https://perma.cc/35AG-5FC2>.

38. Dusty Wunderlich, *Wunderlich: Blockchain—Nevada's Next Horizon?*, RENO GAZETTE-J. (July 15, 2016 8:07 PM PT), <https://perma.cc/2XVE-9D34>.

## II. Preemption of State Laws by the Federal ESIGN Act (or Lack Thereof)

In spite of their policy appeal, many of these state reforms may be vulnerable to constitutional challenge.<sup>39</sup> Indeed, as the following Part describes, the federal ESIGN Act looms large in the field of electronic transactions and may preempt state UETA amendments like Arizona's if left in its current form by Congress.<sup>40</sup>

### A. Federal Statutory Preemption: The Basics

Federal statutory preemption comes in two forms: express and implied. Express preemption is straightforward and occurs where a state law directly conflicts with a federal law.<sup>41</sup> Congress commonly preempts state statutes unambiguously, but even where it has refrained from doing so, preemption can still be implied. The Supreme Court has observed two forms of implied preemption: field preemption and conflict preemption.<sup>42</sup> Field preemption is relatively uncommon and occurs where Congress has shown an intent to occupy an entire topical field.<sup>43</sup> Conflict preemption comes in two forms itself: first, where a state and federal law cannot logically coexist, as in a case where a party's compliance with both laws is physically impossible;<sup>44</sup> and second, where a state law "stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress."<sup>45</sup>

A prominent substantive canon of statutory interpretation bears on this Essay's preemption analysis as well—the "presumption against preemption." The Supreme Court described the canon in *Medtronic, Inc. v. Lohr*:

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39. Because the Constitution makes federal law supreme, state laws are void to the extent that they contradict federal law. U.S. CONST. art. VI ("This Constitution, and the Laws of the United States which shall be made in Pursuance thereof . . . shall be the supreme Law of the Land."); *Gibbons v. Ogden*, 22 U.S. (9 Wheat.) 1, 79 (1824) ("[T]he state law may be suffered to operate, in whole or in part, so far as it may, without actual conflict with the constitution or laws of the United States.").
40. Vermont, for one, has worried that any amendment to its state e-signature laws may trigger federal preemption by ESIGN. *Condos et al.*, *supra* note 13, at 13. The remainder of this Part addresses that concern.
41. *See, e.g.*, *Cipollone v. Liggett Grp., Inc.*, 505 U.S. 504, 516 (1992) ("Congress' intent may be 'explicitly stated in the statute's language or explicitly contained in its structure or purpose.'" (quoting *Jones v. Rath Packing Co.*, 430 U.S. 519, 525 (1977))).
42. *See, e.g.*, *Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n*, 461 U.S. 190, 203-04 (1983).
43. For the "several ways" that "[s]uch a purpose may be evidenced," see *Rice v. Santa Fe Elevator Corp.*, 331 U.S. 218, 230-31 (1947).
44. *See, e.g.*, *Fla. Lime & Avocado Growers, Inc. v. Paul*, 373 U.S. 132, 142-43 (1963).
45. *Hines v. Davidowitz*, 312 U.S. 52, 67 (1941).

[B]ecause the States are independent sovereigns in our federal system, we have long presumed that Congress does not cavalierly pre-empt [state law] . . . . In all pre-emption cases, and particularly in those in which Congress has “legislated . . . in a field which the States have traditionally occupied,” we “start with the assumption that the historic police powers of the States were not to be superseded by the Federal Act unless that was the clear and manifest purpose of Congress.”<sup>46</sup>

## B. ESIGN and the UETA

The Uniform Electronic Transactions Act (UETA)<sup>47</sup> preceded ESIGN and has been adopted by forty-seven states. The UETA makes electronic signatures legally effective by prohibiting parties from denying them legal effect by simple virtue of their electronic form.<sup>48</sup> Thus, the UETA’s chief legal innovation is making electronic signatures just as legally valid as physical signatures.

In response to increased state adoption of the UETA, and with new forms of e-commerce beginning to flourish, Congress enacted ESIGN in 2000 in order to eliminate barriers to global e-commerce by unifying the nation’s law on the subject.<sup>49</sup> ESIGN’s main provision simply restates the UETA’s major section:

[W]ith respect to any transaction in or affecting interstate or foreign commerce—

(1) a signature, contract, or other record relating to such transaction may not be denied legal effect, validity, or enforceability solely because it is in electronic form; and

(2) a contract relating to such transaction may not be denied legal effect, validity, or enforceability solely because an electronic signature or electronic record was used in its formation.<sup>50</sup>

While this provision would ordinarily preempt state rules to the contrary, an additional section of ESIGN affirmatively exempts two categories of state law from preemption: (1) the original version of the UETA; and (2) state laws that specify “alternative procedures or requirements” that are (a) consistent with ESIGN; (b) do not “accord greater legal status of effect to” a “specific technology” within the parameters of ESIGN; and (c) reference ESIGN if enacted after ESIGN’s adoption.<sup>51</sup>

Functionally, then, ESIGN codifies much of the UETA at the federal level, while supplementing it with a few substantive provisions of Congress’s own. It also permits at least some state experimentation, to the extent that state modifications of the UETA’s original language comply with the requirements listed in the previous paragraph.

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46. 518 U.S. 470, 485 (1996) (quoting *Rice*, 331 U.S. at 230) (citation omitted).

47. UNIF. ELEC. TRANSACTIONS ACT (UNIF. LAW COMM’N 1999) [hereinafter UETA].

48. *Id.* § 7.

49. Pub. L. No. 106-229, 114 Stat. 464 (2000) (codified as amended at 15 U.S.C. §§ 7001-7006, 7021, 7031 (2016)).

50. 15 U.S.C. § 7001(a) (2015). Compare *id.*, with UETA § 7.

51. 15 U.S.C. § 7002(a).

C. ESIGN and Arizona's Blockchain Amendment—Preemption Analysis

1. Arizona's UETA Amendment

This Essay considers whether Arizona's blockchain amendment—one such state experiment—is preempted by ESIGN. If it is, other state laws modeled after it will likely suffer the same fate. Whether the Arizona amendment survives is a live question of statutory interpretation—specifically, whether ESIGN's "exemptions to preemption" provision<sup>52</sup> allows the blockchain-related tweak to Arizona's version of the UETA. This question raises several complicated interpretive issues that are ripe for litigation. Below, I offer my analysis of these issues and a prediction of how courts might resolve them.

To reiterate, the Arizona amendment legitimizes blockchain-based records by declaring that "[a] signature that is secured through blockchain technology is considered to be in an electronic form and to be an electronic signature."<sup>53</sup> This amendment places blockchain-based records on par with preexisting forms of electronic records and signatures and requires parties and courts to grant blockchain-secured information full legal effect in spite of its nonwritten form.

2. Standard Categories of Statutory Preemption

Under the standard categories of preemption, the amendment likely survives. First, ESIGN does not appear to *expressly* preempt the amendment because it neither contemplates nor mentions blockchain and because express preemption is typically a tough showing,<sup>54</sup> especially in a field that—as here—"the States have traditionally occupied."<sup>55</sup>

Second, *field* preemption is clearly not present because ESIGN affirmatively disclaims any congressional intent to occupy the entire field of electronic

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52. *Id.*

53. Act of Mar. 29, 2017, ch. 97, 2017 Ariz. Sess. Laws.

54. Express preemption is a difficult finding because courts operate under a "basic assumption that Congress did not intend to displace state law." *Maryland v. Louisiana*, 451 U.S. 725, 746 (1981).

55. *Rice*, 331 U.S. at 230. Because many states adopted versions of the UETA before Congress enacted ESIGN, and because the states have again beaten Congress to the punch in adopting blockchain legislation, it seems safe to say that "the States have traditionally occupied" the regulatory field at issue—or, at the very least, that they did so *originally*. Regardless, the regulation of contracts—the legal area that is most affected by ESIGN and its state counterparts—falls squarely within the traditional police powers of the states. *See, e.g., Ogden v. Saunders*, 25 U.S. (12 Wheat.) 213, 308 (1827) (Thompson, J.) ("The whole subject . . . of the regulation of contracts must remain with the States.").



signature regulation by inviting state UETA laws to coexist with the federal statute.<sup>56</sup>

Likewise, *conflict* preemption does not apply since the Arizona amendment simply expands the universe of electronic information that cannot be denied legal force because of its electronic form—i.e., a party can comply with both the federal law and the Arizona amendment by either (a) granting legal force to blockchain-secured terms and signatures in spite of the fact the E-SIGN does not contemplate blockchain; or (b) complying with the Arizona amendment in Arizona while reserving the right to reject such blockchain-secured items elsewhere.

Moreover, it is difficult to argue that the Arizona amendment is an *obstacle* to Congress's achievement of its interest in passing E-SIGN because E-SIGN's clear purpose is to expand—rather than restrain—electronic commerce.<sup>57</sup> In addition, section 103 of E-SIGN reveals that Congress knew how to include exceptions to the law's general validation of electronic signatures, but chose not to foreclose the law's extension to future innovations such as blockchain.<sup>58</sup>

### 3. Reading the Statutory Text—E-SIGN's "Exemptions to Preemption" Provision

While E-SIGN's substantive provisions do not appear to preempt Arizona's blockchain amendment under the aforementioned doctrines, the federal Act contains an "exemptions to preemption" provision that explicitly preempts state statutes that do not satisfy its particular requirements.<sup>59</sup> Thus, the ultimate status of Arizona's blockchain amendment depends on its validity under this provision: specifically, does the Arizona amendment constitute the type of UETA alteration that Congress expressly sought to preempt in section 102 of E-SIGN? This inquiry requires a close look at section 102, and here, the fate of Arizona's amendment is a closer call.

Delving into the language of section 102 reveals why. As the provision provides, state laws enacted after E-SIGN are exempt from federal preemption "only if" any "alternative procedures or requirements for the use or acceptance (or both) of electronic records or electronic signatures" specified therein (1) are consistent with E-SIGN, (2) do not "require, or accord greater legal status or effect to, the implementation or application of a specific technology or technical

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56. 15 U.S.C. § 7002(a) (2015).

57. Indeed, E-SIGN aims to do so in its very first provision. *See id.* § 7001(a) (2015) (paving the way for improved electronic commerce by affording electronic signatures, contracts, and records a presumption of validity under federal law).

58. *Id.* § 7003 (2015) (outlining specific areas where the law's general requirements shall not apply, such as, among others, contracts involving "adoption, divorce, or other matters of family law").

59. *See id.* § 7002.

specification for performing the functions of creating, storing, generating, receiving, communicating, or authenticating electronic records or electronic signatures,” and (3) refer specifically to ESIGN.<sup>60</sup>

Ultimately, this language is ambiguous, and working through the statute reveals one thorny issue after another. To begin, the Arizona amendment seems to “specif[y]” an “alternative . . . requirement[] for the use or acceptance . . . of electronic records”—namely, a novel requirement that electronic records secured through blockchain be treated like any other electronic record and not denied legal effect.<sup>61</sup> It may also “specif[y]” an “alternative procedure” for “the use or acceptance” of electronic records and signatures—namely, the use of blockchain to record and secure such records and signatures. As we know from the plain language of the rest of the provision, these kinds of “alternative procedures [and] requirements” are exempt from preemption *only* if certain statutory requirements are satisfied, which raises a pair of challenging issues:

*First.* Is the Arizona amendment “consistent with” ESIGN?<sup>62</sup>

*Second.* If so, does the Arizona amendment “require, or accord greater legal status or effect to, the implementation or application of a specific technology” for “creating, storing, generating, receiving, communicating, or authenticating electronic records or electronic signatures”?<sup>63</sup>

In my view, the best interpretation is to allow Arizona’s amendment to stand—at least under the status quo. On a textual reading of ESIGN, Arizona’s amendment seems to align well enough with the requirements of section 102 of ESIGN to stave off preemption, particularly in light of the fact that ESIGN deals with legal areas that have traditionally fallen within the domain of the states.<sup>64</sup> On the first issue, the Arizona amendment seems “consistent with” ESIGN under a modern dictionary definition of “consistent.”<sup>65</sup> By *expanding* the

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60. *Id.* § 7002(a) (emphasis added).

61. *Id.* § 7002(a)(2)(A).

62. *Id.* § 7002(a)(2)(A)(i).

63. *Id.* § 7002(a)(2)(A)(ii).

64. Recall the venerable “presumption against preemption.” *See supra* text accompanying note 46.

65. *See Consistent*, Webster’s THIRD INTERNATIONAL DICTIONARY 484 (3d ed. 2002) (defining “consistent” as “marked by harmony, regularity, or steady continuity throughout . . . coexisting and showing no noteworthy opposing, conflicting, inharmonious, or contradictory qualities or trends”). On a percentage basis, Webster’s Third is the Supreme Court’s general dictionary of choice. James J. Brudney & Lawrence Baum, *Oasis or Mirage: The Supreme Court’s Thirst for Dictionaries in the Rehnquist and Roberts Eras*, 55 WM. & MARY L. REV. 483, 529 (2013) (compiling Supreme Court opinions which cited dictionaries and observing Webster’s Third to be the general dictionary most frequently relied on in such opinions); *see also* Frank B. Cross, Essay, *The Significance of Statutory Interpretive Methodologies*, 82 NOTRE DAME L. REV. 1971, 1973 n.6 (2007) (observing textualists’ fondness for dictionaries).

universe of electronic information that cannot be denied legal effect under the coexisting regimes of ESIGN and Arizona's version of the UETA, the amendment is harmonious with plain language in ESIGN that serves that very function. Indeed, the plain language of ESIGN's first section makes electronic "signature[s], contract[s], [and] other record[s]" legally enforceable.<sup>66</sup> By granting enforceability to a new type of electronic record, the Arizona amendment does not diverge from this congressional language, but actually follows it.

This leads to the second issue: whether Arizona's requirement that parties treat blockchain-secured data as they do other forms of electronic information "accord[s] greater legal status or effect to, the implementation or application of a specific technology" in dealing with electronic signatures.<sup>67</sup> Here also, the Arizona amendment seems fine from a textual standpoint because it accords *equal* (as opposed to *greater*) status to the "specific technology" of blockchain. Admittedly, a good lawyer could also reach the opposite conclusion. If "greater" means "greater status than had previously been granted to a particular technology" in this context, then Arizona's law flunks this test. This reading seems counterintuitive, however, because the restrictive quality of the phrase "specific technology"<sup>68</sup> indicates that ESIGN's drafters were chiefly concerned with prohibiting states from discriminating among competing technologies for storing electronic "signature[s], contract[s], [and] other record[s]."<sup>69</sup> As ESIGN's primary provision shows, it is a record's "electronic form" that matters to Congress, not the particular technology that enabled the record to appear in such a form.<sup>70</sup> A state law that attributes greater or lesser weight to electronic information secured through a specific technology would undermine this plainly apparent goal of ESIGN; by placing blockchain-secured records on par with electronic records secured through preexisting technologies, Arizona's amendment does no such thing.

While some courts might adopt this textual interpretation and end the inquiry here, it is worth noting that this conclusion is much easier to reach under a purposive interpretation of ESIGN. If Congress had a singular purpose in enacting ESIGN, it was to facilitate efficient electronic dealings in a "Cyber Age"<sup>71</sup> by encouraging the use of new technologies in legal areas that have traditionally been subject to physical writing requirements. Arizona's decision

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66. 15 U.S.C. § 7001(a)(1).

67. 15 U.S.C. § 7002(a)(2)(A)(ii).

68. Webster's Third defines "specific" as "intended for or *restricted to* a particular end or object." *Specific*, WEBSTER'S THIRD INTERNATIONAL DICTIONARY, *supra* note 65, at 2187 (emphasis added).

69. 15 U.S.C. § 7001(a)(1).

70. *Id.*

71. See *Packingham v. North Carolina*, 137 S. Ct. 1730, 1736 (2017) (reflecting on the far-reaching impacts of the Internet).

to recognize blockchain as a legitimate technology for gathering, storing, and reflecting electronic information aligns neatly with such a purpose.

Accordingly, I believe Arizona's blockchain law can withstand federal preemption for now—at least until Congress intervenes with blockchain legislation of its own—but this conclusion is far from certain.

### **Conclusion**

As private industries begin to recognize blockchain's appeal, many states are taking legislative steps to grant full legal force to blockchain-based electronic information. While this is a good first step, blockchain-based records will remain in an awkward legal limbo until Congress clarifies E-SIGN—or until courts adopt the interpretive view advocated by this Essay. In its present form, E-SIGN affords states the cold comfort of a yellow light; states can forge ahead with blockchain laws modeled after Arizona's, but they cannot be entirely certain that E-SIGN's exemptions to preemption provision gives them a green light to do so.

The best solution is clear: Congress should follow Arizona's lead by amending E-SIGN to explicitly define blockchain-secured records and signatures as "electronic signatures" that are entitled to legal effect. Congress should waste no time in doing so, as this moment is not unlike the last time Congress altered long standing legal regimes to account for burgeoning new technologies in 2000. By enacting E-SIGN at that moment, Congress encouraged explosive growth in global e-commerce. By adopting bipartisan blockchain legislation, it can enable pioneers to harness blockchain's world-changing potential today.