

Crypto Set To Drive Demand For Traditional Services: Part 2

By **Collin Starkweather and Izzy Nelken** (April 24, 2018, 12:28 PM EDT)

In the first article of this two-part series, we discussed several areas in which virtual currencies are anticipated to drive greater demand from traditional knowledge industry services. In this article, we discuss similar drivers of demand associated with blockchain and smart contracts. While these technologies are closely associated with virtual currencies, they are not necessarily wedded to virtual currencies either in concept or application.

Blockchain

Blockchain is closely associated with bitcoin because its invention is ascribed to Satoshi Nakamoto, the elusive inventor of bitcoin, for the purpose of enabling secure, anonymous transactions.[1] However, it has since been recognized as a technology that can be much more broadly applied.[2]

Blockchain has been characterized as a “distributed ledger.” The general idea behind blockchain is that a linked chain of information is generated (in the case of bitcoin, that information being “blocks” that bundle together transactions) with each subsequent link in the chain relying (cryptographically speaking) on the prior links in the chain. These links are the “ledger,” and are one way in which the integrity of the information in the chain is maintained.

The ledger itself is “distributed” in the sense that it is maintained in multiple locations. For a transaction to be confirmed, it must be confirmed by multiple (presumably independent) sources. In that way, if a nefarious actor were to try to corrupt the blockchain, it would have to gain access to multiple sources, further ensuring the integrity of the information contained in the chain.[3]

Because it can ensure the integrity of related pieces of information (again, transactions in the case of bitcoin) without the need for a trusted third party, blockchain holds particular appeal for use in applications that require trust in the integrity of related pieces of information and would benefit from potential disintermediation.

Since its introduction in 2008, blockchain technology has either been proposed or implemented for applications not only related to finance, such as the implementation of state-backed currencies[4] and



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administration of financial transactions and private equity,[5] but for applications ranging from voting[6] to health care records[7] to administration of intellectual property[8] to registries of assets such as diamonds and public information such as land ownership.[9]

In order to serve the burgeoning set of “use cases”[10] to which blockchain can be applied, information technology and systems professionals with knowledge of cryptography and blockchain technologies will be needed as well as experts with more traditional knowledge capital in the respective domains, including finance, health care and public administration.

Due to the heterogeneity of the potential applications associated with blockchain, the range of potential expertise required to address the demands of blockchain technology is likely to be wider than that associated with virtual currencies discussed in the first article in this series, though we anticipate financial applications to continue to be on the leading edge of both virtual currency and blockchain developments in the near term.

Recognizing the potential for the application of blockchain, there has been an explosion in patents related to the technology,[11] leading to concerns about the possibility of patent wars.[12] Moreover, while some technology developers have recognized the need to establish standard-setting organizations, or SSOs, to establish and license blockchain technology standards,[13] there does not yet appear to be as much industry coordination around standards and associated licensing of standard-essential patents, or SEPs, as in other, more mature technologies such as mobile, where many of the core technologies are licensed on F/RAND terms.[14] Depending on developments in the IP landscape, more widespread adoption of blockchain technologies may be accompanied by an increasing need for experienced IP litigators, associated legal support functions and IP valuation expertise.

Smart Contracts

Smart contracts are, simply put, agreements where execution is automated by software.[15] The idea of smart contracts, which echoes Harvard law professor Lawrence Lessig’s maxim that “code is law,”[16] has been around at least since the term was coined by cryptographer Nick Szabo in the early 1990s,[17] but the advent of virtual currencies and blockchain has breathed new life into the technology.[18]

Virtual currencies and blockchain technology have allowed smart contracts to be placed into a robust transactional framework as a fully integrated feature. For example, the Ethereum platform has included smart contracts as an integrated feature, and if a holder of ether (the virtual currency associated with Ethereum) wants to create a smart contract of the form (written here as pseudocode) “if (*condition occurs*) { *pay ether to Bob* } else { *pay ether to Jane*},” the code is incorporated into the blockchain and hence cryptographically fixed, ensuring the integrity of code and the inexorable execution of the contract.

The virtual currency permits payment to be automated based on a set of defined conditions, though this in and of itself is not much different than what happens when you buy a pair of shoes online. With the addition of blockchain, however, the code (and hence the contract features and execution) become cryptographically immutable, which ensures the integrity of the contract.[19]

Smart contracts have been implemented or proposed for a wide range of applications. As with blockchain technology, the leading edge of development seems to be focused on finance applications. Smart contracts have been proposed for the use of derivative financial products such as options and swaps,[20] prototyped for the creation of “smart bonds” that automatically execute the bond’s issuance

and payment features,[21] implemented for streamlining and automating compensation for insurance providers and claimants,[22] are anticipated to be used for the automation of mortgage document management and payments,[23] and have even been used to create online games of chance.[24] Many initial coin offerings have been built on Ethereum's ERC20 smart contract standard for Ethereum tokens.[25]

There has been speculation that smart contracts may, in some sense, enable technology to replace the practice of law, but the choice of whether to use traditional legal language or a smart contract is not an either-or proposition, and the "use cases" of smart contracts and roles of practicing attorneys strike us as sufficiently disparate that we don't see smart contracts as likely to materially impinge on the practice of law.

For example, while the definition and execution of certain functional clauses in a contract may in some cases be reasonably enhanced with deterministic expression in software, even within the realm of contract law where smart contracts may find ready application, we believe they will likely serve to augment, rather than replace, natural language contracts.[26]

We see smart contracts as, in many respects, just another tool an astute contract attorney might add to their (or their staff's) tool chest if there is potential to enhance their existing practice. Moreover, smart contracts expand opportunities to leverage crossover skills or build capabilities through the provisioning of technical support staff and services in much the same way that advances in technology for legal archival and document review technologies have enhanced legal research roles and e-discovery has expanded the scope of legal services.

Disputes will almost certainly arise as a result of the innate characteristics of smart contracts, including the immutability of code and tamper-proof execution. As any programmer can tell you, at a sufficient level of complexity, there is no such thing as bug-free code, and bugs and other technical risks will undoubtedly be realized.[27] For example, in a recent Law360 article, the authors cited two studies that found high error rates and sizable bug counts based on code review of smart contracts on the Ethereum blockchain.[28] While technical experts will be needed to review the code contained in smart contracts and in other supporting roles, as with litigation in the software industry more generally, litigants would first and foremost need to rely on seasoned legal representation.[29]

Since smart contracts exist in the nexus of programming and law, there has also been debate over whether and in what context the drafting of smart contracts might constitute the practice of law, and thus fall under ABA Model Rule of Professional Conduct 5.5 and related state laws that restrict the unlicensed practice of law.[30]

As with contracts generally, to the extent smart contracts represent sufficient value and are of a sufficient degree of complexity, parties to those contracts will find it in their interests to avail themselves of both competent legal and technology service providers regardless of where the law weighs in. So we don't see the outcome of the debate as a factor in overall demand for professional services, though if the courts are more expansive in their opinion of what constitutes the practice of law, this may contribute to the need for greater input from qualified legal representation.

Conclusion

As with the first part of this series, which considered virtual currencies, we anticipate that more widespread adoption of blockchain technology and smart contracts will only "expand the pie" with

respect to the need for legal and other traditional professional services as well as for those with particular domain expertise.

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[1] Although its invention is ascribed to Satoshi Nakamoto's release of a white paper initially describing bitcoin in 2008, the concepts behind it date to the 1990s. (See, e.g., Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System," White Paper, Oct. 31, 2008, available at <https://bitcoin.org/bitcoin.pdf>.) The person or persons using the pseudonym Satoshi Nakamoto have not yet been positively identified despite the recent prominence of bitcoin and having recently joined the ranks of the world's wealthiest people, at least on paper. (Jennifer Calfas, "Bitcoin's Anonymous Inventor Is Now One of the World's Richest People," Dec. 19, 2017, available at <http://time.com/money/5070980/satoshi-nakamoto-net-worth-bitcoin/>.)

[2] For example, Ginni Rometty, CEO of IBM, speculated that blockchain would become "widely adopted" and "transform the world." (Prableen Bajpai, "How Stock Exchanges Are Experimenting With Blockchain Technology," Nasdaq, June 12, 2017, available at <https://www.nasdaq.com/article/how-stock-exchanges-are-experimenting-with-blockchain-technology-cm801802>.)

[3] For example, when installing the core bitcoin packages in Linux, the entire bitcoin blockchain (currently over 200GB) is downloaded onto the client computer. (See, e.g., Rich Apodaca, "Installing Bitcoin Core on Ubuntu," Bitzuma, Sept. 28, 2017, available at <https://bitzuma.com/posts/getting-started-with-bitcoin-core-on-ubuntu/>.) As a result, the bitcoin blockchain is effectively mirrored on a very large number of computers around the world.

[4] Venezuela has already launched their "petro" virtual currency and China and Iran are reported to be considering their own state-backed virtual currencies. (Adam Samson, "Venezuela launches presale of state-backed 'petro' cryptocurrency," Financial Times, Feb. 20, 2018, available at <https://www.ft.com/content/07b1052c-1648-11e8-9376-4a6390addb44>; Ian Wren, "Iran May Follow Venezuela In Launching Its Own Cryptocurrency," Feb. 22, 2018, available at <https://www.npr.org/sections/thetwo-way/2018/02/22/588080130/iran-may-follow-venezuela-in-launching-its-own-cryptocurrency>; Sara Hsu, "After Cracking Down On Bitcoin, China Contemplates Its Own Digital Currency," Oct. 19, 2017, available at <https://www.forbes.com/sites/sarahsu/2017/10/19/will-china-host-the-worlds-biggest-state-backed-digital-currency>.)

[5] The U.K. bank Santander has introduced blockchain for international transactions and estimates blockchain technology could save banks up to \$20 billion in annual infrastructure costs by 2022, while various exchanges have either been considering or have rolled out blockchain products for applications

such as the recording of private securities transactions and clearing and settling trades. (Mariano Belinky, Emmet Rennick, and Andrew Veitch, "The Fintech 2.0 Paper: rebooting financial services," White Paper, June 2015, available at <https://www.finextra.com/finextra-downloads/newsdocs/the%20fintech%20%20%20paper.pdf>; Prableen Bajpai, "How Stock Exchanges Are Experimenting With Blockchain Technology," Nasdaq, June 12, 2017, available at <https://www.nasdaq.com/article/how-stock-exchanges-are-experimenting-with-blockchain-technology-cm801802>.) Northern Trust and IBM have partnered on a blockchain solution to manage the administration of a private equity fund. (Northern Trust, "Northern Trust and IBM Pioneer Use of Blockchain Technology to Help Transform Private Equity Administration," Press Release, February 21, 2017, available at <https://www.northerntrust.com/about-us/news/press-release?c=70b5ba1adc9928f9977162844c34f57a>.)

[6] For example, Sierra Leone recently used blockchain technology in a proof-of-concept exercise in a recent national election. (Simon Sharwood, "No, Sierra Leone did not just run the world's first 'blockchain election'," The Register, March 21, 2018, available at https://www.theregister.co.uk/2018/03/21/no_sierra_leone_did_not_run_the_worlds_first_blockchain_election/.)

[7] For example, an IBM study in 2017 reported that 16 percent of surveyed health care executives had plans to implement a blockchain solution that year, while 56 percent expected to by 2020. (Bernard Marr, "This Is Why Blockchains Will Transform Healthcare," Forbes, Nov. 29, 2017, available at <https://www.forbes.com/sites/bernardmarr/2017/11/29/this-is-why-blockchains-will-transform-healthcare>.)

[8] "Platform for Intellectual Property Discovery & Mining," Loci, Whitepaper, Version 7, Feb. 6, 2018, available at <https://loci.io/wp-content/uploads/2018/02/loci-full-whitepaper.pdf>.

[9] For example, Georgia, Sweden and Ukraine were reported to be testing blockchain as a way of digitizing land registries. ("Disrupting the trust business — If blockchains ran the world," The Economist, July 15, 2017, available at <https://www.economist.com/news/world-if/21724906-trust-business-little-noticed-huge-startups-deploying-blockchain-technology-threaten>.)

[10] "Use case" is a term of art originating in software design that describes the kinds of activities for which an end user might use software. More broadly, it can refer to the uses to which a technology or system might be applied.

[11] "Who owns the blockchain? A rush to patent the blockchain is a sign of the technology's promise," The Economist, Jan. 12, 2017, available at <https://www.economist.com/news/business/21714395-financial-firms-and-assorted-startups-are-rushing-patent-technology-underlies>. Recently released statistics indicate that Chinese entities were by far the most active filers of blockchain patent applications last year. (Laura Noonan, "China leads blockchain patent applications," Financial Times, March 25, 2018, available at <https://www.ft.com/content/197db4c8-2e92-11e8-9b4b-bc4b9f08f381>.)

[12] Eric Rosenbaum, "The price of the bitcoin bubble: Patent trolls are digging into the blockchain," CNBC, Dec. 19, 2017, available at <https://www.cnbc.com/2017/12/19/a-new-form-of-bitcoin-mining-patent-trolls-coming-for-the-blockchain.html>.

[13] For example, in 2015, 25 banks joined a blockchain startup called R3 CEV to develop common standards, and the International Organization for Standardization recently established a technical

committee to define areas of future standardization work. (“The trust machine — The promise of blockchain,” *The Economist*, Oct. 31, 2015, available at <https://www.economist.com/news/leaders/21677198-technology-behind-bitcoin-could-transform-how-economy-works-trust-machine>; Clare Naden, “Blockchain technology set to grow further with international standards in pipeline,” ISO, May 24, 2017, available at <https://www.iso.org/news/Ref2188.htm>).

[14] RAND refers to reasonable and nondiscriminatory licensing terms whereas FRAND refers to fair, reasonable, and nondiscriminatory licensing terms. The two terms are functionally interchangeable, with various venues adopting one or the other depending on the prevailing vernacular. It is typical of SSOs to require SEP holders in technologies included in a standard to commit to F/RAND terms.

[15] Max Raskin, “The Law and Legality of Smart Contracts,” *Georgetown Law Tech Review* 305, May 2017, available at <https://www.georgetownlawtechreview.org/wp-content/uploads/2017/05/Raskin-1-GEO.-L.-TECH.-REV.-305-.pdf>.

[16] Lessig popularized the notion in his 1999 book titled “Code and Other Laws of Cyberspace.”

[17] Tsui S. Ng, “Blockchain and Beyond: Smart Contracts,” *Business Law Today*, September 2017, available at https://www.americanbar.org/groups/business_law/publications/blt/2017/09/09_ng.html.

[18] The International Swaps and Derivatives Association and Linklaters commented that “[s]mart contracts and [blockchain technology] are often talked of in the same breath but are distinct technologies — albeit complementary and, in some instances, symbiotically linked.” (“Smart Contracts and Distributed Ledger — A Legal Perspective,” ISDA and Linklaters White Paper, August 2017, p. 8, available at <https://www.isda.org/a/6EKDE/smart-contracts-and-distributed-ledger-a-legal-perspective.pdf>.)

[19] Note that (as will be discussed later in this article) even with the simple if-then example, it is easy to imagine situations in which issues may arise despite the integrity of the code itself. For example, suppose the condition relies on obtaining a benchmark value that is published at a specific URL at a given time, but there is an internet service interruption at the given time, that URL changes, or the value published at that URL changes at a later date due to the discovery and resolution of an error.

[20] See, for example, “Smart Contracts and Distributed Ledger — A Legal Perspective,” ISDA and Linklaters White Paper, August 2017, available at <https://www.isda.org/a/6EKDE/smart-contracts-and-distributed-ledger-a-legal-perspective.pdf>.

[21] Claudio Lisco, “Cutting through the blockchain hype,” UBS, Dec. 5, 2016, available at <https://www.ubs.com/magazines/innovation/en/our-approach/2016/path-finding.html>.

[22] Maria Terekhova, “AXA turns to smart contracts for flight-delay insurance,” *Business Insider*, Sept. 15, 2017, available at <http://www.businessinsider.com/axa-turns-to-smart-contracts-for-flight-delay-insurance-2017-9>.

[23] Alex Lielacher, “How Blockchains Can Disrupt the Mortgage Market,” *Nasdaq*, Sept. 21, 2017, available at <https://www.nasdaq.com/article/how-blockchains-can-disrupt-the-mortgage-market-cm848889>.

[24] The gambling site vDice, for example, offers simple games of chance based on Ethereum smart contracts.

[25] Nathan Reiff, "What is ERC-20 and What Does it Mean for Ethereum," Investopedia, June 20, 2017, available at <https://www.investopedia.com/news/what-erc20-and-what-does-it-mean-ethereum>. See also, for example, ICO Alert, where a search for "ERC20" (<https://www.icoalert.com/?q=ERC20>) reveals a large number of ICOs with tokens relying on the ERC20 standard.

[26] For example, were smart contracts to be utilized for transactions involving relevant financial derivatives, the ISDA indicated that "[p]arties [would] still enter an ISDA Master Agreement and schedule drafted in natural human language, although execution might take place electronically." ("Smart Contracts and Distributed Ledger — A Legal Perspective," ISDA and Linklaters White Paper, August 2017, p. 19, available at <https://www.isda.org/a/6EKDE/smart-contracts-and-distributed-ledger-a-legal-perspective.pdf>.) A joint white paper by R3, a consortium of "over 70 of the world's largest financial institutions," and Norton Rose Fulbright LLC provides a more detailed discussion of this point. See "Can smart contracts be legally binding contracts?" R3 and Norton Rose Fulbright White Paper, pp. 13-14, 50, available at <http://www.nortonrosefulbright.com/files/r3-and-norton-rose-fulbright-white-paper-full-report-144581.pdf>.

[27] A possible exception is the widely used document typesetting system TeX created by tech luminary Donald E. Knuth. He famously declared that after his death, any bugs that are discovered would be considered permanent features. (Donald E. Knuth, "The future of TeX and METAFONT," MAPS, November 1990, available at <http://www.ntg.nl/maps/05/34.pdf>.)

[28] Matthew O'Toole, Christopher Kelly and David Hahn, "Smart Contracts Need Smart Corporate Lawyers," Law360, Feb. 7, 2018, available at <https://www.law360.com/articles/1010335/smart-contracts-need-smart-corporate-lawyers>.

[29] For example, code review by experienced technology experts is often a facet of copyright infringement litigation involving software, but does not serve as a substitute for counsel by an experienced IP litigator.

[30] See, for example, John R. Storino, Justin C. Steffen and Matthew T. Gordon, "Decrypting the Ethical Implications of Blockchain Technology," Legaltech News, Nov. 13, 2017, available at <https://jenner.com/system/assets/publications/17556/original/Storino%20Steffen%20Gordon%20LegalTech%20Nov%2013%202017.pdf>.