Non-fungible tokens (NFTs) are the latest advancement in the ongoing evolution of the blockchain market. To help put this new phenomenon into context, the BakerHostetler Blockchain team has prepared a series of papers that examine NFTs from various perspectives. In the first paper in the series, we introduce NFTs from the technological and market perspectives. Forthcoming papers will rely on the concepts in this introduction as we analyze the multiple legal issues arising from this new technology.

What is an NFT?
An NFT is a digital collectible. An NFT is a cultural phenomenon. An NFT is digital art. An NFT is a digital signature on art. An NFT is a new asset class. There are, for better or worse, many, many ways to answer the question “What is an NFT?” Sometimes, the answer’s simplicity is inversely proportional to its accuracy. But even the more jejune answers to
the question “What is an NFT?” provide insight into what an NFT actually is.

An NFT is a digital collectible—something with no physical existence or intrinsic value, but with a value based on popularity. An NFT is a cultural phenomenon akin to a Rubik’s Cube, Beanie Babies, Pokemon or Dogecoin. NFTs have a relationship to digital art and can indicate that an artist has blessed a certain copy of art—similar to a signature. And NFTs are clearly an emerging asset class—in 2021, at least $44.2 billion of cryptocurrency was transacted in the NFT market.1 But while these types of answers describe traits or aspects of an NFT, to get that deeper understanding, it is helpful to have a more technical understanding of “What is an NFT?”

NFT stands for non-fungible token. In brief, an NFT is a one-of-a-kind digital asset created, stored and transferred on a blockchain network, with ownership and transaction history recorded and verified on that network’s blockchain (i.e., digital ledger). This means that the owner of an NFT can prove—without the need for a third-party intermediary—that they are the verified owner. Though typically used to display and transfer data referring and pointing to online digital media files, such as digital artwork, NFTs also have the potential to be used to represent actual ownership of any intellectual property associated with the digital files as well as physical items, such as real estate. While fungible assets, much like dollar bills, can be replaced or exchanged with other identical ones of the same value, NFTs are unique, meaning no two NFTs are the same.

An NFT is a “Token”

The “token” part of NFT means that like other “digital assets” such as bitcoin, ether, Ethereum Network tokens (e.g., ERC-20 tokens), and other “cryptocurrency” tokens, an NFT is essentially digital code that contains certain information and that is created, stored, and transferred on a blockchain network. From a technical perspective, NFTs that exist on the Ethereum Network, for example, are traditionally ERC-721 tokens.2 Like all other cryptographic assets, the “token” part of NFTs cannot be copied or counterfeited, and can exist only in one specific place at any given point in time on a blockchain.

A blockchain is a digital ledger. This ledger keeps track of a token’s ownership and details of the token’s transfer. Once a transaction is recorded on a blockchain, it cannot be changed. For example, ether is a cryptocurrency token that exists on the Ethereum Network, and therefore every transaction of ether can be viewed on the Ethereum blockchain. So if Bob sends Alice five ether on February 18, 2019, at 3:37pm CST, a timestamped record of that transfer will indelibly exist on the Ethereum blockchain.

Like the ether transaction, the creation and transfer of ownership of an NFT is recorded on the blockchain to which it belongs. If Bob buys an NFT from Alice on a given date, and that NFT was created on and exists on the Ethereum blockchain, a record of the transfer of that ERC-721 token (i.e., token that is native to the Ethereum protocol) will exist indelibly on the Ethereum blockchain. If an NFT is created on a different blockchain, for example, the Solana blockchain, and Bob buys an NFT from Alice on a given date, a record of that transfer will exist indelibly on that other blockchain, in this case the Solana blockchain. This means that at any given point in time, the owner of an NFT can point to the relevant blockchain and prove that they are the one and only owner of that NFT.

An NFT is “Non-fungible”

Every NFT is different from other NFTs, hence the “non-fungible” part of the name. Non-fungibility may best be understood by first looking at its antonym—fungibility. A dollar, for example, is fungible because one dollar is functionally the same as another dollar. If Bob borrows five dollars from Alice, Bob can repay Alice with any five dollars—he need not pay her back with the same exact five dollars Alice originally lent him. This is because dollars are fungible. In the same way, cryptocurrencies are fungible. If Bob borrows five ether from Alice, Bob can repay Alice with any five ether. This is because ether (like cryptocurrency in general) is fungible.

Not so with NFTs. Each NFT is distinct from every other NFT by virtue of a unique identification code and associated metadata that are embedded into the NFT in the moment that the NFT is created on its underlying blockchain. This is similar to any other type of unique identification number (UIN), such as a bar code on the back of an event ticket or a grocery store item. However, while traditional UINs can be altered by the third party that hosts the UIN database, the unique identification code and metadata of an NFT cannot be altered because they are recorded on the underlying blockchain. The unique identification code and associated metadata that are embedded into an NFT at creation are immutable and verifiable in the same way that the transactional history and record of ownership of blockchain “tokens” are immutable and publicly available for anyone to view and verify.

Another technical feature of NFTs that contributes to their “non-
fungible” character is that NFTs are, by operation of their technical code, non-divisible. Cryptocurrencies can be subdivided into decimal fractions. In contrast, NFTs exist on the underlying blockchain only as whole numbers.

An NFT Links to a Media File
The characteristics of NFTs, as described above, may lead to their adoption for enhanced record-keeping in the physical world, such as in product supply chains or property title registries. However, over the past two years in particular, NFTs have become most known for their ability to record ownership of digital media. This is accomplished by programming NFTs with code that provides a link to a digital image, song, video, tweet or other media that exists in digital form—for ease, we call this referenced asset the “NFT Media.”

The NFT is separate from the NFT Media. While the NFT exists on its underlying blockchain, the NFT Media exists in a separate digital database—often a traditional centralized or cloud-based database or a decentralized database like the InterPlanetary File System (IPFS). By programming the digital location of the NFT Media into the NFT, the NFT is forever programmed to “point” to the location of the NFT Media. In this way, the NFT serves to verify that the NFT Media is the original, official or genuine version of the media file. This is incredibly important in a digital world, because a digital file can be copied an infinite number of times.

An NFT can make one version of the media file—the NFT Media—unique, and therefore more valuable, than other copies that are not attached to the NFT. In this sense, the NFT Media is similar to a photograph that is part of a series that was signed and numbered by the photographer. While many copies of a photograph exist or can be printed, there is only one version with a particular number, accompanied by that particular photographer’s signature. Like the number and signature, an NFT is a unique identifier that adds value to the NFT Media. But whereas the photograph’s numbering and signature physically exist on the photograph, the NFT is digital code pointing or linking to where that particular copy of the NFT Media is stored.

Where is the NFT Media?
Generally speaking, there are two predominant methods for storing the NFT Media that is referenced/linked in the metadata of the NFT. Each method has its own benefits and risks, and the pros/cons, best practices and pitfalls of each method are still subjects of debate. One way is to store the NFT Media with a location-addressed URL that is directed to a private, centralized server. This can be a private server, but the more common approach is to use an account at a cloud provider, such as Amazon Web Services. The alternative approach is to store the NFT Media on a decentralized storage network, such as the IPFS. There are pros and cons to each approach. The key distinction between the two methods is that if the NFT Media is stored in a private cloud account, the NFT Media can be deleted or altered by the owner of the account. In contrast, NFT Media that is stored on IPFS generally cannot be altered or deleted.

NFT Marketplaces
NFT marketplaces are online platforms where NFTs can be stored, displayed, bought, sold and, in some cases, minted. Marketplaces vary in the types of NFTs they support, fees charged, services offered, terms of use, level of security provided and other factors. In order to fully utilize any particular marketplace, users first need to set up an account with that marketplace. They also need a cryptocurrency wallet that is compatible with the blockchain network on which the NFT is minted. For example, buyers and sellers of NFTs that reside on Ethereum, such as ECR-721 tokens, need a compatible Ethereum wallet, like MetaMask or MyEtherWallet. For Solana-native NFTs, users need a wallet such as Sollet. The wallet should be prefunded, as even listing and minting NFTs on a marketplace often incurs a network and/or marketplace fee to be paid in cryptocurrencies. The NFT’s actual sale price is usually set in a cryptocurrency denomination, although some marketplaces will also accept fiat currency.

For NFT transactions, sellers select the NFT to sell from their wallet, list it for sale on the designated site within the marketplace and either set the NFT’s price or sell the NFT through auction. Sellers can also usually set the duration of time that the NFT will be available for sale or auction. If the seller has not yet created an NFT and only has the NFT Media at this point, many marketplaces offer minting services for a fee. In this case, the creator/seller uploads the NFT Media onto the marketplace and follows certain prompts to create the NFT. Once the minting is done, the marketplace deducts the fees from, and transfers the NFT to, the creator/seller’s wallet. In order to purchase the NFT, a buyer can search the NFTs listed for sale on that marketplace to find the one they want. Then, provided they have a compatible wallet and sufficient funds, the buyer can follow the marketplace’s prompts to participate in the NFT’s sale. If the sale is accepted, the marketplace facilitates the transaction by debiting the sale price, and the transaction fees, from the buyer’s cryptocurrency wallet and transferring the NFT to the buyer’s wallet.
Perpetual Royalties and Other Technical Features

NFTs can incorporate additional features, and technologists and market actors will undoubtedly continue to explore how to integrate NFTs with new functionality. One key technical feature that has garnered much attention is the potential to design NFTs with so-called “perpetual royalties.” When a copyright holder of, for example, a book or art print attempts to contract for royalty payments (here, a percentage of future sale prices) on secondary sales, enforcing that right is exceedingly difficult due to the practical difficulties of tracking those secondary sales and ensuring that subsequent purchasers know and agree to that kind of royalty provision. In the Web 2 world, enforcement is even more difficult, as digital media is readily and even openly copied and transferred freely over the internet. NFTs promise a chance to change the paradigm, to the benefit of the next-generation Web 3 creatives.

Conceptually, the ERC-721 tokens or other blockchain network tokens that underpin NFTs can be designed with smart contract functionality that prevents the NFT from being transferred from one party to another unless and until a cryptocurrency fee is paid to the holder of the copyright in the NFT Media. Similar to Ethereum Network transaction fees (i.e., “gas” fees), this “perpetual royalty” effectively would be programmed into the Ethereum Network itself using smart contracts, such that it would be automatically enforced and very difficult, if not impossible, to circumvent. Similar to a traditional royalty payment, the perpetual royalty fee could be calculated as a percentage of the secondary market sales price. And in contrast to a traditional royalty payment, the payment could be made on all secondary market sales in perpetuity, unless certain intellectual property or other legal bars apply. The implications for Web 3 creators would be groundbreaking. The concept of perpetual royalties is still being developed by blockchain technologists. In the meantime, some third-party NFT marketplaces offer the ability to enforce perpetual royalty payments so long as an NFT remains on the third-party platform.

Other emerging technical capabilities for NFTs include the ability for NFTs to represent tickets to in-person events, access rights to certain private Web 3 portals and participation rights in blockchain network applications. The use cases for an NFT—a unique and verifiable digital asset—are limited only by the imagination of the blockchain developer and business community. And so far, this community has proved to be a very creative group.

The 2021 NFT Market

NFTs began emerging as an asset around 2014, but their popularity soared in 2021. Chainalysis, a blockchain data analytics firm, released its 2021 NFT Market Report and reported that, in 2021, at least $26.9 billion worth of cryptocurrency was sent to Ethereum smart contracts associated with NFT marketplaces and collections. An update to the report notes that “collectors have sent over $37 billion to NFT marketplaces in 2022 as of May 1, putting them on pace to beat the total of $40 billion sent in 2021.” The report proceeds to examine the rising value of NFT investments, track the most popular NFT collections through various transactions and marketplaces, and analyze traffic data to look at where most NFT users are located. The report also addresses factors that help NFT value retention and resale, such as creating and rewarding a cohesive community built around certain NFT collections.

Notable NFT Initiatives

The impact of NFTs this past year can be conveyed in part through news and press releases that, when viewed collectively, reveal the exploding adoption of NFTs in multiple aspects of daily life as the year progressed. NFTs even received official recognition by dictionary company Merriam-Webster, which added to its dictionary a definition of “non-fungible token” and commemorated the addition by auctioning an NFT version of the definition on a popular NFT marketplace. And in a nod to the beginning of it all, the auction house Sotheby’s auctioned an NFT of the source code for the creation of the World Wide Web by British computer scientist Tim Berners-Lee, reportedly selling for $5.4 million to an anonymous buyer.

1. Art

In many ways, the story of digital artist Beeple’s colossal $70 million sale in early 2021 of an NFT featuring a JPEG file with a collage of his photographs taken over a period of 5,000 days was the proverbial “shot heard around the world,” heralding a new age of digital art as a major asset class. The sale reportedly was the third most expensive work sold by a living artist at auction and was conducted by Christie’s, an auction house more likely associated with auction sales of tangible works by artists such as Pablo Picasso, Jasper Johns and Claude Monet as opposed to intangible digital works of art by artists of far more recent minting.

News throughout the year continued to affirm the new power of NFTs. For example, Christie’s auctioned nine rare CryptoPunks, early NFTs that launched in 2017, which collectively sold for nearly
$17 million,8 and Sotheby’s auctioned off the NFT CryptoPunk 7523 for $11.7 million, one of 28 NFTs that the auction house sold over the course of one week for total sales of more than $17 million.8 In the company of more traditional auctions this year such as the silverpoint on paper “Head of a Bear” by Leonardo da Vinci for over $12 million, other auctions, including for two Yuga Labs-designed NFTs titled “101 Bored Ape Yacht Club” and “101 Bored Ape Kennel Club,” were anticipated to draw bids upward of $20 million.10 By December, Sotheby’s was reporting that its sales of NFT works for the year accounted for $100 million in revenue.11

2. Sports

NFTs dominated the 2021 news cycle not only in the art world but also in the sports, fashion, media and entertainment, and government/regulation worlds. The sports industry especially seemed to capitalize on the power and popularity of NFTs.

a. Basketball

Early in the year, the NBA partnered with Dapper Labs in Canada to create NBA Top Shots, which are NFTs sold as collectible highlight videos. A LeBron James Top Shot reportedly was sold for $200,000,12 with a collection of three Top Shots featuring him separately auctioned by an NFT studio, including one that is reported to have been the most expensive Top Shot sold as of May 2021.13 A West Coast NBA team announced that it would auction a series of NFTs, which reportedly was the first time a U.S. professional sports team launched official team-licensed NFTs,14 and fans in Las Vegas were going to have the opportunity to purchase one-of-a-kind “moment in arena” NFTs exclusively at stadium kiosks. According to reports discussing the endeavor, it was to be the first time that NFTs would be sold at a physical location.15

b. Baseball and Football

Major League Baseball closed its first NFT auction featuring a clip of Lou Gehrig’s famous “luckiest man” speech.16 Other reports revealed that a large U.S. trading card company partnered with Major League Baseball with plans to release flagship baseball cards in the form of NFTs,17 and in a related report, the digital “cards” were promoted as containing motion animation, facsimile signatures and other digital content offered through a public blockchain platform.18

The NFL also jumped on the NFT bandwagon, announcing that it would be pairing tickets purchased for certain games with virtual commemorative tickets in NFT form. The league further released commemorative collectible NFTs, including over 100 different collectibles for each of the league’s teams,19 and paired with Dapper Labs in an effort to develop and produce an NFT marketplace with a heavy focus on video content.20

c. Soccer and Other Franchises

Overseas, five Italian soccer teams joined a European digital soccer collectibles platform, increasing the total from Italy’s top league to 11 teams,21 and an English soccer club announced plans to launch its own NFT collection to commemorate its Premier League title victory.22 Spain’s La Liga soccer league reportedly became the first European league to mint an NFT of each of its players. One of the featured features of those NFTs is that owners can use them to create and compete in virtual fantasy soccer tournaments.23 Even cricket got into the game. An international cricket organization was reportedly creating a virtual metaverse dedicated to the sport featuring historical and iconic moments.24 And a well-known American mixed martial arts promotion company planned to release a collection of NFTs featuring memorabilia from that sport.25

3. Fashion

The fashion industry also embraced NFTs in 2021, including well-known houses such as Givenchy, Dolce & Gabbana and Coach. Givenchy created 15 NFTs through a collaboration with the artist Chito, the auction proceeds of which were said to be going to benefit a nonprofit.26 Dolce & Gabbana announced the debut of its collection of “fashion NFT wearables,” marking the brand’s first...

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8 Rare CryptoPunk NFTs Fetch Almost $17M at Christie’s Auction
9 CryptoPunk NFT Sells For Record $117M in Sotheby’s Auction; Sotheby’s Sold a Larva Labs ‘Covid Alien’ CryptoPunk for $11,754,000.
10 Sotheby’s to Auction Collection of Bored Ape Yacht Club NFTs.
11 Sotheby’s NFT Sales Reach $100M in 2021.
12 People have spent more than $230 million buying and trading digital collectibles of NBA highlights.
13 A slam dunk? LeBron James NFT drop could break NBA Top Shot records.
15 First NBA Team to Issue NFT Set.
16 Top Shot to sell exclusive NFT moments at live basketball games.
17 MLB launches into NFT space with help from Lou Gehrig and new company led by.
18 Fanatics:
19 Topps to Launch Official MLB NFTs in Bid to Best NBA Top Shot - TOPPS SERIES 1 BASEBALL COMES TO WAX APRIL 20TH
20 Topps Celebrates Baseball’s Rising Stars with 2021 Topps MLB Inception NFT Collection Launch.
21 Five More Italian Teams Launch NFTs on Digital Soccer Collectibles Platform SoRare.
22 Manchester City to Release NFT Collection Marking Premier League Title.
23 La Liga Becomes First Top Soccer League to Offer NFTs of All Players.
24 International Cricket NFTs to Hit Flow Blockchain Following $17M Seed Round.
26 French Luxury Fashion Brand Givenchy Drops 15 NFTs on OpenSea.
foray into that market. The NFTs were to feature one-of-a-kind items intended to “bridge the physical with the metaphysical” and would be available to “wear” virtually through augmented reality.27 British fashion house Burberry embraced NFTs as a new form of brand promotion, with the intention of offering limited-edition product drops.28 And Coach reportedly partnered with a major men’s fashion magazine and a Singapore-based startup to develop six NFTs inspired by the brand’s iconic designs.29

4. Beer, Wine and Spirits

Beer, wine and spirits companies stepped into the collectibles aspect of NFTs this year. Budweiser announced that it was celebrating its first beer can, sold in 1936, by launching for sale 1,936 NFTs built on the Ethereum blockchain.30 Separately, an NFT representing title to a rare cask of Scotch whisky was auctioned for $2.3 million. The digital collectible was to include two one-of-a-kind whisky-themed digital artworks by an artist in Scotland.31 In celebration of National Rum Day, Bacardi reportedly launched a platform from which it was to auction a specially designed NFT comprised of a 3D video detailing the history and journey of the label.32

5. Media and Entertainment

The media industry also participated in the mainstreaming of NFTs over the past year, with CNN announcing the launch of historic moments NFTs, including space travel, technological advances and election results.33 The Associated Press announced an NFT drop celebrating 175 years of photojournalism, with plans to auction 10 NFTs representing iconic photographs taken throughout history.34 Well-known print magazines Time and Fortune further embraced digital media in the form of NFTs this year. Time sold three of its covers as collectibles—two iconic and one original—as NFTs.35 After featuring the work of a graphic artist on the cover of its August 2021 issue dedicated to cryptocurrency, Fortune reportedly decided to mint the design as a limited-edition NFT series.36 And a large American network television corporation and its animation studio launched a $100 million creative fund for the purpose of producing NFTs around new content, with the first in development related to a new series said to be “the first animated series to be curated entirely on the blockchain.”37

In the music world, the band Kings of Leon jump-started the advent of music NFTs in March 2021 when it became the first major band to release a new record as an NFT.38 Later in the year, John Lennon’s son Julian announced plans to sell NFTs of Beatles memorabilia in the form of audiovisual collectibles, including guitars, clothing and other items from his father.39 An entertainment firm that distributes NFTs to music fans was reportedly the first to use NFTs with decentralized finance to allow fans to obtain a share of artist royalties.40 On the charity front, a major U.S. orchestra released a series of classical music NFTs to benefit musicians impacted by the COVID-19 pandemic.41 And Mick Jagger auctioned an NFT of a visual with his song with Dave Grohl, “Easy Sleazy,” playing in the background to benefit two local charities supporting independent music venues in the United States and United Kingdom.42

6. Government

Even the U.S. government dipped into the market. The U.S. Space Force launched its first NFT collection in 2021, commemorating its launch of the fifth vehicle of its GPS III fleet of satellites in honor of astronaut Neil Armstrong. The collection was noted as the first official corresponding NFT campaign for a space launch.43 In a more terrestrial division of the government, the U.S. Postal Service was reported to have certified a U.S. company to begin producing ePostage labels utilizing NFT mail technology to create the world’s first blockchain-supported postage.44

7. Marketplaces

The creation of additional marketplaces for NFTs was a natural outgrowth of their new ubiquity. In the United States, multiple major cryptocurrency exchanges announced plans to introduce new NFT marketplaces, including one intending to design, curate and sell NFTs for sports, entertainment and lifestyle brands.45 In response

27 Dolce & Gabbana to Launch High Fashion-Inspired NFT Collection in Venice.
28 British Fashion Brand Burberry Releases First NFTs.
29 Coach and GQ China to Release Six NFTs on Ethereum.
30 Budweiser to Launch NFTs in Honor of Its Heritage, Nearly 2,000 Collectibles to Be Included.
31 NFT Tied to Rare Whiskey Cask Auctions for $2.3M.
32 Bacardi to promote new rum brand "3d" through NFT auction.
33 CNN selling historic news ‘moments’ as NFTs.
34 Associated Press Auctions 10 NFTs Celebrating 175 Years of Photojournalism.
35 Time’s NFT Covers Sold at Auction for $439,000.
36 Fortune is dropping its latest cover as NFTs.
37 Fox Entertainment, Bento Box Start NFT Unit, Blockchain Creative Labs, With $100M Funding.
38 Kings of Leon Will Be the First Band to Release an Album as an NFT.
39 Beatles Memorabilia From Julian Lennon’s Collection to Be Sold as NFTs.
40 BAND Royalty NFT Series 1 Features 15 Unique Music Blockchain Art Pieces, Celebrating Industry Diversity.
41 Dallas Symphony Orchestra Releases Classical Music NFTs on Rarible.
42 Mick Jagger is using NFTs to raise money for indie music venues.
43 Armstrong Satellite NFT Launch with Space Force; Space Force Launches Augmented Reality Enabled NFTs.
44 USPS Certifies CaseMail as First Blockchain Generated ePostage.
45 Dolphin Entertainment, FTX Launching NFT Marketplace for Sports and Entertainment Brands (EXCLUSIVE).
to increased market interest in NFTs, a major U.S. cryptocurrency exchange reportedly partnered with a major U.S. financial services platform to make NFTs more accessible and easier to purchase. \textsuperscript{46} E-commerce company Shopify was reported to have integrated an NFT marketplace allowing merchants to issue and sell NFTs directly to consumers, eliminating the need for third-party resellers.\textsuperscript{47} Overseas, a Chinese e-commerce giant announced the launch of a new marketplace intended to allow writers, musicians, artists and game developers a way to sell rights to their intellectual property via the blockchain.\textsuperscript{48} Finally, a global cybersecurity firm announced that it developed functionality on its new platform to tokenize patents in NFT form for the purpose of allowing intellectual property to be treated as unique business assets on the blockchain.\textsuperscript{49}

NFT Legal Issues: Setting the Stage

The NFT market is exciting and moving fast—but it presents myriad legal issues that require a nuanced and multidisciplinary approach. In our forthcoming series, we will take a deep dive into NFT legal issues in advertising/digital media, contractual relationships, taxation, anti-money laundering, anti-fraud/anti-corruption, securities, intellectual property, data privacy/security, sports and entertainment, and metaverse/gaming. Through this series we will define key legal best practices for this exciting new market. Subscribers to our firm’s weekly Blockchain Monitor blog will receive each new paper in the series delivered to their email inbox. In the meantime, we have provided our NFT Best Practices to set the stage for our forthcoming analysis of the complex legal issues facing this market. For a deeper conversation, contact us.

\textsuperscript{46} Coinbase and Mastercard partner to revolutionize NFT purchase experience.
\textsuperscript{47} Shopify to Allow Merchants to Sell NFTs Directly Through Their Stores.
\textsuperscript{48} Alibaba launches NFT marketplace for copyright trading.
\textsuperscript{49} WISeKey’s TrustedNFT Platform to Turn Patents into Non-Fungible Tokens (NFT) and Store Them on an Identity Blockchain Network.