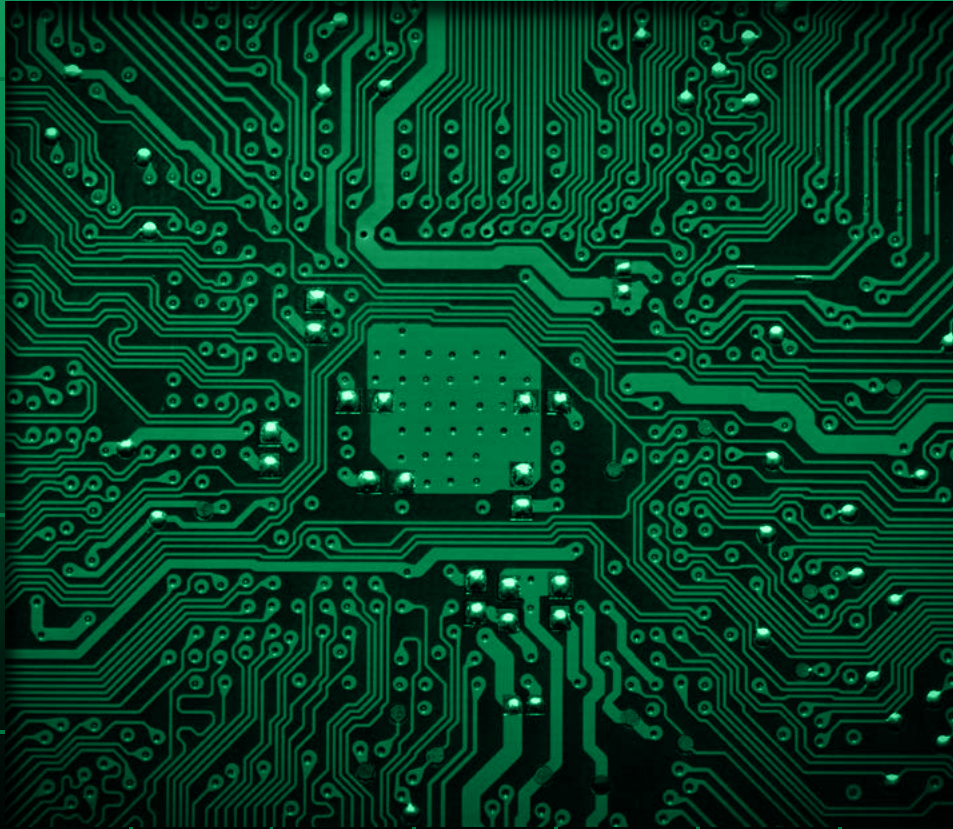


The State of the Digital Assets Data and Infrastructure Landscape

2021



Commissioned by:



**S&P Dow Jones
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Introduction

The digital assets data and blockchain technology infrastructure landscape is rapidly evolving.

As The Block Research noted in last year's report, digital assets quickly went "from a nascent ecosystem with a handful of participants to a professional space filled with investors, venture-backed startups, and billion-dollar businesses. With hundreds of billions of dollars in value flowing through the industry each year, the need for accurate and reliable information has grown significantly."¹ One year and \$2 trillion in total cryptocurrency market capitalization growth later², and the demand for trustworthy and actionable industry data increases with each passing record all-time high.

Given that most blockchains are open source, the bulk of distributed ledger technology (DLT) data is theoretically accessible to all internet users worldwide. In practice, however, blockchain data is anything but cordial: put simply, as one of our industry expert interviewees said "it's a complete mess."

To start, accessing raw blockchain data requires setting up and running a node, which serves as the communication endpoint for interacting with a blockchain network. The number of devices and type of node – full node, light node, archive node, special node, etc. – needed can vary, depending upon specific network requirements and each party's end goal. Once connected to a blockchain, node data is then extracted and stored within an external database. One might draw a conceptual parallel to the process of removing fossil fuels from the earth. Afterall, as the cliché saying goes, "data is the new oil."

Similar to raw oil, crude blockchain data isn't of much value on its own, as distributed ledgers only emit transactions and events. These occurrences happen millions of times each day, where data is the byproduct of communication between protocols, wallets, smart contracts and end-users online. Each blockchain records events differently, block times often vary between protocols, and there is an inherent lack of standardization across the industry. Just like oil, digital assets data must be refined before it can be used as a strategic resource.

¹ [Research report: The State of the Digital Asset Data and Infrastructure commissioned by Blockset](#), The Block Research

² According to Tradingview's 'TOTAL' ticker symbol, which measures Crypto Total Market Cap. From April 16th 2020 to April 16th 2021, TOTAL increased by approximately \$2 Trillion.

Introduction

Luckily, as another industry expert we interviewed from across the pond put it “where there’s muck, there’s money.” So, savvy entrepreneurs have plenty of incentive to roll up their sleeves and make digital assets data intelligible.

The State of the Digital Assets Data and Infrastructure Landscape, 2021 highlights some of the top companies that are building computing infrastructure, creating products and offering services to stakeholders interested in digital assets and blockchain around the world.

RESEARCH BY

**THE BLOCK Research**

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The Block is an information services company founded in 2018. Its research arm, The Block Research, produces research content that covers the digital asset, fintech and financial services industries.

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LUKKA

Founded in 2014, Lukka serves the largest crypto asset institutions with middle and back office data & software solutions. Lukka solves the very unique complexities of crypto (and blockchain) data for businesses so that they can adopt digital assets into their businesses. Its customers include Crypto Asset Exchanges and Trading Desks, CPA & Accounting Firms, Funds, Fund administrators, Fund Auditors, and Financial Auditors, Miners, Protocols, individuals and any business that interacts with crypto transactions. All of Lukka's products are created with institutional standards, such as AICPA Service Organization Company (SOC) Controls, which focus on data quality, financial calculation accuracy & completeness, and managing technology risk. Lukka is a global company, currently headquartered in New York City.

For information about Lukka, visit <https://lukka.tech/>

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Inception & Evolution of Digital Assets Data

Inception & Evolution of Digital Assets Data

There are two primary entities at the root of the digital assets industry: cryptocurrency (crypto) exchanges and crypto miners.

In exchange for contributing their computing power and energy to verify transactions and secure blockchain networks, such as Bitcoin and Ethereum, cryptocurrency miners are rewarded with digital assets like Bitcoin and Ether. Digital assets make their way out into the online ecosystem when miners choose to monetize them, a process that has primarily been done through centralized exchanges or their over-the-counter (OTC) desks to date. This is the prevailing economic tide of the digital assets industry.

Similar to the flow between a central bank and financial institutions at Tier 1 of a monetary system, a concept that we covered at length in The Block Research's [Stablecoins: Bridging the Network Gap Between Traditional Money and Digital Value](#) report, crypto miners and exchanges generate the heartbeat of the digital assets industry. All economic fruit within the digital assets ecosystem stem from vines that are rooted in crypto exchanges and miners.

When selling into miners, economic agents may offer services such as lending or computing products like application-specific integrated circuits (ASICs). Agents can alternatively sell into the exchange infrastructure, which is where services like tax, accounting, compliance, middle office, recruiting, legal, etc. stem. In a similar vein, the digital assets data and infrastructure segment sprouted out of demand from miners seeking insights and exchanges wanting to add new assets.

In order to list new digital assets, crypto exchanges first needed to interact with the underlying blockchains. This required setting up computing infrastructure and running nodes to extract data. While exchanges, such as Coinbase and Kraken, were rapidly scaling their user base, countless digital assets were flooding the online ecosystem. Exchanges realized that it was more efficient and cost-effective to outsource most of their blockchain data needs, as Level 1 protocols (i.e. Cardano, Tezos, Algorand, etc.) take a lot of work to integrate into exchange infrastructure. Thus a new category was born.

When there is a sea of data it can be overwhelming from a decision-making standpoint, especially when data science isn't the core focus of your business. After all, exchanges and miners mainly care about the monetization of digital assets. Thus the value proposition was there for companies willing to index, organize and present data in a consumable manner for stakeholders.

In the early days, digital assets data and infrastructure providers were mostly data accumulators. These companies experimented with deploying and running their own nodes to collect as much raw data as possible from blockchains. As crypto trading activity picked up, another segment of companies started aggregating digital assets market data from exchange Application Programming Interfaces (APIs). These companies could also purchase datasets from the exchanges for a fee.

In layman's terms, companies were either on the node side or the data side of the business. Those on the node side helped clients connect with each blockchain to draw data. Legacy blockchain infrastructure companies mostly consisted of selling nodes, which eventually became a commoditized business. Whereas companies on the data side of the business focused on aggregating, cleansing and organizing blockchain and market data as a part of their customer offerings. It wasn't long before that process became commoditized as well.

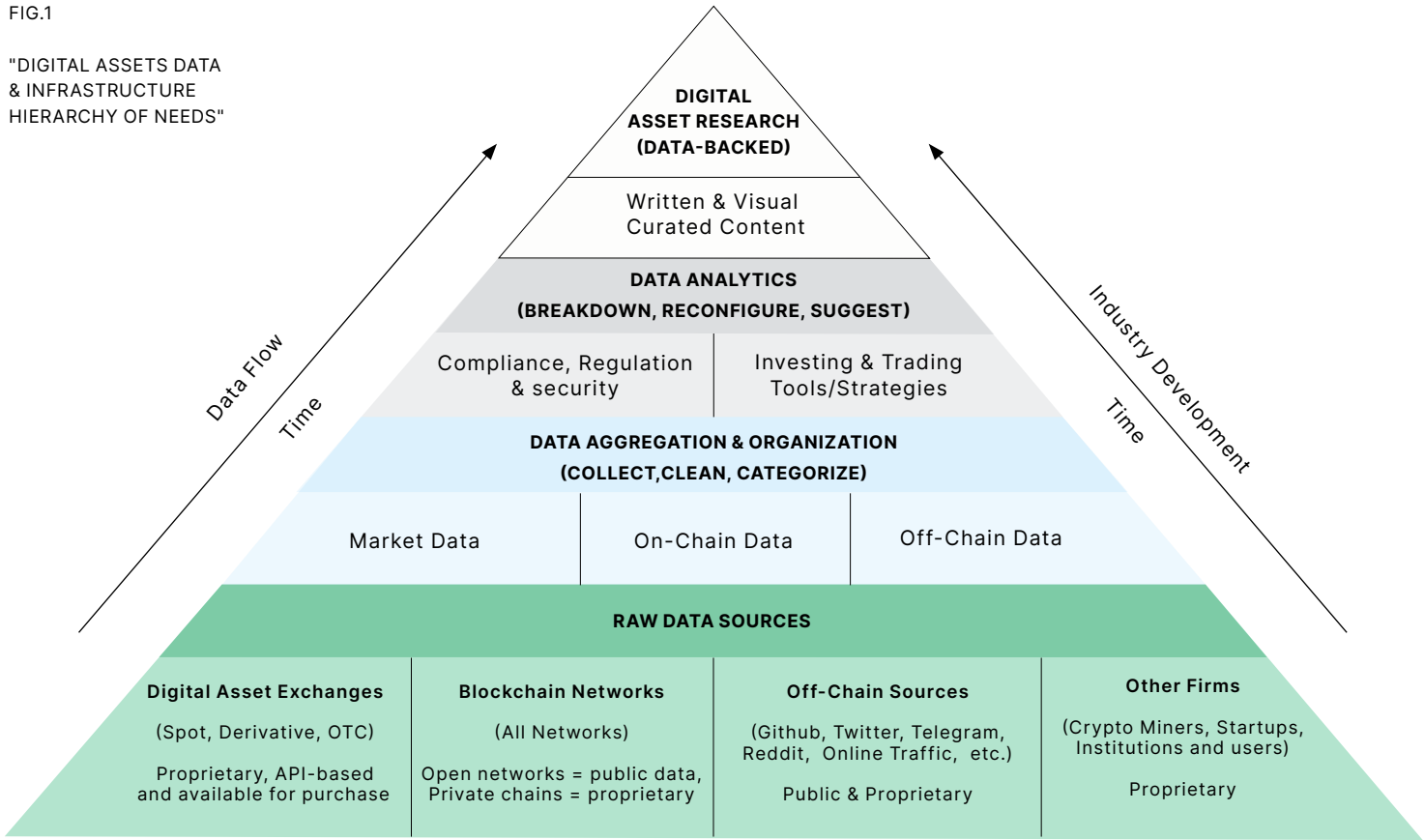
Over time, as the digital assets ecosystem further developed, specialization took hold. Firms on both the market and on-chain data side have moved progressively up the digital assets data and infrastructure "stack," which we illustrate as a pyramid in Figure 1³ below.

3 Inspiration for Figure 1 came from [Architect Partner's](#) 'Crypto Data & Data Analytics Market Map and Opportunity Assessment' April 2021 Report.

Inception & Evolution of Digital Assets Data

FIG.1

"DIGITAL ASSETS DATA
& INFRASTRUCTURE
HIERARCHY OF NEEDS"



The “Digital Assets Data & Infrastructure Hierarchy of Needs” displays the evolution and flow of digital assets data over time. Similar to Maslow's hierarchy of needs, the foundation of the pyramid, raw data sources, are the root of the entire digital assets ecosystem. Without the exchanges, miners, blockchain networks, etc. there would be no sources for data, which is the fuel for the businesses at the other layers of the pyramid. Capital, infrastructure, labor, and other resources have flowed up the pyramid over time.

Today, as institutions continue to enter the digital assets industry, there is more demand for products and services higher up the pyramid. Actionable intelligence is the name of the game, and like self-actualization at the top of Maslow's pyramid, stakeholders within traditional and digital financial services want to reach their full decision-making potential. For that reason, we have seen firms engage in strategic partnerships across levels of the pyramid, expand their own business lines to be on multiple levels of the pyramid, and for those that have the capital, acquire other firms in an effort to control all levels of the pyramid.



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Report Overview

Report Overview

As shown in the previous section, the digital assets data and infrastructure segment has come a long way since its inception. From the root of raw data sources, subsectors have emerged as the number of participants in the digital assets sector has increased. Specialization is now a major theme for companies offering products and services within the industry. Institutionalization is also another major theme that is taking shape with the continued expansion of the digital assets ecosystem.

Bespoke services keep springing up, as company offerings are built around datasets. Similar to last year, these services mostly include indexing or structuring raw blockchain data, maintaining full blockchain nodes – which store the history of a network – to provide the node infrastructure for developers, as well as gathering, normalizing and storing market data from digital asset exchanges. However, a new category has emerged from the blockchain infrastructure section: staking. Staking started gaining traction within the digital assets community in 2018, during the industry's last bear market, and it took several years for the necessary infrastructure to develop. Staking-as-a-service and related offerings are now large enough for staking to warrant its own section within the report.

In our 2021 report, The Block Research examines the growth of the digital assets data and infrastructure sector, noting major themes and changes from one year ago. The Block Research directly interviewed 11 firms for this report (Kaiko, CryptoCompare, RADAR, Coin Metrics, Alchemy, Quicknode, Bitquery, IntoTheBlock, Flipside Crypto, Staked and Glassnode).

In addition to the 11 firms interviewed, we accumulated data for another 31 companies. A total of 42 firms are highlighted in this year's report from across four primary verticals.

These industry verticals include:

- **Infrastructure providers:** blockchain-as-a service firms enabling developers and businesses to build blockchain-enabled applications
- **Staking providers:** blockchain-as-a service companies with solutions

Report Overview

that allow crypto token holders to earn a yield on their digital assets

- **On-chain metrics providers:** insights and analytics across various blockchain networks
- **Market data providers:** price and trade-related data offerings on digital assets across various trading venues and financial markets

Methodology and Process

The interviewed firms were identified based on:

- The Block Research's previous research into the sector
- Insights from last year's report authors
- Insights from industry participants
- Data resources created by industry participants

Once identified, the companies were reached out to via email:

- The interviewees were asked whether they wanted to contribute to the report by participating in a video interview
- 11 of the 12 companies reached out to chose to participate in the video interviews
- During the interview process, The Block Research asked a variety of questions including:
 - What are the different segments of your business?
 - What are your product lines and feature sets of each?
 - How does your firm generate revenue? What are the biggest expenses?
 - What challenges does your firm have in the space?
 - Who do you view as your company's top competitors?
 - How do you differentiate yourself from your competition? How are you similar?
 - Who is your target client (Developers, Consumers, Corporate)?
 - How are your different customer bases going to grow?
 - What were the most significant industry developments from last year?
 - How do you see the digital assets industry evolving over the next 2-3 and 5-10 years?

Report Overview

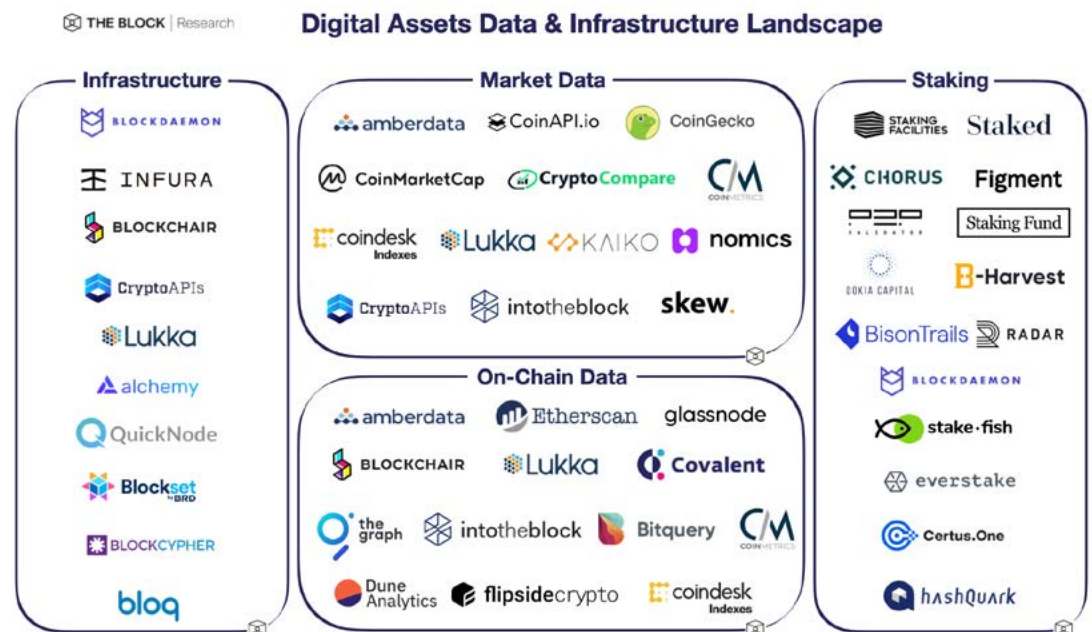
A total of 11 firms completed the interview process, which was performed over the course of two months from March to April. In addition to the interviews, data for firms was manually collected using their websites and third-party online resources, such as LinkedIn, Twitter, Alexa, and PitchBook, among others.

Lastly, in an effort to provide the most accurate detail, The Block Research emailed a spreadsheet-based survey to all firms listed in the infrastructure, on-chain data and market data categories. The vast majority of firms responded and provided the most up to date information pertaining to their company. For those that did not respond to the spreadsheet inquiry, The Block Research used a combination of online data and last year's information to fill in the blanks.

State of the Sector

This report highlights 42 firms participating in the digital assets data and infrastructure sector. As established in the previous section, firms are segmented into four primary verticals: infrastructure, staking, on-chain data and market data.

Map 1



Report Overview

As shown in Map 1 above, firms in our sample set can provide services across multiple verticals.

For instance, we placed Blockchair in infrastructure and on-chain data, Blockdaemon in infrastructure and staking, Crypto APIs in infrastructure and market data, Coin Metrics in on-chain data and market data, CoinDesk Indexes (formerly TradeBlock) in on-chain data and market data, Amberdata in on-chain data and market data, IntoTheBlock in on-chain data and market data, and Lukka in infrastructure, on-chain data and market data.

Furthermore, the categorization of companies is subjective and based on criteria explained within each section of the report. We recognize that we may have classified some firms in one bucket, when they could have been grouped in another category. For instance, we placed Bison Trails in the staking category, when it could have also been in the blockchain infrastructure section. However, since we made Bison Trails the highlight of the staking infrastructure section, and Bison Trails' own website emphasizes its role as a [Proof of Stake \(PoS\) blockchain infrastructure platform-as-a-service \(PaaS\) provider](#), we decided it was most appropriate to designate the company in the staking category.

Finally, readers should note that this is not an exhaustive list of all digital assets data & infrastructure companies, rather these are firms that The Block Research selected for its sample set. Our aim was to form a group representative of each industry segment. If you believe that your firm was miscategorized or would like your company to be considered for next year's report, please contact: research@theblockcrypto.com.



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Part I: Infrastructure

Map 2



All complex systems need appropriate infrastructure to function properly, and the digital assets ecosystem is no different.

Similar to a nation’s oil and gas infrastructure, which is made up of pipelines, drillers, refiners, processors, distributors, etc., the components that generate, transmit, store, cleanse and dispense blockchain data are the backbone of the digital assets industry. Nodes, computing hardware, software applications, cloud architectures and APIs are among the elements necessary to create blockchain-related products and services.

Infrastructure providers serve as the bedrock upon which many blockchain businesses build their services. Figure 2 provides a high-level visualization of where infrastructure providers sit on the digital assets data value chain.

Fig.2

Data & Analytics	dApps
Querying & Indexing	
Infrastructure	

Blockchain-as-a-service (BaaS) Companies

Blockchain infrastructure providers build, organize, maintain and offer access to the structures that interact with blockchains, such as nodes, wallets and developer (dev) tools, while also handling the substructures required to run these systems, such as security services and cloud storage. These components are resource-intensive and require specialized knowledge to set up and keep them running.

Part I: Infrastructure

Enter blockchain-as-a-service (BaaS) companies to offer a solution. Like software-as-a-service (SaaS) companies, BaaS providers let customers connect to blockchain networks, draw data and run applications with ease. These managed platforms allow for the creation of countless digital services from blockchain protocols, the most well-known being decentralized applications (dApps).

Common BaaS platform services⁴ include:

- Platform architecture management
- Modular, preconfigured networks and infrastructure
- Easy setup workflow
- Middleware for monitoring & development for app building
- Dashboard to view and analyze chain code
- Auditable transaction record
- Built-in connections to needed services
- Professional consultation

Nodes-as-a-service (NaaS)

One of the earliest examples of BaaS companies includes Nodes-as-a-Service (NaaS) providers.

Prospective NaaS customers are those looking to connect to a blockchain without having to deal with the technical headaches and costs associated with spinning up node infrastructure. NaaS provider's clients need a constant stream of node data; these include dApp devs, on-chain data and analytics providers, among others. As the ecosystem expands, stakeholders from traditional financial services, technology companies and global regulatory agencies are also becoming interested in aggregating node data.

There are many challenges with running your own node, the first of which is knowing which type to use?

The definition of a node varies across computing fields, but within the context of digital assets, nodes are electronic devices connected to a blockchain network with their own unique identifiers, such as an Internet Protocol (IP) address. These devices serve as the commu-

⁴ [List of Top Blockchain-as-a-Service \(BaaS\) Solutions 2021](#)

nication endpoints for users and applications interacting with blockchains, meaning they redistribute information. Nodes are categorized by the functions that they perform within a blockchain network.

Generally speaking, there are two main types of nodes – full nodes and light nodes – both of which have their own subcategories⁵. Full nodes are essentially servers of blockchains that keep a log of all transactions across the network. These devices also participate in the governance model of each blockchain, so full nodes have the voting power when decisions are made regarding network changes.

Subcategories of full nodes include:

- **Pruned Full Nodes**
 - Have a defined memory limit, meaning there is a certain amount of blocks that can be stored from the blockchain on the node.
 - The oldest blocks are deleted to allow for new blocks to be added when the memory limit is reached.
- **Archival Full Nodes**
 - Keep the entire record of the blockchain history.
 - Can be further subdivided into:
 - **Authority Nodes**
 - Authorize other nodes to join a blockchain network
 - **Miner Nodes**
 - Assist with transaction validation in Proof-of-Work (POW) blockchain networks
 - **Masternodes**
 - Don't add new blocks
 - Maintain a blockchain's ledger
 - Validate transactions
 - **Staking Nodes**
 - Assist with staking rewards and transaction validation in Proof-of-Stake (POS) blockchain networks

As noted above, light nodes are the other main type of devices connected to a blockchain network. Light nodes aren't responsible for validating blocks from transactions, rather they only store block headers. Readers should note that there are other types of block-

⁵ [Blockchain Nodes: An In-Depth Guide](#)

chain nodes, such as super nodes, which help carry out special tasks. In the early days of digital assets, it was possible to launch a full node using weak computing equipment like a central processing unit (CPU). However, as networks like Bitcoin and Ethereum have experienced exponential growth since their launch, significant processing power and memory storage is needed to successfully run a full node. Running a light node can also be challenging, given limited bandwidth from internet service providers (ISPs), business network bottlenecks and security risks from hackers or potential viruses, among other vulnerabilities.

Even for those that have the technical expertise and wherewithal to run self-hosted nodes, such as blockchain developers, it's an inefficient exercise. In today's blockchain environment, maintaining a node is costly, time-intensive and inconsistent.

Common drawbacks⁶ of self-hosted nodes include:

- **Expenses**
 - \$80-100k per year in costs
 - \$2-5k per month in Amazon Web Services (AWS) bills
 - \$4-5k per month of engineering time
- **Time-Intensity**
 - 25% of engineering resources can be spent managing nodes
 - 3-6 months on average to develop blockchain infrastructure
 - Up to 3 weeks recovery from network failures
- **Inconsistency**
 - Nodes on average have issues once every 5 days:
 - CPU spikes, memory leaks, disk issues
 - Inconsistent peering
 - Corrupted internal databases
 - Transaction broadcasting issues
 - Frequent bugs + regressions
 - 1 in 6 "stable releases" are broken

NaaS companies help alleviate the drawbacks of self-hosted nodes by maintaining their own infrastructure of proprietary nodes connected to each blockchain. As such, these providers offer access to networks, such as Bitcoin and Ethereum, while also assuming

⁶ [Alchemy Developer Documentation](#)

responsibility for the actions related to each node. NaaS providers are a bridge allowing customers to enter and exit a blockchain network around the clock.

Top NaaS Providers

The Block Research has identified the five most popular Node-as-a-Service providers. These companies include Infura, Alchemy, Quiknode, Blockdaemon and Bloq. Each NaaS provider has its own distinguishing features.

Infura was the original NaaS company. Infura initially had a stranglehold on the Ethereum node market; one of our interviewees for this report estimates that Infura at one time had a 99% market share. Unfortunately for Infura, there have been reliability issues with their node infrastructure over the years. Just last November, Infura faced a major service outage that caused a delay in the price feeds of ether and ERC-20 tokens, and some crypto exchanges were forced to temporarily halt ether withdrawals.⁷

Furthermore, the digital assets community, particularly developers buying into the concept of “decentralization,” have expressed concerns with one single entity dominating a critical piece of infrastructure for the entire ecosystem.⁸ Put simply, most of the applications and services built for Ethereum, the leading digital assets platform, were reliant on a bottleneck and potential single point of failure. Thus there was an opportunity for other NaaS providers to emerge, further compounded by the fact that Infura only offers its infrastructure for the Ethereum network.

With all of that being said, Infura is still one of the top NaaS providers in the space. As noted in last year’s report, “according to Infura’s figures, in 2018 the firm handled 13 billion queries per day and at times made up between 5% to 10% of all Ethereum full nodes ... one market participant estimated that Infura supports 70% of the top dApps in the Ethereum ecosystem.”⁹ Considering Infura’s close ties to Ethereum, it should have been no surprise that ConsenSys acquired the company for an undisclosed amount in October 2019.¹⁰

⁷ [The Block Ethereum infrastructure provider Infura is down, crypto exchanges begin to disable ETH withdrawals Ethereum](#)

⁸ [The Race Is On to Replace Ethereum's Most Centralized Layer](#)

⁹ [Research report: The State of the Digital Asset Data and Infrastructure commissioned by Blockset](#)

¹⁰ [Infura News | Infura has officially been acquired by ConsenSys](#)

Part I: Infrastructure

Of the NaaS companies, Alchemy is by far the best-funded. The company was founded in 2017 by Stanford computer science graduates, who in addition to engineering prowess have a natural talent for marketing. Alchemy's "Supernode" has established itself as one of the top Ethereum API brands in the space.

Recently, Alchemy closed its Series B round, raising an additional \$80 million with a post valuation of ~\$520 million according to Pitchbook.¹¹ These funds will be used to amplify its developer platform, increase the number of blockchains supported and hire the necessary talent for global expansion. The firm is often cited for its laundry list of noteworthy backers, which include Pantera Capital, Coinbase Ventures, actor Jared Leto, and LinkedIn co-founder Reid Hoffman, among others.¹² Once again, it's all about the brand for Alchemy, which is establishing itself as a premier NaaS provider.

Quicknode, also founded in 2017, is led by seasoned engineers with a passion for data storage, high-speed networking, and distributed computing. Their core team has 20 years of experience running data centers, building distributed systems and navigating the hosting space from the previous web eras. Because of this, Quicknode seems to understand not only the wants, but the needs of its customers quite well.

For example, the co-founder of Dune Analytics, an Ethereum on-chain analytics firm, [shared an anecdote](#) about his experience choosing a NaaS provider. Apparently, Dune's self-hosted Parity archive nodes became corrupted, and while scrambling for a solution, Quicknode helped them free up bandwidth and save money on node-related costs. While on the topic of fees, a Quicknode [blog post](#) compared real-world pricing across NaaS providers and shared [compelling evidence](#) for their services being a value offering.

Wisdom from experience is one thing that capital cannot buy, which is not to say that Quicknode isn't funded. The company joined startup accelerator Y Combinator in 2021, where it received \$150k in SAFE Note funding, the brainchild of Y Combinator. Most recently,

¹¹ [Alchemy Profile - PitchBook](#)

¹² [Alchemy raises \\$80M at a \\$505M valuation to be the 'AWS for blockchain'](#)

Part I: Infrastructure

Quicknode raised \$5.35 million of angel funding from SoftBank Group and other investors in March, as per PitchBook Data.¹³ With only 10 employees, it's fair to say that the Quicknode team is punching above its weight.

Blockdaemon's catchphrase is "We Know Nodes," and that appears to hold true. Founded in 2017 by legacy telecommunications veterans, Blockdaemon offers institutional-grade blockchain infrastructure for scaling and deploying nodes. Blockdaemon refers to itself as a "blockchain deployment facilitator," which [according to its website](#) the company has helped launch thousands of nodes. To date, Blockdaemon has raised about \$11.9 million, with its most recent round of funding coming in March of this year, according to PitchBook Data.¹⁴ The company also offers staking solutions, which we discuss further in the staking section later.

Bloq offers managed infrastructure for building on blockchain networks. Its services are offered to enterprises, protocols and developers alike. On the node side, its Bloq Node product targets enterprises looking to connect with blockchain networks, such as Bitcoin and Algorand. These node clusters are fully-managed, private and secure. According to PitchBook Data¹⁵, the firm's last fundraising round was in 2018, where an undisclosed amount was raised by Galaxy Digital Partners and CMT Digital. However, from our conversation with them last year, we know that Bloq has raised at least \$4 million to date.

Outside of these NaaS providers, there are other companies that offer node services and API-related infrastructure. However, these firms either don't currently make up enough of the NaaS market share to warrant in-depth analysis or they offer other blockchain-related products and services that are the main focus of their business. Said differently, NaaS became an add-on for some firms that already had the necessary infrastructure set up for their core offerings to sell nodes on the side.

¹³ [Quicknode Profile - PitchBook](#)

¹⁴ [Blockdaemon Profile - Pitchbook](#)

¹⁵ [Bloq Profile - PitchBook](#)

Part I: Infrastructure

In a similar vein, some companies like RADAR, which used to provide blockchain infrastructure, pivoted toward the staking segment of the industry. Knowledge, expertise, and computing hardware have proven to be dynamic resources for those that are resourceful and willing to venture into other categories. For instance, Blockdaemon also finds itself in the staking business, as its node infrastructure can be used for alternative purposes.

Another company worth mentioning is Bison Trails, which set up one of the most valuable NaaS ecosystems in the digital assets industry. However, since their blockchain infrastructure was designed for staking tokens, Bison Trails is highlighted in the staking section of this report.

Wallet-as-a-service (WaaS)

Another important subsegment of BaaS companies includes wallet-as-a-service (WaaS) providers. Their products and services are a central component of digital assets custody.

Digital asset wallets facilitate the transfer and storage of cryptographic tokens across blockchains. Each wallet has a unique address (public key) and password (private key), providing users with unprecedented independence regarding control and mobility of assets online. This is where the term “be your own bank” comes from, which originated in the Bitcoin community. However, such great freedom comes with even greater responsibility.

There are always trade-offs made when designing and implementing alternative systems. When one is their own bank, they are responsible for remembering the unique address and password to access their assets on the blockchain. Wallets are also a target of hackers online, so proper cybersecurity, password storage and chain of custody regarding who has access to each wallet is paramount. Further, when managed at scale for institutions, strict adherence to custody laws and regulations must be maintained at all times; WaaS providers help make this process easier.

Part I: Infrastructure

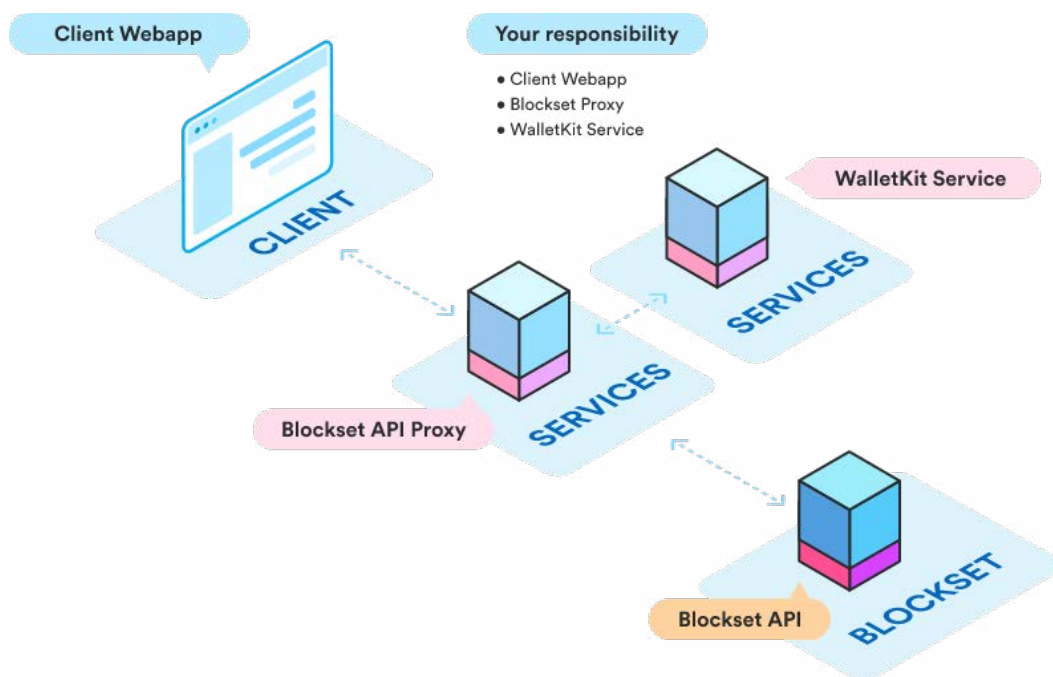
1. Build out and manage their own cluster of blockchain nodes.
2. Develop a Blockchain proxy service that would be responsible for retrieving the raw data off those nodes.
 - a. Requiring specialized devOps and backup nodes
 - b. Dozens of functions
 - c. Messy, Low-level data.
3. Build a Data Aggregator to take that data into their own Database.
 - a. Need to constantly update and refresh their database to new Blockchain reorganizations
 - b. Find a solution for dealing with “stale blocks”
4. Build a Data Translator in order to wrangle, refactor, and format the messy data into something that’s more usable for business logic and web services.
5. Build a custom API to pull data from the Database in order to populate the web client.
6. Create custom services for any features desired such as indexes for getting address balances.
7. Connect WalletKit to manage cryptographic functions such as digital signatures and address management, and assist in blockchain communications.
8. Build workflow to get data out of WalletKit and into their blockchain proxy to broadcast transactions by exposing the endpoint, and finally sending them to the correct network.
9. Setup consistent network monitoring such as “listeners” to see when the user’s transaction has been mined.
10. Connect to third-party services for blockchain analytics and market prices.
11. Design and Develop the front-end Web Client for the Custodial GUI.

WaaS providers cover all of the back-end development work and build the infrastructure necessary to seamlessly and securely accept, store, and send digital assets. Each WaaS solution has its own unique design and proprietary architecture, but the end results are essentially the same.

Graphic 2 from Blockset’s custodial solution developer documentation¹⁷ illustrates how technical requirements for digital asset wallets can be minimized with a WaaS provider.

¹⁷ [Custodial Solution - Developer Documentation](#)

Graphic 2



According to Blockset, a client using a WaaS provider's custodial solution would only need to:

1. Build a small server that houses their own business logic and talks to the WaaS provider's API to receive application-ready blockchain data.
2. Connect wallet software to manage cryptographic functions such as digital signatures and address management, and assist in blockchain communications.
3. Create any custom services or features desired for their project.
4. Design and Develop the front-end Web Client for the Custodial Solution.

Readers should note that this is not an assessment or endorsement of Blockset's WaaS solution. We just found the illustrative example useful for conceptually understanding how a WaaS company can streamline the requirements and steps necessary to use a digital asset wallet at scale.

Other popular WaaS providers include BitGo (acquired by Galaxy Digital), FireBlocks and Curv (acquired by PayPal), among others.

Part I: Infrastructure

Additionally, some companies from other segments, such as Crypto APIs, which is also listed in the market data section, have added WaaS products to their already existing business lines.

For example, version 2.0 of Crypto APIs has a multi-party computation (MPC) based wallet as a service. Clients are responsible for hosting the first node, Crypto APIs host the second node, and the third node is hosted by the escrow agent. A custom governance layer is built-in and transactions can be approved over mobile devices.

General Developer Tools & APIs

We conclude the BaaS infrastructure companies with a more generalized subsection for firms that offer developer tools and API solutions. Similar to blockchain data itself, it's challenging to standardize and sort companies in the industry as they are constantly pivoting strategies and expanding their offerings.

Although the majority of companies in the infrastructure section offer some form of developer tools and APIs, we find it necessary to separate three firms in this generalized category: Blockchair, BlockCypher and Lukka.

Blockchair, which is also featured in the on-chain metrics section, has an API product for pulling data from 17 blockchains. Similar to Blockset, Blockchair provides an API that functions as infrastructure-as-a-service for many wallets, exchanges, and (national) research agencies. Blockchair's API supports numerous analytical queries like filtering, sorting, and aggregating blockchain data. However, since its main offering is a block explorer, we find Blockchair to best be categorized as an on-chain metrics provider that offers a generalized API product as well.

BlockCypher is a cloud-optimized platform powering blockchain applications. The firm's web services help businesses, developers and miners interact with blockchain networks using its publicly accessible suite of RESTful APIs. BlockCypher also has a block explorer that provides information on five live protocols, as well as BlockCypher and Bitcoin's testnets.

Part I: Infrastructure

Both Blockchair and BlockCypher have block explorers, which are covered extensively in the on-chain metrics section.

Lukka provides infrastructure services such as blockchain node and off-blockchain connectivity (exchange and wallet APIs) as a part of its enterprise offerings. The firm's infrastructure is built with AICPA SOC 1 Type II and AICPA SOC 2 Type II controls, a rare certification within the digital assets industry.

Lukka builds and maintains its nodes for its customers on over 10 blockchains that can be accessed through a web portal or data delivery methods (API, SFTP, etc.) depending on the requested data set and time period. Lukka's customers leverage this service as both a stand-alone service and as part of Lukka's wider enterprise software offering, where it is frequently combined or compared to private digital assets data. Ultimately, this service offering enables Lukka's customers to have an auditable record of all transactions that occurred on or with the customers' blockchain addresses. Lukka has implemented various data quality and completeness processes to ensure that the blockchain transaction data is delivered to its customers in a comprehensive and standardized form. Lukka's nodes also allow customers to receive usable decentralized exchange (DEX) and DeFi trade activity reports.

Lukka created over 300 institutional-quality API connectors and file mappings to a variety of liquidity providers (exchanges, OTC desks, etc.), wallets providers, custodians, and other service providers. Similar to Lukka's nodes business, this service is offered stand-alone and as a part of Lukka's broader enterprise software offerings. However, unique to Lukka, they have developed an infrastructure to schedule and run API queries. Customers of Lukka can build custom schedules that will time API queries to run based on that customer's specific business needs (i.e. if a fund needs to reconcile balances every day at 4 pm, they can schedule their API connected accounts to run at this time for a real-time reconciliation process).

Part I: Infrastructure

Firm Comparison

Operations

Table 1 shows operational data and online metrics for the infrastructure providers covered in our sample set.

TABLE 1	OPERATION				ONLINE METRICS (6/21)		
FIRM	HQ	FUNDING	TOP HIRING AREA	EMPLOYEES	LINKEDIN FOLLOWERS	TWITTER FOLLOWERS	ALEXA RANK (A)
Alchemy	USA	\$98,900,000	Engineers	21	2,931	14,900	146,264
Blockchair	Ireland	Private	Developers	6	174	7,243	8,222
Blockcypher	USA	\$3,200,000	N/A	2	593	7,165	15,202
Blockdaemon	USA	\$11,870,000	Devs/Engineers	43	2,142	3,201	209,538
Blockset	Switzerland	\$54,750,000	Engineers	78	166	1,491	380,821
Bloq	USA	\$4,000,000	Devs/Marketing	36	2,490	8,078	1,338,142
Crypto APIs	Bulgaria	Private	Devs/Product	22	962	1,741	132,259
Infura	USA	Private	Engineers/BD	15	1,187	19,600	28,096
Lukka	USA	\$100,000,000	Engineers	80	2,188	2,754	294,570
Quicknode	USA	\$5,849,988	TS Engineer	10	391	6,669	122,525

(A) Alexa.com/siteinfo (As of 6/21/21) - Alexa Rank is an estimate of this site's popularity; it is calculated using a combination of average daily site visitors and pageviews over the past 3 months.

70% of infrastructure providers are based in the United States and have publicly disclosed venture funding. The total amount of funding raised between those 7 firms is about \$278.6 million with an average of \$39.8 million per company. Alchemy (\$98.9 million) and Lukka (\$100 million) are by far the largest funded companies of the group, representing almost 72% of the total funding. Blockset is the third-largest by fundraising, making up about 20% of the capital pool.

As one might expect, the top hiring needs among infrastructure providers are developers and engineers. Blockset, Blockdaemon and Lukka are the top three employers, hiring about 61% of the 285 employees in our sample set. Among infrastructure providers, the average number of employees per firm is about 29 people.

When it comes to online metrics, Alchemy, Blockdaemon, Bloq and Lukka have the most followers on LinkedIn, accounting for about 74% of the total followers from our sample set. LinkedIn has a professional audience and we believe that the follower numbers are more organic

Part I: Infrastructure

on that site versus other social networks, where firms are incentivized to juice follower counts with ad dollars. As for Twitter popularity, Alchemy and Infura dominate follower counts, making up about 47% of the total Twitter followers from our sample set. The social media statistics align with our analysis of Infura and Alchemy as two of the most recognizable brands in the infrastructure space to date.

Lastly, according to Alexa data, BlockCypher and Blockchair have the highest web traffic among the sample set. This likely speaks to the sheer popularity of block explorers within the digital assets ecosystem. Infura, Quicknode and Alchemy have the best web traffic among NaaS providers.

Business Strategy and Pricing

Table 2 displays the target client, business model and monthly pricing for infrastructure providers in our sample set.

TABLE 2	BUSINESS MODEL				MONTHLY PRICING		TARGET CLIENT	
FIRM	SAAS	SLIDING SCALE	FREE TIER	PAID TIER	LOWEST PRICE/MONTH	HIGHEST PRICE/MONTH	DEVELOPER	ENTERPRISE
Alchemy	✓	✓	✓	N/A	\$49	Custom	✓	✓
Blockchair	×	✓	✓	8	\$25	\$1,000	✓	✓
Blockcypher	✓	×	✓	7	\$100	\$2,600	✓	✓
Blockdaemon	✓	✓	✓	3	\$15	Custom	✓	✓
Blockset	✓	✓	✓	N/A	N/A	\$100,000	✓	✓
Bloq	✓	×	✓	5	\$4	\$6,000	✓	✓
Crypto APIs	✓	✓	✓	5	\$99	Custom	✓	✓
Infura	✓	×	✓	4	\$50	\$1,000	✓	✓
Lukka	✓	✓	✓	N/A	Custom	Custom	✓	✓
Quicknode	✓	✓	×	4	\$9	\$300	✓	✓

The most popular business model utilized by infrastructure providers is a Software-as-a-Service (SaaS), where clients are charged on a monthly basis to access infrastructure services. 90% of firms in our sample set use the SaaS model, while 70% also offer a sliding scale. Sliding scale business models charge clients based on usage, which is typically measured via API data calls.

Every firm, except Lukka has a free tier, which is the top of the sales funnels to entice prospective customers to check out the paid offerings. On

Part I: Infrastructure

average, firms offer five pricing tiers for their paid products with prices ranging from \$4 per month to \$100,000 per month. All firms in our infrastructure sample set target both developer and enterprise clients.

Product Suite and Feature Set

Table 3 shows node-related information and client tools offered by the infrastructure providers in our sample set.

TABLE 3	NODES				CLIENT TOOLS				
FIRM	SHARED	DEDICATED	BLOCKCHAIN AGNOSTIC	SUPPORTED NETWORKS	REST API	SDK	WEBSOCKET	JSON-RPC	DASHBOARD
Alchemy	✓	✓	✓	3	✓	✓	✓	✓	✓
Blockchair	✓	✓	✓	17	✓	×	×	✓	✓
Blockcypher	✓	×	✓	3	✓	✓	✓	✓	✓
Blockdaemon	✓	✓	✓	40	✓	✓	✓	✓	✓
Blockset	✓	✓	✓	7	✓	✓	✓	✓	×
Bloq	✓	✓	✓	6	✓	✓	✓	✓	✓
Crypto APIs	✓	N/A	✓	10	✓	✓	✓	×	✓
Infura	✓	×	×	2	✓	×	✓	✓	✓
Lukka	✓	✓	✓	10+	✓	×	✓	×	✓
Quicknode	✓	✓	✓	6	✓	×	✓	✓	✓

Shared node services – through which clients pull blockchain data from a cluster of nodes – is a fundamental service among infrastructure providers; every firm in our blockchain infrastructure sample set offers shared nodes. Additionally, 70% of firms offer dedicated node services, in which providers deploy exclusive nodes to be used by each individual client.

90% of providers are blockchain agnostic, offering support for multiple networks. Infura is the only company from our sample set that has restricted network support. By design, Infura only offers services to Ethereum and Ethereum-compatible networks such as IPFS and Chainlink. Unsurprisingly, Infura is owned by ConsenSys, the Ethereum-focused venture studio. On average, blockchain agnostic firms offer support for over ten networks.



Part II: Staking

Part II: Staking

Map 3



New to this year's report is the staking section, which highlights staking providers and servicing firms within the digital assets ecosystem. Staking providers are blockchain-as-a-service companies that offer solutions allowing crypto token holders to earn a yield on their digital assets.

Staking can be viewed as an extension of blockchain infrastructure, and it is now big business. According to Staked's *The State of Staking* Q2 report, the total market capitalization of this segment reached \$450 billion in April 2021 from \$179 billion in January of this year.¹⁸ 151% quarter over quarter growth has blockchain protocol teams, exchanges, and investors wondering how they can earn a piece of the staking pie.

The firms and infrastructure discussed in this section are among those making it happen.

Staking Infrastructure

Bison Trails created the staking infrastructure gold standard. So much so that the company was acquired by Coinbase in January of 2021.¹⁹

Staking infrastructure requires the same core components as the blockchain infrastructure covered in the previous section. Nodes, specialized software, cloud storage, hardware, etc. are all necessary components for proof of stake (POS) networks. Staking-as-a-service (SaaS) providers build infrastructure, maintain nodes and offer developer tools that make POS blockchains more widely accessible

¹⁸ [The State of Staking Q2 2021](#)

¹⁹ [We're joining Coinbase! — Bison Trails](#)

Part II: Staking

to devs and users.

Designs and system architectures vary across POS blockchain networks. The software (client) that executes functionality can be written in multiple programming languages and different implementations can exist. There are also four types of nodes that underpin proof of stake blockchains.

According to Bison Trails²⁰, these 4 node types include:

1. Participation Nodes:

- a. Are the basic building block of proof of stake networks
- b. Validate transactions and create blocks, and, in return for executing this work, earn block rewards
- c. Lock a set amount of value that is “staked” in order for the node to become an active participant, or validator, on the network
- d. Produce useful work on-chain in exchange for rewards once active

2. Read/Write Nodes:

- a. Verify transactions
- b. Obtain information about transactions (query)
- c. Write data such as transfers or smart contract interactions (transactions) to the chain

3. Sentry (Proxy) Nodes:

- a. Stand between a participation node and the blockchain, allowing the participation node to complete its function while staying private and hidden from the public internet
- b. Function to protect the participation node from attacks by creating an extra barrier between the public internet and the participation node

4. Relay Nodes:

- a. Serve as hubs for the network’s peer to peer (or node to node) communication layer
- b. Connect to a participation node and maintain connections to many other nodes in order to reduce transmission time by maintaining open, efficient communication paths

In addition to being well versed in the 4 main types of nodes and the interactions between them, POS network engineering requires familiarity with clusters. A cluster refers to network-specific nodes or a

²⁰ [What is blockchain infrastructure? — Bison Trails](#)

Part II: Staking

group of nodes, and their supporting infrastructure. Supporting tools assist with load balancing, network monitoring and alert services, which are crucial to POS blockchain security and access control.

According to Bison Trails²¹, node clusters offer:

1. Load Balancing:

- a. Distributes traffic across multiple servers to improve node responsiveness
- b. Ensures no single server bears an inordinate amount of network demand

2. Failover Protection:

- a. Ensures a node does not experience extended downtime if the system it runs on goes out of commission
- b. Can differ in form, depending upon whether a node is cloud- or hardware-based
- c. Is enhanced when multi-regional and distributed across cloud providers

3. Monitoring and Alerting Services:

- a. Ensure that nodes are healthy and participating optimally in the network
- b. Closely track uptime to ensure all nodes are reliable, stable, connected to the protocol, and able to access data

4. Container Services:

- a. Enable mass actions within a cluster
- b. Allow apps and their packages to be formatted for version control
- c. Help maintain multiple clusters and support blockchain client APIs

Staking-as-a-Service infrastructure providers allow users to participate in staking without having to build and preserve the data warehouses, servers and other hardware components necessary to stay continually connected to POS blockchain networks. Further, the technical skills and software necessary to safely connect to these chains require continual adaptation.

There are a plethora of POS protocols in existence already, with more sprouting up each day. According to Staked's *The State of Staking Q2* report, 26 of these protocols were in the top 100 by market cap, many

²¹ [What is blockchain infrastructure? — Bison Trails](#)

Part II: Staking

thanks to the emergence of decentralized finance (DeFi). These protocols often have different governance mechanisms, algorithms and application links, which is a technical barrier for non-specialists. SaaS infrastructure providers take care of these back-end requirements, bridging the gap between POS blockchain networks and users, such as token holders, developers, and businesses that offer other staking products and services.

Staking Operations

When starting a staking company, there are two major components: the technical side and the business side.

From the technical side, you need DevOps resources and structure. Engineers need to be familiar with computer networks, infrastructure, servers, AWS and blockchain nodes. Staking companies are essentially glorified information technology (IT) companies. For instance, about 67% of a staking provider's costs and resources go to setting up servers and nodes, paying server costs and bills from AWS and Google. Headcount is split 70/30, with about 70% of employees on the engineering side and 30% on the business & operations side.

Security is a critical component as well. Security for running the node infrastructure, key management software and the monitoring/alert tools to be on top of the state of each network. These components help ensure that uptime and attestation rates are good, where POS network participants are randomly called upon to transfer information and participate in the consensus process.

There are two ways that staking providers go about adding new networks to their platforms.

The first approach, which is the most popular, is client relationship-based. Clients who are oftentimes investors will communicate that they invested in a certain protocol and that they are looking to add staking services for that network. Staking providers keep a long list of what projects their customers invested in and keep in mind how

Part II: Staking

they will eventually add staking support to that network once possible. Alternatively, staking providers are approached by project teams. These teams reveal that their networks are looking to go live soon and that they need a provider to assist them with setting up staking infrastructure. Staking providers are more critical of this approach because they need to have a minimum guarantee from the protocol teams to cover the costs of running nodes and developmental resources.

The timeframe for launching staking support depends on the project's phases, which can vary from protocol to protocol. Protocols generally have a testnet, but some have incentivized testnets, where staking support can be needed before the network goes live via mainnet. There's usually an initial discussion 6-12 months before the mainnet launches.

Between initial discussion and mainnet launch, the providers run testnets and casually keep in touch with project teams. There are system upgrades along the way and there might be some incentives to help the protocol perform certain tasks during the testing phases. Then about a month before there is a concrete mainnet timeline, the staking provider reaches out to all of their investors and ensures that the infrastructure will be ready for the mainnet launch date. If a provider is really motivated, they can get a node cluster setup within a couple of weeks.

From a net income perspective, once there's enough momentum around the network, staking providers don't typically require protocol teams to continue paying them. This is because the costs of running that particular project are covered by the staking revenue. Although staking providers offer services to retail digital asset holders, the majority of staking revenue comes from institutions, such as digital asset funds, exchanges, custodians, etc.

One can draw parallels between a staking provider's business model from a revenue standpoint to that of a financial manager in traditional financial services. Money managers generate fees from assets under management (AUM), while staking providers receive a percentage of the total number of assets staked to their platform or

Part II: Staking

the value staked. However, it should be noted that staking providers don't take custody of the assets staked, as the activity is done on-chain. Similar to asset managers in traditional finance, staking providers have relationships with custodians, such as Fireblocks and BitGo, who secure institutions' digital assets for staking. Ultimately, the staking has to be done from the wallet that is holding the asset.

Firm Comparison

Staking Providers and Related Companies

Table 4 displays important metrics from top staking providers and staking related companies. It should be noted that this is not an exhaustive list of all staking companies, rather these are firms that The Block Research finds interesting from a staking perspective, and worth highlighting for this report.

TABLE 4	OPERATION				ONLINE METRICS (6/21)			STAKING METRICS			
FIRM	HQ	FUNDING	TOP HIRING AREA	EMPLOYEES	LI FOLLOWERS	TWITTER FOLLOWERS	ALEXA RANK (A)	SUPPORTED PROTOCOLS (B)	COMING SOON (B)	STAKED VALUE (C)	USERS (D)
B-Harvest	South Korea	Private	Engineers/DeFi Research	4	31	2,535	618,601	12	N/A	\$219,483,496	1,199
Bison Trails	USA	Acquired	Engineers/Marketing	70	1,148	7,086	181,350	21	7	\$422,098,285	802
Blockdaemon	USA	\$11,870,000	Engineers	43	2,142	3,201	209,538	22	N/A	\$230,608,366	724
Certus One	USA	Private	N/A	3	68	2,357	736,096	6	N/A	\$293,949,229	597
ChorusOne	Switzerland	Private	Engineers	14	324	5,860	480,092	22	8	\$750,699,180	3,208
Dokia Capital	Romania	N/A	N/A	5	135	2,260	1,698,139	6	6	\$533,284,167	1,943
Everstake	Ukraine	Private	Engineers	17	145	7,806	309,695	28	4	\$1,268,744,916	231,100
Figment Networks	Canada	\$5,000,000	Engineers	34	333	5,982	162,353	30	2	\$385,546,759	5,677
HashQuark	Hong Kong	\$2,000,000	N/A	1	38	1,147	1,024,661	41	3	\$175,789,617	Unknown
p2p.org	UK	Private	N/A	23	242	3,989	435,308	22	8	\$834,212,679	17,095
Radar	USA	\$13,300,000	Engineers	23	884	17,400	256,488	N/A	N/A	N/A	N/A
Stake Fish	South Korea	N/A	Engineers/Strategy	19	716	6,880	172,283	22	4	\$445,985,208	8,902
Staked	USA	\$5,000,000	Engineers	17	532	6,422	113,232	28	3	\$634,299,602	12,542
Staking Facilities	Germany	Private	Engineers/Marketing	8	518	3,288	486,116	10	3	\$477,695,938	2,257
Staking Fund	N/A	Private	N/A	N/A	N/A	230	2,272,256	5	N/A	\$184,151,919	528

(A) Alexa.com/siteinfo (As of 6/21/21) - Alexa Rank is an estimate of this site's popularity; it is calculated using a combination of average daily site visitors and pageviews over the past 3 months.

(B) Based on Providers Website (As of 6/21/21)

(C) StakingRewards.com/providers (As of 6/21/21)

(D) Staking Rewards.com/providers (As of 6/21/21). - Users is the total number of unique on-chain delegators across all supported networks.

The majority of companies within Table 4 are staking infrastructure companies or staking service providers. Firms such as Staked, Bison Trails, Figment Networks, Chorus One, Stake Fish, Everstake, p2p.org, Staking Facilities, HashQuark, Certus One, Dokia Capital, Staking Fund

Part II: Staking

and B-Harvest have built their businesses around staking entirely. Blockdaemon, which is also listed in the infrastructure section as a Nodes-as-a-Service provider, additionally supports POS networks with another part of its business. Since Blockdaemon has owned nodes and one of the more sophisticated pieces of NaaS infrastructure, its computing power can also be used for staking. With the explosion in staking over the past few years and the commoditization of selling nodes, those that can do both like Blockdaemon are able to capture low-hanging fruit from a revenue standpoint.

Lastly, RADAR falls into a staking classification of its own. As noted in the infrastructure section, RADAR used to provide blockchain infrastructure but it pivoted toward staking; its knowledge, expertise, and computing hardware have proven to be dynamic resources from a business strategy mobility standpoint. So, what exactly does RADAR do now?

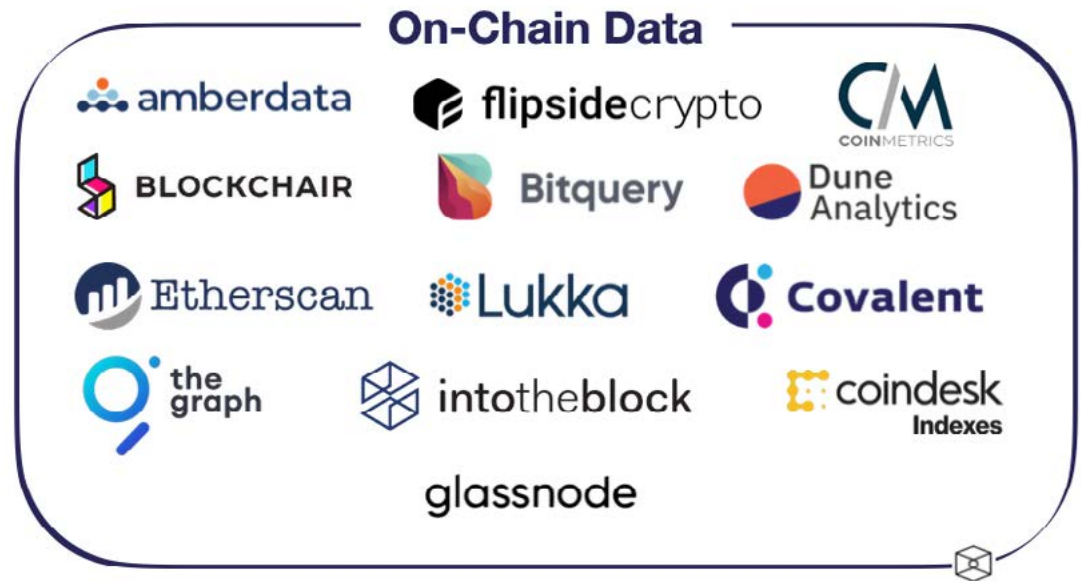
RADAR offers bespoke staking solutions, something referred to internally as “Active Participation.” They are a professional liquidity and infrastructure partner that works directly with blockchain networks and protocols across their lifecycle, while also helping them go to market for staking. RADAR’s concierge white-glove service is a very unique business model, and from what we are told it’s shockingly lucrative.



Part 3: On-chain Metrics

Part III: On-chain Metrics

Map 4



As mentioned in the introduction, data produced by a blockchain is theoretically publicly accessible, but procuring actionable insights from that data requires additional work; raw data must be extracted, parsed, and cleansed from protocols using nodes. On-chain metrics providers offer services that convert raw and unorganized blockchain data into user-friendly and digestible information. Most firms use algorithmic strategies to aggregate and synthesize data into metrics such as transaction counts, exchange flows, and value settled.

On-chain data firms do a lot of low-level work. They run their own nodes internally and are highly reliant on DevOps engineers. Instead of exposing the nodes to customers, like infrastructure providers, they're providing organized data and even tailored insights to clients. Some firms allow customers to access organized data through their API, which means that the client doesn't need to handle the back-end work. Others might provide the client with a SQL database or give them access to a Google BigQuery, which lets them interface with the data as they see fit.

On-chain data teams are slightly smaller than infrastructure teams, but they're still quite expensive. Other operating costs can be high as well, with node maintenance, data storage and network upgrades making up the bulk. On the lower end of the cost spectrum, annual server expenses are in the tens of thousands of dollars. According

to interview participants, providers with a wider range of blockchain coverage and associated feature sets can have server costs in the mid-six figure range per year.

Block Explorers

Block explorers are one of the most basic types of on-chain metric tools. However, depending upon the context, block explorers may also fall into the infrastructure category.

Block explorers are graphical user interfaces (GUIs) that visually display blockchain data for users; one can think of them as internet browsers for blockchains. With a block explorer, users can track transactions, fees, specific addresses, blocks, and mempool activity, amongst other activities. However, similar to creating node infrastructure and digital asset wallets, building a block explorer from scratch is a tall task for most.

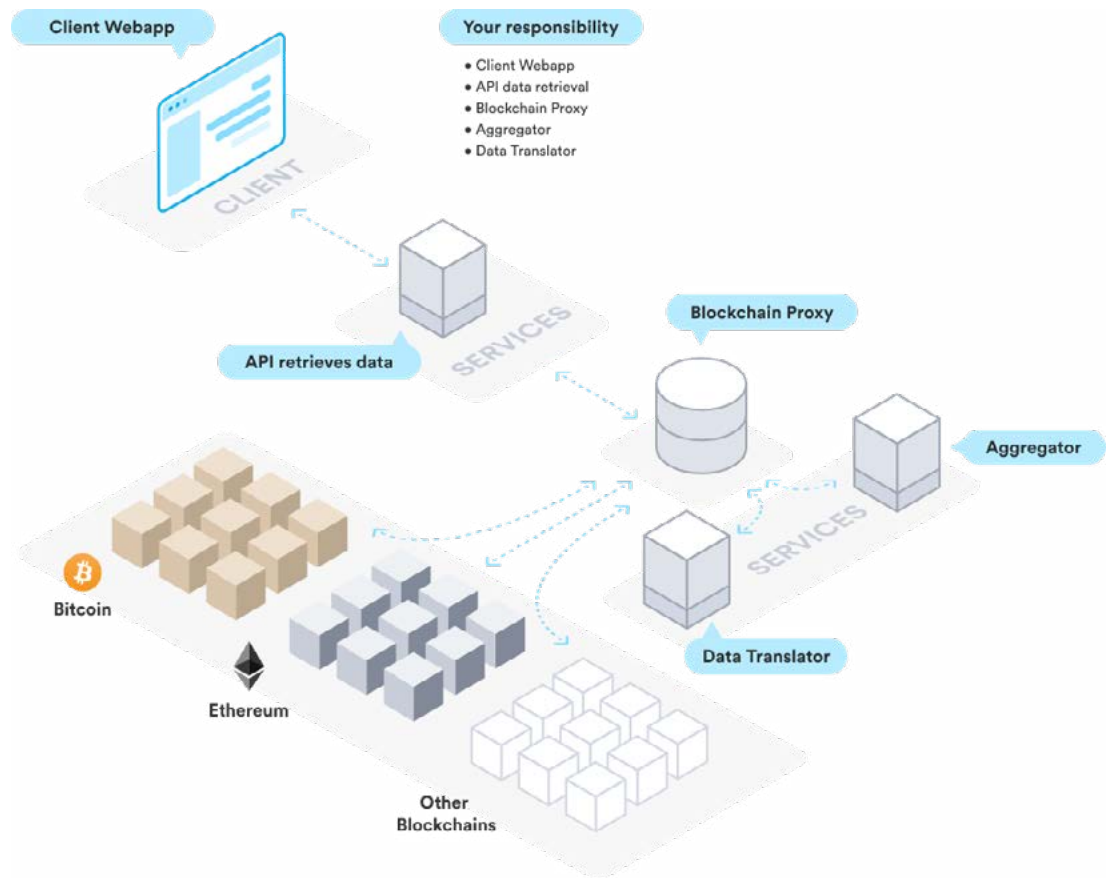
Yet again bulk cloud storage is needed, developers to set up and oversee each node for each specific blockchain, indexing tools for said DevOps personnel, aggregation and translation services, among other technical areas requiring attention. Furthermore, custom APIs are required to standardize and transport blockchain data from custom databases into web clients.

Graphic 3 from Blockset's block explorer developer documentation²² illustrates back-end requirements for accessing each digital asset using a block explorer.

²² [Block Explorer - Developer Documentation](#)

Part III: On-chain Metrics

Graphic 3



According to Blockset, in order to develop a block explorer, one would need to:

1. Build out and manage their own cluster of blockchain nodes.
2. Develop a Blockchain proxy service that would be responsible for retrieving the raw data off those nodes.
 - Requiring specialized devOps and backup nodes
 - Dozens of functions
 - With messy, low-level data
3. Build a Data Aggregator to take in that data into their own custom database.
 - Need to constantly update and refresh their database to new blockchain reorganizations
 - Find a solution for dealing with "stale blocks"
4. Build a Data Translator in order to wrangle, refactor, and format the messy data into something that's more usable for business logic and web services.

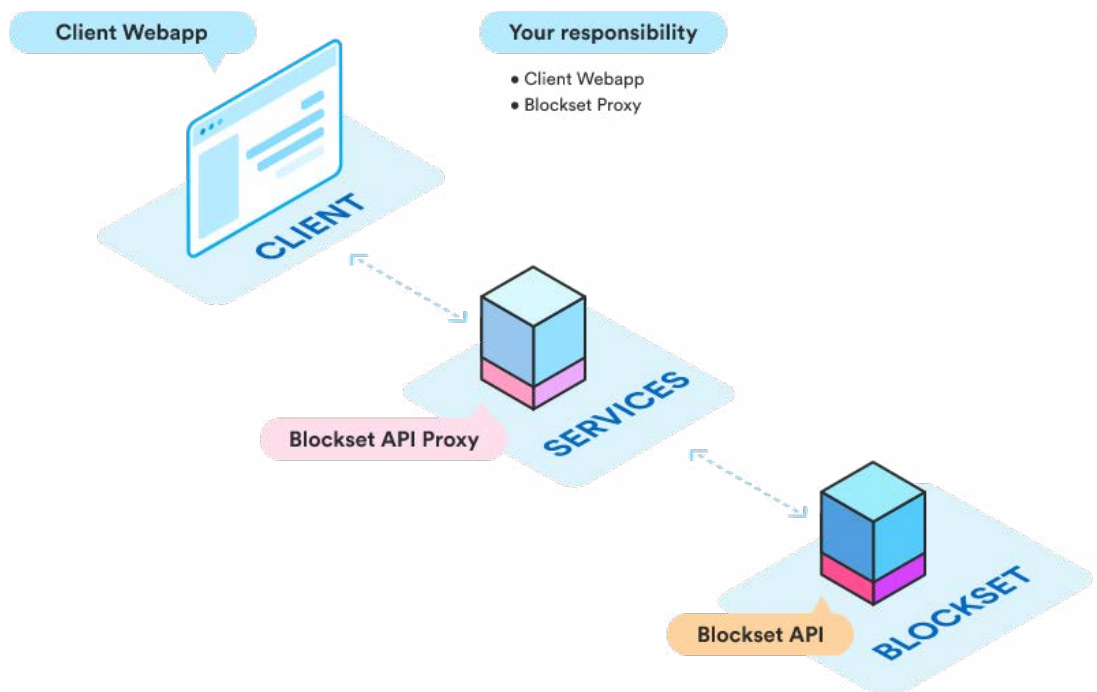
Part III: On-chain Metrics

5. Build a custom API to pull data from the Database in order to populate the web client.
6. Create custom services for any unique features desired (such as indexes for getting address balances).
7. Connect to third-party services for blockchain analytics and market prices.
8. Design and Develop the front-end Web Client for the Block Explorer GUI.

On-chain metrics firms with block explorers cover all of the back-end development work and build the infrastructure necessary to seamlessly interface with blockchains. Using a software layer, users can examine, trace, and analyze digital assets data from one simple GUI. Each block explorer has its own unique design and proprietary architecture, but the end results are essentially the same.

Graphic 4 from Blockset's block explorer developer documentation²³ illustrates how technical requirements for block explorers can be minimized with on-chain metrics firms.

Graphic 4



²³ [Block Explorer - Developer Documentation](#)

Part III: On-chain Metrics

According to Blockset, a client using a block explorer would only need to:

1. Build a small server that houses your own business logic and talks to the on-chain metric provider's API to receive application-ready blockchain data.
2. Create any custom services or features desired for their project.
3. Design and Develop the front-end Web Client for the Block Explorer GUI.

Readers should note that this is not an assessment or endorsement of Blockset's block explorer. We just found the illustrative example useful for conceptually understanding how an on-chain metrics provider can streamline the requirements and steps necessary to use a block explorer.

Like we noted at the beginning of this section, firms providing block explorers can fall into the on-chain metrics segment or blockchain infrastructure category. Classification is mostly dependent upon their other offerings. We find it best to classify BlockSet as infrastructure since its block explorer is mostly used by enterprises in conjunction with its product suite for wallets and custodian solutions. BlockCypher is also in the infrastructure bucket since it has other products for businesses, developers and miners.

As for the on-chain metrics providers with block explorers, we include Etherscan, Blockchair, Coindesk Indexes (formerly Trade-Block) and Coin Metrics. Readers should note that this list is not exhaustive and that other firms have block explorers, but they were not included in our sample set.

Of the firms in our on-chain metrics provider sample set, Etherscan and Blockchair best fit in the block explorer category. These firms are known for their block explorers and have built most of their business around that offering to date. However, as shown in the Infrastructure section, Blockchair is now offering an API that functions as an infrastructure-as-a-service for many wallets, exchanges, and

Part III: On-chain Metrics

(national) research agencies. So, Blockchair is pushing to diversify its business lines outside of its primary block explorer offering.

Alternatively, Coindesk Indexes (formerly TradeBlock) and Coin Metrics have other significant lines of business and services, which better overlap in other areas of on-chain metrics and market data. These firms just so happen to offer a block explorer alongside their other lines of business.

Block explorers mainly target retail, developer and blockchain enthusiasts clientele. Alexa rankings from Table 5 in the firm comparison section show how popular block explorers are among online user traffic worldwide; Etherscan and Blockchair have the best Alexa rankings among the on-chain metrics providers in our sample set. Readers should note that our on-chain metrics sample set didn't include Blockchain.com, which operates one of the largest and most popular block explorers. Although we didn't cover Blockchain.com, we find it necessary to give them an honorary mention.

Like infrastructure providers, it's also challenging to subcategorize on-chain metrics providers. This is mostly due to the evolution of the on-chain metrics segment over the past several years.

As mentioned in the inception and evolution of digital assets section at the beginning of this report, early on-chain metrics firms mainly focused on the aggregation of blockchain data. This type of activity soon became commoditized as more firms gained a greater understanding of how blockchain data worked. Over time, on-chain data companies realized what they were specifically good at doing. If there was a demand for their services, then specialized niches would emerge. As such, firms in the on-chain metrics category aren't necessarily all competitors; they just fulfill different needs of clients within the digital assets ecosystem.

Flipside Crypto and Glassnode are perfect examples of on-chain data companies forming organically by serving a market need. We classify both firms under blockchain analytics.

Blockchain Analytics

Flipside Crypto (Flipside) initially started out as a cryptocurrency fund. The firm's co-founders, a technologist and data scientist, had an advantage trading with algorithms that could extract data from blockchains. Their early models could understand blockchain user behaviors, allowing the fund to identify in real-time what was an investor, decentralized applications (dApps), miner, block reward, exchange, etc. Over time, protocol teams started reaching out to Flipside to understand their method for identifying blockchain users.

Flipside views itself as 'Google Analytics for blockchains.' Blockchain protocols work with them to better understand what their users are doing. Flipside uses its models to extract blockchain data and provide a series of analytics, via API or visual dashboard, that helps protocol teams better operate their business. The evolutionary part of Flipside's business model revolves around opening up the data layers of blockchains for crypto community members to experiment and build applications on top of the protocols. Open source network effects create sustainable online ecosystems by compounding user knowledge and resources.

In a similar vein to Flipside Crypto, two of Glassnode's three co-founders, both mechanical engineers, also ran a crypto fund before starting their on-chain data company; the third co-founder is a neuroscientist by training. Clients include high net worth retail investors and institutions from digital assets and traditional finance, with revenues being split about 50/50 between both sides. However, institutional demand is growing rapidly.

Glassnode uses data science and machine learning to analyze blockchain data, distilling transactional data into market intelligence. With an emphasis on user-centric interfaces, the firm builds applications that help investors make educated decisions based on insights directly from the blockchains. Informed investor decisions are also at the heart of IntoTheBlock.

IntoTheBlock is a data science company that uses AI-backed research to provide actionable intelligence for the digital assets market. The firm's platform uses advanced statistics and machine learning techniques to enable investors to make informed decisions using its 50+ indicators; these indicators span 6 different categories, including financial, ownership, network, order-book, social, and derivatives.

IntoTheBlock's business is split between several thousand retail subscribers and its institutional clientele. Retail subscriptions doubled over the past quarter and the institutional side grew even faster. IntoTheBlock's quantitative strategies division provides investment funds seeking alpha with strategies – arbitrage, high-frequency trading (HFT), yield farming, etc. – in both centralized finance (CeFi) and DeFi markets.

Dune Analytics (Dune) allows anyone to analyze, visualize and share blockchain data. The product is built for the community with openness and collaboration at the core. Instead of starting from scratch, you started from what tens of thousands of community members have already created, bringing the open finance dynamic of composability to the data layer. Users query human-readable smart contract data with SQL. Developers and digital assets enthusiasts often turn to Dune as the go-to source for understanding Ethereum ecosystem activity. To date, Dune Analytics provides network data for Ethereum and xDAI, however, readers should note that the firm plans to soon offer support for two additional networks.

As the Bitquery team likes to say “In our Data-Driven world, API is the law,” and their blockchain data company strictly adheres to that covenant using on-chain data, which they consider to be the ground truth. Reminiscent to Quicknode's blockchain infrastructure team, Bitquery was co-founded by software engineers, both of which have over 20 years of experience with legacy networks and market data. Successful exits are a part of their history as well, with one co-founder having sold a microdata company to Dow Jones in the early 2000s, after which he built and sold a fixed-mobile convergence system to Blackberry.

The core Bitquery team linked up in 2016; they started out in the digital assets industry doing smart contract audits, a service that was highly in demand during the ICO era. After auditing over \$1 billion in digital assets smart contracts by 2018, the Bitquery team came up with the idea to build Bloxy, its first blockchain analytics product. Bloxy sought to solve the inconvenient truth around blockchains; pulling on-chain data is challenging and it requires an engineering mindset, computation power, and the infrastructure covered earlier in this report.

Bloxy is the predecessor of Bitquery's current array of software products that parse, index, and warehouse on-chain data in a concerted way via APIs. These APIs offer solutions across multiple digital assets verticals, including Decentralized exchange (DEX) trading, DeFi lending and borrowing, blockchain surveillance and forensics, among others. Bitquery's GraphQL API interface draws parallels to another blockchain analytics company, The Graph.

The Graph is developing a distributed hosted service protocol that will allow others to build dApps on the Ethereum blockchain and the Interplanetary File System (IPFS), a P2P storage network. With GraphQL and their company platform, users can query blockchains to index data from smart contracts, uncover novel data sources for dApps, and create their own applications by traversing and joining on-chain data.

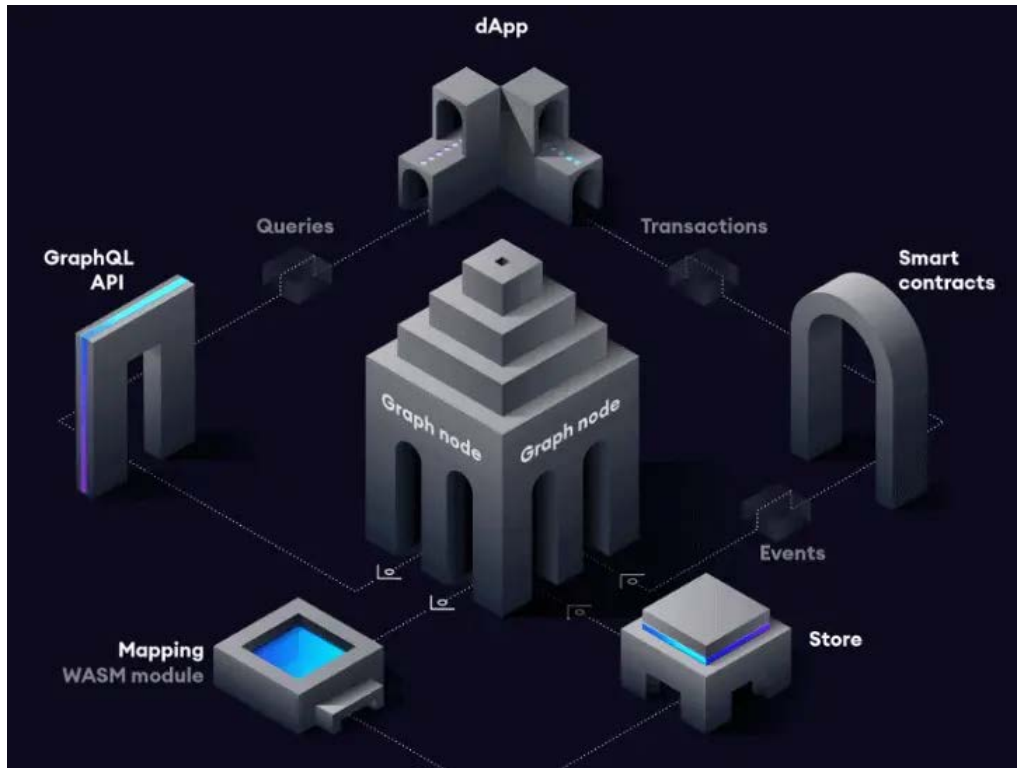
So, both Bitquery and The Graph use the open-source data query and manipulation language, GraphQL, to allow users to flexibly pull on-chain data from blockchain networks. Each company strives to minimize blockchain infrastructure costs for the end-users, where they are only charged based on usage.

One of the biggest differences between Bitquery and The Graph is seen in system architecture. Graphic 5 from The Graph's developer documentation²⁴ illustrates its decentralized design.

²⁴ [How The Graph Works - Developer Documentation](#)

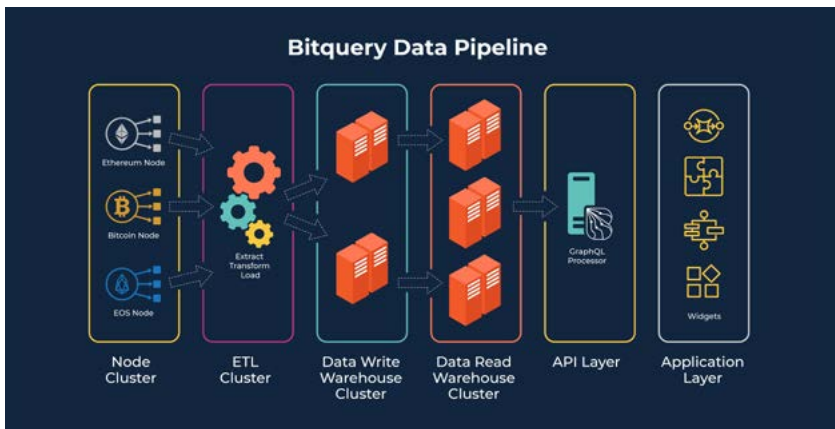
Part III: On-chain Metrics

Graphic 5



The Graph's decentralization relies on a mass of indexers and curators. Indexers power Graph nodes and are responsible for storing and indexing Subgraph data. Curators assist with verifying the integrity of data and signal other needed subgraphs. This architecture allows The Graph to be a decentralized caching layer for accessing Ethereum and IPFS data.

Graphic 6



Alternatively, Bitquery's architecture sacrifices decentralization for increased processing power and developer experience.

Graphic 6 from Bitquery's blog²⁵ illustrates its more centralized design.

Bitquery's centralized servers have the capability to process over 160 terabytes of blockchain data from

30+ networks. Its client tools let users examine, evaluate, and digest on-chain data in a fast and efficient manner.

²⁵ [Bitquery Architecture - Solving Blockchain Data Problems](#)

Part III: On-chain Metrics

Each system architecture has its strengths and weaknesses, and we hold that they should be viewed as complementary within the digital assets ecosystem.

We round out the blockchain analytics section with Coindesk Indexes (formerly TradeBlock) and Coin Metrics, both of which are also highlighted in the market data category. Additionally, they were mentioned above in the block explorer segment, but we find that the on-chain metrics portion of their businesses is more aptly categorized as blockchain analytics.

The majority of Coindesk Indexes' products are built around market data, which is the firm's bread and butter. Despite that, we include Coindesk Indexes here since its proprietary analytics tools provide institutions with insights into blockchain networks, in the form of reports and custom datasets.

Coin Metrics is a data aggregation platform that brings together fundamental blockchain network data and digital assets market data under one roof. The company is the most diverse from an offering standpoint out of all the companies mentioned in this report, which is even more impressive given the level of execution by Coin Metrics across each category.

Coin Metrics started as the passion project of a digital assets industry wunderkind working on his master's thesis; he wanted to study the economic behaviors of public blockchain networks, but couldn't find any reliable data. After finding a talented developer to run nodes and create parsing tools to extract on-chain data, these eventual co-founders were able to better understand blockchain network activity.

Coin Metrics later expanded into digital assets market data, which we will discuss further in the market data section of this report. As for on-chain data, Coin Metrics is extremely thorough in its collection process and takes pride in the resiliency of its back-end infrastructure. For example, the company runs three Bitcoin nodes, three Litecoin nodes, and three Ethereum nodes. At any moment, at least two nodes are constantly collecting data and transferring it to one of its two data centers in different areas of the world. These almost

pedantic processes are all in an effort to one day become the most trusted on-chain data provider for financial institutions when they eventually become serious about entering the digital assets ecosystem.

General On-Chain Data & APIs

We conclude the on-chain metrics companies with a more generalized subsection for firms that offer blockchain data through API solutions. Although the majority of companies in this section have APIs for client tools, we find it necessary to separate three firms in this generalized category: Amberdata, Covalent and Lukka.

Amberdata, which is also featured in the market data section, built a cloud-based platform designed to offer blockchain data to enterprises. Its SaaS platform aggregates node data from validated blockchains and delivers it cleanly to clients via its online dashboard and API. Amberdata's metrics provide insights into blockchain network health, on-chain transactions, dApps, and token usage. These metrics help clients build their own applications.

Covalent burst onto the digital assets scene after its development team won a distributed systems hackathon in 2017. The firm's single, unified API can be used to pull on-chain data, such as wallet balances, token positions and transaction activity, across seven blockchain networks. Covalent differentiates itself by fully indexing entire blockchains, including every transaction, wallet address and smart contract executed on each network. Notable backers include Binance Labs, Coinbase Ventures and Alameda Research, among others.

Lukka is the first and only company to run nodes in an AICPA SOC 1 Type II and SOC 2 Type II infrastructure, allowing the firm to provide on-chain metrics with the same institutional-quality standards. Lukka's enterprise customers benefit from a warehouse of on-chain data of which can be delivered via custom build reports and dashboards, their enterprise software interface, or API. Lukka runs nodes on more than 10 blockchains, providing aggregated metrics specific to those blockchains as well as organized decentralized exchange (DEX) and DeFi activity. Lukka's enterprise customers leverage an expansive library of on-chain metrics to build custom solutions to meet the

needs of their business and integrate that data with the company's wider enterprise offerings.

Firm Comparison

Operations

Table 5 shows operational data and online metrics for the on-chain metrics providers covered in our sample set.

TABLE 5	OPERATION					ONLINE METRICS (6/21)		
FIRM	HQ	FUNDING	ESTABLISHED	TOP HIRING NEED	EMPLOYEES	LI FOLLOWERS	TWITTER FOLLOWERS	ALEXA RANK (A)
Amberdata	USA	\$5,000,000	2017	N/A	12	352	2,069	517,167
Blockchair	Ireland	N/A	2016	Developers	6	174	7,244	8,222
Bitquery	USA	Private	2017	Devs/Engineers	10	148	2,611	30,854
Coin Metrics	USA	\$22,900,000	2017	Engineers	26	1,860	78,800	50,834
Covalent	Canada	\$15,600,000	2017	Developers	30	914	30,300	82,017
Dune Analytics	Norway	\$2,250,000	2018	Devs/Engineers	7	314	16,800	45,321
Etherscan	APAC	\$500,000	2016	Developers	8	71	47,800	846
Flipside Crypto	USA	\$14,500,000	2017	Engineers	30	1,110	8,394	65,350
Glassnode	Switzerland	Private	2017	DS, BE, FE	23	791	260,400	13,435
The Graph	USA	\$19,500,000	2018	Engineers/Content	40	4,540	111,900	34,317
CoinDesk Indexes (TradeBlock)	USA	Acquired	2013	Engineers	14	992	15,000	126,754
IntoTheBlock	USA	Private	2019	Engineers	16	1,502	15,700	29,449
Lukka	USA	\$100,000,000	2014	Engineers	80	2,188	2,754	294,570

(A) Alexa.com/siteinfo (As of 6/21/21) - Alexa Rank is an estimate of this site's popularity; it is calculated using a combination of average daily site visitors and pageviews over the past 3 months.

About 69% of on-chain metrics providers are based in North America and almost 62% have publicly disclosed venture funding. Coin Metrics, The Graph and Lukka are the three highest funded companies in this category. One firm, TradeBlock, was acquired thus far in 2021.

The top hiring needs among on-chain metrics providers are unsurprisingly developers and engineers. The Graph, Flipside Crypto, Covalent and Lukka are the top four employers, hiring almost 60% of the 302 employees in our sample set. Among on-chain metrics providers, the average number of employees per firm is about 23 people. When it comes to online metrics, The Graph, IntoTheBlock, Lukka and Coin Metrics have the most followers on LinkedIn, accounting for about

Part III: On-chain Metrics

67% of LinkedIn followers from our sample set. LinkedIn has a professional audience and we believe that the follower numbers are more organic on that site versus other social networks, where firms are incentivized to juice follower counts with ad dollars. As for Twitter popularity, Glassnode and The Graph dominate follower counts, making up almost 62% of the total Twitter followers from our sample set.

Lastly, according to Alexa data, Etherscan and Blockchair have the highest web traffic among the sample set. This likely speaks to the sheer popularity of block explorers within the digital assets ecosystem. Glassnode ranks third among web traffic, which is likely attributed to the large number of retail users that frequent the site to check crypto metrics during periods of high price appreciation, which we've seen over the past year.

Business Strategy and Pricing

Table 6 displays the target client, business model and monthly pricing for the on-chain metrics providers in our sample set.

TABLE 6 FIRM	TARGET CLIENT		BUSINESS MODEL						MONTHLY PRICING	
	RETAIL	ENTERPRISE	SAAS	SLIDING SCALE	CONSULTING	ADVERTISING	FREE TIER	PAID TIER	LOWEST	HIGHEST
Amberdata	×	✓	✓	✓	✓	×	✓	2	\$50	Per Size
Blockchair	✓	✓	×	✓	×	✓	✓	8	\$25	\$1,000
Bitquery	✓	✓	✓	✓	×	×	✓	5	\$250	\$2,000
Coin Metrics	✓	✓	✓	×	✓	×	✓	N/A	N/A	N/A
Covalent	×	✓	×	✓	×	×	✓	N/A	N/A	N/A
Dune Analytics	✓	✓	✓	×	×	×	✓	1	\$390	\$390
Etherscan	✓	×	×	×	×	×	✓	N/A	N/A	N/A
Flipside Crypto	×	✓	✓	×	×	×	✓	N/A	N/A	N/A
Glassnode	✓	✓	✓	×	×	×	✓	2	\$29	\$800
The Graph	✓	×	×	×	×	×	✓	N/A	N/A	N/A
CoinDesk Indexes (TradeBlock)	×	✓	✓	×	✓	×	×	1	N/A	N/A
IntoTheBlock	✓	✓	✓	×	×	×	✓	1	\$10	N/A
Lukka	×	✓	✓	✓	×	×	×	N/A	Custom	Custom

62% of on-chain metrics providers target retail clients, almost 85% target enterprise clients and about 46% target both. A bias toward enterprise clients shows that the digital assets industry is being further institutionalized.

Part III: On-chain Metrics

The most popular business model utilized by on-chain providers is a Software-as-a-Service model, in which clients are charged on a monthly basis to access the services provided. Firms also offer sliding scale business models, charging clients based on data usage, consulting services, and advertisement offerings.

Every firm except CoinDesk Indexes and Lukka has a free tier, which makes sense given that CoinDesk Indexes and Lukka only target enterprises. On average, firms offer three pricing tiers for their paid products with prices ranging from \$10 per month to \$2,000 per month. Compared to infrastructure providers, a lower percentage of on-chain metrics providers offer free tiers for users to test their products.

Similar to infrastructure providers, on-chain metrics providers are mainly focused on enterprises. However, unlike infrastructure firms, on-chain metrics providers primarily target investors and researchers instead of businesses that are building on blockchains.

Product Suite and Feature Set

Table 7 shows node-related information and client tools offered by the on-chain metrics providers in our sample set.

TABLE 7	NODES		CLIENT TOOLS				
FIRM	BLOCKCHAIN AGNOSTIC	SUPPORTED NETWORKS	REST API	WEBSOCKET	SQL	CSV	DASHBOARD
Amberdata	✓	10	✓	✓	×	✓	✓
Blockchair	✓	17	✓	×	✓	✓	✓
Bitquery	✓	30	✓	N/A	N/A	×	✓
Coin Metrics	✓	95	✓	✓	×	✓	✓
Covalent	✓	12	✓	✓	✓	✓	✓
Dune Analytics	✓	4	×	×	✓	✓	✓
Etherscan	×	1	✓	✓	×	✓	✓
Flipside Crypto	✓	30	✓	✓	✓	✓	✓
Glassnode	✓	10	✓	×	×	✓	✓
The Graph	✓	19	×	✓	×	×	×
CoinDesk Indexes (TradeBlock)	✓	10	✓	✓	×	✓	✓
IntoTheBlock	✓	16	✓	✓	×	✓	✓
Lukka	✓	10+	✓	✓	×	✓	✓

Part III: On-chain Metrics

About 92% of on-chain metrics providers are blockchain agonistic, providing data services for more than one blockchain network. On average, these firms offer support for about 21 blockchain networks. The most popular way on-chain metrics providers deliver their data is via a native dashboard, followed by CSV data downloads or REST API.



Part IV: Market Data

Part IV: Market Data

Map 5



Market data firms are integral to the digital assets ecosystem.

Unlike equity markets, where spot trading data comes from the NASDAQ and the NYSE and the majority of derivatives data comes from a handful of financial markets companies [Chicago Mercantile Exchange (CME) Group, Intercontinental Exchange (ICE) or Chicago Board Options Exchange (CBOE)], available market data in the digital assets ecosystem is fragmented across numerous digital asset exchanges and more recently DeFi protocols.

The original business model for market data firms involved buying data directly from exchanges. Data engineers would then ingest and organize said data into actionable information for clients, a process more commonly known as [extract, transform, load \(ETL\)](#) in general computing. Quite frankly, these companies look more like data science companies than crypto firms.

Market data issues mostly revolve around the lack of data standardization; having to deal with thousands of spreadsheets is not an uncommon occurrence. Scattered datasets require skilled practitioners for data collection, computing infrastructure to transport and store market data, and computation-intensive resources for heavy data processing.

As discussed in previous sections, computing equipment and data scientist's salaries can be quite expensive; one industry expert estimated that spending \$200k per month on a team of about 10 is normal. However, these practitioners are necessary, as they come up

with proprietary methods for drawing, collecting, and scrubbing digital assets market data from exchanges to ultimately convert it into a usable format.

Last year, The Block Research identified at least 20 legitimate digital asset exchanges²⁶ – some global and some regional – that have real volume and sufficient liquidity to make them worth tracking. Each digital asset exchange has its own set of APIs with different degrees of documentation, which requires the data to be normalized and pre-processed to make it comparable across exchanges. The distribution of rate limits across digital asset exchanges is also highly variable.

Digital asset exchanges, particularly those focusing on retail clients, typically distribute market data openly through representational state transfer (REST) and websocket APIs; this data is mostly historical trade data. We will further discuss historical trade data and other types of market data in the digital assets market data categories section below.

Market participants primarily seek digital assets market data providers for a few reasons. The first is to aggregate different exchange APIs into one comprehensive API for collecting their own data. Alternatively, clients may also seek access to sets of pre-processed historical market data (i.e. order book data). Neither is attainable by solely using digital asset exchange APIs. As a result, these offerings are extremely valuable to stakeholders, such as quantitative and algorithmic traders, hedge funds, investment management firms, crypto miners, digital asset lenders and more.

Since the vast majority of stakeholders are those seeking to financialize digital assets (i.e. investors, speculators, miners, etc.), the core use case for market data is to backtest trading strategies. In the next section, we will examine the different categories of market data and talk about their relation to backtesting; readers should always keep backtesting in mind when thinking about digital assets market data.

²⁶ [Introducing The Block legitimate volume index, an extension of regional exchanges on top of 'Bitwise 10'](#)

Digital Assets Market Data Categories

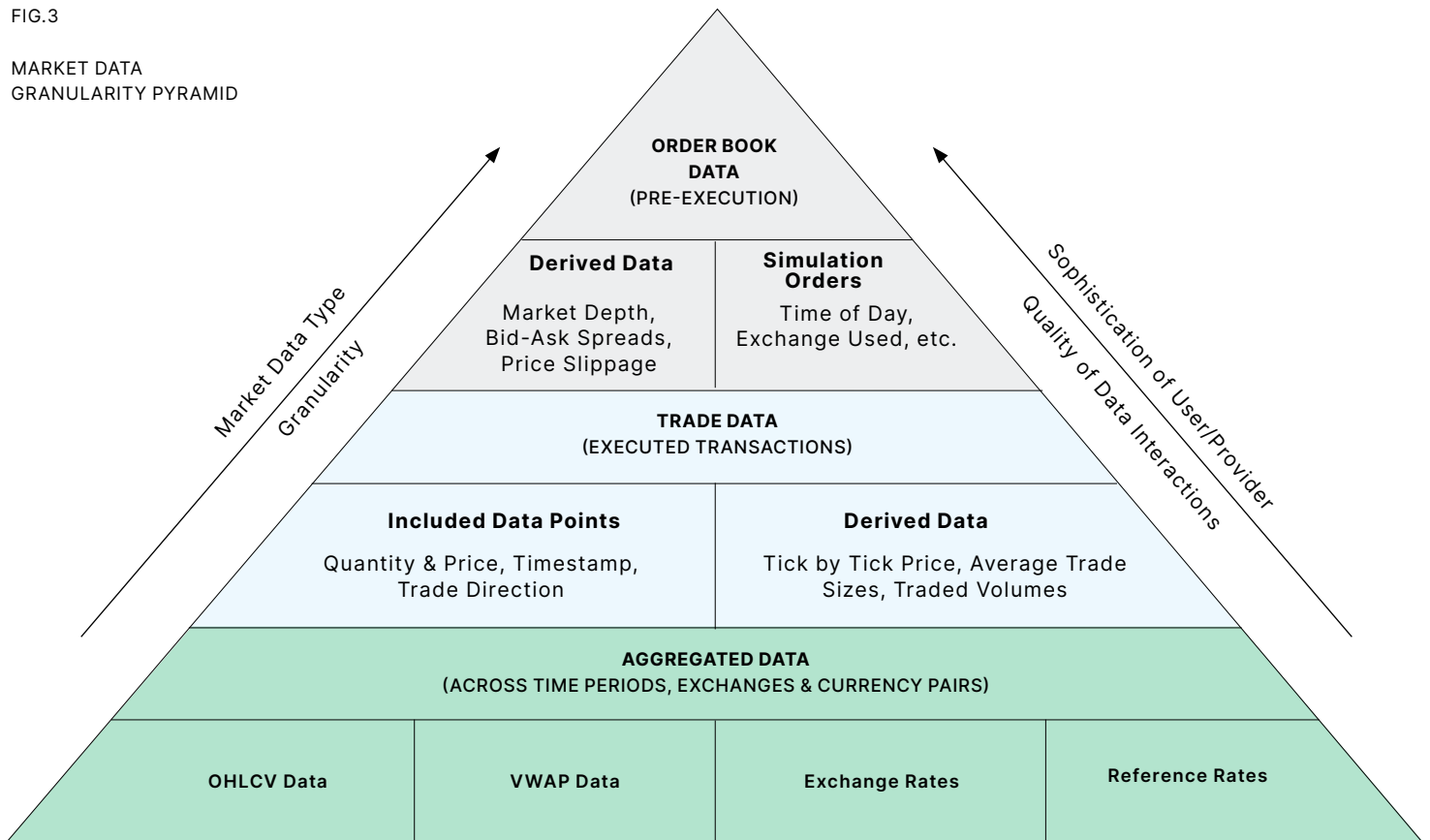
Before discussing digital assets market data firms, it is best to understand the different types of market data.

Similar to traditional market data, digital assets market data can be segmented into three main categories: aggregated data, trade data and order book data. These data segments are listed in order of detail (granularity), with the least detailed being aggregated data and the most detailed being order book data. As a general rule, the more granular the data, the higher the quality and the better it is for backtesting trading strategies. We illustrate this relationship in Figure 3²⁷ below.

²⁷ Inspiration for Figure 3 and information from this section came from [Kaiko's 'Crypto Market Data Platforms'](#) webinar.

FIG.3

MARKET DATA
GRANULARITY PYRAMID



The “Market Data Granularity Pyramid” displays the three main categories of market data as different levels of a pyramid; market data definition and detail (granularity) increase at each step. Additionally, the sophistication of market data providers and users also increases at each level of the pyramid, given the enhanced requirements necessary to interact with higher quality market data. These relationships and the information shown in Figure 3 are further explained below.

Aggregated data is collected over a defining factor, such as time. For example, the data can be collected over a time period (i.e. BTC average price over 60 minutes). It may also be collected across exchanges and currency pairs (i.e. BTC average price over Coinbase, Kraken, Binance, etc.). Furthermore, aggregated data can be subdivided by data type, as shown below.

The four most popular types of aggregated data are:

- **Open-High-Low-Close-Volume (OHLCV) Data**
 - Includes 5 data points over a time period
 - Open - The first price level
 - High - The highest price reached
 - Low - The lowest price reached
 - Close - The last price level
 - Volume - The total amount traded
 - Commonly represented as a candlestick chart
- **Volume Weighted Average Price (VWAP) Data**
 - The average asset price over a time period, weighted by volume
 - $VWAP = \frac{\sum Price * Volume}{\sum Volume}$
- **Exchange Rates**
 - Used for currency conversions
- **Reference Rates**
 - Standardized format used to find the average price of an asset across exchanges

So, there is a vast range of aggregated data. It is the most common data type displayed on price display websites (i.e. BTC reference rates). Aggregated data is useful, as it provides a nice overview of the market. However, it's not that detailed, making it difficult to accurately backtest a trading strategy using aggregated data.

Part IV: Market Data

Trade data is one of the most straightforward types of data. It is basically every executed transaction on a digital asset exchange (i.e. When a user buys BTC on Coinbase). The trade data point would include the amount of BTC purchased, the price BTC was purchased at, a timestamp, and usually the direction of the trade.

Since trade data is more granular than aggregated data, it is more useful for backtesting and further up the market data granularity pyramid. When backtesting trade data, users can derive tick by tick price changes, average trade sizes and the volumes traded during transactions. Readers should note that trade data is post transaction execution.

The last and most granular type of market data is order book data. Digital asset exchange order books are pre-execution lists recording all of the bids and asking prices for assets from market makers placing limit orders. For example, market makers will place bids to buy BTC or asks to sell BTC on either side of the midpoint price, reflecting the real-time supply and demand for BTC on that exchange. Unlike trade data, order book data is pre transaction execution.

Order book data is the most powerful data type among market data categories. Not only does order book data show the real underlying supply and demand for an asset, but it also allows users to derive metrics, such as market liquidity.

Three popular metrics that can be derived from market data include:

- **Market Depth**
 - The number of bid and ask orders for an asset at different price levels
- **Bid-Ask Spreads**
 - The price difference between the best market asking price and the best market bid for an asset
- **Price Slippage**
 - The variance between a user's expected market price for an asset and the actual price of the trade once the transaction is executed

Since order book data is the most granular, it is the best type of market data to use for backtesting. Using these datasets, users can accurately simulate orders and better understand how their orders would be executed over time. Factors such as time of day and exchange used are taken into account when simulating strategies to see the true liquidity of an asset trading pair at any given time within the digital assets market.

Now that readers better understand the three main categories of market data, we can explore the different segments of market data providers.

Segmentation of Market Data Providers

Similar to infrastructure and on-chain metrics firms, it is challenging to subcategorize digital assets market data providers.

We would like to once again emphasize that the classification of companies is subjective, and our attempt to do so is in an effort to advance research efforts in the field. Readers should note that this is not meant to be an exhaustive list of all digital assets market data providers, rather these are firms that The Block Research selected for a representative sample set.

The thirteen companies that we chose to represent the market data segment are Amberdata, CoinAPI, CoinDesk Indexes (TradeBlock), Coingecko, CoinMarketCap, Coin Metrics, Crypto APIs, CryptoCompare, IntoTheBlock, Kaiko, Lukka, Nomics and Skew, all of which were displayed in Map 5 at the beginning of this section. We believe that these firms can be grouped based on main offering into three subcategories: data aggregation services, derivatives & analytics services and enterprise data services.

Our market data firm sample set is broken down by subcategory as follows:

- **Data Aggregation Services**
 - Coingecko
 - CoinMarketCap
 - Nomics

Part IV: Market Data

- **Derivatives & Analytics Services**
 - CoinDesk Indexes (TradeBlock)
 - IntoTheBlock
 - Skew
- **Enterprise Data Services**
 - Amberdata
 - CoinAPI
 - Coin Metrics
 - Crypto APIs
 - CryptoCompare
 - Lukka
 - Kaiko

Readers should note that these groupings are not meant to be binding, as a lot of these firms have offerings that span multiple market data subcategories. For instance, Coin Metrics also provides derivatives and analytics services, but we found that enterprise data services best characterizes their core market data identity. To better understand the extent of each market data provider's offerings, we also recommend reading the firm comparison section.

Data Aggregation Services

Digital assets market data aggregators gather raw exchange data and process it to be expressed in a summary form.

Similar to last year, Coingecko and CoinMarketCap are the two largest retail-facing market data aggregators. Most of their revenue comes from ads, making web traffic the most vital metric for success. Unsurprisingly, both firms have extremely high Alexa traffic ranks, which we explore more later.

Coingecko developed a digital assets ranking platform meant to provide users with a general overview of cryptocurrency markets, tracking metrics such as token price, exchange volume and market capitalization. According to Coingecko's [methodology page](#), market data is also available for token trading volume, outlier detection, global trading volume, global market capitalization and token all-time highs, among others.

Part IV: Market Data

All data that Coingecko aggregates is queried and passed through their proprietary algorithms to verify authenticity and data integrity. In an effort to combat fake volume data from exchanges, Coingecko launched its “Trust Score” in May 2019. Trust scores are available for each crypto trading pair on Coingecko and its listed spot crypto exchanges, which are ranked based on liquidity, scale of operation and API coverage. Derivative trading pairs and derivative exchanges appear to be on the horizon for future trust scores.

CoinMarketCap doesn’t need much of a description. As shown later in Table 8 of the market data firm comparison section, it's one of the most heavily trafficked websites in the world. Since web traffic is the key for market data aggregators, it's no wonder [Binance purchased CoinMarketCap](#) for a reported \$400 million last year.

However, we will add that the quality of CoinMarketCap’s data has come into question in the past, specifically in Bitwise Asset Management’s [2019 report](#) that was presented to the U.S. Security and Exchange Commission. Although CoinMarketCap [later claimed to be fixing its market data integrity](#), that didn’t stop other firms, like Nomics, from making it their mission to offer a more transparent data aggregation alternative.

Founded in 2018, Nomics is a digital assets market data aggregator that prides itself on offering [transparent volume statistics](#) for nearly every digital asset and exchange in the industry. The firm was created in response to increasing demand by digital asset investors for commercial grade APIs and reliable market data products. Nomics’ co-founder summarized the history of digital assets market data and his company’s push toward increasing transparency in a [manifesto from 2019](#), which we highly recommend readers look over, as the post is quite eye-opening.

Through Nomics’ online interface, users can access free and paid exchange data APIs with scores of endpoints; such endpoints return sparkline, all-time high (ATH), exchange rate and supply data, as well as historic candle/OHLC data for digital asset trading pairs on hundreds of digital asset exchanges. Furthermore, the API lets develop-

ers programmatically retrieve current and historical prices of select digital assets, allowing investors to track their portfolio, market fluctuations and pull financial data.

Derivatives & Analytics Services

With the increasing popularity of derivatives in the digital assets markets, market data firms have an opportunity to provide analytics related to these and other budding financial instruments.

Coindesk Indexes (formerly TradeBlock), which is also featured in the on-chain metrics section, developed an online platform with institutional grade trading tools, indices (XBX Bitcoin Index) and data for the digital assets market. The firm calculates and publishes digital asset reference rates that are used to price fund assets under management (AUM), OTC transactions and derivatives. Its order management system (OMS) and execution management system (EMS) software facilitate trades on digital asset exchanges and OTC.

Digital asset investors and traders use Coindesk Indexes' platform for front, middle, and back-office needs, including market analytics, insights, order management, compliance automation, and more. As discussed later in the mergers and acquisitions section, TradeBlock was purchased by Coindesk at the beginning of 2021.

IntoTheBlock, which is also featured in the on-chain metrics section, uses AI-backed research and data science to provide actionable intelligence for the digital assets market. Their market analytics offering allows users to compare spot (order-book level indicators) and derivatives trading data. Derivatives insights include metrics such as open interest, volume, and basis for perpetual swaps and futures across 32+ derivatives exchanges.

Skew developed a derivatives analytics platform that offers insights into digital asset markets and fully automated global trading data. Clients can track Bitcoin and Ethereum spot, futures and options in real-time using customized data dashboards with 350+ charts to choose from. The data behind each chart is also available to download in CSV format.

Founded in 2018, Skew quickly became one of the leading data analytics providers for digital asset derivatives data. It has over 100 institutional clients, which include trading firms, banks, exchanges and hedge funds. Skew's professional data analytics and trade execution services were so unique that Coinbase acquired the firm in May; we discuss this transaction further in the mergers and acquisitions section of the report.

Enterprise Data Services

Providers with enterprise data services have robust computing infrastructure, sophisticated data processing techniques and proprietary normalization methods for delivering high quality market data to clients. Historical data is usually delivered to clients in computer files or via API, while live data is available through streaming API.

Streaming APIs are used to examine real-time data, offering a web-based medium for clients to receive up-to-date information and fresh results. The provider opens a WebSocket with customers (usually funds) who give them guidelines and standards for the type of market data they need to execute trading strategies. So, a streaming data API allows users to have their pulse on the digital assets market, where live market data is delivered over an open socket.

In addition to market data delivery, most enterprise data services firms offer bespoke solutions that institutions are willing to pay top dollar for, since institutions don't have the necessary infrastructure to satisfy all of their digital assets market data needs.

Amberdata, which is also featured in the on-chain metrics section, built a cloud-based platform designed to offer digital assets ecosystem data. Its market data can be used to build applications and execute trading strategies. Via streaming data APIs, customers can obtain Level I and Level II price data, receive real-time reference rates, view live prices for digital assets, and gain visibility into the market depth of spot and derivatives.

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CoinAPI is a digital assets market data platform that integrates crypto exchange APIs into one unified API. Market data – asset symbols, exchange rates, price quotes, exchange order books, executed transactions, OHLCV, etc. – can be delivered on-demand using HTTP RESTful APIs or via WebSocket and FIX protocols for real-time streaming. When asked to describe its niche within the category, the CoinAPI team said “we are a one stop software and service provider for cryptocurrency market data and trading APIs, offering low latency real-time market data, trading and historical data APIs.”

Coin Metrics, which was also featured in the on-chain metrics section, is a provider of digital asset market and network data designed to deliver transparent and actionable data analytics to its customers. As previously mentioned, Coin Metrics’ co-founders originally focused on running nodes and created parsing tools to study blockchain network behavior; at the time they used external sources for aggregated market data.

This all changed when Coin Metrics hired a traditional financial services veteran who had previously built four market data companies, the last of which aggregated fixed income data for Thomson Reuters. Once solidified, Coin Metrics’ core leadership set out to become a trusted digital assets data provider – bringing together blockchain network data, market data, reference rates and indexes under one platform – for institutions worldwide.

Understanding the tricks of the traditional market data trade, Coin Metrics knew that a resilient back-end infrastructure was integral to becoming a go-to digital assets market data provider for institutional clients. Coin Metrics’ data and analytics are always accessible due to the redundancy of its data centers and infrastructure components. Additionally, the firm leveraged its senior leadership’s experience with traditional market frameworks to create 11 principles for aggregating digital assets market data. These quality control principles are the foundation of Coin Metrics’ reference rate, which is featured on CNBC, and one of the firm’s best known market data offerings.

According to [Coin Metrics' website](#), it offers three main types of digital assets market data:

- **Market Data Feed**
 - Provides access to historical and real-time data from over 30 spot and derivatives digital asset exchanges
 - Offers all of the fundamental market-related data types including tick-by-tick trades, quotes, order book snapshots, candles, and more
- **Reference Rates**
 - Designed to represent the price of a digital asset in an arm's length transaction between a willing buyer and willing seller
 - Utilizes a 61-minute window to calculate prices once an hour, every hour, including on weekends and holidays
 - Can be used for portfolio accounting, as settlement prices for financial derivative contracts, and as closing prices for investment products
- **Indexes**
 - A comprehensive suite of single-asset, multi-asset and unique crypto asset benchmarks used by leading crypto and traditional financial institutions
 - Calculation agent services for institutions seeking to administer their own custom indexes

In short, Coin Metrics wants to be the trusted data bridge for legacy institutions to access the digital assets ecosystem. The company has the right mix of youthful talent/ambition and seasoned wisdom from financial services experience to become a standard-bearer for digital assets data. And if Coin Metrics' recently closed [\\$15 Billion Series B round](#) led by Goldman Sachs is any indication, the firm is well on its way to doing just that.

Crypto APIs, which is also featured in the blockchain infrastructure section, offers unified market data via REST APIs. Digital assets market data – latest price, official symbol, currency, etc. – is collected from the public WebSockets of exchanges. After aggregation, the exchange market data is processed, indexed and stored in Crypto APIs' internal databases. Gapless live market data exchange rates are another feature available for customers.

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CryptoCompare's online platform offers real-time and historical digital assets market data to institutions and retail investors. By aggregating and analysing tick data from exchanges, and integrating different datasets in digital asset prices, CryptoCompare strives to provide a comprehensive, holistic overview of the digital assets market. At a granular level, CryptoCompare produces: digital assets trade data, order book data, historical data (6,000+ assets and 250,000+ trading pairs), social data, reports and a suite of digital asset indices.

Founded in 2013, CryptoCompare's leadership recognized the economic and geopolitical importance of Bitcoin early on. They also saw the value in building a platform to collect digital assets market data en masse; doing so allowed them to monetize website traffic and later create indices, reference rates and other more advanced offerings. The website shined during 2017's digital assets boom, helping CryptoCompare amass 80K registered API key users today. Furthermore, about 2 million users per hour (unique IP addresses), 4 million daily users, and 20-30 million monthly users connect to their API.

We originally placed the firm in the data aggregation subcategory, since CryptoCompare's real-time aggregate index methodology (CCCAGG) is at the heart of its business. However, we felt that doing so would have sold CryptoCompare short, since its market and price data feeds are used by institutions, such as VanEck, Thomson Reuters and Yahoo Finance. For example, CryptoCompare's [digital asset indices](#) (31 total) are currently administered by MV Index Solutions (MVIS) and Singapore Exchange (SGX).

Founded in 2014 by a former SAP consultant, Lukka built the world's first crypto tax calculator, and quickly established itself as a leading tax software provider in the then-nascent digital assets industry. However, crypto tax software is just the tip of the iceberg when it comes to Lukka's business lines today, as made clear by the firm's most recent post-money valuation, which [according to PitchBook](#), was estimated to be \$200 million as of March 25th, 2021.

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On that date, Lukka raised \$53 million in Series D venture funding from top brands, including State Street, S&P Global, CPA.com and the globally recognized Soros Fund Management. The latest investment round brings total funding to \$100 million, making Lukka the top funded independent startup in this year's report. Readers are likely wondering how Lukka achieved this feat?

In 2017, Lukka became more institutional focused, offering middle and back office software and more importantly, data solutions, to its clients. [Customers include](#) fund administrators, mining and staking businesses, digital asset exchanges and trading desks, blockchain protocol teams and auditors, among others. These are the types of institutional clients that utilize [Lukka Reference Data](#) and [Lukka Prime](#) to service their data management needs.

Lukka Reference Data is an extensive security master file of digital asset names, tickers, trading pairs, and more across exchanges, service providers and other market data sources within the digital assets ecosystem. Reference data is available for 7,300+ spot assets, 27,000+ derivatives, 34,000+ trading pairs from 250+ sources and includes 7+ years of history, all of which is housed within a Type II SOC infrastructure.

Lukka Prime is a Fair-Market-Value (FMV) pricing methodology for digital assets, specifically designed to provide institutions with post-trade market data pricing that aligns with Generally Accepted Accounting Principles (GAAP), International Financial Reporting Standards (IFRS), and SEC guidelines for valuation and accounting standards. Coverage is available for 875+ assets from 12+ sources of raw pricing data online. Using Lukka Prime's five-step weighting process, principle exchanges and the last asset price on that exchange are identified to determine FMV at a specific time.

According to [Lukka's website](#), its five-step weighting process requires:

- Assigning each exchange for each pair of currencies a Base Exchange Score (BES) reflecting static exchange characteristics such as oversight, microstructure and technology - all done per asset.
- Adjusting the BES based on the relative monthly volume of each

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- exchange service. This new score is the Volume Adjusted Score (VAS).
- Decaying the adjusted score based on the time passed since last trade on exchange. Here, Lukka is assessing the level of activity in the market by considering the frequency (volume) of trades. The decay factor reflects the time since the last trade on the exchange. This is the final Decayed Volume Adjusted Score (DVAS) - tracks freshness of data by tracking most recent trades.
 - Ranking the exchanges by the DVAS score and designate the highest-ranking exchange as the Principal Market for that point in time – principal market is exchange with highest DVAS.
 - Using an executed exchange price for each covered asset representing the FMV for a specific time.

Both Lukka Reference Data and Lukka Prime are being used by traditional financial services data firms today. Last summer, [dxFeed partnered with Lukka](#) to include its data in its expanding portfolio of specialized market data products. IHS Markit [employs both services](#) as part of its IHS Markit Pricing, Valuations and Reference Data [offerings](#). Furthermore, last month, [S&P Dow Jones Indices \(S&P DJI\) launched](#) its “S&P Digital Market Indices,” all of which use Lukka’s digital assets pricing and reference data.

In addition to Lukka Reference Data and Lukka Prime, Lukka also offers raw tick data from digital asset exchanges. This service standardizes both historical and real-time tick data from exchanges and delivers these datasets to customers. Exchange order book level data can be provided in the same fashion as the raw tick data too.

Since 2014, Kaiko has been providing institutional investors and other stakeholders with digital assets market data through its enterprise-grade computing infrastructure. The company collects, normalizes, stores and distributes digital assets market data via a live-stream WebSocket, REST API, and cloud-based flat-file data feed, to which clients connect when building data-driven applications. Use cases include backtesting trading strategies, research and analysis, pricing and valuation, charting and analytics, building indices and analyzing order book liquidity, among others.

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Kaiko's raw trade data, order books, and aggregates currently cover 40,000+ currency pairs across 100+ exchanges. The firm offers extensive digital asset datasets, with over five years of historical data on hand. Clients include professional investors, academic researchers, regulators, security issuers, third-party platforms and exchanges.

Kaiko recently closed a \$24 million Series A round, which was led by Anthemis and Underscore VC to scale their digital asset financial data services for institutions. With this fundraising, the firm has now raised a total of \$29.5 million to date, which makes Kaiko one of the top-funded market data providers in the space. Furthermore, the Kaiko team has one of the best, if not the best, understandings of market data infrastructure among firms mentioned in this report.

Considering Kaiko's vast experience and knowledge with digital assets market data infrastructure, which is becoming increasingly important, we asked members of their team to discuss the topic in the next section.

Insiders Weigh-In on Market Data Infrastructure

The following insights were provided from The Block Research's interview with Clara Medalie and Bediss Cherif of Kaiko. With permission, we formulated parts of our conversation into this general overview.

Advanced market data providers have taken the digital assets information business model further. These firms are essentially infrastructure providers; they lay the pipes connecting the underlying exchange industry. Clients, which include crypto funds, quant funds, asset managers and traders in general, come to market data providers for clean and normalized data.

Inconsistencies in data standards and difficulties in accessing market data infrastructure are problems. Every digital asset exchange has a public API used to access market data. In order to access this data, one needs to build connections. This can prove challenging, however, as there's no consistency across exchanges. Each exchange creates its own data standards, has its own asset taxono-

Part IV: Market Data

mies and there are different protocols for accessing said data from exchange to exchange. In the end, after the providers go through all of the necessary phases, clients are consuming clean and normalized data feeds.

Generally, there are 4 steps to the market data infrastructure process: collection, normalization, storage and delivery.

During the collection phase, the developer team creates connections to digital asset exchanges, establishing a proprietary collection infrastructure. Next, during normalization (standardization), the data is standardized using internal data formats. Normalization is dependent on the type of data being collected, as each exchange has its own unique data formats, from timestamps to asset codes. For example, when referring to something as simple as Bitcoin, derivatives exchange Bitmex uses the asset code XBT, while Coinbase uses the asset code BTC.

Standardizing the different types of data across all of these exchanges can be a nightmare for non-specialists. Advanced market data providers have proprietary data standards to normalize exchange data; so hundreds of independent raw data feeds are inputted into their process and the resulting output is single formatted data. The storage phase involves warehousing data files in readily accessible databases; this makes the data easier to consume. Finally, the fourth phase, delivery, is the client-facing stage. Data can be delivered to clients in multiple formats, with one option being flat files.

For example, if a client wanted a historical file of Bitcoin denominated in USD from Coinbase's order book history, the data provider would pull that data and provide a file with all of that information. Alternatively, using the market data provider's API, which is essentially an API of exchange APIs, can help clients access the full order book history from hundreds of crypto exchanges. Lastly, for advanced clients like traders and funds, there is a lower live-streaming data option with even lower latency.

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As the market data segment moves closer to institutionalization, standardized data is a must-have. A lot of the current institutional clients are traders from funds who need clean historical data for backtesting their strategies, i.e. quant fund's machine learning. Pricing and valuation data is also in demand from enterprise clients, where a lot of the live pricing data seen on websites and tv is powered by market data providers.

Market data feeds will evolve extensively over the coming years. The future of the digital assets market is in the past, meaning that the market data segment will likely follow the path of the equities markets in the late 90s and early 2000s. Everything is internet-low-light infrastructure today and all the APIs are public APIs. It's hard to compare traditional financial market exchanges to digital asset exchanges in terms of capacity and market size. A lot of leapfrogging will need to be done infrastructure-wise for digital asset exchanges, without repeating the same mistakes made by the legacy market exchanges.

The importance of analytics for decision-making will continue to grow. Pricing and valuation data are currently a result of market data provider analytics. These analytics will be extended in the future to include L1 and L2 protocol feeds. Decentralized Finance (DeFi) is another area that market data providers will be expanding their coverage into. Institutions are showing a lot of interest in DeFi, since it is essentially lending and borrowing at the end of the day. However, the methods for data collection in these markets are different from traditional markets, and there is a lot of opportunity for those that can come up with systems to collect raw data and disseminate actionable insights.

Emerging Digital Assets Market Data Themes

When asked about emerging digital assets market data themes, Clara Medalie from Kaiko provided the following insights:

1. The pressing need for data standards

- Before institutional adoption can happen at scale, it is absolutely essential that data standards across infrastructure providers be developed and maintained.
 - These standards will enable interoperability and allow dif-

ferent actors to easily plug into the universe of underlying market infrastructure providers, without encountering standardization issues.

- Right now, there is no consistency in identifiers, formatting, derivatives contracts labels, timestamps, data content, protocols, etc. across 100+ cryptocurrency exchanges.
 - This makes the job of a data provider hugely important, as we are the ones manually verifying, standardizing, and normalizing data across tens of thousands of traded instruments.
- Data formats are regulated in traditional finance through regulations such as Markets in Financial Instruments Directive (MiFID), but there are no such standards in crypto.
 - A few months ago, Kaiko partnered with Bloomberg and the Object Management Group to issue Financial Global Identifiers (FIGIs) for crypto assets, which is a data standard used throughout the traditional financial industry.
 - Kaiko will begin issuing FIGIs in Q2 of this year, which will hopefully improve interoperability between industry actors.
 - Their reference database is free and open to the public and is a valuable tool for mapping identifiers.

2. Developments in data infrastructure

- At its core, to be a data provider is to be a centralized hub connecting a vast network of exchanges and feeds.
- Data providers are only as successful as the data infrastructure they have built.
- To reach institutional maturity, crypto data infrastructure must match the technical needs of the most sophisticated type of trader, which prioritizes low latency and high availability.

3. The need for reliable data inputs for exchange-traded products (ETPs)

- One of the biggest trends of the year was the growth of regulated crypto investment products.
 - Traditional exchanges around the world now list dozens of crypto ETPs and derivatives contracts, giving exposure to an entirely new class of investors.

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- Most of these ETPs track the price of crypto-assets such as Bitcoin, but what determines this price?
 - That is where data providers come in.
- Data providers are crucial for providing regulatory compliant data that accurately reflects the price of a crypto asset at a given point in time.
 - Accurate and reliable price feeds are an essential component of the trading cycle, playing a role in everything from risk management to settlement.

Firm Comparison

Operations

Table 8 shows operational data and online metrics for the market data providers covered in our sample set.

TABLE 8	OPERATION					ONLINE METRICS (6/21)		
FIRM	HQ	FUNDING	ESTABLISHED	TOP HIRING NEED	EMPLOYEES	LI FOLLOWERS	TWITTER FOLLOWERS	ALEXA RANK (A)
Amberdata	USA	\$5,000,000	2017	N/A	12	352	2,069	517,167
CoinAPI	Remote	Private	2016	PM/Client Advocate	11	17	7	86,741
Coingecko	Malaysia	Private	2014	Engineers	31	12,976	492,900	515
CoinMarketCap	Remote	Acquired	2013	BD/Marketing	65	40,889	2,000,000	123
Coin Metrics	USA	\$22,900,000	2017	Engineers	26	1,860	78,800	50,834
Crypto APIs	Bulgaria	Private	2018	Devs/Product	22	963	1,741	132,259
CryptoCompare	UK	£4,470,000	2013	Research/Engineers	55	2,602	29,600	6,470
Kaiko	France	\$29,500,000	2014	Finance	23	1,723	6,168	89,679
Nomics	USA	\$3,000,000	2018	Sales	7	470	17,000	10,731
Skew	UK	Acquired	2018	N/A	22	2,357	45,000	107,219
CoinDesk Indexes (TradeBlock)	USA	Acquired	2013	Engineers	14	992	15,000	126,754
IntoTheBlock	USA	Private	2019	Engineers	16	1,502	15,700	29,449
Lukka	USA	\$100,000,000	2014	Engineers	80	2,188	2,754	294,570

(A) Alexa.com/siteinfo (As of 6/21/21) - Alexa Rank is an estimate of this site's popularity; it is calculated using a combination of average daily site visitors and pageviews over the past 3 months.

The geographic breakdown of market data providers is mainly between two continents, North America (about 46%) and Europe (about 31%). Additionally, two companies identified their headquarters as being remote.

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About 46% of market data providers from our sample have publicly disclosed venture funding. Lukka, Kaiko, Coin Metrics and CryptoCompare are the four highest funded companies in this category; Lukka makes up about 61% of total disclosed funding from our sample set. Two firms, Skew and TradeBlock, have been acquired thus far in 2021, while CoinMarketCap was acquired last year.

The top hiring need among market data providers is unsurprisingly engineers. However, secondary employment needs are scattered across non technology roles, showing the relative maturity of these firms. Lukka, CoinMarketCap and CryptoCompare are the top three employers, hiring almost 51% of the 374 employees in our sample set. Among market data providers, the average number of employees per firm is almost 29 people.

When it comes to online metrics, CoinMarketCap, Coingecko and CryptoCompare have the most followers on LinkedIn, making up almost 82% of LinkedIn followers from our sample set. LinkedIn has a professional audience and we believe that the follower numbers are more organic on that site versus other social networks, where firms are incentivized to juice follower counts with ad dollars. As for Twitter popularity, CoinMarketCap is in a category of its own, being the only firm with over 1 million followers; its 2 million followers account for almost 74% of the total Twitter followers in our sample set. Coingecko and Coin Metrics are the next closest, with about 18% and almost 3% of the total Twitter followers from our sample set.

Lastly, according to Alexa data, CoinMarketCap and Coingecko clearly have the highest web traffic among our sample set. In fact, as of June 21st, CoinMarketCap was within the top 125 most visited websites in the world. Since CoinMarketCap and Coingecko are heavily retail focused, this likely can be attributed to the rapid crypto market price increases in the first several months of the year. CryptoCompare ranks third by web traffic, which again can likely be attributed to the large number of retail users that frequent the site to check crypto metrics during periods of high price appreciation, which we've seen over the past year.

Business Strategy and Pricing

Table 9 displays the target client, business model and monthly pricing for market data providers in our sample set.

FIRM	BUSINESS MODEL			TARGET CLIENT		PRICING				
	SAAS	ADS	EVENTS	RETAIL	ENTERPRISE	FREE TIER	PAID TIERS	LOWEST PRICE/M	HIGHEST PRICE/M	# OF EXCHANGES
Amberdata	✓	×	×	×	✓	✓	2	\$50	Per Size	100+
CoinAPI	✓	×	×	×	✓	✓	4	\$79	Per Size	332
Coingecko	✓	✓	×	✓	×	✓	1	-	Per Size	468
CoinMarketCap	✓	✓	✓	✓	✓	✓	5	\$29	Per Size	310
Coin Metrics	✓	×	×	✓	✓	✓	1	-	Per Size	34
Crypto APIs	✓	×	×	✓	✓	✓	5	\$99	Per Size	Top 15
CryptoCompare	✓	✓	✓	✓	✓	✓	3	\$80	Per Size	250
Kaiko	✓	×	×	✓	✓	×	1	-	Per Size	90
Nomics	✓	✓	×	✓	✓	✓	3	\$1,000	Per Size	431
Skew	✓	×	×	✓	✓	✓	1	\$199	Per Size	20
CoinDesk Indexes (TradeBlock)	✓	×	×	✓	✓	×	1	-	Per Size	27
IntoTheBlock	✓	×	×	✓	✓	✓	1	\$10	-	50
Lukka	✓	×	×	×	✓	×	N/A	-	-	250+

Almost 54% of market data providers target retail clients, about 92% target enterprise clients and about 46% target both. A bias toward enterprise clients shows that the digital assets industry is being further institutionalized.

The most popular business model utilized by on-chain providers is a Software-as-a-Service (SaaS) model, in which clients are charged on a monthly basis to access the services provided: 100% of our market data provider sample set utilizes SaaS in their operations. Almost 31% of firms utilize advertisements in their business model, and unsurprisingly, these are the firms with the most retail traffic, such as CoinMarketCap and Coingecko. Only two firms, CoinMarketCap and CryptoCompare, depend on events for a material part of their revenues.

Every firm except Kaiko and CoinDesk Indexes has a free tier, which makes sense given that Kaiko and CoinDesk Indexes only target enter-

prise clients. On average, firms offer two pricing tiers for their paid products with the lowest price per month being \$10, and the most popular option for higher tiers being custom pricing. Compared to on-chain data providers, a lower percentage of market data providers offer free tiers for users to test their products; this percentage is even smaller when compared to infrastructure providers.

Similar to infrastructure providers and on-chain metric providers, market data providers are mainly focused on enterprises. This is another confirmation that the industry is shifting to a more institutionalized focus. However, each segment targets a different clientele: on-chain metrics providers primarily target investors and researchers, infrastructure providers mostly target businesses that are building on blockchains, and market data providers mostly target funds, regulators, investors and speculators.

Product Suite and Feature Set

Table 10 shows market data delivery methods and types of data offered by market data providers in our sample set.

TABLE 10	DELIVERY					DATA TYPE				
FIRM	REST API	CSV	FIX API	WEBSOCKET	DASHBOARD	TRADE DATA	ORDER BOOK	OHLCV	NORMALIZED	INDEX PROVIDER
Amberdata	✓	✓	✓	✓	✓	✓	✓	✓	✓	×
CoinAPI	✓	✓	✓	✓	×	✓	✓	✓	✓	✓
CoinGecko	✓	✓	×	×	✓	×	×	✓	×	✓
CoinMarketCap	✓	✓	×	×	✓	×	×	✓	×	✓
Coin Metrics	✓	✓	×	✓	✓	✓	✓	✓	✓	✓
Crypto APIs	✓	✓	×	✓	×	✓	✓	✓	✓	✓
CryptoCompare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Kaiko	✓	✓	×	✓	×	✓	✓	✓	✓	✓
Nomics	✓	✓	×	×	✓	✓	✓	✓	✓	✓
Skew	×	✓	×	×	✓	✓	✓	✓	✓	×
CoinDesk Indexes (TradeBlock)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IntoTheBlock	✓	✓	✓	✓	✓	✓	✓	×	✓	×
Lukka	✓	✓	×	✓	✓	✓	✓	✓	✓	✓

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The two most popular data delivery methods among market data providers are via Rest API (about 92%) and CSV (100%), and about 92% of firms offer both methods. The least utilized method of data delivery is by way of Fixed API.

As for data type, OHLCV is the most popular, with 12 of 13 firms or about 92% of market data providers offering open-high-low-close data; IntoTheBlock is the only firm that doesn't provide OHLCV data to clients. Order book and trade data are the second and third most popular offerings, with almost 85% of market data companies providing them to customers. Coingecko and CoinMarketCap are the only two firms from our sample set that don't offer order book and trade data, which makes intuitive sense, as both target retail clients.



THE BLOCK Research

The State of the
Digital Assets Data
and Infrastructure
Landscape, 2021

Mergers & Acquisitions

Mergers & Acquisitions

Thus far in 2021, there have been nine noteworthy acquisitions within the digital assets data and infrastructure ecosystem. These transactions are listed chronologically in Table 11 below.

TABLE 11

PURCHASER	DATE	TRANSACTION VALUE	REPORTED DETAILS	ACQUIRED FIRM	ACQUIRED FIRM CATEGORY
CoinDesk	1/5/21	Undisclosed	N/A	TradeBlock	Market & On-Chain Data
NYDIG	1/11/21	Undisclosed	N/A	Digital Assets Data	Market Data
Coinbase	1/18/21	Undisclosed	Speculated \$80M + Deal	Bison Trails	Staking
Blockdaemon	2/1/21	Undisclosed	N/A	Lunie	Staking
iMining	3/22/21	\$13.4M	\$11.2M Stock + \$2.2M Financing	CanETH	Staking
Sino-Global	3/25/21	\$5M	All Stock Transaction	Super Node	Infrastructure
Tendermint	4/7/21	Undisclosed	ATOM Tokens (4 Year Vesting)	B-Harvest	Staking
Coinbase	4/30/21	Undisclosed	N/A	Skew	Market Data
OIO Holdings	5/31/21	Undisclosed	All Stock Transaction	Moonstake	Staking

CoinDesk started the year off with a bang when it acquired TradeBlock for an undisclosed amount five days into 2021. As discussed in the market data and on-chain metrics sections earlier, TradeBlock offers digital asset pricing, market indexes and trading tools. Purchasing TradeBlock was a strategic move by CoinDesk for several reasons.

First, the timing of the move aligns with the themes that we noted in the market data section. As the industry becomes more institutionalized, reliable reference rates are needed to increase information integrity among stakeholders. According to TradeBlock, more than \$20 billion of investment products use its indexes and billions of dollars in monthly trading volume is quoted against them.²⁸ TradeBlock's reference price and index service will be integrated into CoinDesk, and will henceforth be known as "CoinDesk Indexes."

Another noteworthy tidbit related to the deal is Digital Currency Group (DCG) serving as a degree of separation between CoinDesk and TradeBlock. Prior to the acquisition, TradeBlock had previously raised funds from DCG, which also happens to own CoinDesk. Additionally, the Grayscale Bitcoin Trust (GBTC) is the top user of TradeBlock's XB index, and DCG is the owner of Grayscale Investments, which sponsors GBTC. So, the companies were already well familiar with one another,

²⁸ [CoinDesk Acquires Trade-Block, the World's Leading Crypto Index Provider](#)

and the TradeBlock team appears to have been “acqui-hired,” as CoinDesk noted TradeBlock’s entire staff will remain.²⁹

Since the financial terms of the deal were private, we can only assume that TradeBlock’s was bought out for substantially more than the \$2.8 million that Andreessen Horowitz and DCG sunk into it in July of 2014.³⁰ One thing we can say is that Coindesk’s acquisition of TradeBlock kicked off a busy month of acquisitions in the digital assets industry.

The following week, New York Digital Investment Group LLC (NYDIG) acquired Digital Assets Data for an undisclosed sum on January 11th, 2021. NYDIG, a Bitcoin custody and trading services provider, made headlines late last year when MassMutual invested \$5 million in the company, and announced it was using NYDIG services to acquire \$100 million of Bitcoin.³¹ By acquiring Digital Assets Data, NYDIG adds a budding digital assets research and analytics platform focused on institutions. Further, Digital Assets Data’s co-founders will join NYDIG, with one overseeing mergers and acquisitions and another as the head of product.³²

Prior to being acquired by NYDIG, Digital Assets Data had raised about \$11.7 million, according to PitchBook.³³ PitchBook estimates that Digital Assets Data’s post valuation was around \$32 million on July 25, 2019, which is quite impressive given the firm had only launched earlier that year after raising an initial \$6 million in seed funding.³⁴ Unsurprisingly, DCG was among the initial investors in Digital Assets Data.

January’s acquisition spree was rounded out when Coinbase purchased Bison Trails for an undisclosed amount on January 18, 2021. Unlike the Digital Assets Data and TradeBlock acquisitions, which were seen in the on-chain metrics and market data segments, the Bison Trails purchase touched the staking and infrastructure sections. With the acquisition, Coinbase solidified the foundation of its blockchain infrastructure suite; the firm will also allow Bison Trails to continue building offerings for its customers, which Fortune pegged “around 200”³⁵ at the time of the acquisition.

²⁹ [CoinDesk Acquires TradeBlock, Adding Indexes and Pricing to News, Events Offerings](#)

³⁰ [TradeBlock Raises \\$2.8 Million From Andreessen Horowitz, Others](#)

³¹ [Insurance firm MassMutual buys \\$100 million worth of bitcoin through NYDIG](#)

³² [NYDIG Acquires Digital Assets Data](#)

³³ [Digital Assets Data Profile - Pitchbook](#)

³⁴ [With \\$3.2M in new funding, Digital Assets Data looks to expand its institutional platform](#)

³⁵ [Coinbase acquires crypto builder Bison Trails, deal reported to be above \\$80M](#)

Mergers & Acquisitions

Coinbase and Bison Trails were one of the most logical matches in digital assets. Their relationship started in late 2019 when Bison Trails raised \$25.5 million in Series A financing; [Coinbase Ventures](#) was among the investors in the round, which was led by Blockchain Capital.³⁶ The ties were strengthened when Bison Trails and Coinbase Custody engaged in a commercial partnership in 2020. Throughout last year, the firms worked closely together to improve the user experience for staking Polkadot (DOT), Solana (SOL), and Celo (CELO) tokens.

Although the terms of Bison Trails' purchase were undisclosed, it was speculated that the deal's transaction value was [within the range](#) of Coinbase's previous acquisitions of Tagomi and Earn. More specifically, citing someone familiar with the deal, Fortune reported that the transaction was above \$80 million or the all-stock Tagomi purchase by Coinbase.³⁷ One thing we do know for sure is that Bison Trails raised a little over \$30 million in funding prior to its acquisition. So, we'd say that the speculated acquisition range is likely fair.

February saw one notable transaction in the staking segment; self-proclaimed "blockchain deployment facilitator," Blockdaemon, acquired Lunie, a staking and governance platform, for an undisclosed amount on February 1st, 2021. Lunie, which was founded in 2019, offers non-custodial staking services to users for a range of POS blockchain networks, including Polkadot, Kusama, Terra and Cosmos.

Acquiring Lunie was a strategic move by Blockdaemon, which attained Lunie's technology and management team in the process. Lunie's full suite of applications will help Blockdaemon enhance its staking services, specifically in the areas of network governance and cross-protocol coordination of tooling. Furthermore, the domain specific knowledge and experience of Lunie's team will accelerate the speed at which Blockdaemon can execute on its expansion of staking services. Therefore, this deal can best be categorized as an "acqui-hire."

There were two acquisitions worthy of mention that took place in the month of March.

³⁶ [Bison Trails secures \\$25.5 Million Series A financing round led by Blockchain Capital — Bison Trails](#)

³⁷ [Coinbase acquires crypto builder Bison Trails, deal reported to be above \\$80M](#)

The first deal closed on March 22nd, 2021, when the Canadian-owned, publicly-traded cryptocurrency and blockchain investment company, iMining Blockchain (iMining), purchased CanETH Staking Services Inc. (CanETH). iMining issued 28 million shares to acquire all of the outstanding shares of CanETH, which allowed CanETH to become a wholly owned subsidiary of iMining and made CanETH the first publicly listed Ethereum 2.0 Staking Service in North America.³⁸ Considering iMining's shares closed at \$0.40 on March 22nd, this transaction was valued at around \$11.2 million.

Additionally, there was an accompanying private placement of \$2.155 million, which related to CanETH's previously issued 17,240,000 subscription receipts; the receipts automatically converted into an equivalent number of units, with each unit consisting of one common share and one-half of one common share purchase warrant in iMining. CanETH's CFO also became a director of iMining.³⁹ As a result of the acquisition, iMining was able to subsequently launch fractional staking services in April, which allows retail investors to participate in Ethereum POS mining with as little as 1 ETH.

The second March acquisition happened in the blockchain infrastructure segment. On March 25th, 2021, Sino-Global Shipping America, Ltd. (Sino-Global) purchased a 60% ownership of blockchain infrastructure developer Super Node LLC (Super Node) in an all stock transaction valued at \$5 million.⁴⁰ Headquartered in New York, Sino-Global is a publicly traded global logistics company that's been diversifying into the digital assets market. Super Node's CyberMiles nodes and related dApps will help Sino-Global strengthen its logistics supply chain and help the company further build out its digital business.

Digital assets data and infrastructure deal activity picked back up in the beginning of Q2 when the development studio Tendermint acquired the DeFi technology company B-Harvest on April 7, 2021. Similar to Coinbase and Bison Trails, Tendermint and B-Harvest were a natural fit; Tendermint is the creator of Cosmos' blockchain ecosystem and the B-Harvest team has been developing on the network for years. Furthermore, the companies had already been working together since last October to create a decentralized exchange, Gravity DEX.

³⁸ [iMining Completes Acquisition of CanETH](#)

³⁹ [iMining Completes Acquisition of CanETH - IR WORLD](#)

⁴⁰ [Sino-Global to Acquire Majority of Blockchain Infrastructure Developer in \\$5 Million Stock Transaction](#)

Tendermint purchasing B-Harvest is the best example of an acquirement out of the bunch. Speaking about the acquisition, Jin Kwon from Tendermint said “we are ecstatic to add the B-Harvest team to Tendermint. With this newly aligned incentive, B-Harvest team will continue to focus on building, deploying, and improving the Gravity DEX while also adding other valuable features to the Cosmos Hub.”⁴¹

Most of the details behind the B-Harvest acquisition were kept private. However, it revealed that the deal includes a four-year vesting⁴² of Cosmos (ATOM) tokens; as Jin Kwon said, the incentives are indeed newly aligned. We also found it noteworthy that Tendermint raised \$20 million for a Cosmos ecosystem fund one week before the acquisition.⁴³ Regardless, B-Harvest was the second company from our staking segment to be acquired this year.

Another notable acquisition that we will highlight is Coinbase’s deal for digital assets data analytics platform, Skew, which was announced on April 30, 2021. Unfortunately, financial details surrounding this deal are private. However, according to PitchBook Data,⁴⁴ Skew had raised \$7.32 million before the acquisition and its most recent post valuation was \$15.53 million in April 2020. Given that information, we’ll leave it to the reader to estimate the potential range of the acquisition.

Coinbase’s purchase of Skew is another example of activity meant to cater to the growing institutional interest for digital assets. Greg Tusar, VP of Institutional Product at Coinbase, reiterated this idea in a blog post when he wrote “we know that access to high quality data is essential for institutions assessing investments in crypto assets. That’s why we’re excited to integrate skew’s data analytics platform with Coinbase Prime, allowing our customers to track cryptocurrency spot and derivatives markets in real-time.”⁴⁵ So, Skew’s real-time data analytics will be integrated into Coinbase’s institutional platform.

The last newsworthy acquisition took place at the end of May and once again involves the staking section; 5 of the 9 deals or almost 56% of acquisitions this year took place in the staking segment. On May 31st, 2021, Singapore-based OIO Holdings Limited (OIO Hold-

⁴¹ [Tendermint Acquires B-Harvest Team to Build a DEX for the Cosmos Hub](#)

⁴² [Tendermint Acquisition Takes Aim at New Interoperable DEX for Cosmos](#)

⁴³ [Announcing Tendermint Ventures](#)

⁴⁴ [Skew Profile - Pitchbook](#)

⁴⁵ [Coinbase to acquire leading institutional data analytics platform, skew](#)

ings), a publicly traded mechanical and electrical engineering services and blockchain solutions provider, purchased Moonstake Limited (Moonstake) for an undisclosed in an all-stock transaction.⁴⁶

Moonstake developed a staking technology platform that let users store digital assets in web and mobile wallets, which allowed clients to participate in POS transactions to earn staking rewards on their digital assets. Founded in 2020, Moonstake's convenient and intuitive interface allowed the company to quickly become Asia's second largest staking business. As of this writing, over \$926 million in total assets were staked using Moonstake and 11 networks are available for staking, [according to their website](#). The acquisition allows OIO Holdings to immediately gain a strong foothold in the staking sector and it will receive a commission of up to 0.5% of staking assets as well.⁴⁷

Acquisitions have cooled off over the past few months, which we suspect is likely related to the recent drop in total crypto market capitalization. However, once risk appetite picks back up, we suspect that M&A activity will too. As our fellow research analyst John D'antoni concluded in The Block Research's [2021 Digital Asset Outlook Report](#) and reiterated in a [follow-up research piece](#): "data & analytics firms are ripe candidates for M&A activity in 2021."

The Block Research and those practitioners that we interviewed hold that digital assets data and infrastructure consolidation will only increase as the space becomes more institutionalized.

⁴⁶ [Singapore-Listed Blockchain Firm Buys Crypto Staking Platform Moonstake](#)

⁴⁷ [Singapore-Listed Blockchain Firm Buys Crypto Staking Platform Moonstake](#)



Conclusion

Conclusion

The State of the Digital Assets Data and Infrastructure Landscape, 2021 provides an overview of the computer hardware, application software, professional processes and most importantly, the companies needed to turn crude blockchain and market data into actionable resources.

The prevailing industry tide is generated through the monetization of digital assets by miners securing blockchain networks and exchanges facilitating the trade of these assets among market participants. Similar to their traditional financial system counterparts, miners (central banks) and exchanges (financial institutions) are stewards of the blockchain economy, allowing for the origination and flow of digital assets (value) and related data throughout the ecosystem online; all economic fruit within the industry stem from vines rooted in sources of raw data.

Companies featured in this report are among those economic agents that use computing infrastructure and data science services to aggregate, cleanse, organize and analyze raw data sources, transforming their emissions into strategic resources for clients seeking to further understand and monetize the digital assets ecosystem. Our representative sample set highlights 42 firms across four industry verticals – infrastructure, staking, on-chain metrics and market data – helping readers understand why the digital assets ecosystem was able to grow to over \$2 trillion in the second quarter of 2021.

Two major themes are present throughout this year's report: maturation and institutionalization.

The industry has come a long way since the grassroots days of cypherpunks and hobbyists, with billion dollar businesses, such as Coinbase, integrating with the traditional financial markets and digital assets further establishing themselves as legitimate investments, contracts and vehicles. Increased demand for actionable intelligence among global stakeholders has led to labor, entrepreneurship, capital, and other factors of production pouring into the space, further accelerating progression.

Conclusion

Providers across our four segments have developed identities outside of the generic data narratives of years past. Armed with wisdom from experience, those that remain are consolidating at both the industry level – as made evident by nine noteworthy acquisitions having taken place already this year – and the organizational level, with firms increasing their offerings across tiers of the “Digital Assets Data & Infrastructure Hierarchy of Needs.”

In close, if data is the new oil, and blockchain is the foundation for the new internet, then the companies laying the infrastructure and establishing processes to procure and refine digital assets data are uniquely positioned to capitalize on the continued expansion of the next web: the value of which is priceless.

