DIGITAL ASSET RESEARCH

Q2 2020 GitHub Activity - Computational Platforms Supersector

Overview

This report is the third installment of our Developer Activity Series for 2Q20 and is a collation of key GitHub metrics across 111 Target Repositories of the top public digital assets within DAR's Computational Platforms Supersector. For a broader overview on the ecosystem's GitHub developer activity please refer to 2Q20 Part 1 or Part 2.

Adoption and viability of public digital assets benefit from an ecosystem of demand, use, and support. Developer activity and engagement is one facet of this ecosystem, which can be measured by the underlying open source code repositories. The number of bugs fixed, the number of code changes proposed, the number of developers who return to contribute, and other measures all help better understand the depth of community involvement.

This series of reports uses DAR's Industry Taxonomy to compare developer activity across industry sectors. For this report, a set of metrics are employed to measure the developer activity during 2Q20 for the Computational Platforms. This Supersector is comprised of assets that exist within networks that support highly expressive, Turing-complete smart contracts. To learn more about this framework please reach out to the DAR team or refer to the Appendix below.

A follow-up report will cover a comparison of developer activity across 2Q20 for the Financial Instruments supersector and its respective sectors and subsectors. A more detailed analysis of individual token activity is available for purchase.

FIGURE 1 – Digital Currencies Sector Activity (2Q20)

	Sector (# of Subsectors)	Commits	Releases	Developers (Repeat)	Developers (Casual)	Developers (One Time)
Computational Platforms	**Application Tokens** (12)	−32%	−3%	224%	−19%	−18%
	Smart Contract Platforms (4)	−32%	−17%	−1169%	11%	6%
	Protocol Interoperability (2)	−81%	21%	−754%	−64%	−61%
	Notarization & Supply Chain Management (2)	967%	100%	−143%	156%	35%
	Distributed Computation & Storage (3)	−46%	0%	−305%	10%	3%

Notes 1-4: "N/A" stands for Not Available. During the data collection process, DAR notes that some digital asset project repositories are private and therefore DAR is unable to collect. A "casual developer" has contributed code 2-9 days in month period. A "repeat developer" has contributed code for minimum 10 days in a month period. A "one-time" developer has contributed code one day in a month period.

There are five sectors within the Computational Platforms: Application Tokens, Smart Contract Platforms, Protocol Interoperability, Notarization & Supply Chain Management, and Distributed Computation & Storage. Sectors are further comprised of subsectors. **Figure 1** provides an overview of the Q2 developer activity from the five sectors and compares the results to 1Q20.

FIGURE 2 – Computational Platforms Sector Percent Difference (2Q20 vs 1Q20)
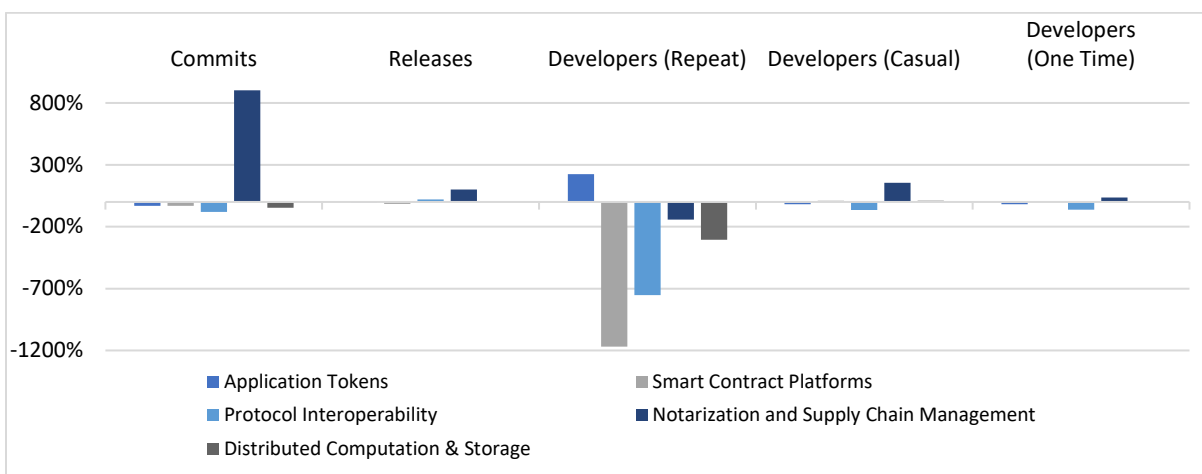
Figure 2 provides the percent change in developer activity for the five Computational Platforms sectors between 2Q20 and 1Q20. The calculated results are then compared to one another for each overview metric.

Sector Overview

Below are the results for the overview metrics of developer activity in 2Q20 for each subsector. Percent change columns compare 2Q20 with 1Q20.

FIGURE 3 – Digital Currency Subsector 2Q20 Totals

Subsector (# of Assets)	Commits		Releases		Repeat Developers		Casual Developers		One–Time Developers	
	Totals	% Change	Totals	% Change	Totals	% Change	Totals	% Change	Totals	% Change
Digital Art, Collectibles & NFTs (2)	39	3900%	0	0%	15	1500%	231	23100%	186	18600%
Gaming Services (1)	0	0%	0	0%	0	0%	19	−86%	24	−85%
Videogames (4)	34	−90%	0	0%	7	−97%	245	−61%	174	−44%
Exchange Tokens (11)	336	−5%	6	0%	319	29%	965	83%	801	228%
Prediction Markets (2)	1133	2212%	9	800%	984	496%	1236	506%	541	48%
Advertising Platforms (3)	839	−75%	1	100%	583	−61%	456	−65%	241	−45%
Social Networks (8)	776	−28%	9	−55%	553	20%	1774	−42%	1953	−25%
Decentralized Identity Solutions (4)	372	−70%	3	50%	196	−61%	743	−63%	857	−56%
Tokenized Wallet Applications (9)	167	56%	3	200%	401	1643%	1295	437%	1021	170%
Accounts Receivable Factoring (1)	0	0%	0	0%	0	0%	0	0%	11	−75%
Smart Contract Oracles (2)	559	1298%	7	600%	570	57000%	1555	714%	695	379%
Gift Cards, Rebates & Coupons (1)	123	−54%	1	−67%	224	−59%	579	−67%	577	−48%
Multi–Purpose Smart Contracts (21)	0	0%	0	0%	0	0%	0	0%	0	0%
Security–Focused Smart Contracts (2)	3	−88%	0	−100%	0	−100%	54	2%	199	262%
Privacy–Focused Smart Contract Platforms (1)	0	0%	0	0%	0	0%	0	0%	0	0%
Scalability–Focused Smart Contract Platforms (17)	0	0%	0	0%	0	0%	0	0%	0	0%
Intermediary Interoperability Solutions (6)	351	−81%	17	21%	341	−68%	1719	−64%	1578	−61%
Atomic Swap Solutions (0)	0	0%	0	0%	0	0%	0	0%	0	0%
Data Notarization Platforms (4)	60	900%	4	100%	82	−62%	648	115%	803	19%
Supply Chain Management Systems (3)	4	400%	0	0%	0	0%	122	12200%	106	10600%
Cloud–Computing Intermediary (4)	35	25%	0	−100%	0	0%	281	−26%	139	−64%
Crowdsourced Computation Platform (4)	414	438%	4	100%	283	1565%	759	48%	731	−7%
Min	0	−88%	0	−100%	0	−100%	0	−64%	0.00	−64%
Max	414	900%	17	100%	341	1565%	1719	12200%	1578	10600%
Average	96	177%	2	2%	78	148%	398	1364%	395	1194%

Below are the results for the overview metrics of developer activity in 2Q20. Each asset's Q2 performance is then compared to 1Q20 and the results are shown below.

FIGURE 4 – List of Assets in Digital Currencies Supersector

		GitHub Metrics						Derived Metrics	
Name	Ticker	Commits	Releases	Developers (Repeat)	Developers (Casual)	Developers (One Time)		Open-To-Close Ratio	Average Time To Close Issue
0x	ZRX	N/A	N/A	N/A	N/A	N/A		N/A	N/A
Adex	ADX	N/A	N/A	N/A	N/A	N/A		N/A	N/A
aelf	ELF	941%	0%	1565%	106%	10%		−48%	19%
Aeron	ARN	N/A	N/A	N/A	N/A	N/A		N/A	N/A
Aeternity	AE	N/A	N/A	N/A	N/A	N/A		N/A	N/A
AION	AION	25%	N/A	N/A	−51%	−45%		−100%	N/A
AirSwap	AST	−70%	N/A	N/A	−80%	−42%		−85%	N/A
Algorand	ALGO	N/A	N/A	N/A	N/A	N/A		N/A	N/A
Ambrosus	AMB	N/A	N/A	N/A	N/A	N/A		N/A	N/A
AppCoins	APPC	−54%	−67%	−59%	−67%	−48%		−23%	−68%
Ardor	ARDR	−66%	N/A	−67%	−59%	−73%		N/A	N/A
Ark	ARK	−55%	50%	−61%	−60%	−69%		−100%	60%
Augur	REP	N/A	N/A	N/A	N/A	N/A		N/A	N/A
Bancor	BNT	N/A	N/A	N/A	N/A	N/A		N/A	N/A
Basic Attention Token	BAT	−75%	N/A	−61%	−67%	−59%		55%	N/A
Binance Coin	BNB	−100%	−100%	N/A	−100%	−74%		−100%	−100%
Bitshares	BTS	249%	N/A	1888%	76%	−10%		−27%	N/A
BitTorrent	BTT	−94%	−67%	−100%	−59%	−83%		0%	−67%
Bluzelle	BLZ	N/A	N/A	N/A	N/A	N/A		N/A	N/A
Box Token	BOX	−93%	0%	N/A	−50%	−76%		−100%	0%

N1: If you are interested in using our data set for additional analysis, please reach out to the DAR team for more details.
N2: Open-to-Close Ratio is calculated by dividing the total number of Closed Issues by the total number of Open Issues in the GitHub repository.
N3: Average Time to Close Issue is a measure of a project's ability to efficiently close pull requests in a timely manner.
N4: In the case of "N/A", the previous quarter did not have any activity.

Supersector Constituents

GitHub Metrics

Name	Ticker	Commits	Releases	Developers (Repeat)	Developers (Casual)	Developers (One Time)
Bytom	BTM	N/A	N/A	N/A	N/A	N/A
Cardano	ADA	N/A	N/A	N/A	N/A	N/A
Chainlink	LINK	790%	600%	N/A	463%	227%
Civic	CVC	−79%	0%	−78%	−67%	−71%
Cortex	CTXC	N/A	N/A	N/A	N/A	N/A
Cosmos	ATOM	−88%	400%	−94%	−58%	−66%
Crypterium	CRPT	N/A	N/A	N/A	N/A	N/A
CyberMiles	CMT	347%	N/A	131%	−21%	−23%
Decentraland	MANA	N/A	N/A	N/A	N/A	N/A
Dent	DENT	N/A	N/A	N/A	N/A	N/A
Dock	DOCK	−68%	N/A	−57%	−29%	−36%
Dragonchain	DRGN	N/A	N/A	N/A	N/A	N/A
Eidoo	EDO	N/A	N/A	N/A	N/A	−70%
Elastos	ELA	−89%	N/A	−96%	−50%	−81%
Enigma	ENG	N/A	N/A	N/A	N/A	N/A
Enjin	ENJ	N/A	N/A	N/A	N/A	N/A
EOS	EOS	−4%	0%	−5%	175%	986%
Ethereum	ETH	1136%	100%	N/A	1737%	1426%
Ethereum Classic	ETC	−25%	−79%	−67%	−55%	−81%
Factom	FCT	N/A	N/A	N/A	N/A	N/A
FunFair	FUN	N/A	N/A	N/A	−86%	−85%
GIFTO	GTO	N/A	N/A	N/A	N/A	N/A

Derived Metrics

Name	Ticker	Open-To-Close Ratio	Average Time To Close Issue
Bytom	BTM	N/A	N/A
Cardano	ADA	N/A	N/A
Chainlink	LINK	240%	882%
Civic	CVC	−100%	536%
Cortex	CTXC	N/A	N/A
Cosmos	ATOM	33%	401%
Crypterium	CRPT	N/A	N/A
CyberMiles	CMT	−82%	N/A
Decentraland	MANA	N/A	N/A
Dent	DENT	N/A	N/A
Dock	DOCK	N/A	N/A
Dragonchain	DRGN	N/A	N/A
Eidoo	EDO	0%	N/A
Elastos	ELA	0%	N/A
Enigma	ENG	N/A	N/A
Enjin	ENJ	N/A	N/A
EOS	EOS	−22%	1752%
Ethereum	ETH	432%	14%
Ethereum Classic	ETC	−100%	−79%
Factom	FCT	N/A	N/A
FunFair	FUN	N/A	N/A
GIFTO	GTO	N/A	N/A

N1: If you are interested in using our data set for additional analysis, please reach out to the DAR team for more details.

N2: Open-to-Close Ratio is calculated by dividing the total number of Closed Issues by the total number of Open Issues in the GitHub repository.

N3: Average Time to Close Issue is a measure of a project's ability to efficiently close pull requests in a timely manner.

N4: In the case of "N/A", the previous quarter did not have any activity.

Supersector Constituents

GitHub Metrics

Name	Ticker	Commits	Releases	Developers (Repeat)	Developers (Casual)	Developers (One Time)
Gnosis	GNO	159%	800%	14%	143%	−26%
GoChain	GO	N/A	N/A	N/A	N/A	N/A
Golem	GNT	N/A	N/A	N/A	N/A	N/A
GXChain	GXC	−68%	−100%	−100%	−84%	−75%
Holochain	HOT	140%	N/A	N/A	−46%	−24%
Huobi Token	HT	−63%	−100%	−63%	−86%	−79%
ICON	ICX	−82%	−100%	−88%	−76%	−76%
iExec rlc	RLC	25%	−100%	N/A	−26%	−64%
Ignis	IGNIS	N/A	N/A	N/A	N/A	N/A
IOST	IOST	−44%	0%	−38%	−49%	−58%
IoTeX	IOTX	N/A	N/A	N/A	N/A	N/A
KuCoinShares	KCS	−100%	N/A	N/A	N/A	−78%
Kyber Network	KNC	6%	N/A	47%	−14%	132%
LEO Token	LEO	N/A	N/A	N/A	N/A	N/A
Lisk	LSK	1372%	N/A	1300%	7%	−61%
Loom	LOOM	−90%	N/A	−97%	−61%	−56%
Loopring	LRC	N/A	N/A	N/A	N/A	N/A
Mainframe	MFT	N/A	N/A	N/A	N/A	−81%
Matrix AI Network	MAN	−34%	33%	−19%	−35%	−4%
Medicalchain	MTN	N/A	N/A	N/A	N/A	N/A
Metaverse ETP	ETP	N/A	N/A	N/A	N/A	N/A
Mithril	MITH	−66%	−79%	−42%	−67%	−62%
Nano	NANO	−80%	−73%	−3%	−47%	−63%

Derived Metrics

Open−To−Close Ratio	Average Time To Close Issue
−65%	73%
N/A	N/A
N/A	N/A
−100%	−100%
−43%	N/A
−61%	−100%
−57%	−100%
−100%	−100%
N/A	N/A
−20%	34%
N/A	N/A
N/A	N/A
−100%	N/A
N/A	N/A
N/A	N/A
−100%	N/A
N/A	N/A
−100%	N/A
−64%	744%
N/A	N/A
N/A	N/A
−72%	−75%
156%	−87%

N1: If you are interested in using our data set for additional analysis, please reach out to the DAR team for more details.
N2: Open-to-Close Ratio is calculated by dividing the total number of Closed Issues by the total number of Open Issues in the GitHub repository.
N3: Average Time to Close Issue is a measure of a project's ability to efficiently close pull requests in a timely manner.
N4: In the case of "N/A", the previous quarter did not have any activity.

Supersector Constituents

GitHub Metrics

Name	Ticker	Commits	Releases	Developers (Repeat)	Developers (Casual)	Developers (One Time)
Nebulas	NAS	−72%	−83%	−88%	−59%	−73%
NEM	NEM	−88%	−100%	−100%	−51%	−64%
NEO	NEO	−90%	−92%	−80%	−24%	3%
Nexus	NXS	−75%	0%	−51%	−69%	−96%
Nuls	NULS	−77%	−50%	−70%	−46%	−19%
Nxt	NXT	N/A	N/A	N/A	N/A	N/A
Obyte	Bytes	−7%	−83%	−72%	−46%	−68%
Odyssey	OCN	−100%	N/A	N/A	−100%	−100%
OMG Network	OMG	−93%	N/A	−100%	−75%	−68%
Ontology	ONT	767%	100%	−62%	82%	−1%
OST Platform	OST	N/A	N/A	N/A	N/A	N/A
PCHAIN	PI	−9%	50%	177%	5%	125%
po.et	POE	−100%	−100%	N/A	−77%	−88%
Populous	PPT	N/A	N/A	N/A	N/A	−75%
Propy	PRO	N/A	N/A	N/A	N/A	N/A
qash	QASH	N/A	N/A	N/A	N/A	N/A
QLC Chain	QLC	33%	0%	N/A	188%	83%
Qtum	QTUM	N/A	N/A	N/A	N/A	N/A
Quantstamp	QSP	−61%	N/A	48%	−24%	−22%
Quantum	QAU	−95%	−100%	−87%	−44%	−58%
QuarkChain	QKC	20%	N/A	657%	−35%	−71%
Raiden Network Token	RDN	N/A	N/A	N/A	N/A	N/A
ReddCoin	RDD	N/A	N/A	N/A	N/A	N/A

Derived Metrics

Open−To−Close Ratio	Average Time To Close Issue
−71%	−83%
N/A	−100%
−8%	−92%
−41%	10%
−54%	−3%
N/A	N/A
−71%	−83%
N/A	N/A
−100%	N/A
−45%	303%
N/A	N/A
619%	1191%
−100%	−100%
N/A	N/A
N/A	N/A
N/A	N/A
100%	0%
N/A	N/A
N/A	N/A
N/A	−100%
−26%	N/A
N/A	N/A
N/A	N/A

N1: If you are interested in using our data set for additional analysis, please reach out to the DAR team for more details.
N2: Open-to-Close Ratio is calculated by dividing the total number of Closed Issues by the total number of Open Issues in the GitHub repository.
N3: Average Time to Close Issue is a measure of a project's ability to efficiently close pull requests in a timely manner.
N4: In the case of "N/A", the previous quarter did not have any activity.

Supersector Constituents

GitHub Metrics

Name	Ticker	Commits	Releases	Developers (Repeat)	Developers (Casual)	Developers (One Time)
Refereum	RFR	N/A	N/A	N/A	N/A	N/A
Republic Protocol	REN	−66%	−80%	−52%	−80%	−89%
Revain	R	78%	N/A	500%	38%	585%
Santiment Network Token	SAN	N/A	N/A	N/A	N/A	N/A
Siacoin	SC	−52%	−100%	N/A	−21%	−75%
SingularityNET	AGI	N/A	N/A	N/A	N/A	N/A
SmartMesh	SMT	−79%	N/A	N/A	−41%	−25%
Sonm	SNM	−79%	N/A	N/A	−41%	−25%
Sreamr DATAcoin	DATA	N/A	N/A	N/A	N/A	N/A
Status	SNT	N/A	N/A	N/A	N/A	N/A
Steem	STEEM	N/A	N/A	N/A	N/A	14700%
storj	STORJ	−65%	150%	−62%	26%	353%
Storm	STORM	−100%	−100%	N/A	−100%	−89%
Tezos	XTZ	−100%	−100%	−100%	2%	−20%
THEKEY	TKY	−8%	0%	113%	−59%	−71%
Theta	THETA	−79%	0%	−78%	−67%	−71%
Tron	TRX	50%	0%	−13%	192%	356%
VeChain	VET	N/A	N/A	N/A	N/A	N/A
Waltonchain	WTC	N/A	N/A	N/A	N/A	N/A
Wanchain	WAN	−100%	N/A	−100%	−94%	−78%
Waves	WAVES	N/A	N/A	N/A	N/A	N/A
WAX	WAXP	N/A	N/A	N/A	N/A	N/A
Zilliqa	ZIL	40%	0%	5%	99%	26%

Derived Metrics

Name	Ticker	Open-To-Close Ratio	Average Time To Close Issue
Refereum	RFR	N/A	N/A
Republic Protocol	REN	−100%	−80%
Revain	R	−81%	N/A
Santiment Network Token	SAN	N/A	N/A
Siacoin	SC	−100%	−100%
SingularityNET	AGI	N/A	N/A
SmartMesh	SMT	N/A	N/A
Sonm	SNM	N/A	N/A
Sreamr DATAcoin	DATA	N/A	N/A
Status	SNT	N/A	N/A
Steem	STEEM	N/A	N/A
storj	STORJ	88%	115%
Storm	STORM	−100%	−100%
Tezos	XTZ	−33%	−100%
THEKEY	TKY	−100%	0%
Theta	THETA	−100%	536%
Tron	TRX	21%	1%
VeChain	VET	N/A	N/A
Waltonchain	WTC	N/A	N/A
Wanchain	WAN	−75%	N/A
Waves	WAVES	N/A	N/A
WAX	WAXP	N/A	N/A
Zilliqa	ZIL	−8%	−92%

N1: If you are interested in using our data set for additional analysis, please reach out to the DAR team for more details.
N2: Open-to-Close Ratio is calculated by dividing the total number of Closed Issues by the total number of Open Issues in the GitHub repository.
N3: Average Time to Close Issue is a measure of a project's ability to efficiently close pull requests in a timely manner.
N4: In the case of "N/A", the previous quarter did not have any activity.

Calendar

Below are selected events from DAR's Crypto Events Calendar in 2Q20 for the 11 Computational Platforms Supersector assets highlighted in this report.

FIGURE 5 – List of Assets in Digital Currencies Supersector

Asset	Event	Description	Date	Source	Notes
ATOM	Storage & Custody Event	Coinbase Custody Staking Support	May 20 2020	Link	Digital asset exchange Coinbase to begin staking support for ATOM
ETH	Client Update	Go Implementation v1.9.15	Jun 8 2020	Link	Maintenance release, bug fixes
LINK	Client Update	V0.8.7	June 15 2020	Link	Features addition surrounding node's reliability when putting transactions on-chain.
REP	Client Update	V2 Deployment	Jun 1 2020	Link	V2 will be deployed to the Ethereum network and go live on the first weeks of June
XLM	Client Update	Protocol 13Upgrade	June 18 2020	Link	Token transfer starts on June 15; no trading fees until 1 September 2020.
XTZ	Corporate Action	$25M Class-Action Lawsuit Settlement Pending	Jun 3 2020	Link	The lawsuit was filed against Tezos for illegal raising of over $232M during its ICO.

Note: For more information about our Crypto Events Calendar, please reach out to the DAR team for more details.

Appendix

Glossary

Metric	Description
Open Issues	The total number of Open Issues in the defined period.
Closed Issues	The total number of Closed Issues in the defined period.
Open-to-Close Ratio (OCIR)	A direct measure of developer effectiveness. It is calculated by dividing the total number of Closed Issues (issues with the codebase that have been fixed by the development team) by the total number of Open Issues (issues with the codebase that have not been fixed by the development team).
Minimum Proposed Pull Request Requirement (PPR)	A measure of developer activity. It is calculated by adding all Pull Requests (requests to change the codebase) proposed by internal or external developers, or by the users of the codebase.
Minimum Merged Pull Request Requirement (MPR)	A measure of developer activity. It is calculated by adding all Pull Requests (requests to change the codebase) implemented by internal or external developers.
Commits	A commit is an approved change to a project's source code that the project's community and administrators agree is an improvement. This metric can be used as a benchmark since a forked project inherits all the code commits of its predecessors.
Number of Releases	A measure of a project's software updates over a period.
Average Size of Release	A measure of a project's development team's ability to release efficient and clean software updates. Each release is compared to its predecessor to gather an average size across all releases. This metric is measured in megabytes.
Average Time-to-Close Pull Request (T2C)	A measure of a project's ability to efficiently close pull requests in a timely manner. In the case of this report, the period is one business quarter or approximately 90 days.
Developers (Total)	The total amount of developers that have contributed to a project in the time. In the case of this report, the period is one-business quarter or approximately 90 days.
Developers (Repeat)	A repeat developer has contributed code for a minimum 10 days in a month period.
Developers (Casual)	A casual developer has contributed code for a minimum two days and maximum nine days in a month period.
Developers (One Time)	A one-time developer has contributed code one day in a monthly period.
Number of Forks	A fork is a copy of a repository that a developer manages. Forks let you make changes to a project without affecting the original repository. You can fetch updates from or submit changes to the original repository with pull requests. In open source projects, forks are often used to iterate on ideas or changes before they are offered back to the upstream repository. A project can only be forked once per developer account; therefore, it is difficult for nefarious actors to manipulate the metric.

Digital Asset Industry Taxonomy

Name	Description
Digital Currencies	The Digital Currencies Supersector is comprised of digital assets whose main objective is to replicate the fundamental functions of money: store of value, medium of exchange, and unit of account.
Computational Platforms	The Computation Platforms Supersector is comprised of assets that exist within networks that support highly expressive, Turing-complete smart contracts.
Financial Instruments	The Financial Instruments Supersector is comprised of assets that apply the decentralized properties of digital assets to financial contracts and corporate structures that exist in traditional finance.

DAR has devised a comprehensive industry taxonomy for digital assets that ranges from industry to subsector. Frameworks for classification and comparative analysis are important for understanding risk and exposure in emerging assets and technologies.

DAR's classification focuses on the underlying technology each asset employs and captures the nuance and peculiarities of the digital assets currently in the market. This bottom-up methodology is granular in its approach and stems from fundamental research and technological understanding of the assets.

The classification is structured so that it can continue to adapt and be comprehensively applied as new assets and technologies emerge, providing a future-proof framework to classify digital assets.

If you are interested in using this framework, please reach out to the DAR team for more details about the DAR Industry Taxonomy.

Target Repository

A single digital asset and supporting network may have dozens of different repositories. Because of this, we make a qualitative assessment to determine the most relevant and comparable repository in the context of cross-sector statistical analysis. We call this repository the Target Repository and collect all statistics described in this report from that single location.

Native Digital Assets function as the main medium of exchange within their parent networks, like BTC in Bitcoin and ETH in Ethereum. For the majority of Native Digital Assets, the Target Repository is the Client. This piece of software is what network participants use to send, receive, relay, and validate digital asset transactions. The Client also enforces the rules that define the key properties of these digital assets, such as inflation, divisibility, and transferability.

Unlike Native Digital Assets, Application Tokens are digital assets issued within an existing network supported by token standards, like ERC20, ERC223, amongst many others. The majority of Applications Tokens do not have a Client. When evaluating developer stats of an Application Token, the Target Repository used is the core repository of the application itself, which is often in the form of a smart contract. In the case of ZRX, for example, the Target Repository is the smart contract codebase that supports its Decentralized Exchange protocol, which is 0x's main application.

DISCLOSURES

You are permitted to store, display, analyze, modify, and print this report, but only for your own use. You are not permitted to (a) reverse engineer, decompile, decode, decrypt, disassemble, or in any way derive source code from this report; (b) modify, translate, adapt, alter, or create derivative works from this report; (c) copy (except as expressly permitted in the Subscription Services Agreement), distribute, publicly display, transmit, sell, rent, lease or otherwise exploit this report or grant any third party access to it; (d) frame or scrape or in-line link to the this report or use web crawlers, web spiders or other automated means to access, copy, index, process and/or store any of the information herein; (e) create apps, extensions, programs or other products or services that use any of the information herein; or (f) make or have made a service or product using similar ideas, features, functions or graphics of or providing a similar benefit as that provided by this report.

DAR DOES NOT MAKE AND HEREBY EXPRESSLY DISCLAIMS ALL WARRANTIES, ORAL OR WRITTEN, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. WITHOUT LIMITING THE FOREGOING, YOU AGREE THAT YOUR USE OF THIS REPORT IS AT YOUR SOLE RISK AND ACKNOWLEDGE THAT THIS REPORT IS PROVIDED "AS-IS" AND DAR DOES NOT MAKE ANY WARRANTIES WITH RESPECT TO THE OPERATION, AVAILABILITY, RELIABILITY, ORIGINALITY OR ADEQUACY OF THE SAME. THIS REPORT (INCLUDING ANY INFERENCES OR CONCLUSIONS DRAWN HEREIN) IS BASED ON INFORMATION DAR CONSIDERS RELIABLE, HOWEVER, DAR DOES NOT REPRESENT IT AS ACCURATE OR COMPLETE, AND IT SHOULD NOT BE RELIED ON AS SUCH. THIS REPORT (INCLUDING ANY INFERENCES OR CONCLUSIONS DRAWN HEREIN) IS PROVIDED FOR GENERAL INFORMATIONAL PURPOSES ONLY AND YOU ARE RESPONSIBLE FOR DETERMINING WHETHER ANYTHING CONTAINED HEREIN IS SUITABLE FOR YOUR PARTICULAR CIRCUMSTANCES, AND FOR SEEKING PROFESSIONAL TAX AND/OR INVESTMENT ADVICE AS APPROPRIATE. DAR DOES NOT GIVE TAX, LEGAL OR INVESTMENT ADVICE OR ADVOCATE THE PURCHASE OR SALE OF ANY SECURITY, INVESTMENT, CRYPTOCURRENCY OR DIGITAL ASSET. NONE OF THE INFORMATION CONTAINED IN THIS REPORT CONSTITUTES OR IS INTENDED TO CONSTITUTE A RECOMMENDATION BY DAR TO ACQUIRE, HOLD, INVEST IN, OR USE ANY PARTICULAR COIN, TOKEN, CRYPTOCURRENCY, PROTOCOL, COMPANY OR FOUNDATION.

You assume the entire risk of any use you make or permit to be made from this report. Without limiting the foregoing and to the maximum extent permitted by applicable law, in no event shall DAR have any liability regarding this report for damages, even if notified of such possibility.

The information contained herein is as of the date hereof and is subject to change without prior notice. We may provide oral or written market commentary or trading strategies to our clients that reflect opinions that are contrary to the opinions expressed in this research. Information containing any historical information, data or analysis should not be taken as an indication or guarantee of any future performance as past performance does not guarantee future results. None of DAR's products or services recommend, endorse, or otherwise express any opinion regarding any "coin", "token", "cryptocurrency" "protocol", "company" or "foundation" and none of DAR's products or services are intended to constitute investment advice or a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such.