Blockchain Development Trends

2022 Edition

This report outlines critical development trends in decentralized protocols and projects from January 2021 to December 2021

Outlier Ventures

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1. Introduction

In this document, we analyze development activity, including levels of commits and authors, for the top fifty (50) ranked projects according to market capitalization or total value locked in 2021. This report focuses on core development, meaning all development that is specific to the core protocol itself and not the wider ecosystem. As an example, we focus on Ethereum and its core repositories, excluding repositories such as Polygon or Optimism which would classify as wider ecosystem developments.

We believe that analyzing core development is important for ensuring transparency and understanding progress and innovation of the protocol. Core decentralized protocols often serve as a foundation for many projects to build on; when teams make the crucial selection of what framework they should base their work on, they should be well-informed on the protocol's development history. Although this is certainly not the most important factor for selection, it is nonetheless useful for ensuring that teams find the solutions most tailored to their use case.

We also hope to provide the general public with an understanding of how a protocol is developed in an open-source environment, compared to closed-source environments and hybrid models of open and closed developments. Web3 is a relatively new field, and the frequency of new projects makes it difficult to navigate them without a thorough understanding of the industry's core structure. This report can serve as a guiding tool towards understanding the space of top protocol development processes.

2. Methodology

In this section, we outline the methodology used to produce the contents of this report. As stated in the introduction, we include the top fifty (50) protocols according to market capitalization or total value locked for core blockchain projects and decentralized finance protocols. Our selection was based on:

- **Market Capitalization**: We selected the top fifty (50) protocols on CoinMarketCap (CMC) according to their snapshot taken on the 1st of January 2022[1].

- **Total Value Locked**: We selected top-fifty (50) protocols on DefiPulse according to a snapshot taken on the site by the WayBackMachine service on 1st of January 2022[2].

For our data analysis we used DevPulse, our own publicly available tool, where we collect organisational repositories for each respective project along with other data sources.

We recommend visiting our Web3 Development Activity dashboard to learn more.

All the core repositories of each GitHub organization's protocol were examined andforked repositories were ignored, as including all forks in the analysis would have added more noise than clarity. For similar reasons, only activity for each repository's default branch (main or master) was included. In these 'unforked' repositories, all commits to the default branch were indexed and analyzed.

We attribute the development activity for each organization on GitHub to a single protocol, and do not include individual repositories outside of those organizations in order to most accurately show development activity to the core development of protocols.

1 https://coinmarketcap.com/historical/20220101/

2 https://web.archive.org/web/20220101152704/https://www.defipulse.com/

2.1 Core Development

Core development measures weekly commit and code updates (additions and deletions) over time to the core protocol GitHub organization repositories. Commits to the default branch and line-by-line additions and deletions to code across all repositories under each target organization were indexed and compared. We ignored empty commits with less than or equal to one line of code.

There exist some exemptions to the above, as we have included native wallets for chains that would require custom wallets such as Phantom for Solana or Keplr for Cosmos. There are some cases where we have included more than the core organizational open-source profile, in instances where sub-organizations or other organizations also contribute to core projects for the respective protocol.

2.2 Contributing Core Developers

Contributing core developers measure the monthly active developers in a protocol's core GitHub organization repositories over time based on their commits. The developer commits to all core repositories of each protocol were de-duplicated against commits to other core repositories over the course of a month to find all unique contributors per month.

3. Blockchain Protocols

In this section, we summarize our analysis of the top 50 open-source blockchain protocols by market capitalization, including non-tokenized protocols such as Hyperledger and Corda. We summarize our main discoveries in relevant subsections, such as protocols with rising commits, declining commits, and other relevant categories as described in the chapter above.

3.1 Commits

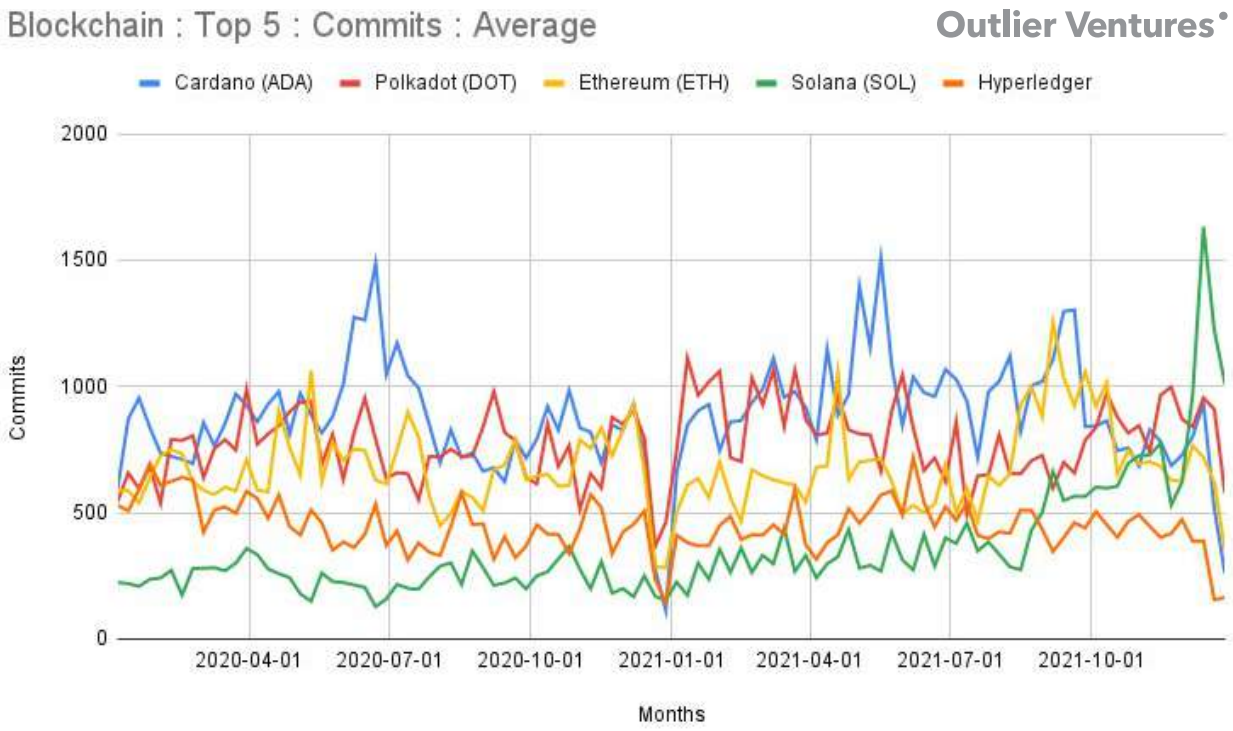
The total number of commits per 12-month period has slightly decreased by -0.8%, going from 543 449 total commits compared to 539 194 commits in the recent year. This slight decrease in development activity does not indicate any downward trend for overall development in the Web3 space.

3.1.1 Top Commit Trends

This section analyzes the top ten protocols for the highest monthly average of commits (CPM). Cardano showed clear signs of a high average volume of 926 CPM. It is important to note that we have observed a high amount of monthly commits designated exclusively to project coordination and not necessarily to active core protocol development for Cardano. Polkadot exhibited a high-level average of commits per month, leveling at 822 CPM, which resulted in an 11.2% difference between Cardano at the top compared to Polkadot. Right beneath those two protocols, Ethereum averaged at 692 commits per month, showing relatively stable numbers compared to last year when it performed 666 CPM. This resulted in a 3.9% increase. Solana performed rather well, with an increase of 96.9% in average commits per month by reporting 472 CPM last year compared to 240 average CPM in 2020. Lastly, Hyperledger exhibited a slight decrease in average commits per month compared to

the previous reporting period, recording an average of 440 CPM last year compared to 454 CPM in 2020.

Moreover, we list the top ten (10) protocols with the highest amount of average CPM, in which we are comparing the results from 01.01.2020 to 31.12.2020 with 01.01.2021 to 31.12.2021 time period.



Protocols	2020 AVG CPM	2021 AVG CPM	Yearly Δ CPM
Cardano (ADA)	843	926	9.9%
Polkadot (DOT)	738	822	11.5%
Ethereum (ETH)	666	692	3.9%
Solana (SOL)	240	472	96.9%
Hyperledger	454	440	-3.0%
Filecoin (FIL)	667	426	-36.1%
IOTA (MIOTA)	266	406	52.9%
Cosmos (ATOM)	487	394	-19.1%
Flow (FLOW)	315	392	24.4%
Kusama (KSM)	338	344	1.6%
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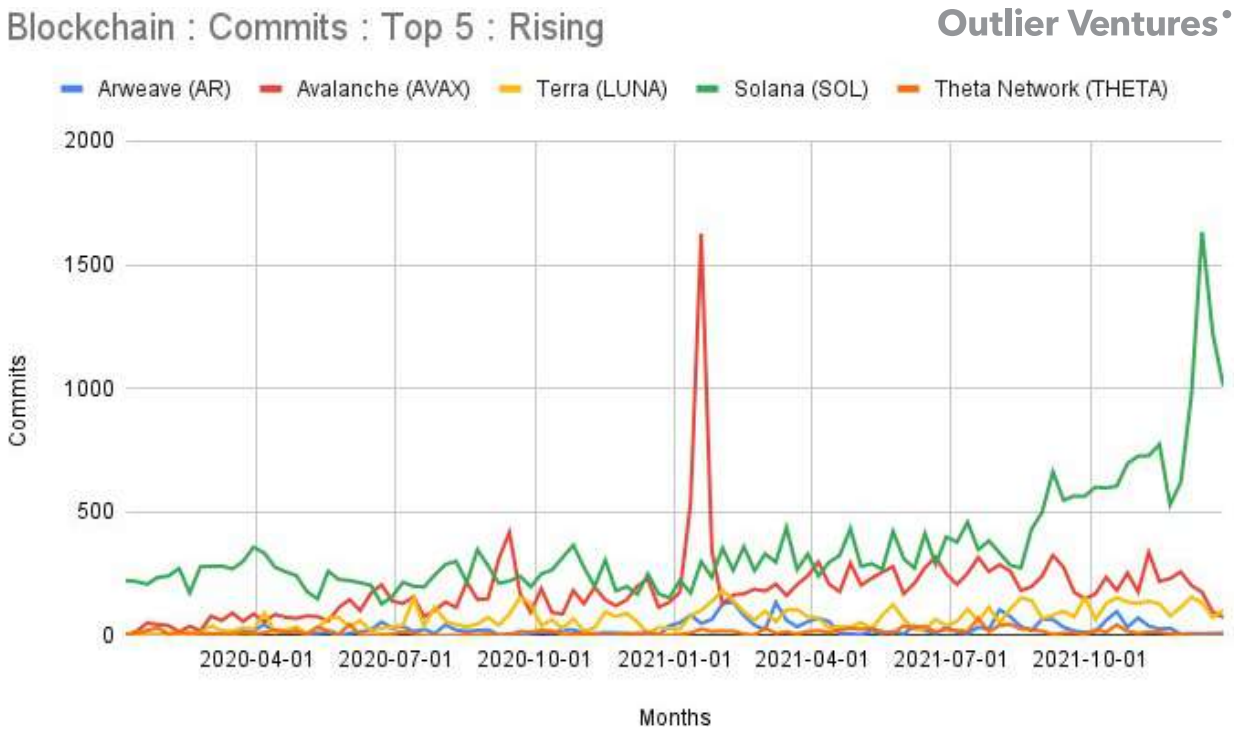
3.1.2 Rising Commit Trends

Arweave demonstrated a clear rising trend in the last 12-month period compared to 2020 – going from 785 commits per year (CPY) to 2,200 CPY, marking a growth of 180.3% of commit activity. We have seen an increase of interest in decentralized storage solutions that may be fueling the rise of development activity with Arweave. **Avalanche** exhibited impressive numbers with a 114.5% increase compared to 2020, going from 6,177 CPY to 13,250 CPY. **Terra** showed impressive growth, going from 2,373 CPY to 4,783 CPY, which resulted in a 101.6% increase in development activity. **Solana** demonstrated 96.9% in yearly commit growth, where we observed 12,459 CPY in 2020 compared to last year's 24,531 CPY. Lastly, **Theta Network** increased by 81.8%, going from 534 CPY to 971 CPY.



Protocols	2020 CPY	2021 CPY	Yearly Δ CPY
Arweave (AR)	785	2,200	180.3%
Avalanche (AVAX)	6,177	13,250	114.5%
Terra (LUNA)	2,373	4,783	101.6%
Solana (SOL)	12,459	24,531	96.9%
Theta Network (THETA)	534	971	81.8%
IOTA (MIOTA)	13,820	21,129	52.9%
Zcash (ZEC)	6,573	9,773	48.7%
Oasis Network (ROSE)	3,257	4,536	39.3%
Crypto.com Coin (CRO)	1,491	2,073	39.0%
Chainlink (LINK)	6,128	8,513	38.9%
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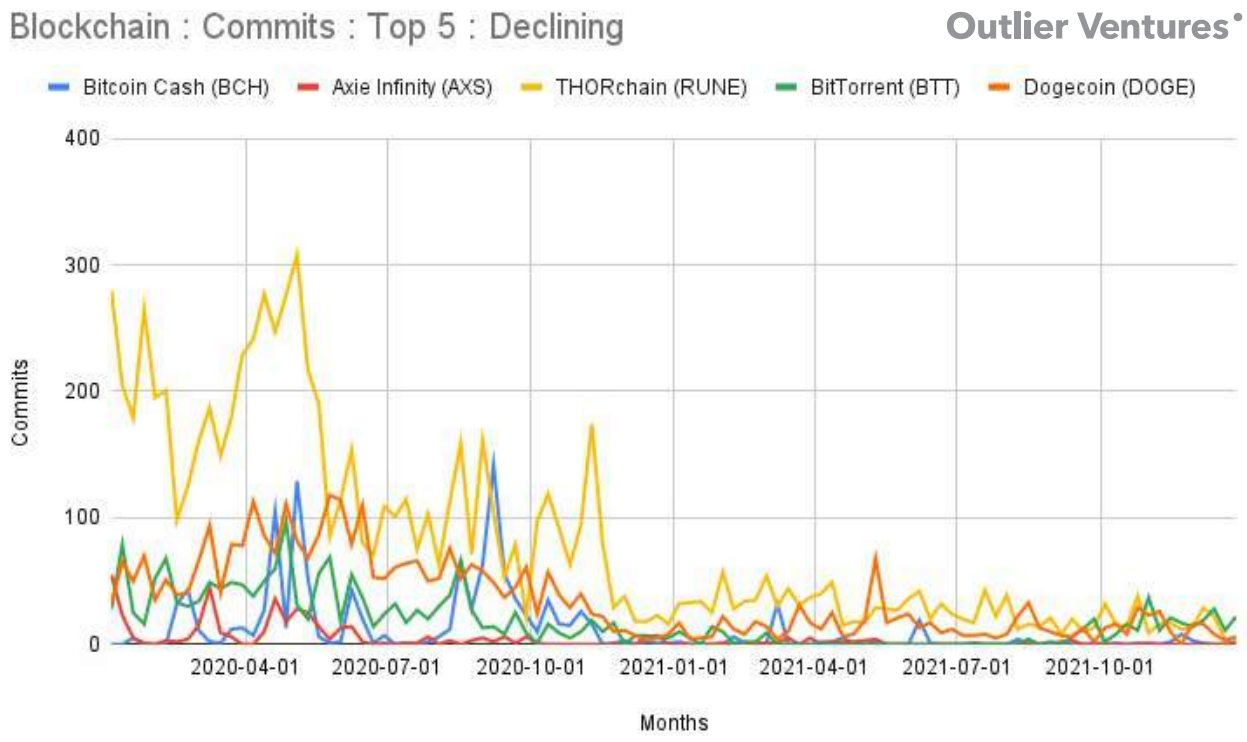
3.1.3 Declining Commit Trends

Bitcoin Cash demonstrated a -90.9% decrease in development activity, going from 1,092 CPY to 98 CPY last year. **Axie Infinity** decreased by -90.8%, going from 381 CPY in 2020 compared to 35 CPY in 2021. It is important to note that this number is for open-source development, whereas a game most likely has the majority of its development done in a closed-source environment, meaning that this data is not included in the numbers above. **THORchain** went from 6,902 CPY to 1,344 CPY, resulting in a -80.7% decrease of development activity. **BitTorrent** exhibited a -79.8% decrease from 1,561 CPY in 2020 to 298 CPY last year. **Dogecoin** to the moon? Not so much when it comes to their development activity, as they are very much grounded to earth at the moment, going from 2,899 CPY to 736 CPY, respectively. This resulted in a decrease of -74.7 in yearly commit levels.



Protocols	2020 CPY	2021 CPY	Yearly Δ CPY
Bitcoin Cash (BCH)	1,092	98	-90.9%
Axie Infinity (AXS)	381	35	-90.8%
THORchain (RUNE)	6,902	1,344	-80.7%
BitTorrent (BTT)	1,561	298	-79.8%
Dogecoin (DOGE)	2,899	736	-74.7%
XDC Network (XDC)	1,757	652	-62.9%
Klaytn (KLAY)	4,420	1,716	-61.4%
Harmony One (ONE)	9,156	3,607	-59.8%
KuCoin (KCS)	378	185	-53.7%
Tron Protocol (TRX)	6,174	2,987	-51.7%
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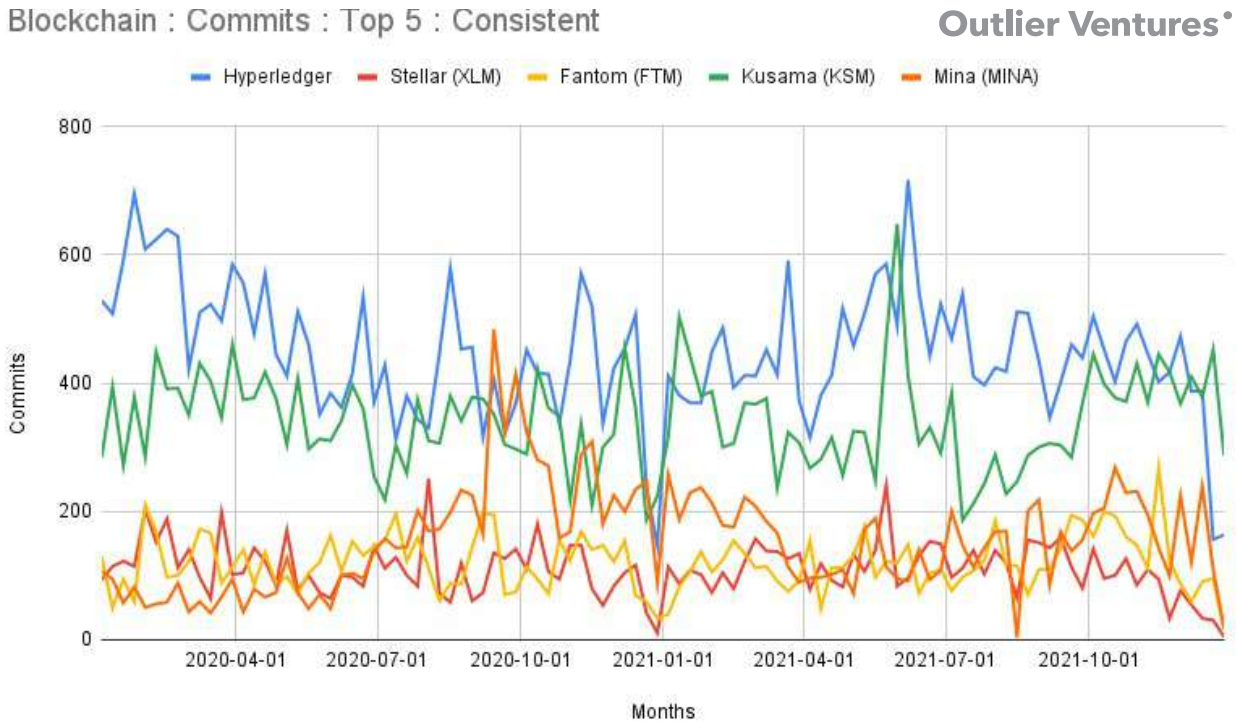
3.1.4 Consistent Commit Trends

In this section, we review protocols that have performed consistently over the time period of this report. **Basic Attention Token** demonstrated consistent commit levels when they experienced a 9.8% increase in CPY, going from 1,044 CPY to 1,146 CPY last year. **Elrond** increased by 6.8%, going from 16,087 CPY to 17,188 CPY. As covered earlier, **Ethereum** demonstrated a high throughput rate of commits per month and year, and also exhibited remarkably stable levels of commits compared to the year before: from 34,627 CPY in 2020 to 35,963 CPY in 2021, a 3.9% increase. **Mina** showed a minor increase of 2.0% in CPY, with 7,953 CPY in 2020 to 8,116 CPY last year. Lastly, **Kusama** exhibited a relatively stable commit level, going from 17,587 CPY to 17,866 CPY, an 1.6% increase in yearly commit levels.



Protocols	2020 CPY	2021 CPY	Yearly Δ CPY
Basic Attention Token (BAT)	1,044	1,146	9.8%
Elrond (EGLD)	16,087	17,188	6.8%
Ethereum (ETH)	34,627	35,963	3.9%
Mina (MINA)	7,953	8,116	2.0%
Kusama (KSM)	17,587	17,866	1.6%
Fantom (FTM)	6,205	6,206	0.0%
Stellar (XLM)	5,787	5,630	-2.7%
Hyperledger	23,594	22,876	-3.0%
Celo (CELO)	12,298	11,910	-3.2%
Bitcoin (BTC)	14,841	14,067	-5.2%
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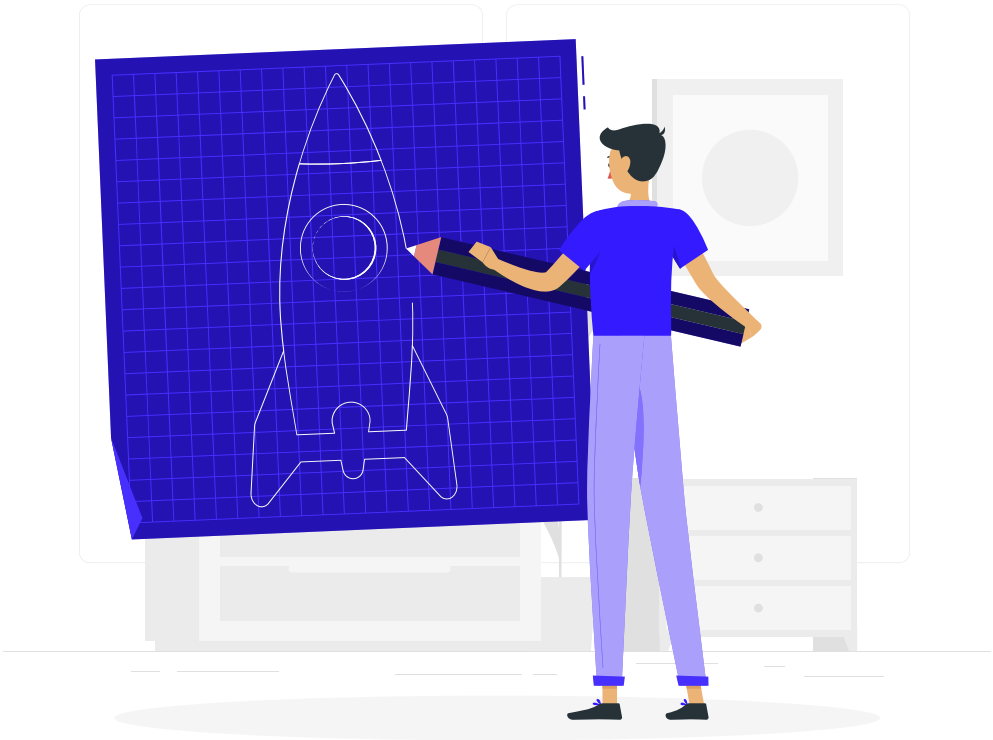
3.2 Developers

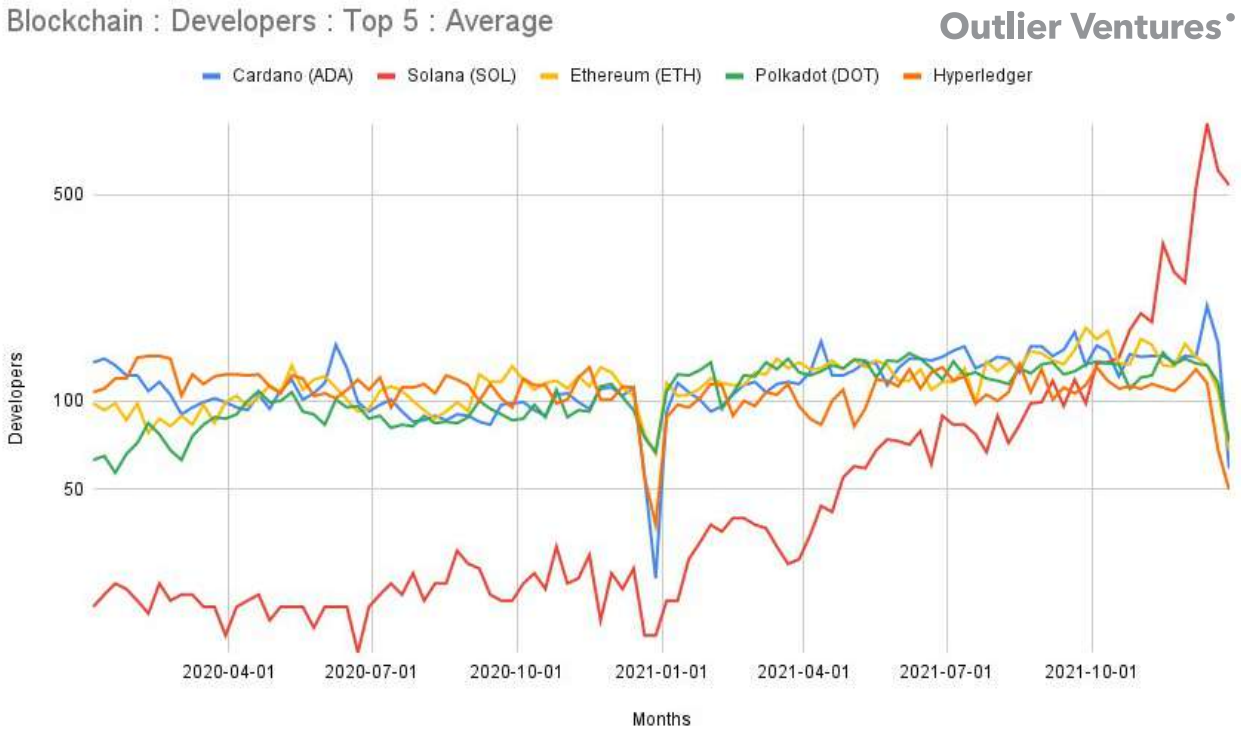
The top protocols (non-decentralized finance protocols) demonstrated clear growth in yearly active developers, going from 6,264 active developers per month during a 12-month period to an average of 7,561 active developers over the next 12-month period, resulting in a 20.7% growth rate.



3.2.1 Top Developer Trends

In this section, we review the top ten (10) protocols with the most active developers per month on average during the reporting period. **Cardano** gets the top spot, demonstrating a base of 131 MAD compared to 101 MAD in 2020, an increase of 29.7% MAD. Just below Cardano, **Solana** demonstrated impressive growth, with 131 MAD reported in 2021 compared to 22 MAD in 2020, a 491.0% increase in monthly active developers per year. **Ethereum** exhibited a 25.6% increase, going from 103 MAD to 130 MAD last year. **Polkadot** showed an impressive jump in developers as they rose from 88 MAD to 126 MAD, a 44.1% increase of monthly active developers on average per year across a 2 year period. Lastly, **Hyperledger** demonstrated a relatively stable number of active developers on average, with a slight decrease of -4.5% from 112 MAD to 107 MAD.

Note that the below chart has a logarithmic scale because of the large differences in absolute numbers of MADs.



Protocols	2020 AVG MAD	2021 AVG MAD	Yearly Δ MAD
Cardano (ADA)	101	131	29.7%
Solana (SOL)	22	131	491.0%
Ethereum (ETH)	103	130	25.6%
Polkadot (DOT)	88	126	44.1%
Hyperledger	112	107	-4.5%
Cosmos (ATOM)	58	72	22.6%
IOTA (MIOTA)	48	65	37.0%
Kusama (KSM)	42	56	33.7%
Filecoin (FIL)	62	55	-10.7%
Celo (CELO)	47	50	6.5%

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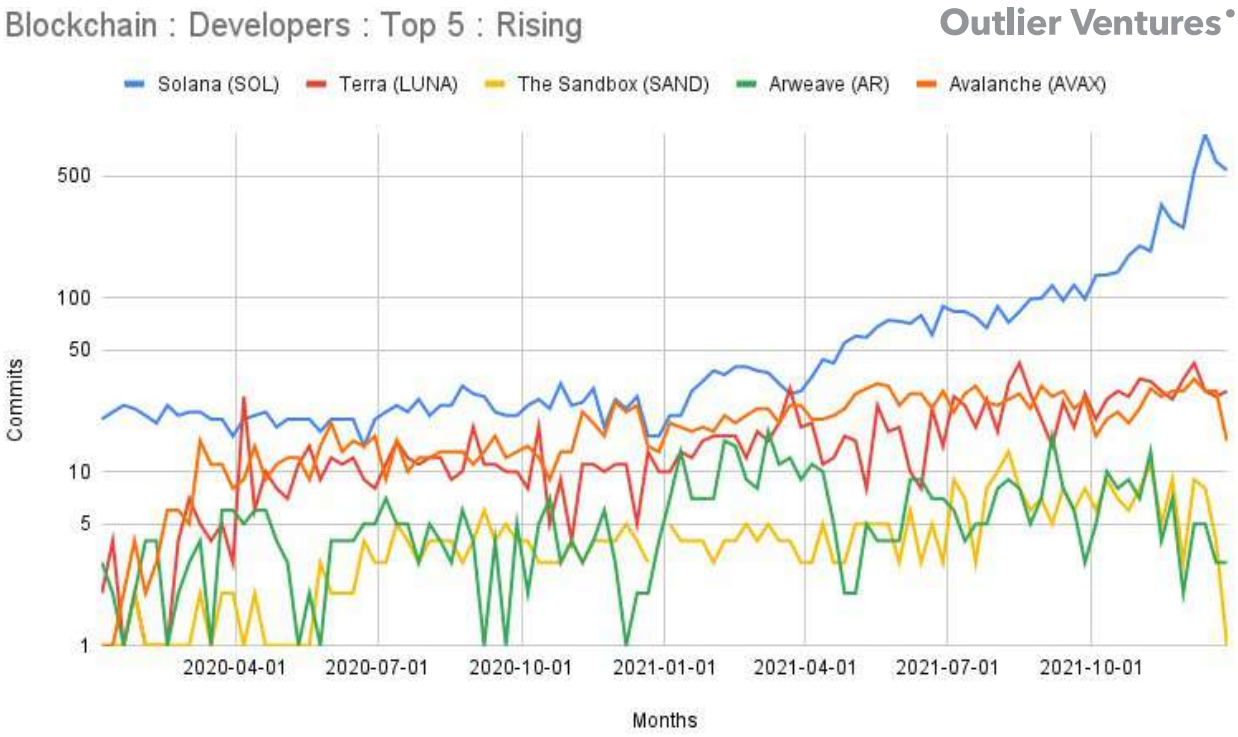
3.2.2 Rising Developer Trends

As mentioned in the previous section, **Solana** exhibited an impressive growth of monthly active developers, with a 491.0% increase from 22 MAD to 131 MAD on average. **Terra** doubled their average active developer number, growing from a base of 9 MAD to 21 MAD last year, a 139.8% increase. The Sandbox exhibited a 112.4% increase in the number of developers, with 3 MAD in 2020 compared to 6 MAD in 2021 – we note that as **The Sandbox** is a game, much of its development is related to game mechanics and the engine is closed, not open source. As we observed in the chapter above, **Arweave** showed an impressive growth in development activity, reflecting the increase in the number of active developers per month increasing by 105.3%. Lastly, **Avalanche** demonstrated a level of growth that doubled their developer base, going from 12 MAD to 24 MAD and resulting in a 104.0% increase overall.

Note that the below chart has a logarithmic scale because of the large differences in absolute numbers of MADs.



Protocols	2020 AVG MAD	2021 AVG MAD	Yearly Δ MAD
Solana (SOL)	22	131	491.0%
Terra (LUNA)	9	21	139.8%
The Sandbox (SAND)	3	6	112.4%
Arweave (AR)	4	7	105.3%
Avalanche (AVAX)	12	24	104.0%
Cryptocom Coin (CRO)	6	11	94.7%
Chainlink (LINK)	17	32	81.8%
Helium (HNT)	21	37	74.7%
Flow (FLOW)	24	41	68.7%
Internet Computer (ICP)	17	28	65.4%

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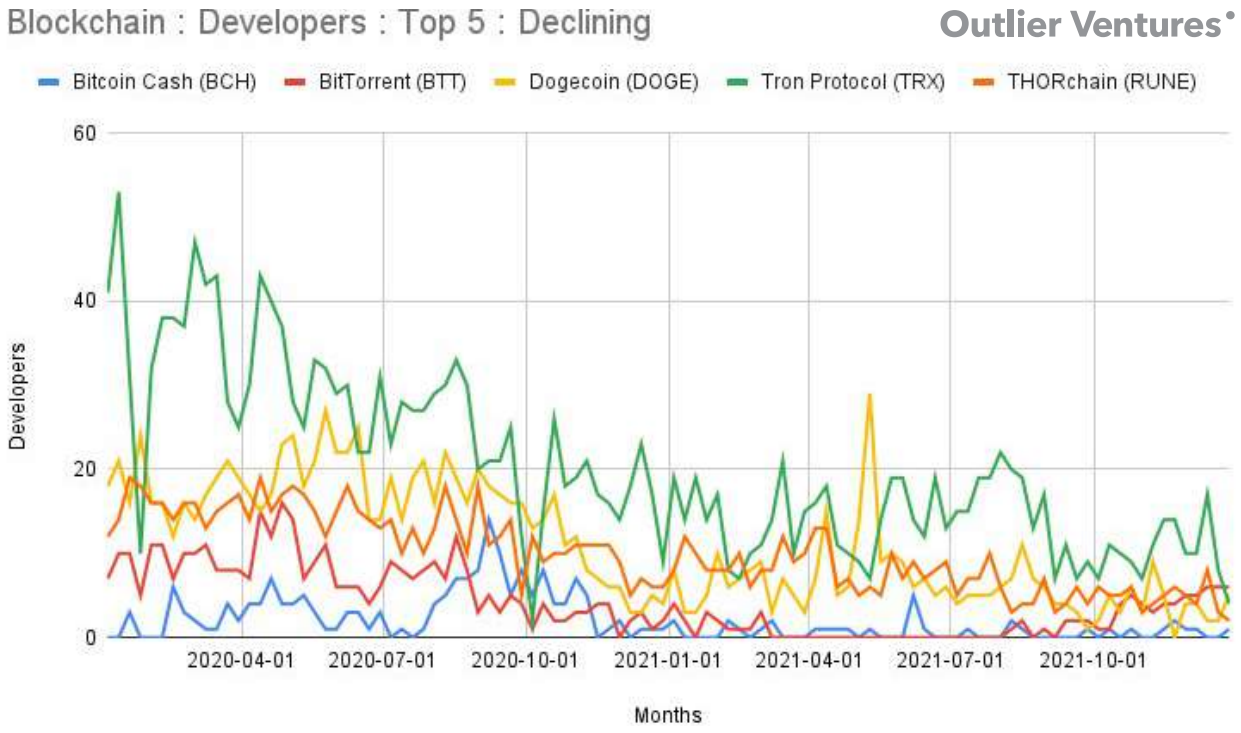
3.2.3 Declining Developer Trends

We registered a -86.6% decrease in the amount of active monthly developers for **Bitcoin Cash**, as they went from 3 MAD to 1 MAD last year. **BitTorrent** decreased from 7 MAD to 2 MAD, resulting in a -77.1% decrease. As we covered in earlier sections of this report, **Dogecoin** has demonstrated a decline in developer activity that was mirrored by developer numbers, with a -61.1% move from 16 MAD to 6 MAD last year. **Tron Protocol** had, on average, 27 MAD in 2020 compared to last year's 13 MAD, resulting in a -51.3% decrease. Lastly, **THORchain** decreased by -48.2% in total compared to 2020, where we registered 13 MAD compared to 7 MAD last year.



Protocols	2020 AVG MAD	2021 AVG MAD	Yearly Δ MAD
Bitcoin Cash (BCH)	3	1	-81.6%
BitTorrent (BTT)	7	2	-77.1%
Dogecoin (DOGE)	16	6	-61.1%
Tron Protocol (TRX)	27	13	-51.3%
THORchain (RUNE)	13	7	-48.2%
Corda	24	13	-46.1%
Klaytn (KLAY)	13	8	-40.7%
EOS (EOS)	27	18	-33.0%
Harmony One (ONE)	30	20	-32.6%
XDC Network (XDC)	5	4	-27.5%
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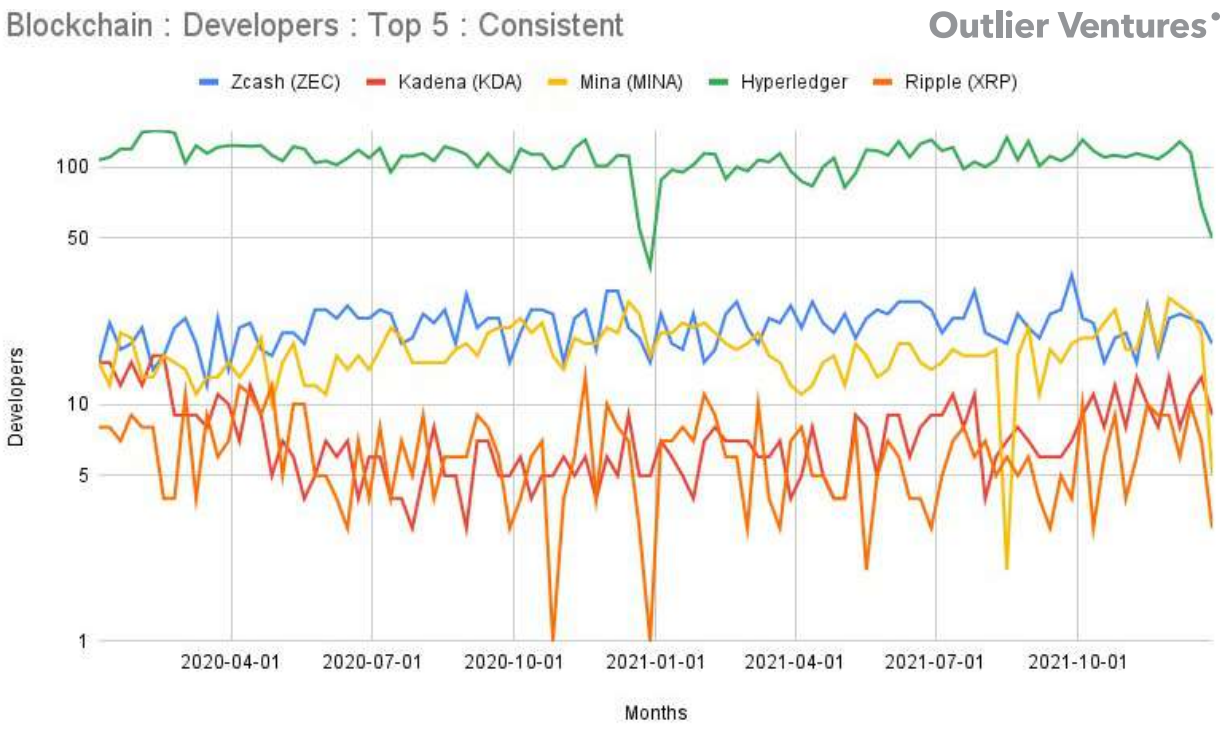
3.2.4 Consistent Developer Trends

Dash demonstrated a stable number of active monthly developers: 13 MAD for both of the years across the reporting period. They did display a slight 7.2% increase of total developers last year. **Celo** went from an average of 47 MAD in 2020 to 50 MAD in 2021, resulting in an increase of 6.5% of active monthly developers. **ZCash** exhibited stable developer numbers, going from 21 MAD to 22 MAD, a 6.1% increase. **Kadena** performed consistently, experiencing a slight 5.0% increase in active developers per month, from 7 MAD to 8 MAD last year. Lastly, **Mina** had the same number of active developers per year compared to 2020 at 17 MAD.

Note that the below chart has a logarithmic scale because of the large differences in absolute numbers of MADs.



Protocols	2020 AVG MAD	2021 AVG MAD	Yearly Δ MAD
Dash (DASH)	13	13	7.2%
Celo (CELO)	47	50	6.5%
Zcash (ZEC)	21	22	6.1%
Kadena (KDA)	7	8	5.0%
Mina (MINA)	17	17	3.7%
Hyperledger	112	107	-4.5%
Ripple (XRP)	7	6	-6.8%
Stellar (XLM)	25	23	-6.9%
Bitcoin (BTC)	45	42	-7.0%
Oasis Network (ROSE)	16	15	-8.4%
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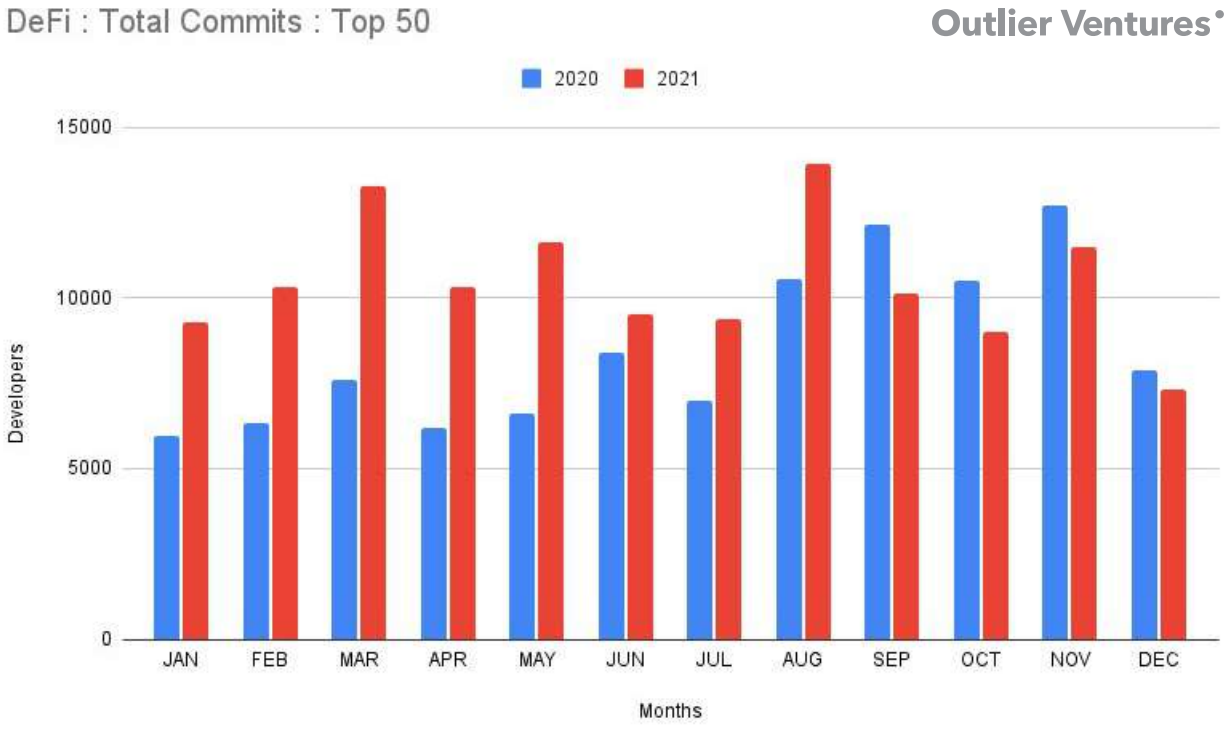
4. Decentralized Finance Protocols

In this section, we summarize our analysis of the top 50 open-source decentralized finance protocols by total value locked, according to Defipulse. We outline our main discoveries in relevant subsections, such as protocols with rising commits, declining commits, and other relevant categories described in the chapter above.

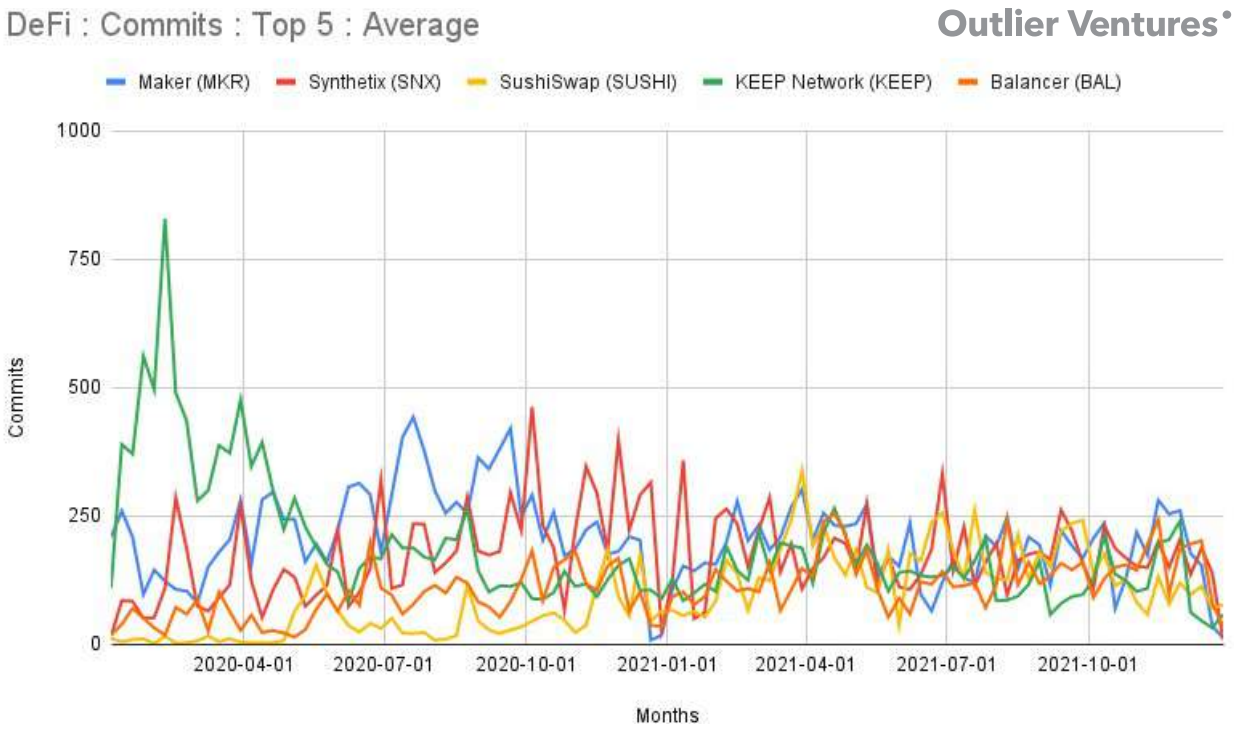
4.1 Commits

We observed that decentralized finance (DeFi) protocols experienced a slight increase in development activity compared to the previous reporting period, known in the industry as "DeFi summer." The total amount of commits for 2020 was 101,917, compared with 125,653 commits last year, marking a 23.3% increase.



4.1.1 Top Commit Trends

Maker takes the crown for the highest number of average commits per month at 9,466 CPM last year; however, they experienced a slight decrease from the previous year, where they had an average of 11,886 CPM, a -20.4% decrease overall. **Synthetix** demonstrated a high number of average commits per month at 8,982 CPM. **SushiSwap** went from 2,102 CPM to 7,559 CPM, seeing in a 259.6% increase last year. **KEEP Network** experienced a -40.1% decrease in development activity; in 2020, they recorded an average of 11,969 CPM compared to 7,559 CPM in 2021. Lastly, **Balancer** increased by 61.5%, going from 4,272 CPM to 6,898 CPM last year.



Protocols	2020 AVG CPM	2021 AVG CPM	Yearly Δ CPM
Maker (MKR)	11,886	9,466	-20.4%
Synthetix (SNX)	8,917	8,982	0.7%
SushiSwap (SUSHI)	2,102	7,559	259.6%
KEEP Network (KEEP)	11,969	7,165	-40.1%
Balancer (BAL)	4,272	6,898	61.5%
Uniswap (UNI)	4,231	6,021	42.3%
Loopring (LRC)	1,456	5,508	278.3%
Rari Capital (RGT)	2,035	5,448	167.7%
Yearn Finance (YFI)	2,270	4,364	92.2%
Bancor (BNT)	4,706	3,859	-18.0%

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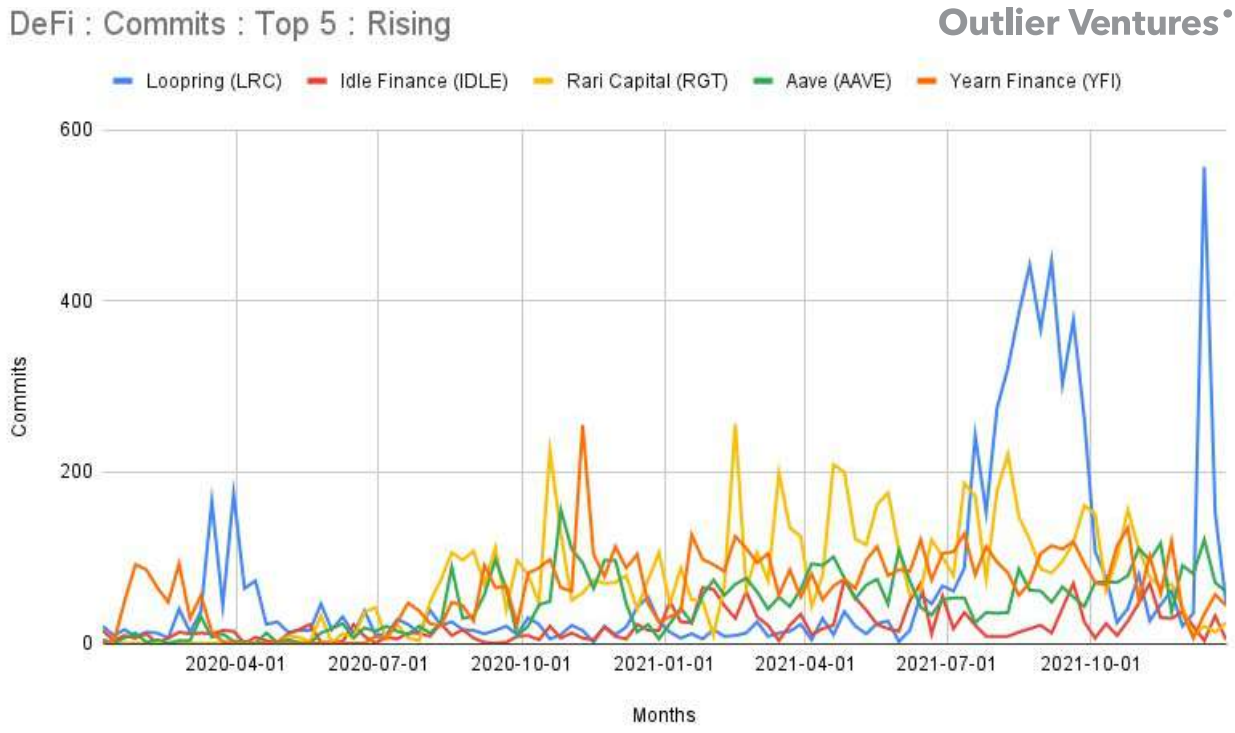
4.1.2 Rising Commit Trends

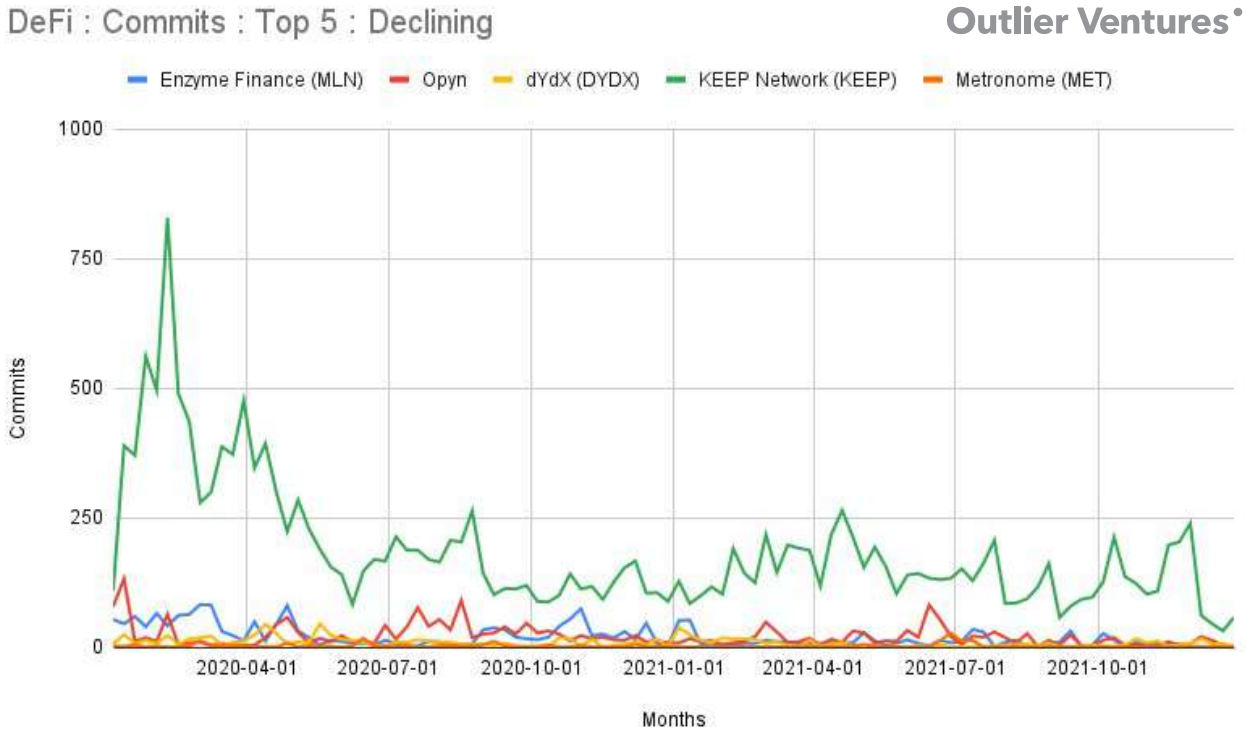
We observed an impressive increase in development activity for **Loopring**, which experienced a 278.3% increase in total commits per year, going from 1,456 CPY to 5,508 CPY last year. Similarly, **Idle Finance** exhibited high growth percentages (228.8%), marking 473 CPY compared to 1,555 CPY last year. **Rari Capital** exhibited a growth of 167.7%, going from 2,035 CPY to 5,448 CPY last year. The DeFi staple **Aave** also enjoyed a great increase in development activity last year, with 1,489 CPY in 2020 compared to 3,326 CPY for 2021, a 123.4% increase. Lastly, **Yearn Finance** increased by 92.2% in total commits per year, going from 2,270 CPY to 4,364 CPY last year.



Protocols	2020 CPY	2021 CPY	Yearly Δ CPY
Loopring (LRC)	1,456	5,508	278.3%
Idle Finance (IDLE)	473	1,555	228.8%
Rari Capital (RGT)	2,035	5,448	167.7%
Aave (AAVE)	1,489	3,326	123.4%
Yearn Finance (YFI)	2,270	4,364	92.2%
Balancer (BAL)	4,272	6,898	61.5%
InstaDApp (INST)	1,564	2,477	58.4%
Tornado Cash (TORN)	514	758	47.5%
Set Protocol	1,743	2,516	44.3%
Uniswap (UNI)	4,231	6,021	42.3%
			Outlier Ventures

4.1.3 Declining Commit Trends

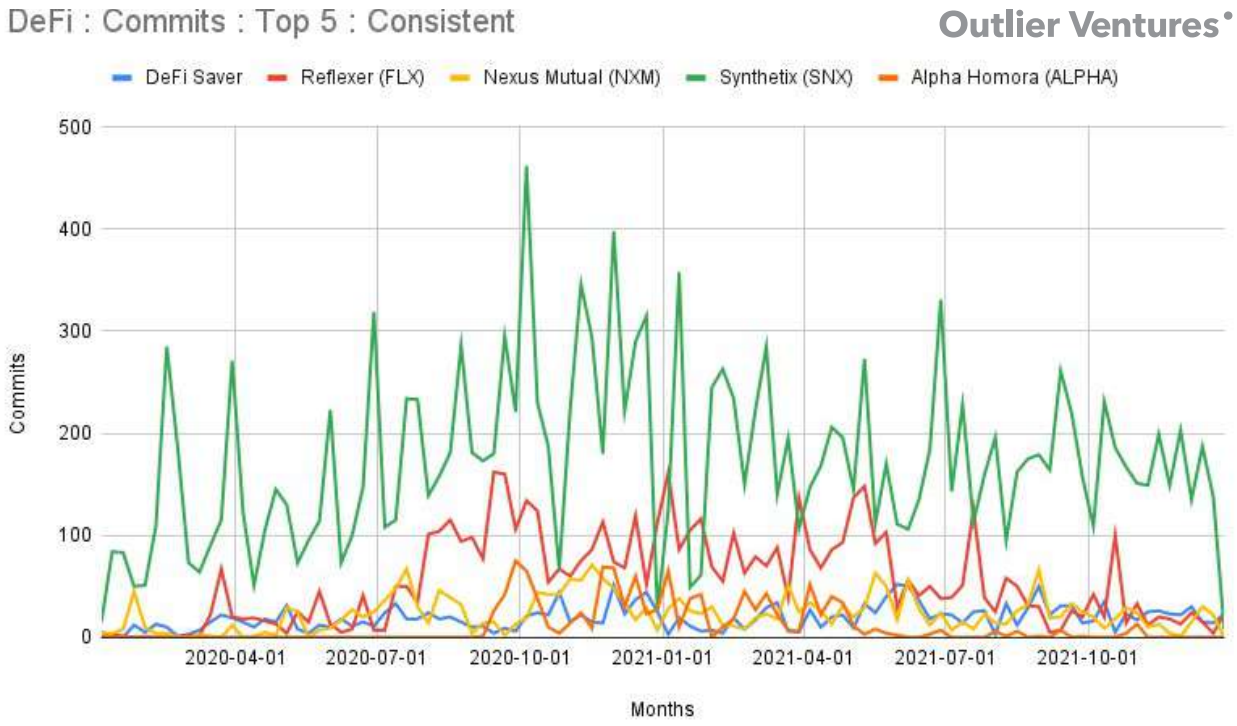
Enzyme Finance demonstrated a decrease in total development activity annually for the reporting period, going from 1,497 CPY in 2020, to a total of 531 CPY last year, resulting in a -64.5% decrease. **Opyn** decreased by -42.6% overall, going from 1,384 CPY to 795 CPY. Similarly, **dYdX** also exhibited a decrease in total development activity, with a decrease of -42.3% from 579 CPY in 2020 to 334 CPY last year. Although maintaining a relatively high average number of commits per month, as covered in the sections above, **KEEP Network** decreased by -40.1%, going from 11,969 CPY to 7,165 CPY last year. Lastly, **Metronome** had a relatively low number of total commits over the whole reporting period, and decreased by -37.8%, from 119 CPy to 74 CPY last year.



Protocols	2020 CPY	2021 CPY	Yearly Δ CPY
Enzyme Finance (MLN)	1,497	531	-64.5%
Opyn	1,384	795	-42.6%
dYdX (DYDX)	579	334	-42.3%
KEEP Network (KEEP)	11,969	7,165	-40.1%
Metronome (MET)	119	74	-37.8%
RenVM (REN)	4,123	2,933	-28.9%
Sablier	88	63	-28.4%
Maker (MKR)	11,886	9,466	-20.4%
Compound (COMP)	3,576	2,881	-19.4%
Bancor (BNT)	4,706	3,859	-18.0%
			Outlier Ventures

4.1.4 Consistent Commit Trends

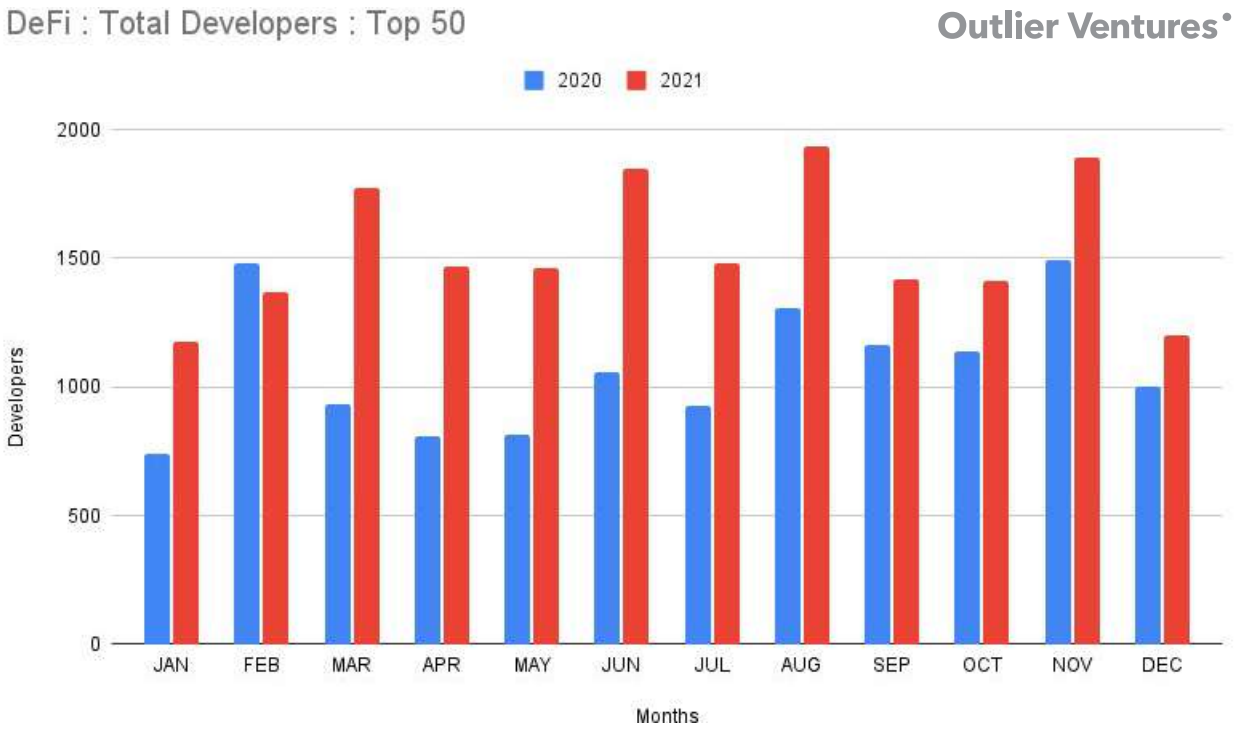
Decentralized Finance protocols, on average, do not have high yearly commit numbers due to the relatively limited scope of their protocols. Protocols that have performed rather consistently, with a yearly ±30% difference, may have months where there is very little development activity on the repositories that are open to the public. **DeFi Saver** increased their yearly commits by 30.2%, going from 859 CPY in 2020 to 1,118 CPY in 2021. **Reflexer** went from 2,645 CPY to 3,040 CPY, resulting in a 14.9% increase. **Nexus Mutual** demonstrated a consistent level of activity throughout the reporting period, with 1,146 CPY in 2020 compared to last year's 1,211 CPY, a 5.7% increase. Similarly, **Synthetix** performed consistently, with a slight increase of 0.7% from 8,917 CPY to 8,982 CPY. Lastly, **Alpha Homora** went from 585 CPY to 558 CPY, leading to a slight -4.6% decrease.



Protocols	2020 CPY	2021 CPY	Yearly Δ CPY
DeFi Saver	859	531	30.2%
Reflexer (FLX)	2,645	795	14.9%
Nexus Mutual (NXM)	1,146	334	5.7%
Synthetix (SNX)	8,917	7,165	0.7%
Alpha Homora (ALPHA)	585	74	-4.6%
BProtocol (BPRO)	943	2,933	-7.7%
Liquity (LQTY)	2,010	63	-9.0%
Lightning Network (BTC)	1,921	9,466	-12.6%
Curve Finance (CRV)	3,157	2,881	-15.6%
Bancor (BNT)	4,706	3,859	-18.0%
			Outlier Ventures

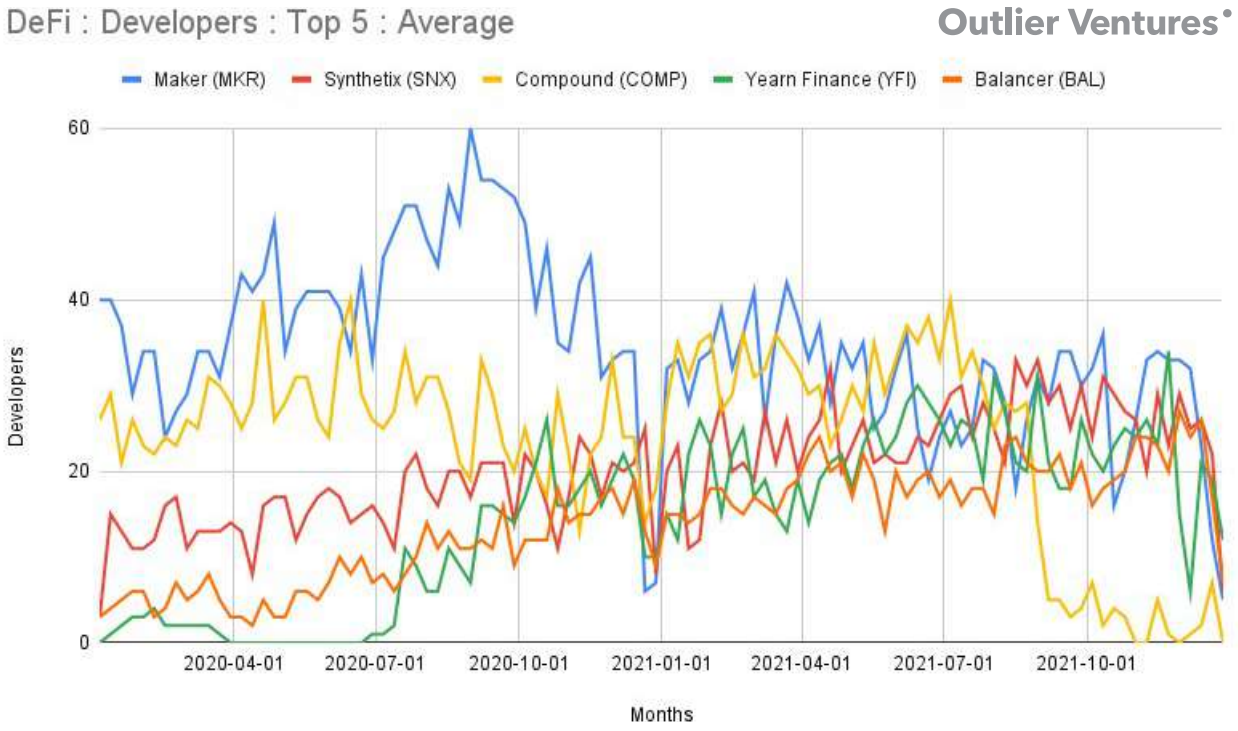
4.2 Developers

We observed quite an impressive growth in monthly active developers in the recent 12-month period compared to last year, with an overall increase of 43.2% in developers onboarded to DeFi protocols.



4.2.1 Top Developer Trends

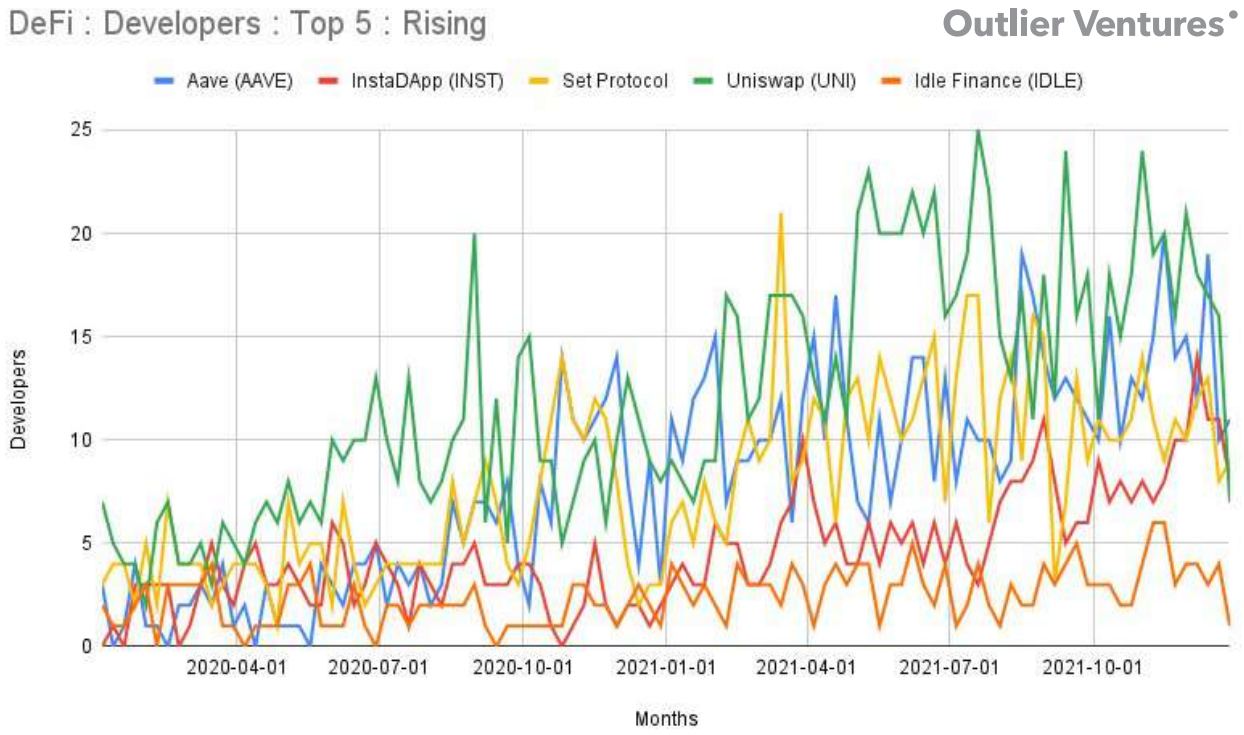
Maker ranks number one when it comes to average monthly active developers, compared to the other selected protocols for this report. However, Maker did experience a slight decrease from the year before, going from 39 MAD compared to 30 MAD last year, a decrease of -24.7% overall. **Synthetix** increased their monthly active developers on an annual basis of 51.1%, going from 16 MAD in 2020 to 24 MAD in 2021. **Compound**, one of the original lending and borrowing protocols, performed rather consistently throughout the reporting period; however, they did experience a slight decrease by -16.4% of monthly active developers, going from 26 MAD from 2020 to 22 MAD last year. **Yearn Finance** displayed an impressive increase of monthly active developers, going from 7 MAD to 22 MAD, a 196.3% increase. Lastly, **Balancer**, as covered above in the previous sections, doubled their number from 9 MAD to 19 MAD, resulting in a 109.4% increase.



Protocols	2020 AVG MAD	2021 AVG MAD	Yearly Δ MAD
Maker (MKR)	39	30	-24.7%
Synthetix (SNX)	16	24	51.1%
Compound (COMP)	26	22	-16.4%
Yearn Finance (YFI)	7	22	196.3%
Balancer (BAL)	9	19	109.4%
Uniswap (UNI)	8	16	102.6%
SushiSwap (SUSHI)	3	15	360.0%
KEEP Network (KEEP)	16	12	-26.7%
Aave (AAVE)	4	12	167.1%
Index Coop (INDEX)	5	11	105.2%
			Outlier Ventures

4.2.2 Rising Developer Trends

Aave doubled their average monthly active developers from 4 MAD in 2020 to 12 MAD last year, a 167.1% increase. **InstaDapp** increased their active developer base by an average of 132.9%, going from 3 MAD to 6 MAD. **Set Protocol** displayed a similar doubling of their developer base by 105.2%, from 5 MAD in 2020 compared to last year's 11 MAD. **Uniswap** went from 8 MAD to 16 MAD, resulting in a 102.6% increase. **Idle Finance** experienced a slight increase from 2 MAD to 3 MAD last year, a 73.6% bump of monthly active developers on average.

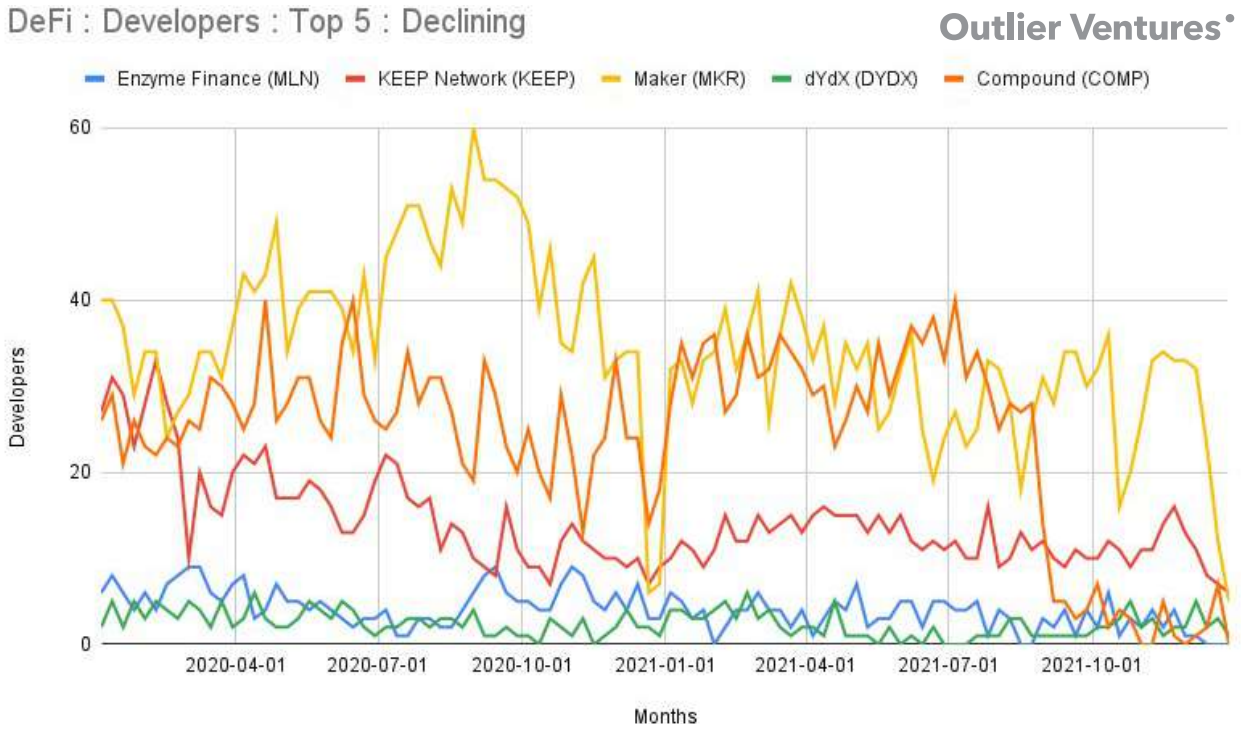


Protocols	2020 AVG MAD	2021 AVG MAD	Yearly Δ MAD
Aave (AAVE)	4	12	167.1%
InstaDApp (INST)	3	6	132.9%
Set Protocol	5	11	105.2%
Uniswap (UNI)	8	16	102.6%
Idle Finance (IDLE)	2	3	73.6%
Synthetix (SNX)	16	24	51.1%
Nexus Mutual (NXM)	2	3	36.5%
Bancor (BNT)	6	7	20.9%
Loopring (LRC)	6	7	18.0%
Lightning Network (BTC)	7	8	6.4%
			Outlier Ventures

4.2.3 Declining Developer Trends

As mentioned above, DeFi protocols usually have a limited scope when it comes to functionality, and the core protocol itself does not often need updates or upgrades – usually it is the front-end application that gets frequently updated. This results in many protocols only having a small number of active developers. We have set a minimum threshold of at least 3 developers at the beginning of the reporting period to be included in this section; projects that have been excluded because of this threshold have been included in the appendix.

Enzyme Finance went from 5 MAD in 2020 compared to last year's 3 MAD, resulting in a -39.8% decrease. **KEEP Network** decreased by -26.7% average monthly active developers, going from 16 MAD to 12 MAD last year. **Maker**, as previously mentioned in the chapters above, decreased by -24.7% from 39 MAD to 30 MAD. **dYdX** declined by -23.4%, going from 3 MAD in 2020 to 2 MAD in 2021; these are the developers who work on Open Source code and, presumably, there are other developers from the dYdX team working on closed-environment projects. Lastly, **Compound** went from 26 MAD to 22 MAD last year, resulting in a -16.4 decline.

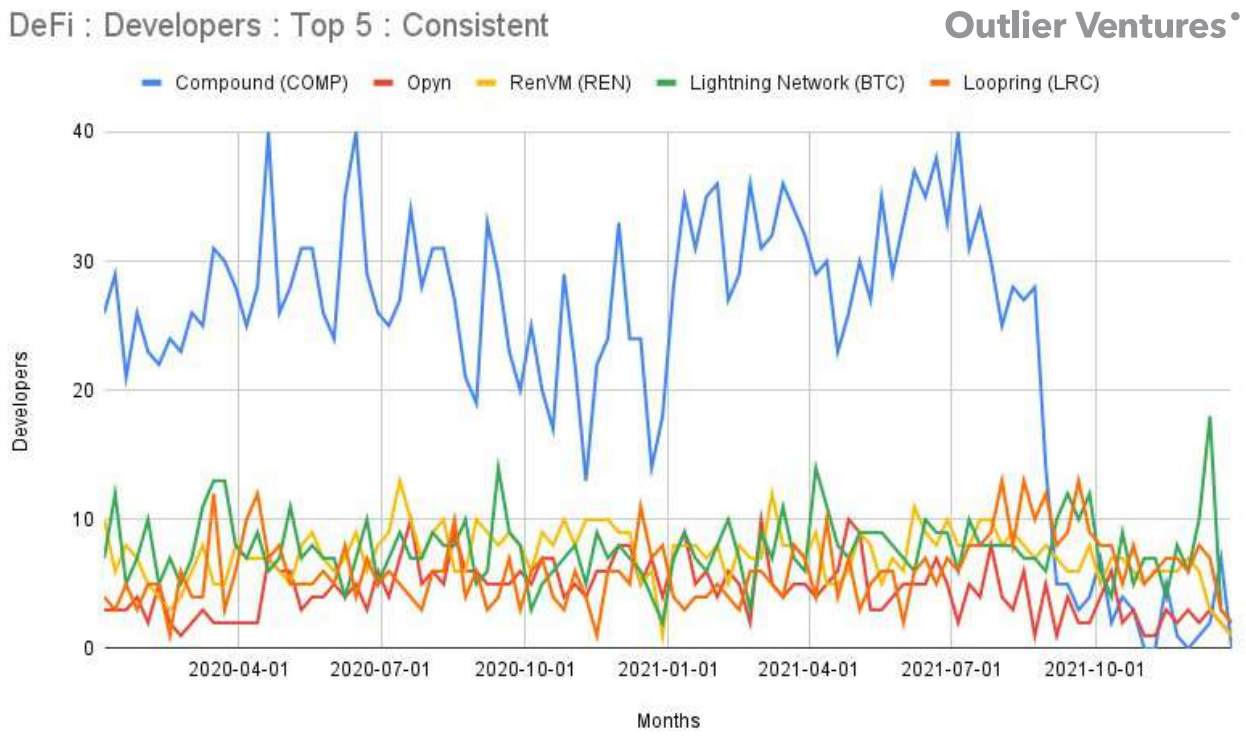


Protocols	2020 AVG MAD	2021 AVG MAD	Yearly Δ MAD
Enzyme Finance (MLN)	5	3	-39.8%
KEEP Network (KEEP)	16	12	-26.7%
Maker (MKR)	39	30	-24.7%
dYdX (DYDX)	3	2	-23.4%
Compound (COMP)	26	22	-16.4%
Opyn	5	4	-8.9%
RenVM (REN)	7	7	-4.4%

Outlier Ventures

4.2.4 Consistent Developer Trends

As we observed in the previous edition of this report, there are a relatively small number of DeFi protocols which perform consistently in the percentage area of a ±30% difference, as most protocols are only between one to two years old. **Compound** performed relatively consistently throughout the reporting period, with they had 26 MAD in 2020 compared to 22 MAD in 2021, a -16.4% drop. **Opyn** dropped by -8.9%, going from 5 MAD to 4 MAD last year. **RenVM** performed at the exact same level as the year before. **Lightning Network** experienced a slight 6.4% growth level, from 7 MAD to 8 MAD last year. Lastly, **Loopring** performed consistently, going from 7 MAD in 2020 to 8 MAD in 2021, a 18.0% increase overall.



Protocols	2020 AVG MAD	2021 AVG MAD	Yearly Δ MAD
Compound (COMP)	26	22	-16.4%
Opyn	5	4	-8.9%
RenVM (REN)	7	7	-4.4%
Lightning Network (BTC)	7	8	6.4%
Loopring (LRC)	6	7	18.0%
Bancor (BNT)	6	7	20.9%
mStable (MTA)	5	6	23.3%
			Outlier Ventures

Appendix

A.1 Other Observations

A.1.1 Blockchain Protocols

- We observed that Litecoin has performed rather poorly when it comes to both developer commit and author numbers, especially when we take its total market capitalization. First, regarding commits, Litecoin declined by -31.9%, going from 577 CPY in 2020 compared to 393 in 2020. This is very low when compared to the relatively high market cap coins in similar positions, such as Algorand (3998 CPY for last year) and Chainlink (8513 CPY last year). Secondly, Litecoin demonstrated rather low numbers of average active monthly developers, they had 2 MAD in 2020 and 2 MAD in 2021.

- During the reporting period, we observed that developers were increasingly drawn to alternative L1s such as Solana. This increase in general interest can be observed both from a commits and developer standpoint.

A.1.2 DeFi Protocols

- Some DeFi Protocols were not mentioned in some sections, as they did not qualify for the minimum threshold. Such protocols were Metronome, which decreased quite drastically from 1 MAD in 2020 to no monthly active developers in 2021, and Sablier, which experienced the exact same trend as Metronome.

- In last year's report, we included a section called "newcomers" for protocols born during that specific period, which we left out this year as not as many protocols were born. However, protocols such as OlympusDAO gained quite a bit of traction in 2021.

A.2 Notes and Caveats

- In this report, we have focused on including core repositories of each respective protocol, meaning that the primary organization has been included. In some cases, we have included third-party organizations such as PolkadotJS, due to the organizational structure of the Polkadot ecosystem. We would like to note that this change in inclusion and exclusion criteria may slightly modify the reported numbers of commits and developers compared to previous reports.

- Further, we would like to point out that we have adjusted the methodology of this report. For our data analysis, we use our own publicly available tool, referred to as DevPulse, where we collect data sources such as organisational repositories for each respective project. We recommend visiting our Web3 Development Activity dashboard that can be found here.

- We have included repositories that are exclusively hosted on GitHub and GitLab for this release of the report.

- Repositories that have been forked from other repositories have been excluded from our analysis, such that some genuine development activities may not have been included. Some projects may be affected more than others.

- Some repositories have been forked but not marked forked by GitHub; such projects are mainly Bitcoin Cash, Ethereum Classic, and SushiSwap. These repositories have been included in the report.

- In this report, we have exclusively included activity of the main branch, such that commits that have not yet reached the main branch or are for any reason kept out from the main branch have been excluded.

- Projects may use automated agents such as "Dependabot," which inflates the number of commits and developers for a project. We aim to exclude such automated agents in future releases.

- Organizations such as IOHK work on several projects such as Ethereum Classic. However, since most of the activity is related to Cardano, we mainly attribute all activities to Cardano.

A.3 Blockchain Protocols Data

A.3.1 Commits

Protocols	TOT [2020]	AVG [2020]	TOT [2021]	AVG [2021]	[20] Δ [21]
Algorand (ALGO)	3,191	61	3,998	77	25.3%
Arweave (AR)	785	15	2,200	42	180.3%
Avalanche (AVAX)	6,177	119	13,250	255	114.5%
Axie Infinity (AXS)	381	7	35	1	-90.8%
Basic Attention Token (BAT)	1,044	20	1,146	22	9.8%
Binance Smart Chain (BNB)	3,935	76	3,362	65	-14.6%
Bitcoin (BTC)	14,841	285	14,067	271	-5.2%
Bitcoin Cash (BCH)	1,092	21	99	2	-90.9%
Bitcoin SV (BSV)	1,684	32	1,383	27	-17.9%
BitTorrent (BTT)	1,561	30	315	6	-79.8%
Cardano (ADA)	43,813	843	48,148	926	9.9%
Celo (CELO)	12,298	237	11,910	229	-3.2%
Chainlink (LINK)	6,128	118	8,513	164	38.9%
Chiliz (CHZ)	13	0	17	0	30.8%
Corda	5,051	97	2,726	52	-46.0%
Cosmos (ATOM)	25,314	487	20,468	394	-19.1%
Crypto.com Coin (CRO)	1,491	29	2,073	40	39.0%
Dash (DASH)	4,695	90	5,506	106	17.3%
Decentraland (MANA)	7,491	144	9,285	179	23.9%
Dogecoin (DOGE)	2,899	56	734	14	-74.7%
Elrond (EGLD)	16,087	309	17,188	331	6.8%
Enjin Coin (ENJ)	495	10	369	7	-25.5%

Protocols	TOT [2020]	AVG [2020]	TOT [2021]	AVG [2021]	[20] Δ [21]
EOS (EOS) 1	10,378	200	6,644	128	-36.0%
Ethereum (ETH)	34,627	666	35,963	692	3.9%
Ethereum Classic (ETC)	16,483	317	11,056	213	-32.9%
Fantom (FTM)	6,205	119	6,206	119	0.0%
Filecoin (FIL)	34,667	667	22,149	426	-36.1%
Flow (FLOW)	16,362	315	20,362	392	24.4%
Harmony One (ONE)	9,156	176	3,679	71	-59.8%
Hedera (HBAR)	8,219	158	11,150	214	35.7%
Helium (HNT)	7,184	138	9,847	189	37.1%
Hyperledger	23,594	454	22,876	440	-3.0%
Internet Computer (ICP)	5,255	101	6,952	134	32.3%
IOTA (MIOTA)	13,820	266	21,129	406	52.9%
Kadena (KDA)	2,796	54	1,959	38	-29.9%
Klaytn (KLAY)	4,420	85	1,708	33	-61.4%
KuCoin (KCS)	378	7	175	3	-53.7%
Kusama (KSM)	17,587	338	17,866	344	1.6%
Litecoin (LTC)	577	11	393	8	-31.9%
Mina (MINA)	7,953	153	8,116	156	2.0%
Monero (XMR)	4,612	89	3,086	59	-33.1%
NEAR Protocol (NEAR)	9,714	187	13,197	254	35.9%
Neo (NEO)	1,385	27	1,062	20	-23.3%
Polkadot (DOT)	38,358	738	42,754	822	11.5%
Polygon (MATIC)	6,621	127	5,511	106	-16.8%
Quant (QNT)	280	5	346	7	23.6%
Ripple (XRP)	723	14	654	13	-9.5%
Solana (SOL)	12,459	240	24,531	472	96.9%
Stacks (STX)	20,902	402	14,935	287	-28.5%
Stellar (XLM)	5,787	111	5,630	108	-2.7%
Terra (LUNA)	2,373	46	4,783	92	101.6%
Tezos (XTZ)	8,544	164	9,838	189	15.1%
The Graph (GRT)	4,825	93	3,297	63	-31.7%
The Sandbox (SAND)	4,386	84	2,190	42	-50.1%
Theta Network (THETA)	534	10	971	19	81.8%
THORchain (RUNE)	6,902	133	1,332	26	-80.7%
Tron Protocol (TRX)	6,174	119	2,983	57	-51.7%

Protocols	TOT [2020]	AVG [2020]	TOT [2021]	AVG [2021]	[20] Δ [21]
VeChain (VET)	1,727	33	933	18	-46.0%
Wrapped Bitcoin (WBTC)	19	0	14	0	-26.3%
Zcash (ZEC)	6,573	126	9,773	188	48.7%

Outlier Ventures•

A.3.2 Developers

Protocols	AVG MAD [2020]	AVG MAD [2021]	[20] Δ [21]
Algorand (ALGO)	16	21	34.5%
Arweave (AR)	4	7	105.3%
Avalanche (AVAX)	12	24	104.0%
Axie Infinity (AXS)	1	0	-52.4%
Basic Attention Token (BAT)	5	6	11.0%
Binance Smart Chain (BNB)	24	18	-24.0%
Bitcoin (BTC)	45	42	-7.0%
Bitcoin Cash (BCH)	3	1	-81.6%
Bitcoin SV (BSV)	11	8	-23.2%
BitTorrent (BTT)	7	2	-77.1%
Cardano (ADA)	101	131	29.7%
Celo (CELO)	47	50	6.5%
Chainlink (LINK)	17	32	81.8%
Chiliz (CHZ)	0	0	140.0%
Corda	24	13	-46.1%
Cosmos (ATOM)	58	72	22.6%
Cryptocom Coin (CRO)	6	11	94.7%
Dash (DASH)	13	13	7.2%
Decentraland (MANA)	18	29	56.8%
Dogecoin (DOGE)	16	6	-61.1%
Elrond (EGLD)	19	30	58.7%
Enjin Coin (ENJ)	1	1	-10.4%
EOS (EOS) 1	27	18	-33.0%
Ethereum (ETH)	103	130	25.6%
Ethereum Classic (ETC)	18	14	-21.9%
Fantom (FTM)	13	12	-12.6%
Filecoin (FIL)	62	55	-10.7%

Outlier Ventures•

Protocols	AVG MAD [2020]	AVG MAD [2021]	[20] Δ [21]
Flow (FLOW)	24	41	68.7%
Harmony One (ONE)	30	20	-32.6%
Hedera (HBAR)	21	33	57.7%
Helium (HNT)	21	37	74.7%
Hyperledger	112	107	-4.5%
Internet Computer (ICP)	17	28	65.4%
IOTA (MIOTA)	48	65	37.0%
Kadena (KDA)	7	8	5.0%
Klaytn (KLAY)	13	8	-40.7%
KuCoin (KCS)	2	1	-38.3%
Kusama (KSM)	42	56	33.7%
Litecoin (LTC)	2	2	0.0%
Mina (MINA)	17	17	3.7%
Monero (XMR)	17	13	-22.4%
NEAR Protocol (NEAR)	29	39	31.4%
Neo (NEO)	9	7	-20.7%
Oasis Network (ROSE)	16	15	-8.4%
Polkadot (DOT)	88	126	44.1%
Polygon (MATIC)	24	28	15.4%
Quant (QNT)	2	1	-11.5%
Ripple (XRP)	7	6	-6.8%
Solana (SOL)	22	131	491.0%
Stacks (STX)	22	25	13.2%
Stellar (XLM)	25	23	-6.9%
Terra (LUNA)	9	21	139.8%
Tezos (XTZ)	27	35	31.5%
The Graph (GRT)	10	11	14.8%
The Sandbox (SAND)	3	6	112.4%
Theta Network (THETA)	3	4	29.8%
THORchain (RUNE)	13	7	-48.2%
Tron Protocol (TRX)	27	13	-51.3%
VeChain (VET)	5	5	-11.3%
Wrapped Bitcoin (WBTC)	0	0	-38.5%
Zcash (ZEC)	21	22	6.1%

A.4 DeFi Protocols Data

A.4.1 Commits

Protocols	TOT [2020]	AVG [2020]	TOT [2021]	AVG [2021]	[20] Δ [21]
Aave (AAVE)	1,489	29	3,326	64	123.4%
Alchemix (ALCX)	0	0	35	1	100.0%
Alpha Homora (ALPHA)	585	11	558	11	-4.6%
BadgerDAO (BADGER)	120	2	2,999	58	2399.2%
Balancer (BAL)	4,272	82	6,898	133	61.5%
Bancor (BNT)	4,706	91	3,859	74	-18.0%
BiFi (BIFI)	0	0	49	1	100.0%
BProtocol (BPRO)	943	18	870	17	-7.7%
Compound (COMP)	3,576	69	2,881	55	-19.4%
Convex Finance (CVX)	0	0	312	6	100.0%
Cream Finance (CREAM)	121	2	576	11	376.0%
Curve Finance (CRV)	3,157	61	2,664	51	-15.6%
DeFi Saver	859	17	1,118	22	30.2%
DefiDollar (DFD)	107	2	101	2	-5.6%
dYdX (DYDX)	579	11	334	6	-42.3%
Element Finance	107	2	731	14	583.2%
Enzyme Finance (MLN)	1,497	29	531	10	-64.5%
Fei Protocol (FEI)	163	3	2,443	47	1398.8%
Flexa (FXC)	6	0	5	0	-16.7%
Harvest Finance (FARM)	42	1	542	10	1190.5%
Idle Finance (IDLE)	473	9	1,555	30	228.8%
Index Coop (INDEX)	1,743	34	2,516	48	44.3%
InstaDApp (INST)	1,564	30	2,477	48	58.4%
KEEP Network (KEEP)	11,969	230	7,165	138	-40.1%
KeeperDAO (ROOK)	21	0	256	5	1119.0%
Lightning Network (BTC)	1,921	37	1,678	32	-12.6%
Liquity (LQTY)	2,010	39	1,829	35	-9.0%
Loopring (LRC)	1,456	28	5,508	106	278.3%
Maker (MKR)	11,886	229	9,466	182	-20.4%
Metronome (MET)	119	2	74	1	-37.8%
mStable (MTA)	1,366	26	2,196	42	60.8%
Nexus Mutual (NXM)	1,146	22	1,211	23	5.7%

Protocols	TOT [2020]	AVG [2020]	TOT [2021]	AVG [2021]	[20] Δ [21]
Notional (NOTE)	116	2	1,186	23	922.4%
Olympus (OHM	0	0	3,096	60	100.0%
Opyn	1,384	27	795	15	-42.6%
Origin Dollar (OUSD)	12,294	236	7,383	142	-39.9%
Pickle Finance (PICKLE)	314	6	2,094	40	566.9%
QiDao (QI)	0	0	27	1	100.0%
Rari Capital (RGT)	2,035	39	5,448	105	167.7%
Reflexer (FLX)	2,645	51	3,040	58	14.9%
RenVM (REN)	4,123	79	2,933	56	-28.9%
Sablier	88	2	63	1	-28.4%
Saddle SDL	353	7	864	17	144.8%
Set Protocol	1,743	34	2,516	48	44.3%
SushiSwap (SUSHI)	2,102	40	7,559	145	259.6%
Synthetix (SNX)	8,917	171	8,982	173	0.7%
Tornado Cash (TORN)	514	10	758	15	47.5%
TrueFi (TRU)	772	15	1,125	22	45.7%
Uniswap (UNI)	4,231	81	6,021	116	42.3%
Vesper (VSP)	13	0	636	12	4792.3%
Yearn Finance (YFI)	2,270	44	4,364	84	92.2%

Outlier Ventures•

A.4.2 Developers

Protocols	TOT [2020]	AVG [2020]	[20] Δ [21]
Aave (AAVE)	4	12	167.1%
Alchemix (ALCX)	0	0	100.0%
Alpha Homora (ALPHA)	1	1	22.6%
BadgerDAO (BADGER)	0	9	1680.0%
Balancer (BAL)	9	19	109.4%
Bancor (BNT)	6	7	20.9%
BiFi (BIFI)	0	0	100.0%
BProtocol (BPRO)	2	2	6.5%
Compound (COMP)	26	22	-16.4%
Convex Finance (CVX)	0	1	100.0%
Cream Finance (CREAM)	1	3	321.9%

Outlier Ventures•

Protocols	TOT [2020]	AVG [2020]	[20] Δ [21]
Curve Finance (CRV)	3	6	112.1%
DeFi Saver	2	4	77.0%
DefiDollar (DFD)	1	1	0.0%
dYdX (DYDX)	3	2	-23.4%
Element Finance	1	5	671.9%
Enzyme Finance (MLN)	5	3	-39.8%
Fei Protocol (FEI)	0	4	2030.0%
Flexa (FXC)	0	0	0.0%
Harvest Finance (FARM)	0	3	584.2%
Idle Finance (IDLE)	2	3	73.6%
Index Coop (INDEX)	5	11	105.2%
InstaDApp (INST)	3	6	132.9%
KEEP Network (KEEP)	16	12	-26.7%
KeeperDAO (ROOK)	0	1	588.9%
Lightning Network (BTC)	7	8	6.4%
Liquity (LQTY)	3	5	78.7%
Loopring (LRC)	6	7	18.0%
Maker (MKR)	39	30	-24.7%
Metronome (MET)	1	0	-80.0%
mStable (MTA)	5	6	23.3%
Nexus Mutual (NXM)	2	3	36.5%
Notional (NOTE)	1	2	360.7%
Olympus (OHM	0	10	100.0%
Opyn	5	4	-8.9%
Origin Dollar (OUSD)	11	8	-21.0%
Pickle Finance (PICKLE)	1	8	625.9%
QiDao (QI)	0	0	100.0%
Rari Capital (RGT)	2	6	254.7%
Reflexer (FLX)	4	7	59.4%
RenVM (REN)	7	7	-4.4%
Sablier	1	0	-52.8%
Saddle SDL	2	5	202.5%
Set Protocol	5	11	105.2%
SushiSwap (SUSHI)	3	15	360.0%

Protocols	TOT [2020]	AVG [2020]	[20] Δ [21]
Synthetix (SNX)	16	24	51.1%
Tornado Cash (TORN)	2	3	58.9%
TrueFi (TRU)	4	6	67.2%
Uniswap (UNI)	8	16	102.6%
Vesper (VSP)	0	4	5050.0%
Yearn Finance (YFI)	7	22	196.3%

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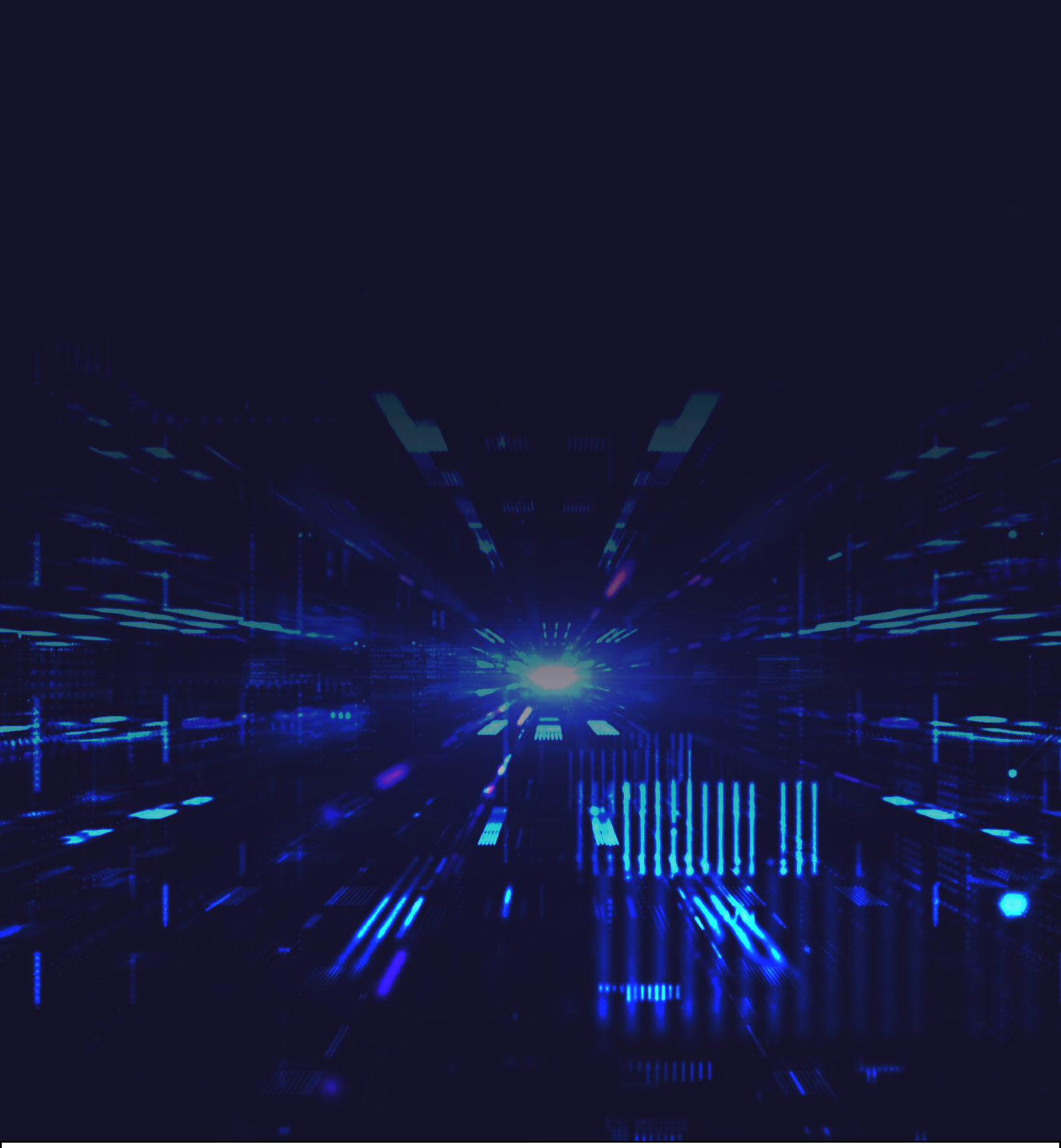

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GENERAL ENQUIRIES

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