

ELECTRIC⚡CAPITAL

# DEVELOPER REPORT

January — December 2022

# INTRODUCTION

Electric Capital is a leading crypto venture firm. We are early-stage investors in many well-known Layer-1 platforms, DeFi protocols, NFT projects, DAOs, and breakout crypto businesses. Learn more at [ElectricCapital.com](https://ElectricCapital.com)

We share this data publicly in the hopes of helping the crypto community have a clearer understanding of the industry's collective progress. We are grateful to everyone in the community who helps by contributing to our Github, the foundations who help us validate our analysis, and the friends who offer feedback on drafts.

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## Contributors



Maria  
Shen  
**Author**  
[@mariashen](https://github.com/mariashen)



Enrique  
Herreros  
**Data**  
[@eherrerosj](https://github.com/eherrerosj)



Curtis  
Spencer  
**Data**  
[@jubos](https://github.com/jubos)



Emre  
Caliskan  
**Engineer**  
[@n4motto](https://github.com/n4motto)



Avichal  
Garg  
**Author**  
[@avichal](https://github.com/avichal)



Ken  
Deeter  
**Data**  
[@puntium](https://github.com/puntium)



Mitchell  
Hammer  
**Contributor**  
[@mitchellhammer](https://github.com/mitchellhammer)



Mark  
Xia  
**Contributor**  
[@sheatgm](https://github.com/sheatgm)



Martha  
Shear  
**Contributor**  
[@martha\\_shear](https://github.com/martha_shear)



Adam  
Wolff  
**Contributor**  
[@dmwlf](https://github.com/dmwlf)



Gary  
Thung  
**Contributor**  
[@garythung](https://github.com/garythung)



Photon  
**Contributor**  
[@photon0x](https://github.com/photon0x)



Emily  
Myers  
**Contributor**  
[@EmilyMMeyers](https://github.com/EmilyMMeyers)

+300 volunteers in the crypto community who added to our Github taxonomy and scrubbed data!

# HOW WE MEASURE DEVELOPER ACTIVITY

An early and leading indicator of value creation in emerging platforms is developer engagement. Developers build killer applications that deliver value to end users, which attracts more customers, which then draws more developers.

Because crypto is significantly open source, we have a unique and unprecedented ability to understand an emerging industry that may be worth many trillions.

For the 2022 report, we analyzed 250M code commits. The taxonomy of projects is crowdsourced from [Crypto Ecosystems](#), the foundations from many of the ecosystems, as well as CoinGecko, CoinMarketCap, DappRadar, DefiLlama, Github, Gitlab, and others.

We infer non-original commits, which account for 65% of the total, and credit only the original authors and original ecosystems that produce code. We try our best to eliminate bots and de-duplicate developers with multiple accounts.

More details are in the appendix.

The taxonomy of projects is available at our Github:  
[github.com/electric-capital/crypto-ecosystems](https://github.com/electric-capital/crypto-ecosystems)

# CAVEATS

## We undercount developers because we rely on open-source repositories only

There are many more crypto developers than are accounted for in our report. Some teams are working on closed-source projects or deploy their code on-chain without ever open-sourcing their contracts. We also undercount developers in roles such as backporting, testing, or release engineering as their efforts may not result in unique code contributions.

Some teams first work in a closed source environment, then open-source their code later. We and the community add new open-source repositories to a common mapping found at [Crypto Ecosystems](#). Not all open-source repositories will make it into the taxonomy in time for this report every year.

It requires more than just software engineers to build crypto products that reach mainstream adoption, so this is a dramatic undercounting of the number of people building in crypto.

## Not all commits are created equal

Some code commits may be routine changes, whereas others represent hours of accumulated research and analysis. Despite these caveats, we consider the analysis in this report directionally and relatively accurate.

### Feedback

We are always looking to improve. Please share feedback with us at [devreport@electriccapital.com](mailto:devreport@electriccapital.com)

# EXECUTIVE SUMMARY

## Developers are a leading indicator of value creation.

Developers build apps that deliver value to users. Killer apps attract customers, and those customers bring more developers. Because crypto is significantly open source, we have an unprecedented ability to measure developer adoption and fundamental traction in an emerging industry.

### Crypto developers are +5% YoY, despite 70%+ decline in prices.

- 23,343 monthly developers as of Dec 2022
- 471,000+ monthly code commits are made toward open-source crypto projects
- +8% YoY growth in Full-Time developers. Full-Time devs contribute 76% of code commits
- All-time high of 61,000+ developers contributed code for the first time in 2022

### Crypto developers increased meaningfully since 2018.

- Crypto network value is back to Jan 2018 levels, but monthly developers increased +297%.
- 3x growth in Bitcoin monthly active developers, from 372 to 946 since Jan 18
- 5x growth in Ethereum monthly active developers, from 1084 to 5819 since Jan 2018
- Solana, Polkadot, Cosmos, & Polygon grew from fewer than 200 devs to 1,000+ developers since Jan 2018

### Major ecosystems are emerging beyond Bitcoin and Ethereum.

- 72% of monthly active devs work outside the Bitcoin and Ethereum ecosystems
- Solana, NEAR, and Polygon grew 40% YoY and have 500+ total monthly active developers
- Sui, Aptos, Starknet, Mina, Osmosis, Hedera, Optimism, and Arbitrum grew 50%+ YoY and have 100+ total monthly active developers
- 3,901 developers work in DeFi every month across multiple chains, +240% since DeFi summer. 50% of DeFi developers are outside of Ethereum
- 900+ developers write code monthly in NFTs across chains, +299% since 2021

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01

# DEVELOPER OVERVIEW

# WE ARE NOW 14 YEARS INTO THE CREATION OF OPEN-SOURCE CRYPTO

## Bitcoin v0.1 released

Satoshi Nakamoto [satoshi at vistomail.com](mailto:satoshi@vistomail.com)

Thu Jan 8 14:27:40 EST 2009

Announcing the first release of Bitcoin, a new electronic cash system that uses a peer-to-peer network to prevent double-spending.

It's completely decentralized with no server or central authority.

See [bitcoin.org](http://bitcoin.org) for screenshots.

Download link:

<http://downloads.sourceforge.net/bitcoin/bitcoin-0.1.0.rar>

Windows only for now. **Open source C++ code is included.**

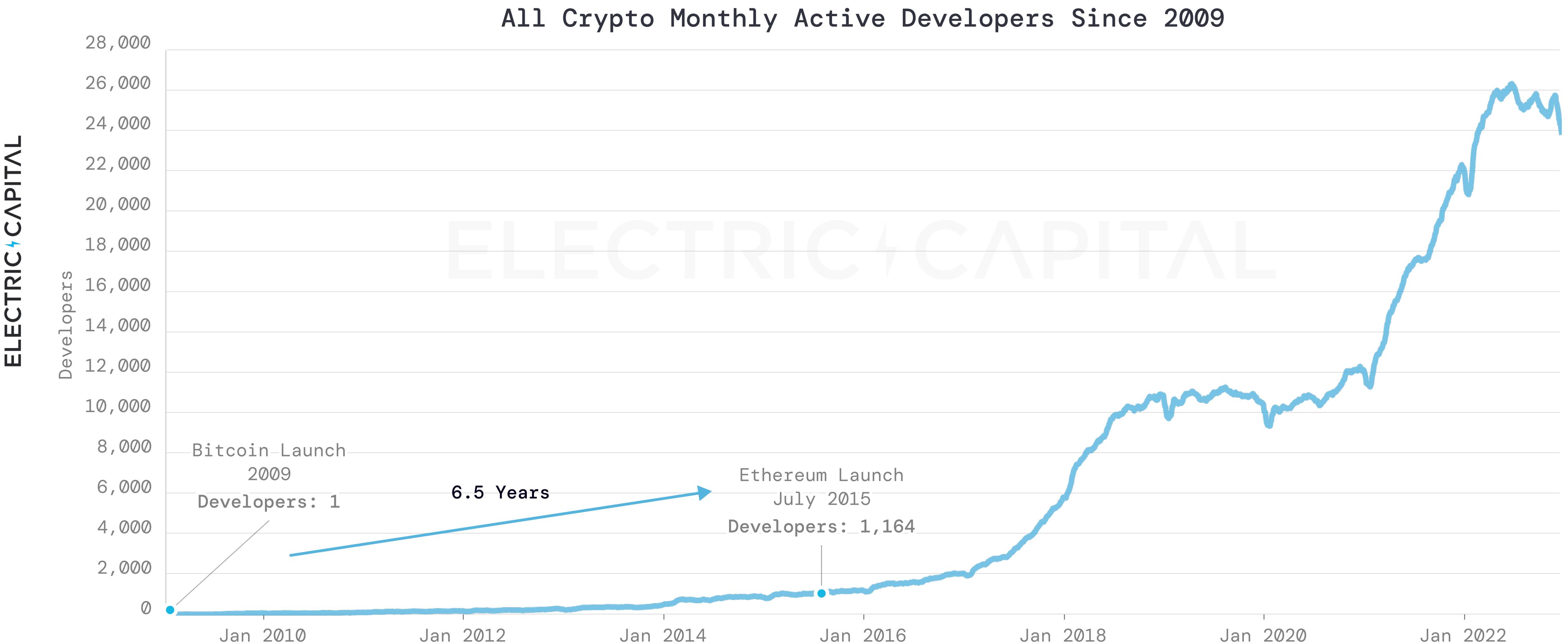
- Unpack the files into a directory
- Run BITCOIN.EXE
- It automatically connects to other nodes

If you can keep a node running that accepts incoming connections, you'll really be helping the network a lot. Port 8333 on your firewall needs to be open to receive incoming connections.

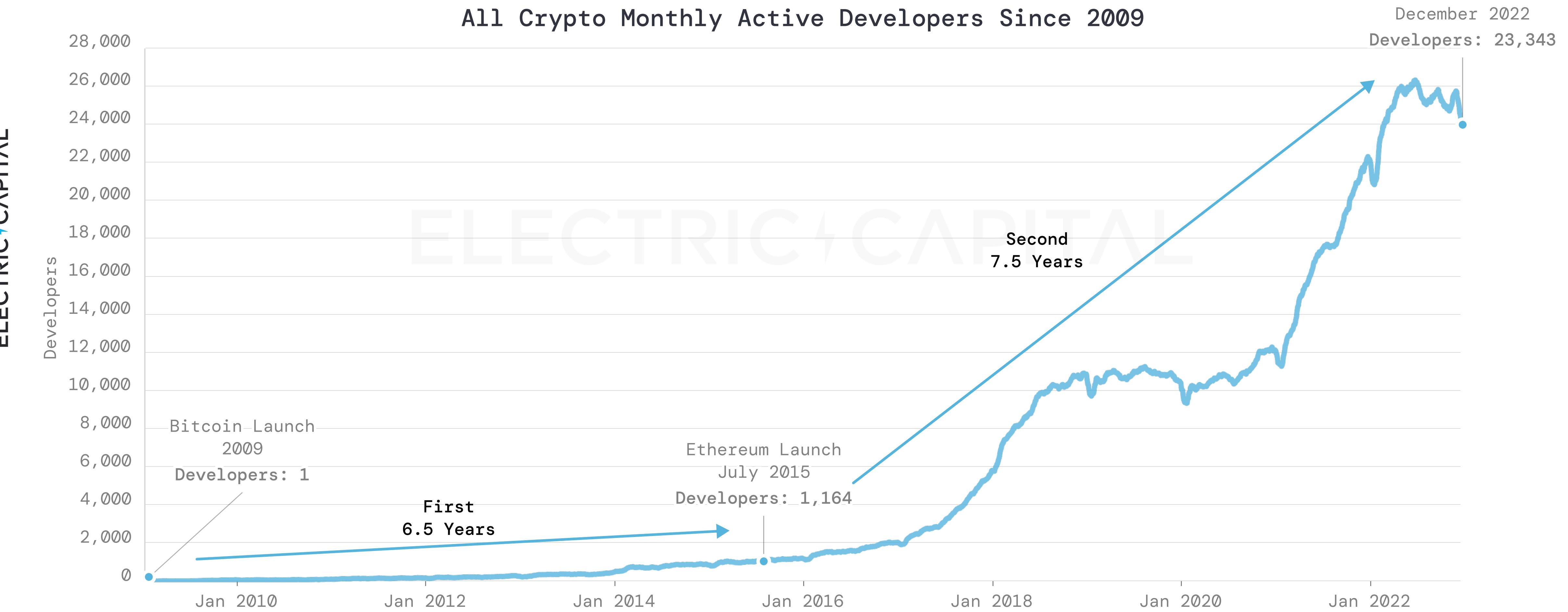
The software is still alpha and experimental. There's no guarantee the system's state won't have to be restarted at some point if it becomes necessary, although I've done everything I can to build in extensibility and versioning.

You can get coins by getting someone to send you some, or turn on Options->Generate Coins to run a node and generate blocks. I made the proof-of-work difficulty ridiculously easy to start with, so for a little while in the beginning a typical PC will be able to generate coins in just a few hours. It'll get a lot harder when competition makes the automatic adjustment drive up the difficulty. Generated coins must wait 120 blocks to mature before they can be spent.

# IN THE FIRST 7 YEARS: 1,000+ MONTHLY ACTIVE DEVELOPERS WROTE CODE

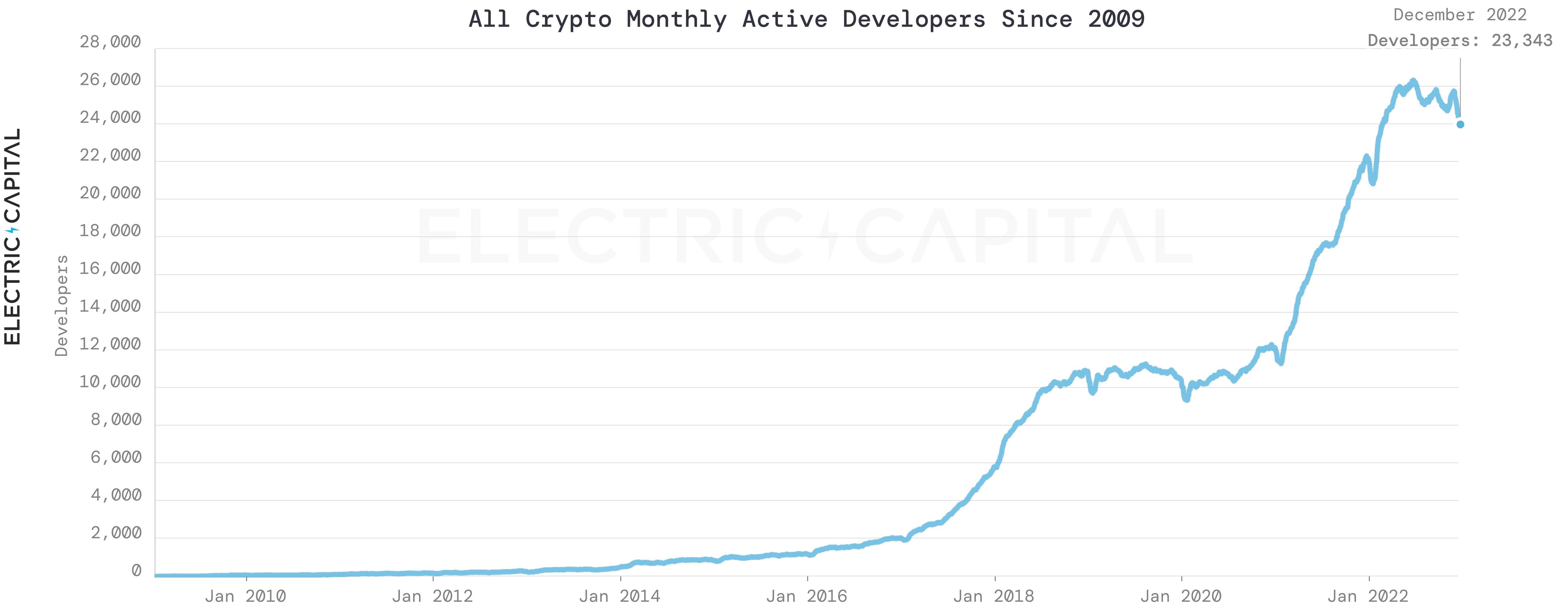


# IN THE NEXT 7 YEARS: CRYPTO GAINED +22,000 MORE MONTHLY ACTIVE DEVS

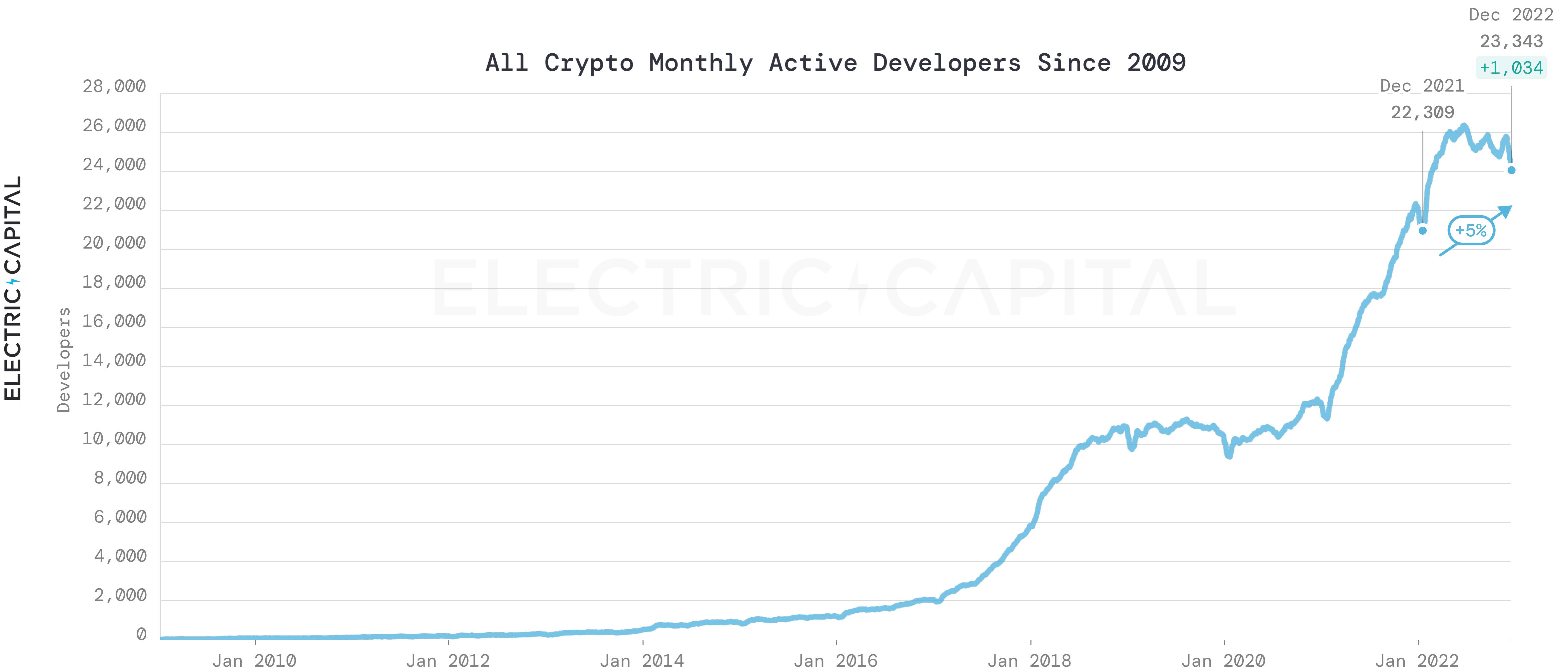


We use July 30, 2015 as the Ethereum Launch Date, when the genesis block was created.

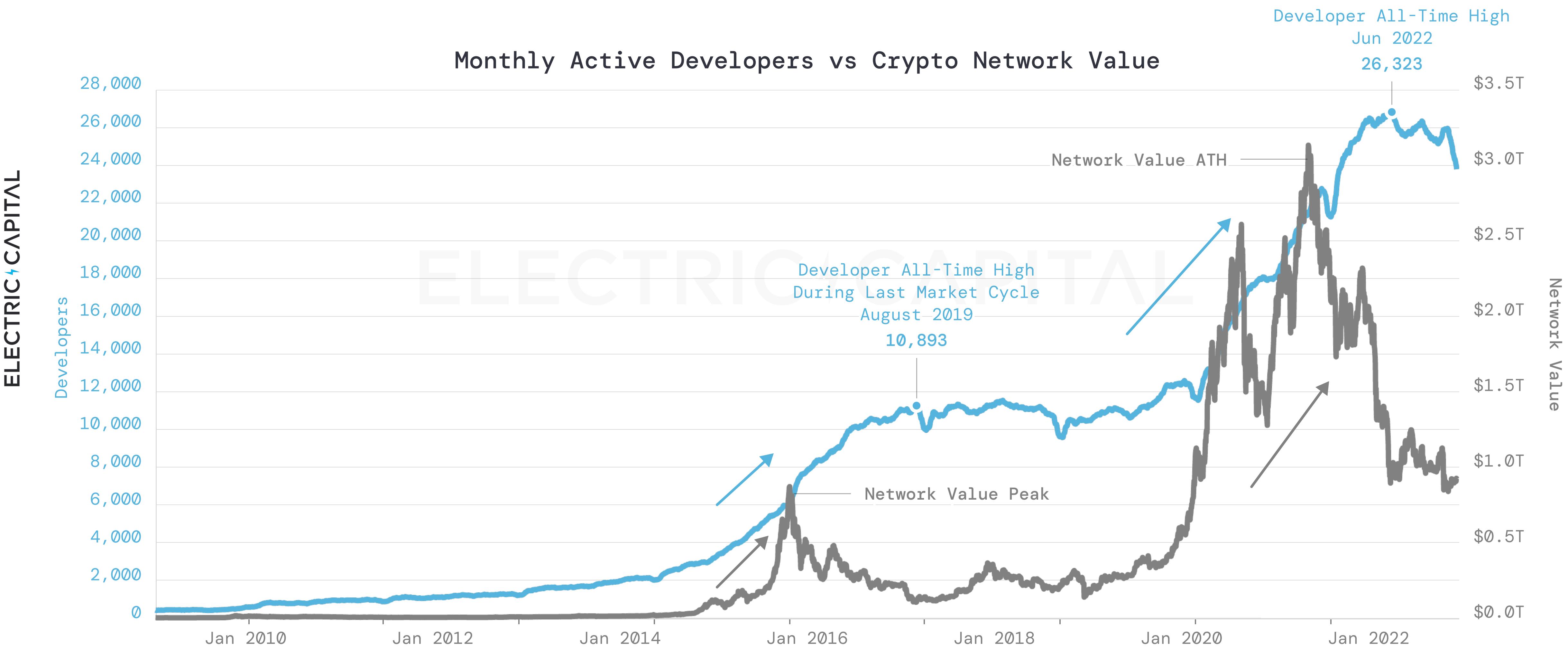
# THERE ARE NOW 23,343 MONTHLY ACTIVE DEVELOPERS IN CRYPTO



+5% MONTHLY ACTIVE DEVELOPERS FROM DECEMBER 2021 TO DECEMBER 2022

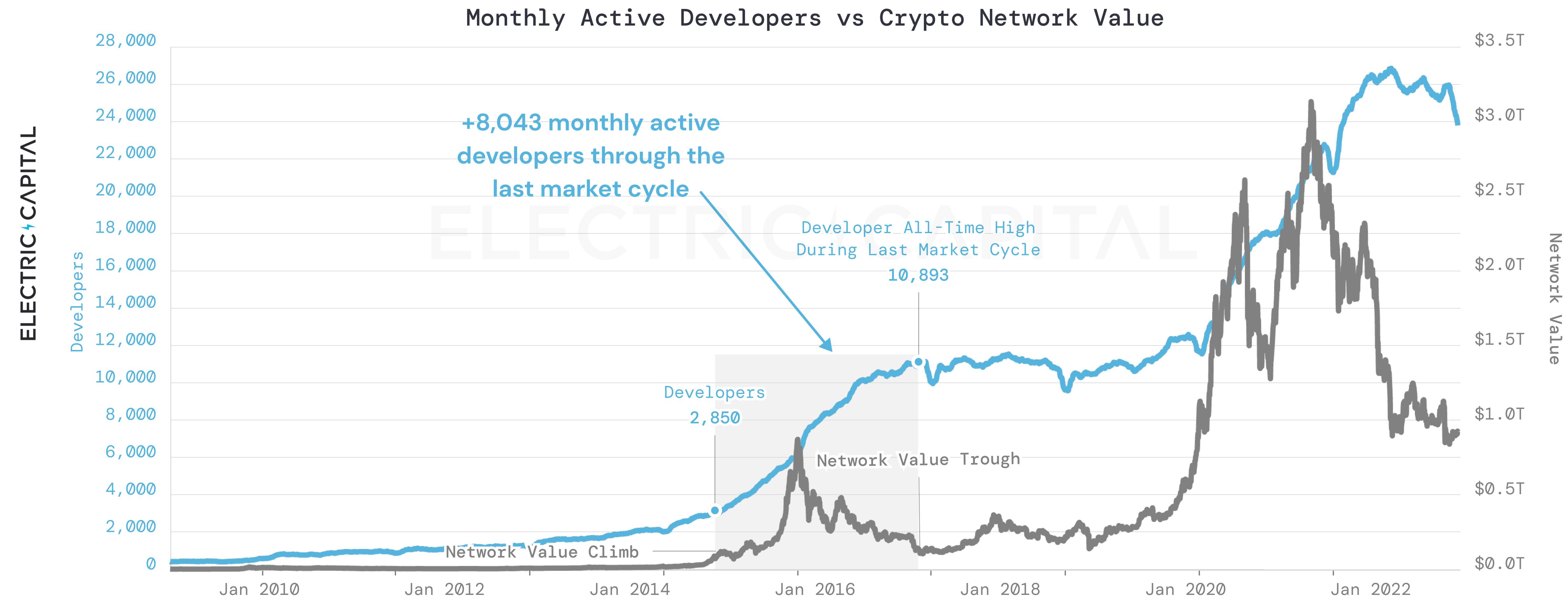


# MONTHLY ACTIVE DEVS INCREASE ALONGSIDE PRICES IN A MARKET CYCLE



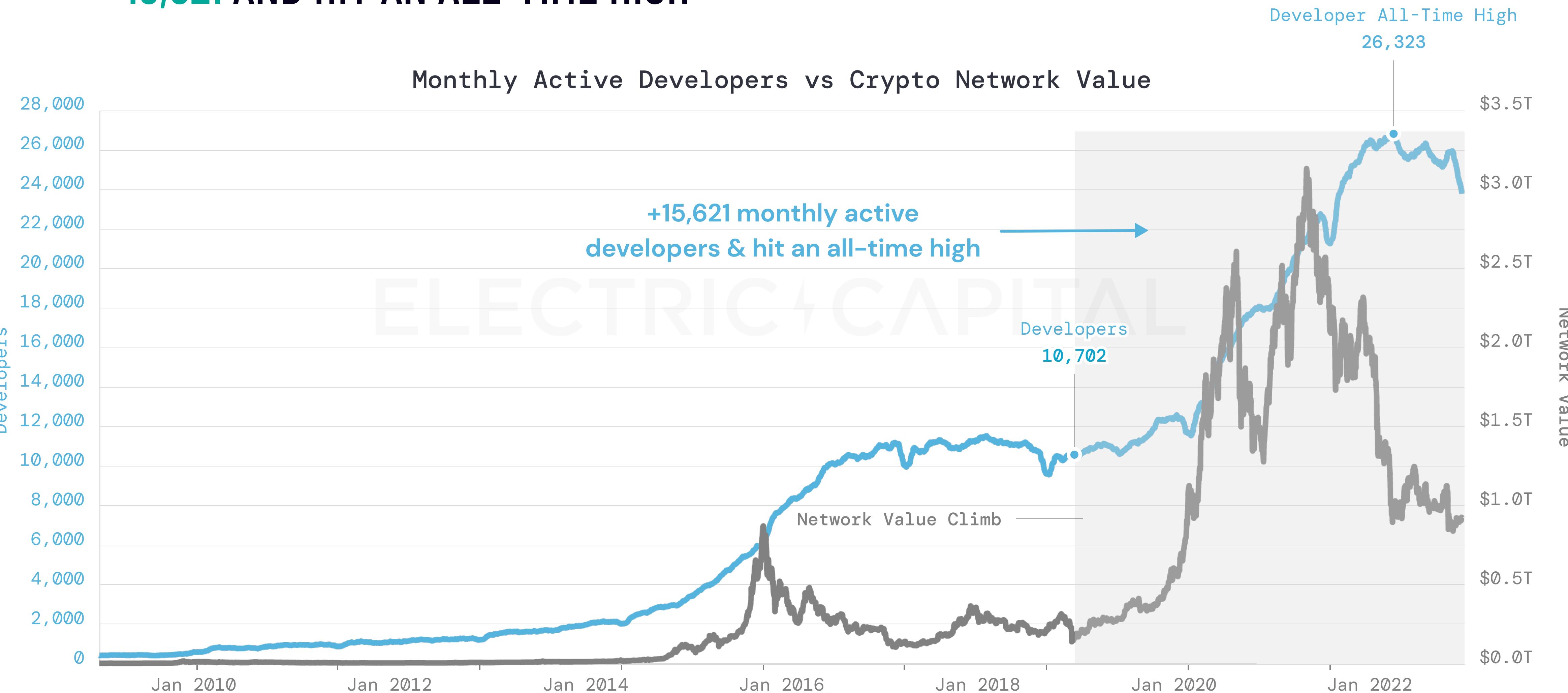
Total Network Value is the value of total crypto market cap from CoinGecko. Total Network Value reached a high Jan 6, 2018. Total Network Value reached an all-time high Nov 8, 2021.

# DURING THE LAST MARKET CYCLE: MONTHLY DEVELOPERS GREW BY +8,043 TO OVER 10,000 FOR THE FIRST TIME

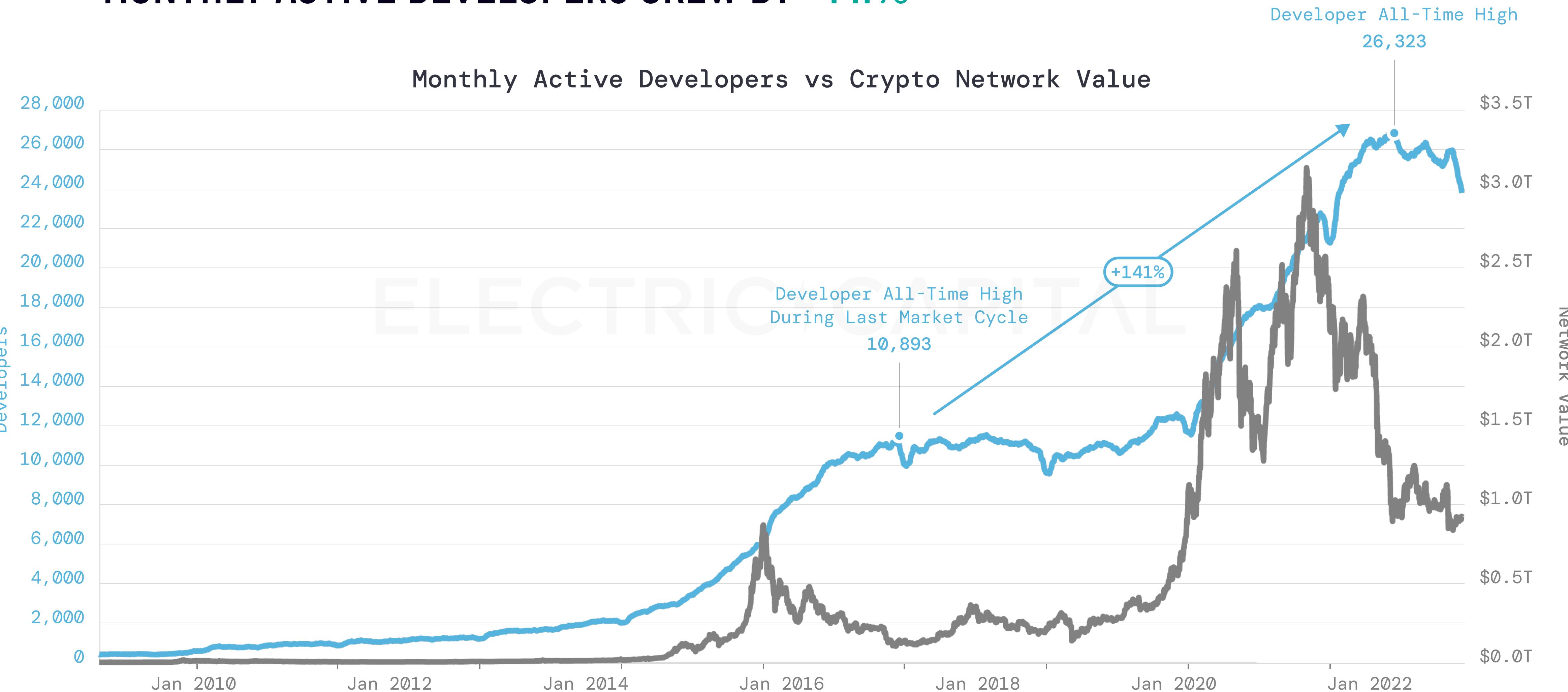


Total Network Value is the value of total crypto market cap from Coingecko. Total Network Value began to climb May 11, 2017. Total Network Value reached a trough Dec 14, 2018. Previous Dev ATH was on Dec 16, 2018.

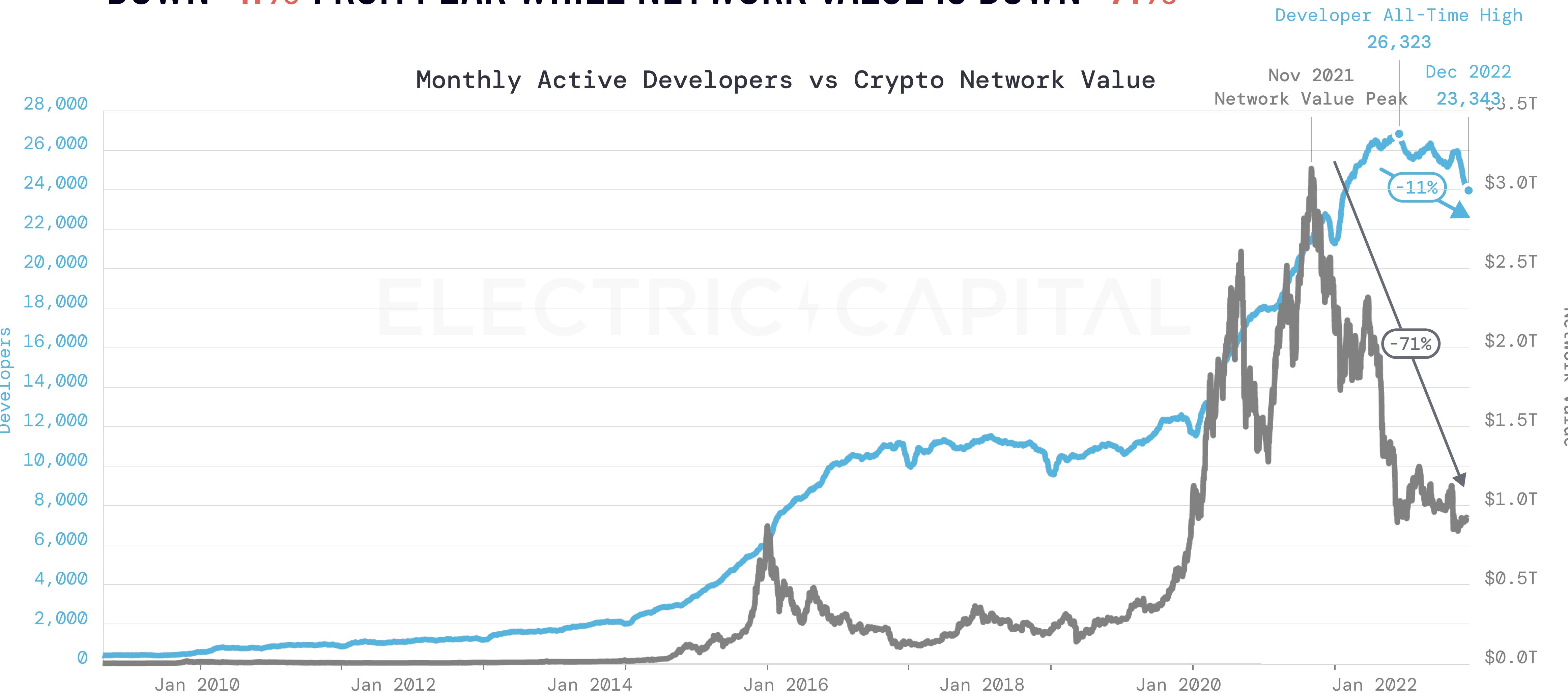
# DURING THE CURRENT MARKET CYCLE: MONTHLY ACTIVE DEVELOPERS GREW BY +15,621 AND HIT AN ALL-TIME HIGH



# FROM LAST CYCLE'S DEVELOPER PEAK TO THIS CYCLE'S DEVELOPER PEAK: MONTHLY ACTIVE DEVELOPERS GREW BY +141%

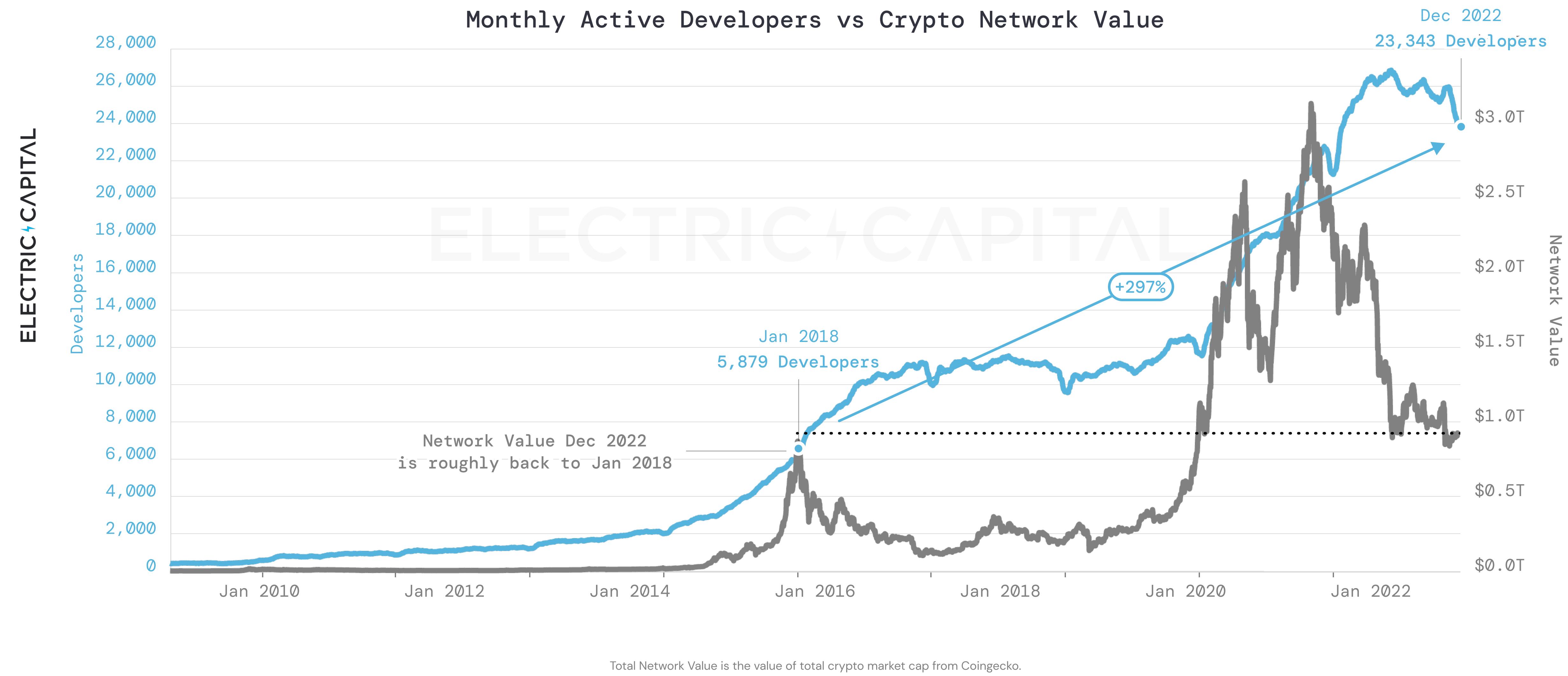


# DEVELOPERS ARE STAYING WHILE NETWORK VALUE IS DOWN: DEVELOPERS ARE DOWN -11% FROM PEAK WHILE NETWORK VALUE IS DOWN -71%



Total Network Value is the value of total crypto market cap from Coingecko. Total Network Value reached an all-time high Nov 8, 2021.

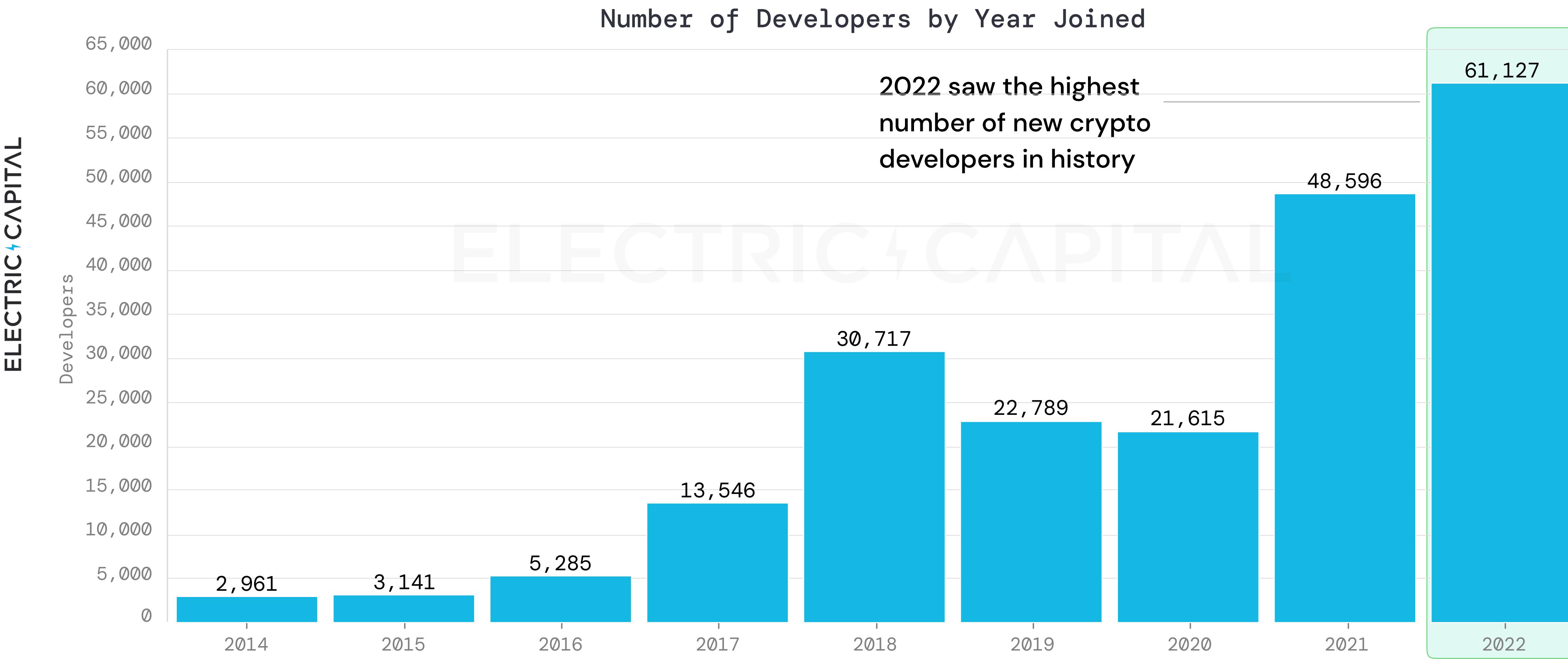
# DEVELOPERS ARE STICKY: NETWORK VALUE IS ROUGHLY BACK TO JANUARY 2018 LEVELS, BUT MONTHLY ACTIVE DEVELOPERS INCREASED +297%



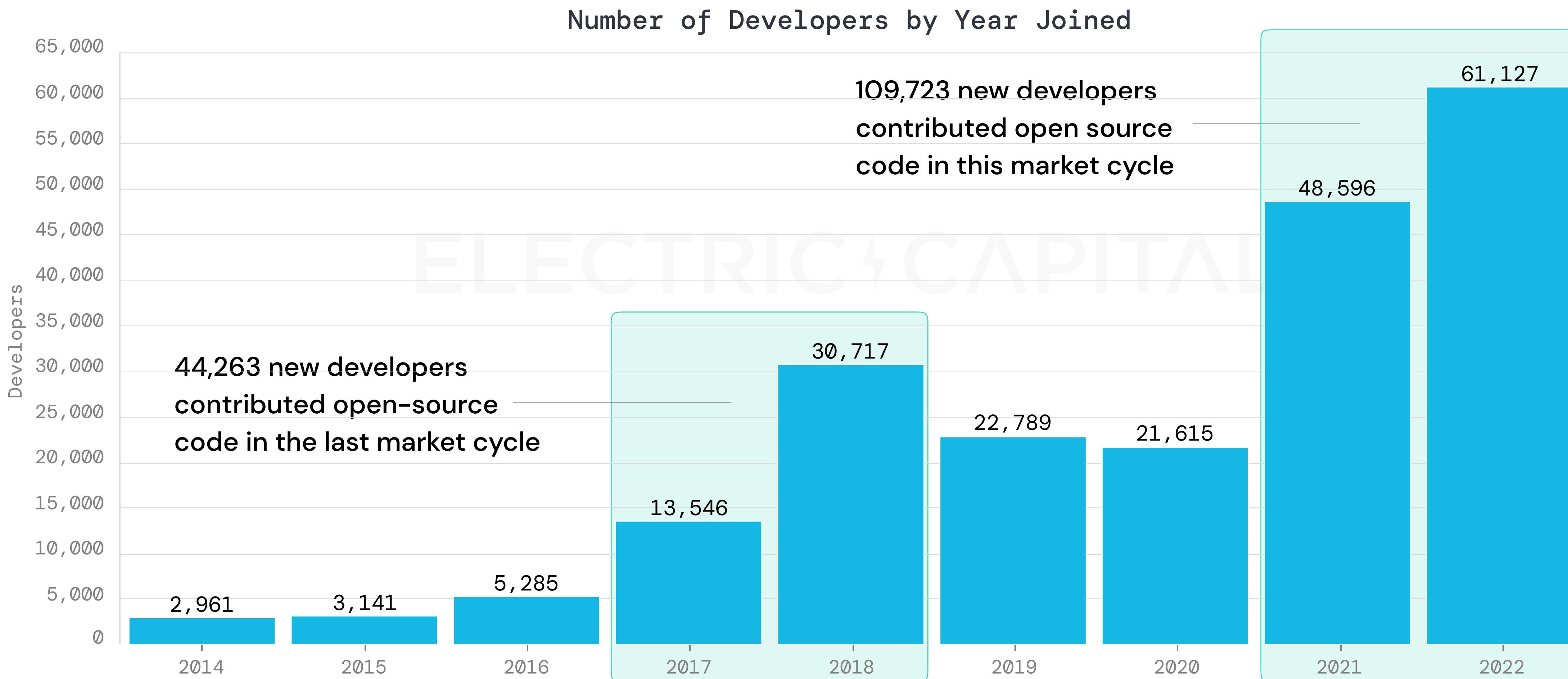


HOW MANY NEW DEVELOPERS ENTERED CRYPTO?

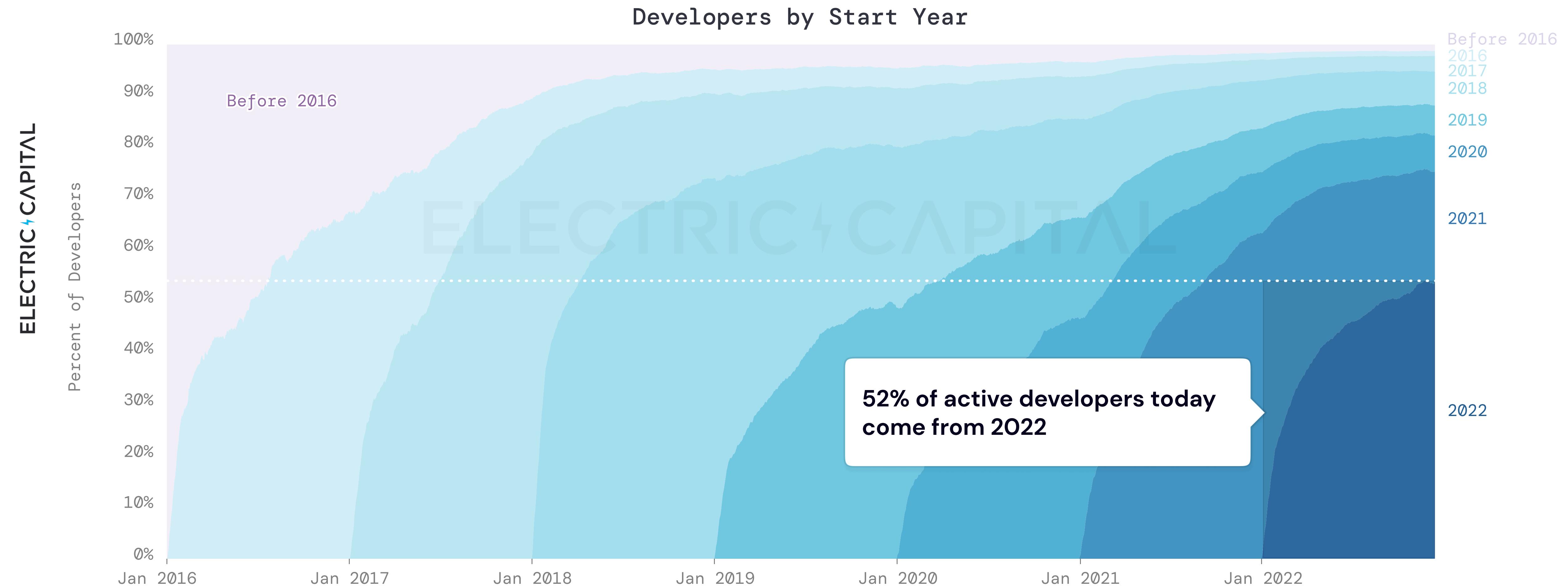
# THE HIGHEST NUMBER OF NEW DEVELOPERS EVER WROTE OPEN-SOURCE CRYPTO CODE IN 2022: 61,127 NEW DEVELOPERS



IN THE 2021 & 2022 MARKET UPSWING, **109,723** NEW DEVELOPERS CONTRIBUTED OPEN-SOURCE CODE, A **+148%** INCREASE COMPARED TO 2017 AND 2018 AT 44,263

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# 52% OF MONTHLY ACTIVE DEVELOPERS STARTED CONTRIBUTING IN 2022



HOW ACTIVE ARE DEVELOPERS?

LET'S LOOK AT ACTIVITY BY FREQUENCY AND VOLUME OF COMMITS

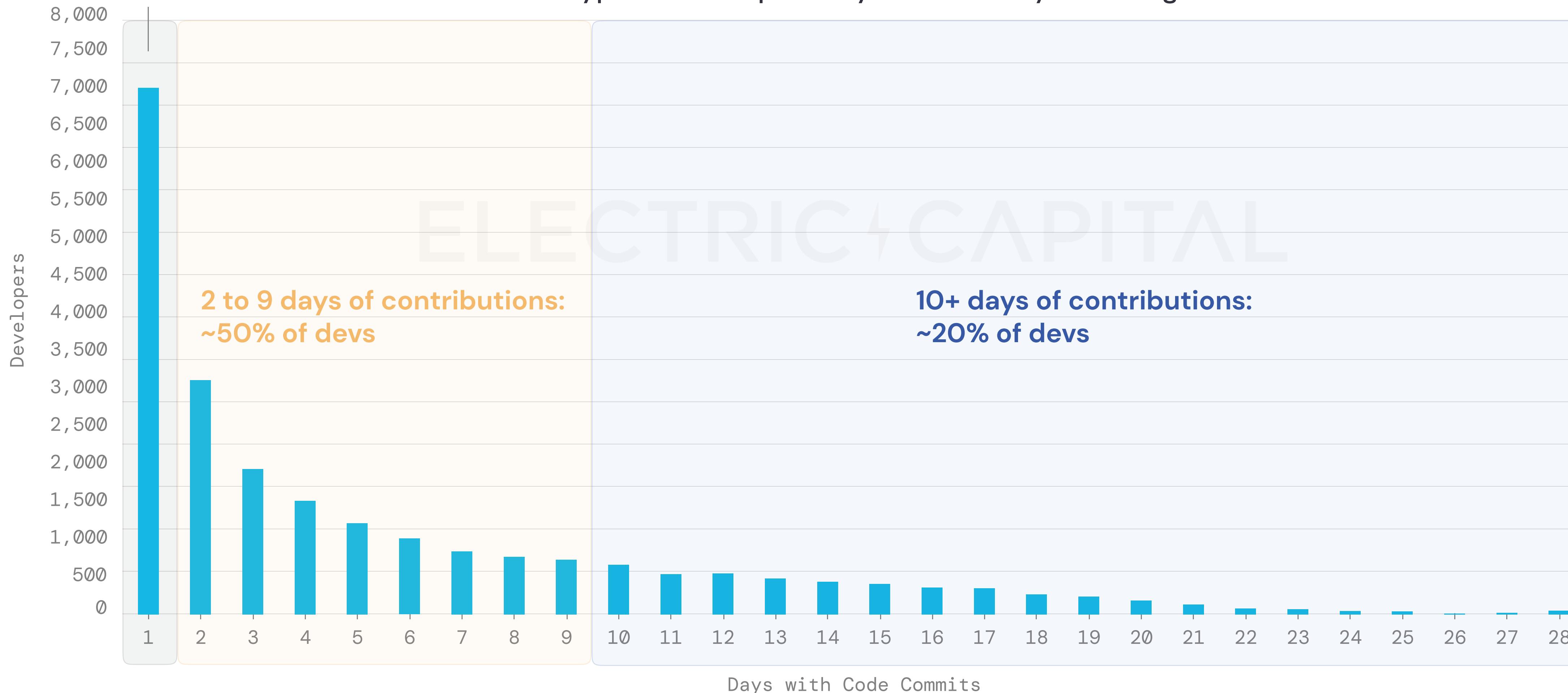
# FREQUENCY: 30% OF DEVS COMMIT CODE 1 DAY IN A MONTH, 50% COMMIT CODE 2-9 DAYS, AND 20% OF DEVELOPERS COMMIT CODE 10+ DAYS IN A MONTH

One day of contribution:

~30% of devs

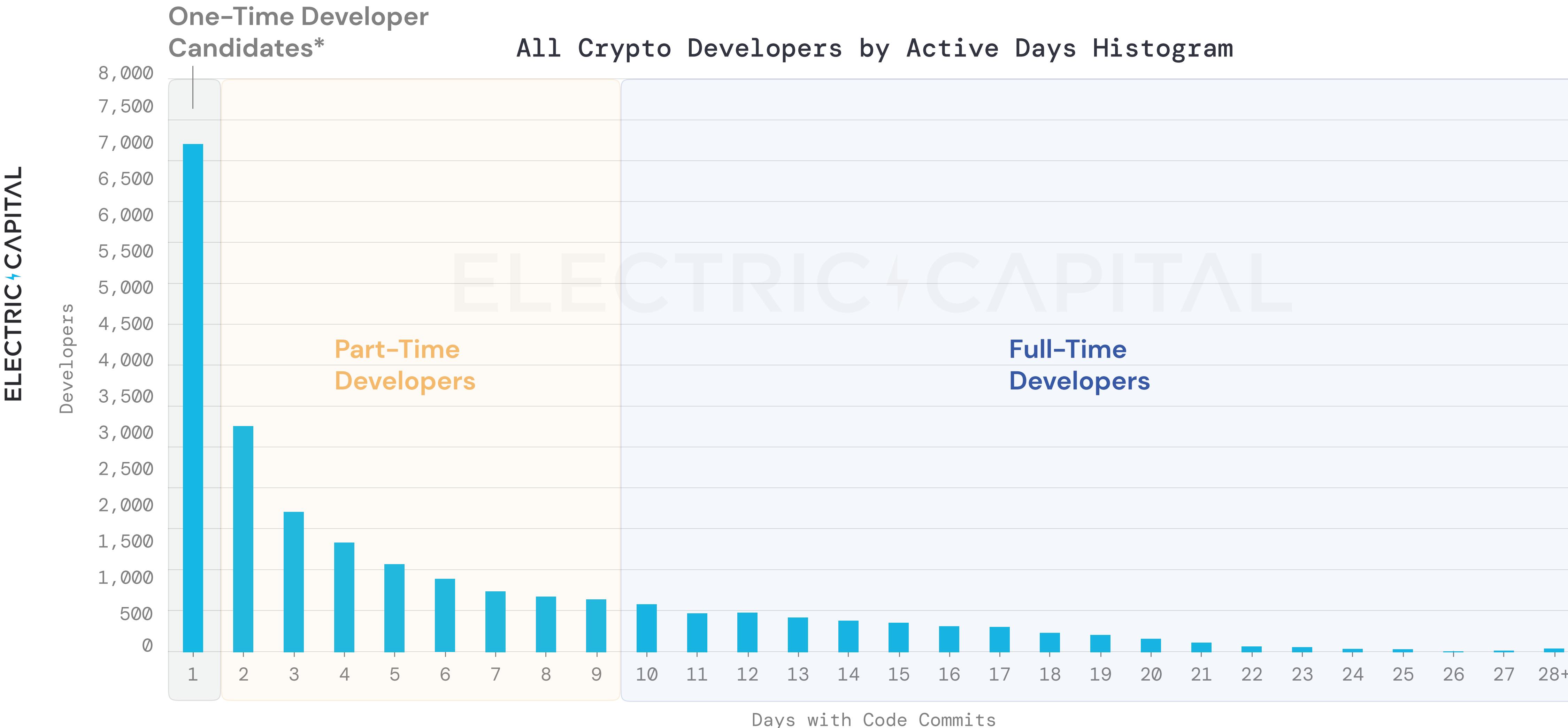
All Crypto Developers by Active Days Histogram

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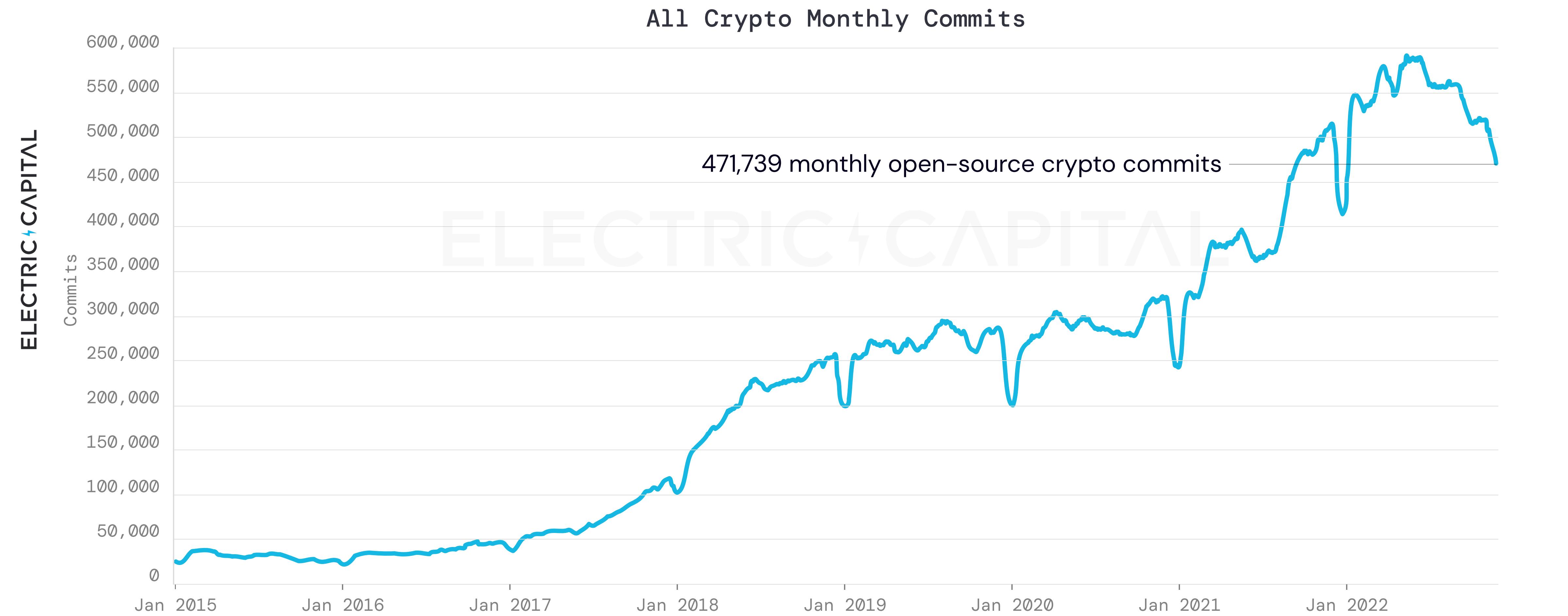


\*Developers active for one-day in a month are not necessarily One-Time developers. One-Time developers are those who were active only one day in a 3-month period.

# WE CAN BUCKET THESE DEVELOPERS INTO ONE-TIME, PART-TIME, & FULL-TIME



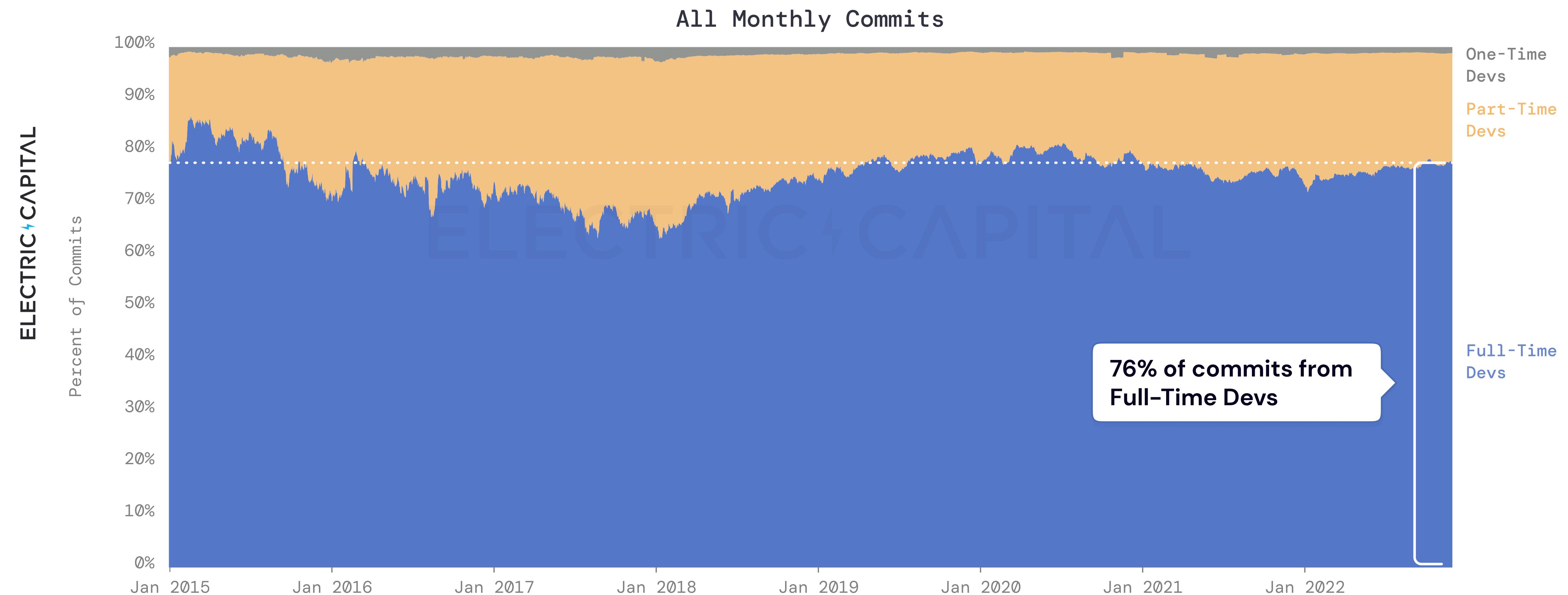
# VOLUME: THERE ARE 471K+ MONTHLY COMMITS IN OPEN-SOURCE CRYPTO



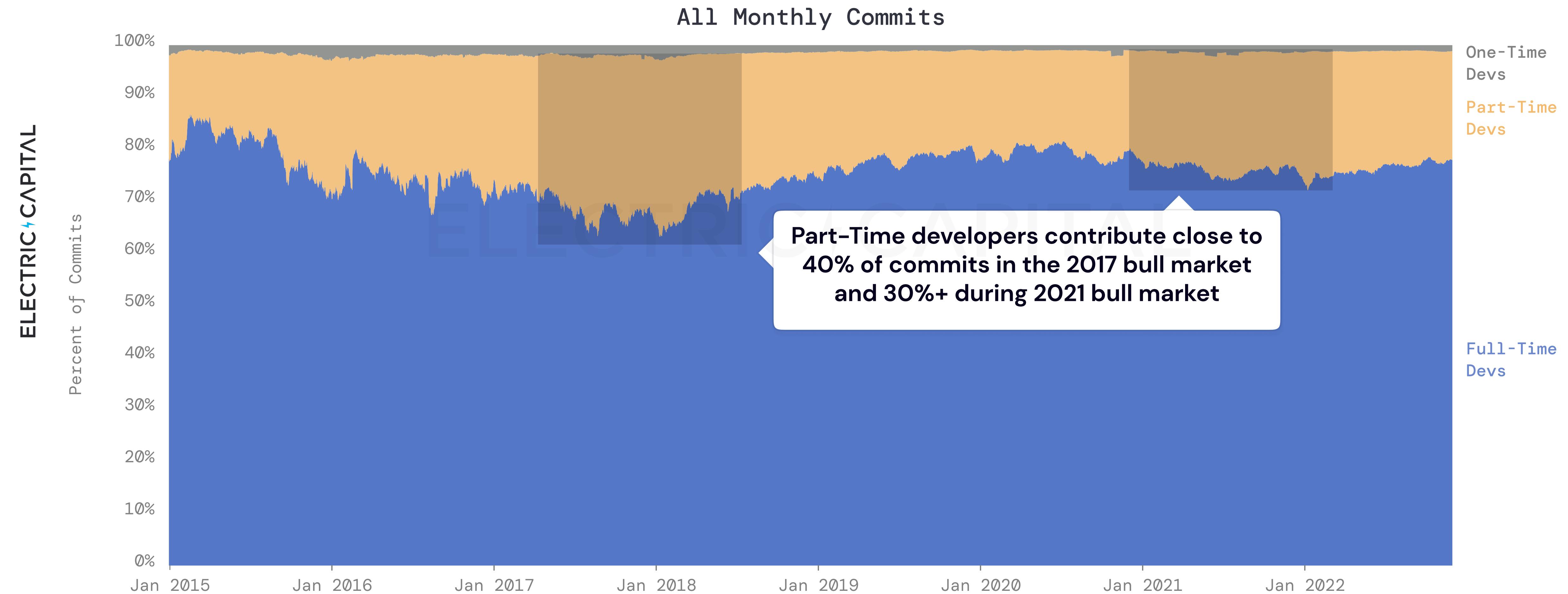
# WE CAN SEGMENT BY FREQUENCY OF CONTRIBUTION: FULL-TIME DEVS CONTRIBUTE THE MOST COMMITS: 356K COMMITS A MONTH



# FULL-TIME DEVELOPERS ARE THE BIGGEST CODE CONTRIBUTORS: FULL-TIME DEVELOPERS CONTRIBUTE 76% OF ALL COMMITS

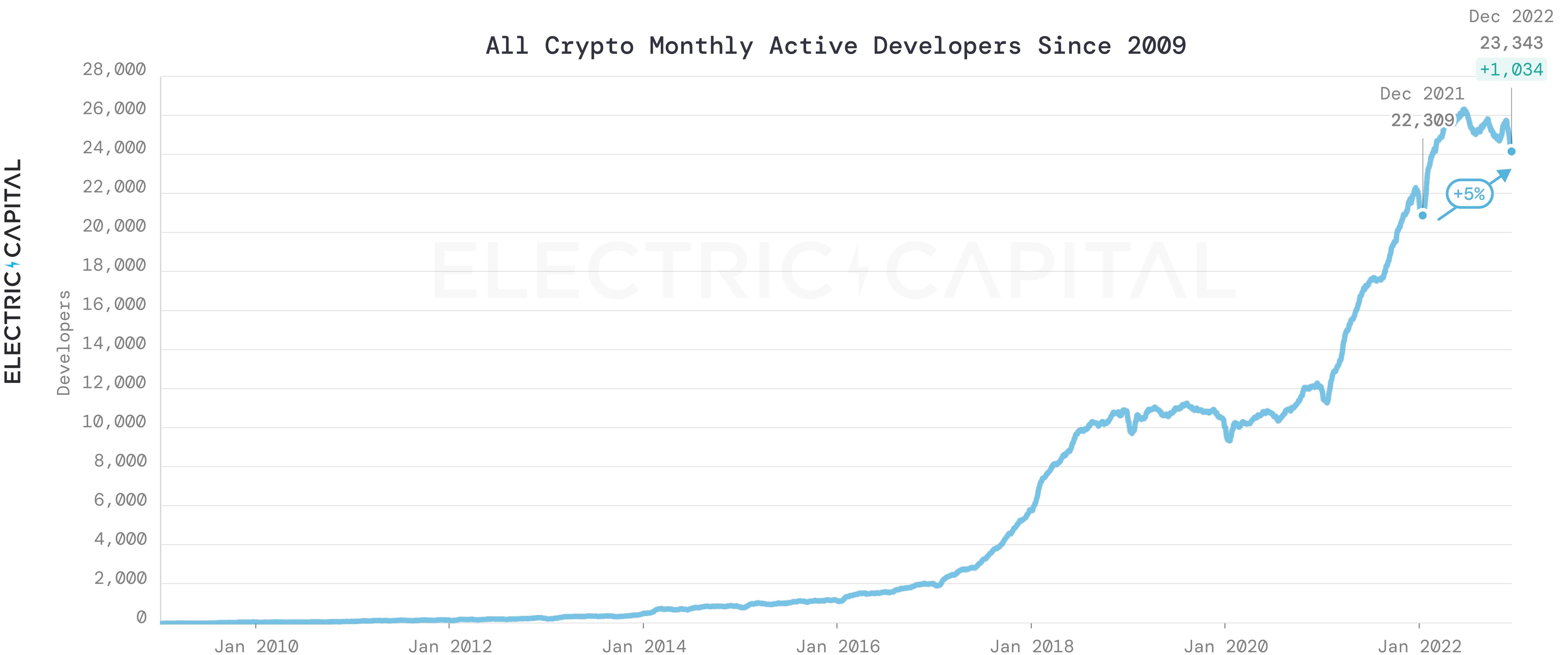


# PART-TIME DEVELOPERS CONTRIBUTE MORE COMMITS IN BULL MARKETS

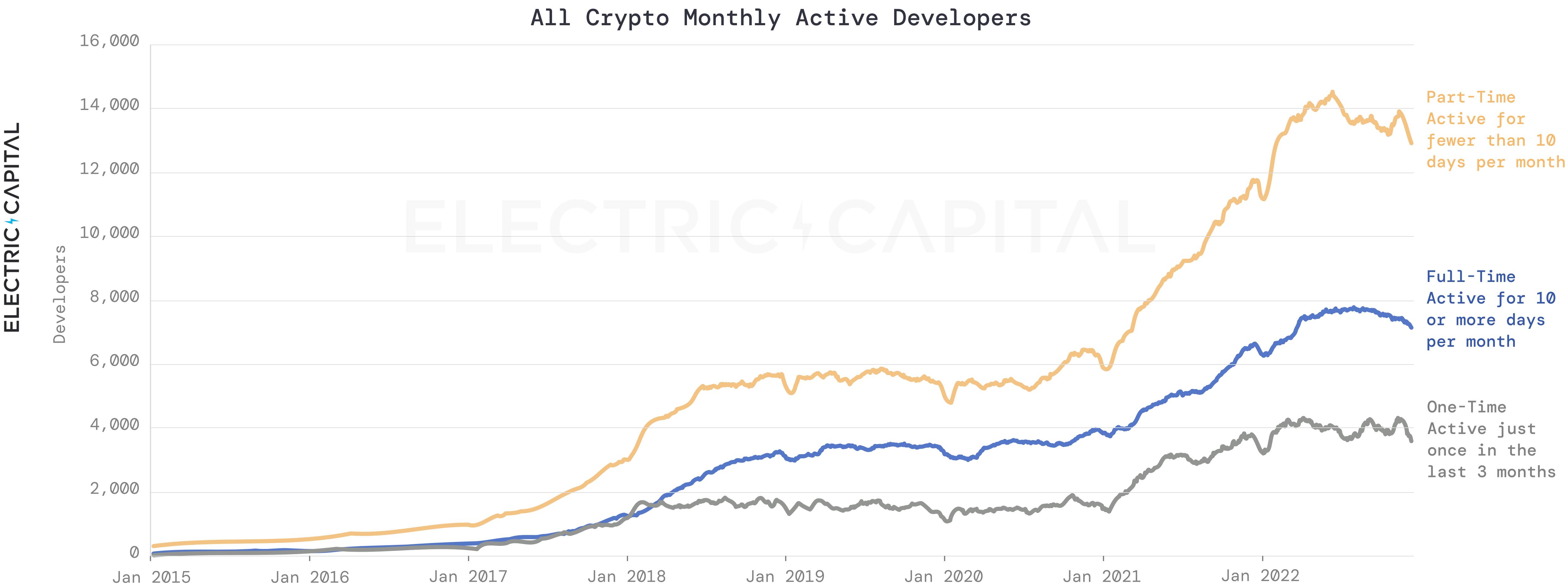


APPLY THIS FREQUENCY BASED SEGMENTATION  
TO DEVELOPERS IN 2022...

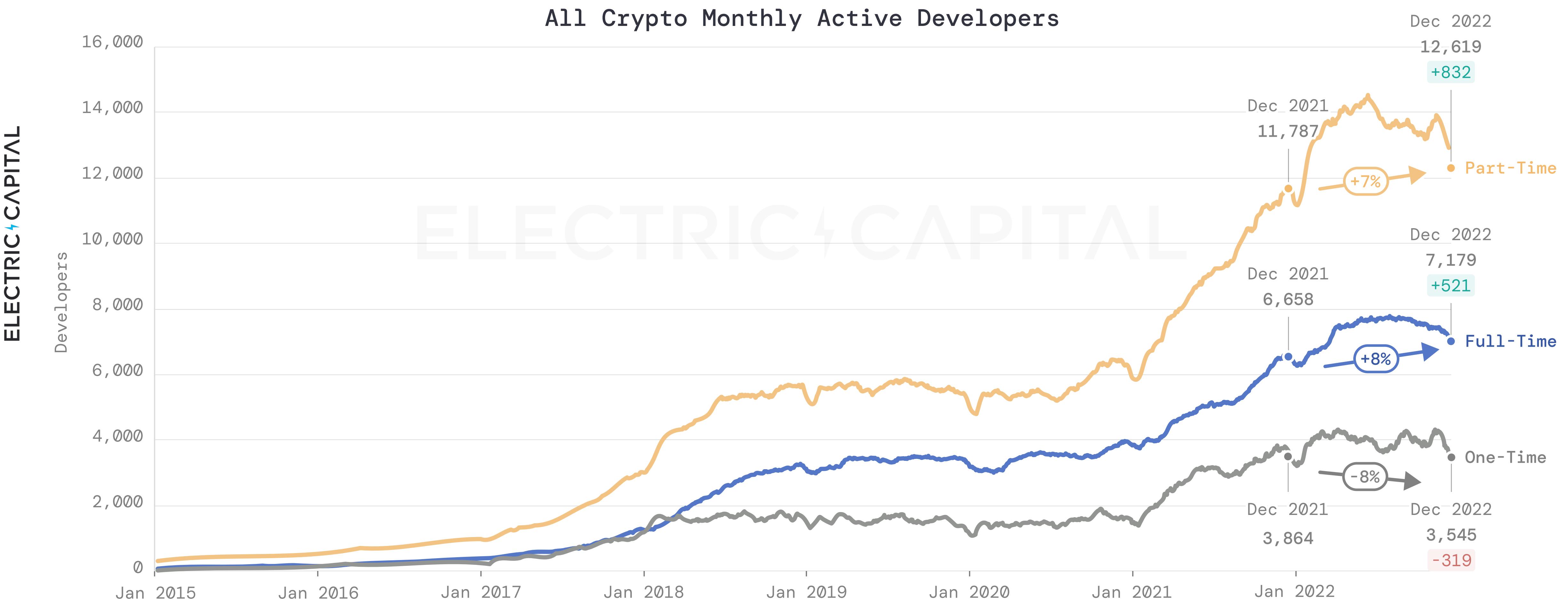
+5% MONTHLY ACTIVE DEVELOPERS FROM DECEMBER 2021 TO DECEMBER 2022



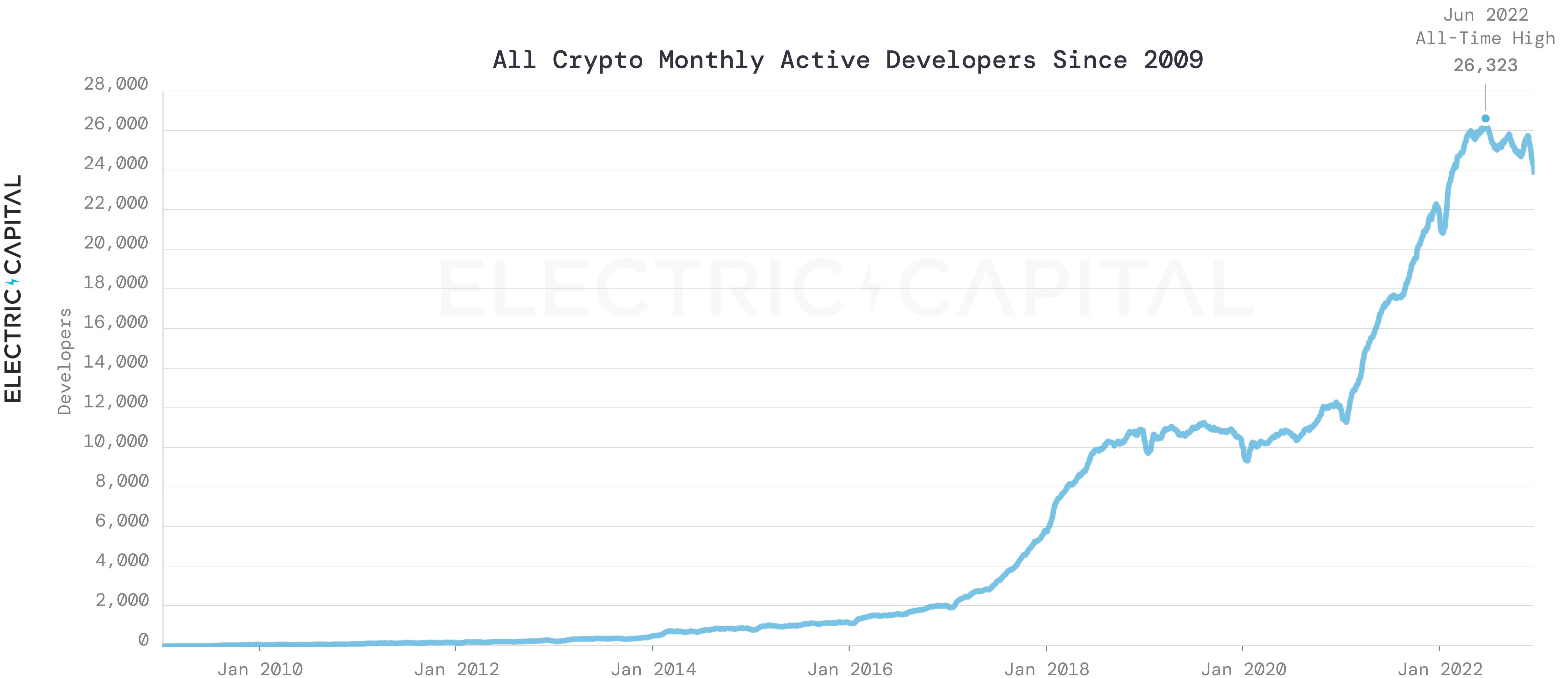
# WE CAN SEGMENT DEVELOPERS BASED ON FREQUENCY OF CONTRIBUTION



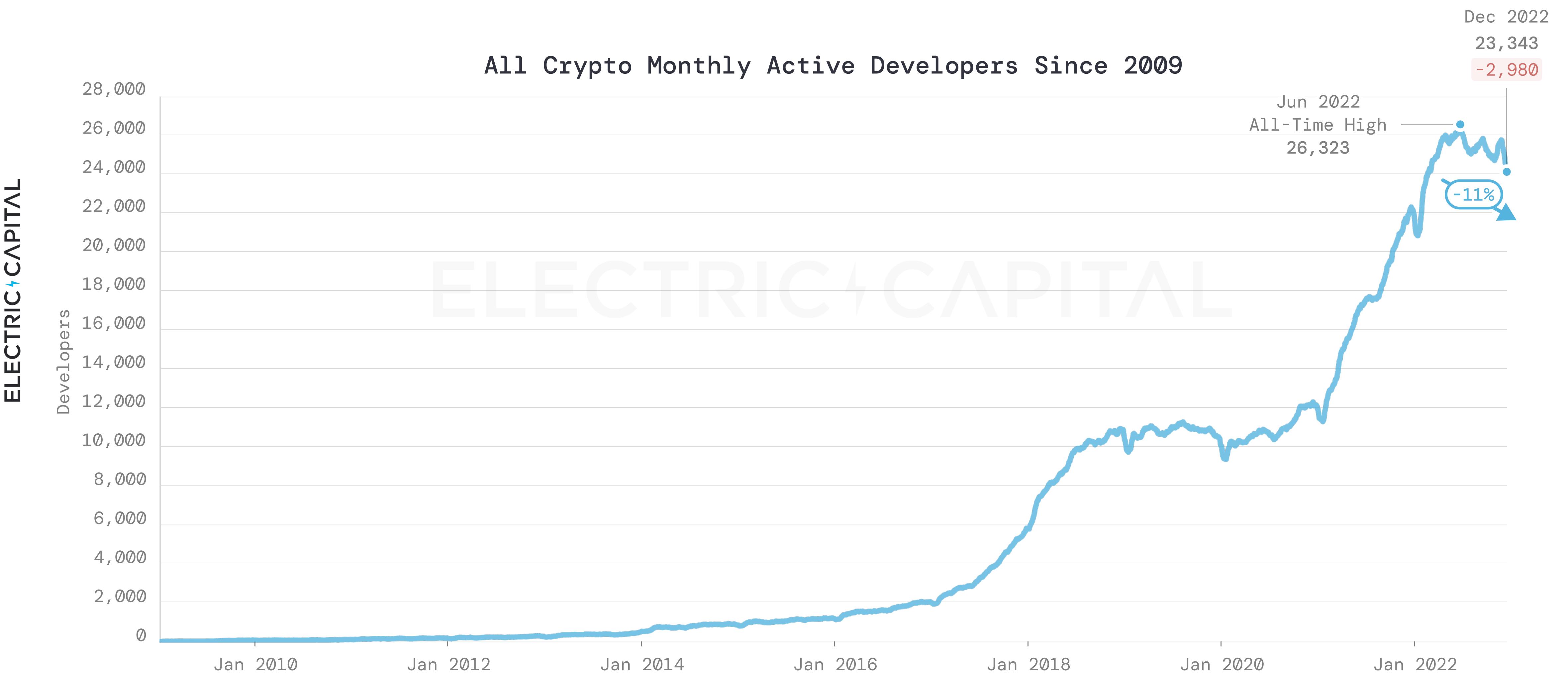
**+8% FULL-TIME DEVELOPERS YEAR OVER YEAR TO 7,179 FULL-TIME DEVELOPERS**



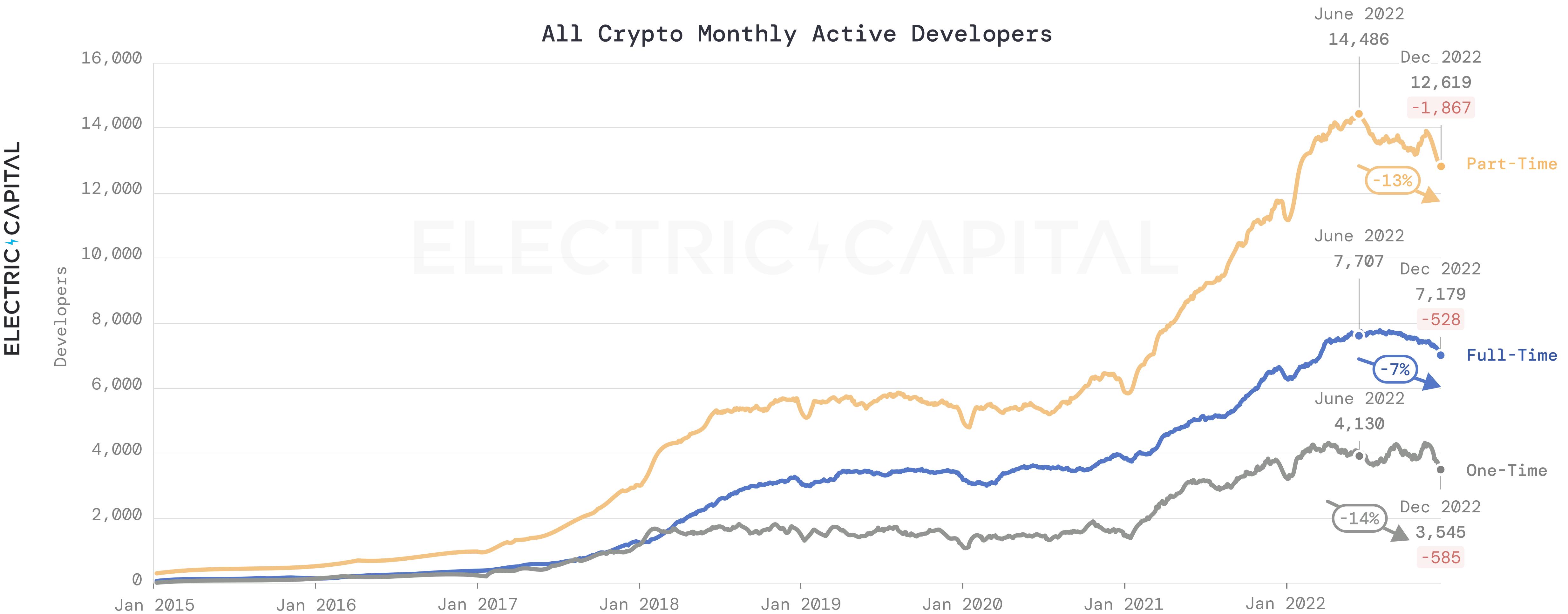
# DEVELOPERS REACHED ALL-TIME HIGH IN JUNE 2022



# SINCE ALL-TIME HIGH: MONTHLY ACTIVE DEVELOPERS FELL -11%



# SINCE ALL-TIME HIGH: DEVELOPER LOSSES ARE MOSTLY FROM PART-TIME (-13%) AND ONE-TIME (-14%) DEVELOPERS

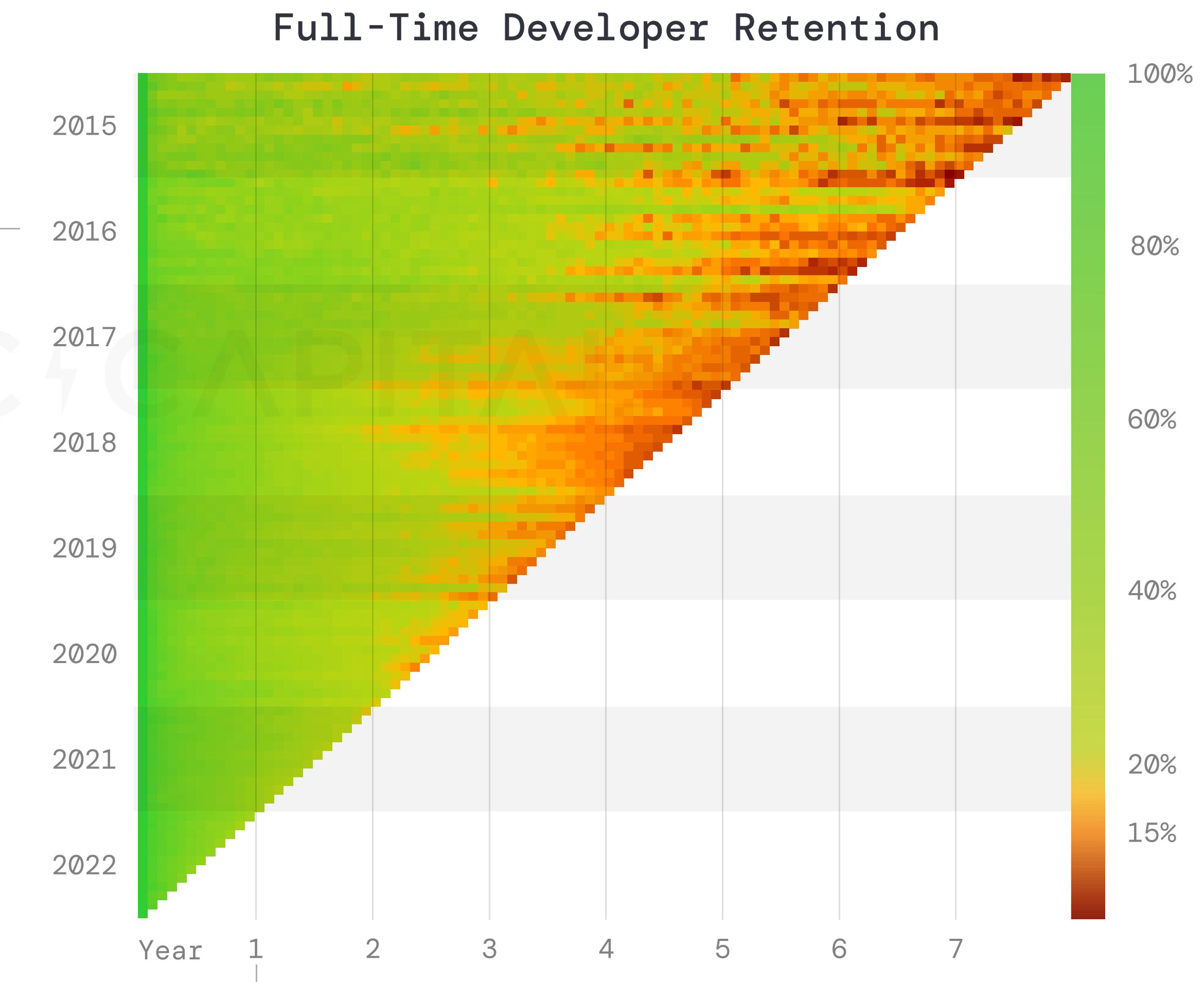


HOW DO WE RECONCILE  
61K DEVELOPERS WHO CONTRIBUTED TO CRYPTO IN 2022  
VS. 23K MONTHLY ACTIVE DEVELOPERS?

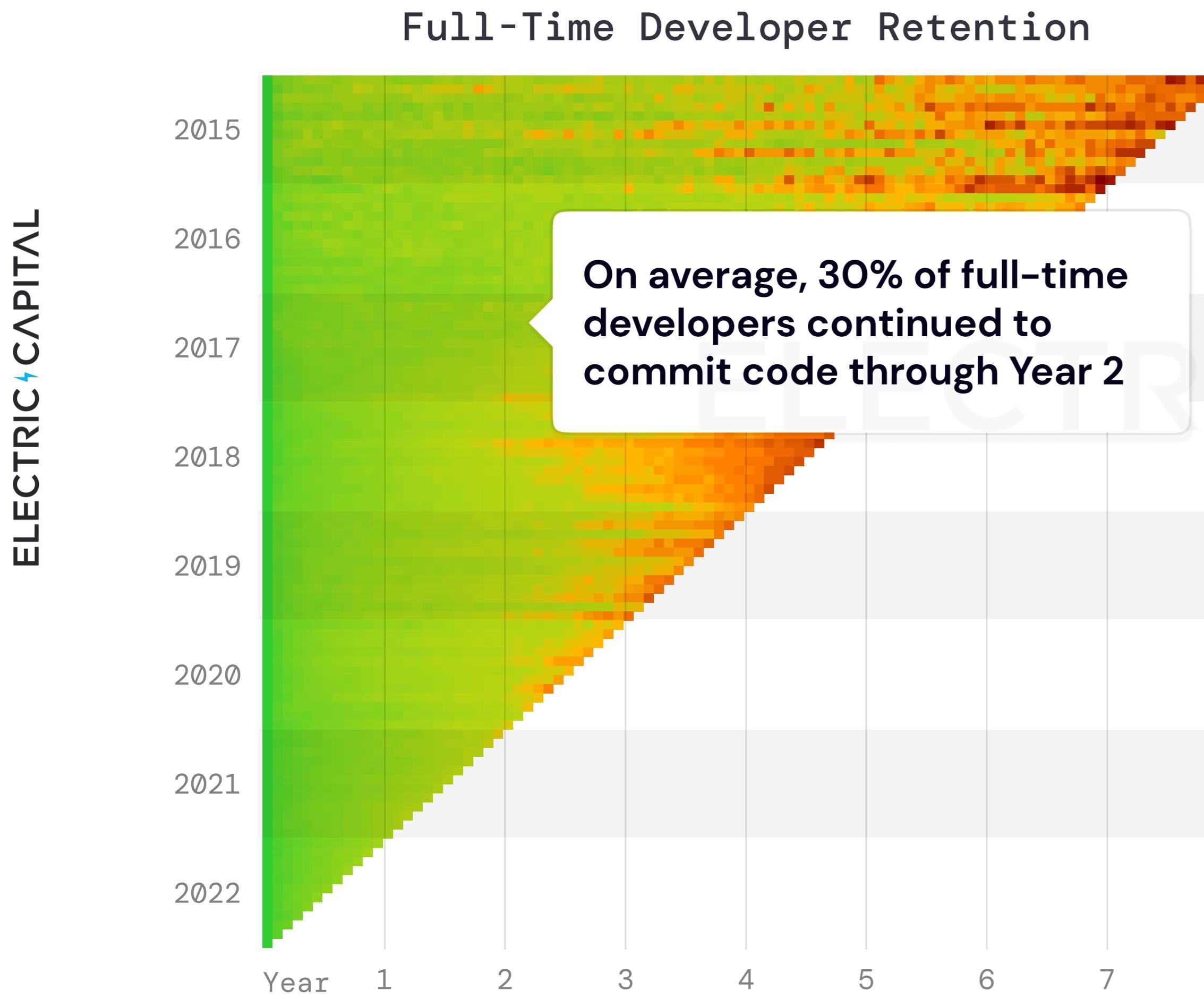
# WE CAN LOOK MORE GRANULARLY AT RETENTION BY MONTHLY COHORTS

Each row represents the developers  
that joined each month

Each column represents the percent of developers from  
that month that committed code the next month



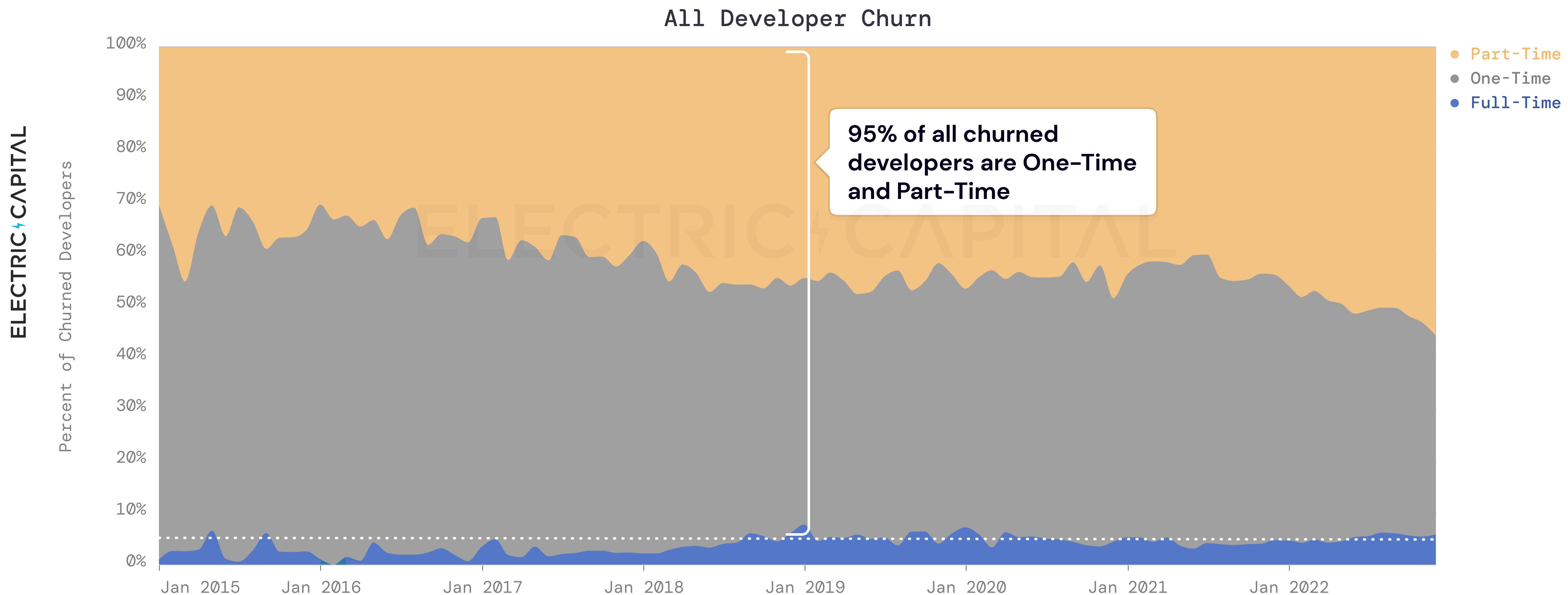
# FULL-TIME DEVELOPERS HAVE SIGNIFICANTLY BETTER RETENTION OVER TIME: 30% OF FULL-TIME DEVS CONTINUED TO CONTRIBUTE THROUGH YEAR 2



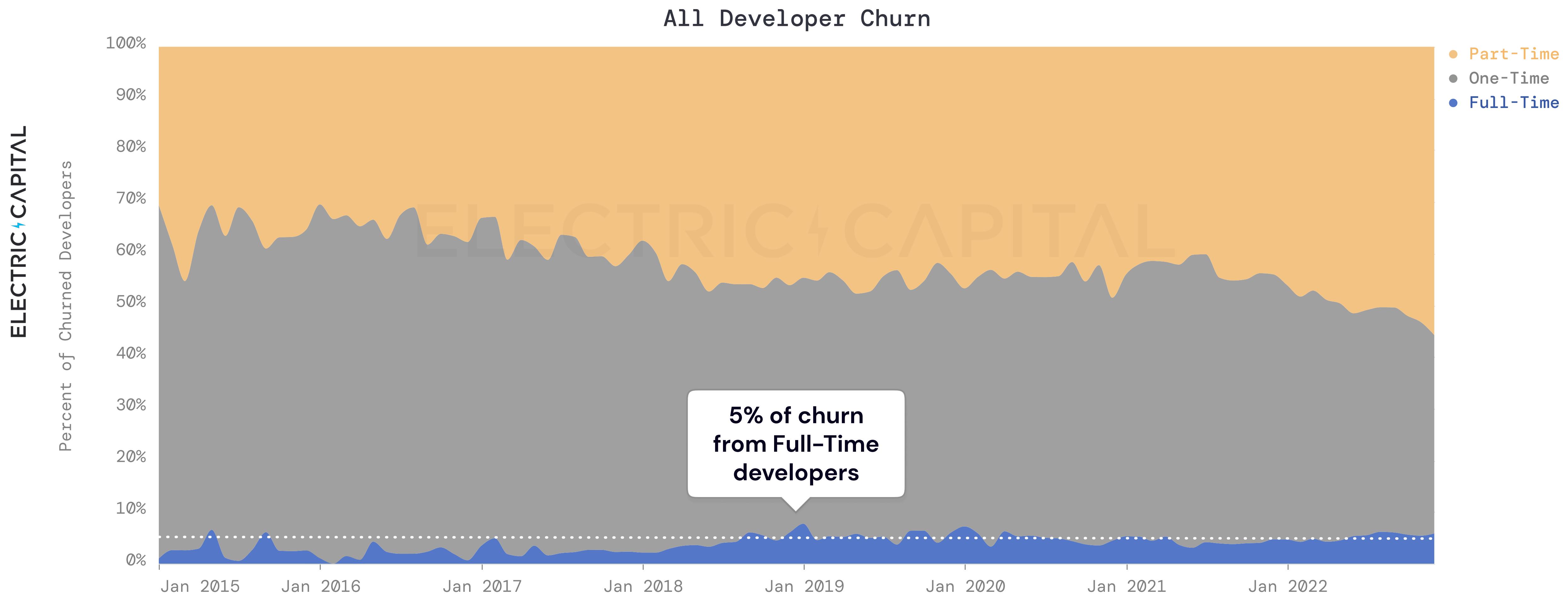


HOW ACTIVE WERE DEVELOPERS WHO LEFT?

# 95% OF MONTHLY DEVELOPERS WHO LEAVE ARE ONE-TIME AND PART-TIME DEVELOPERS

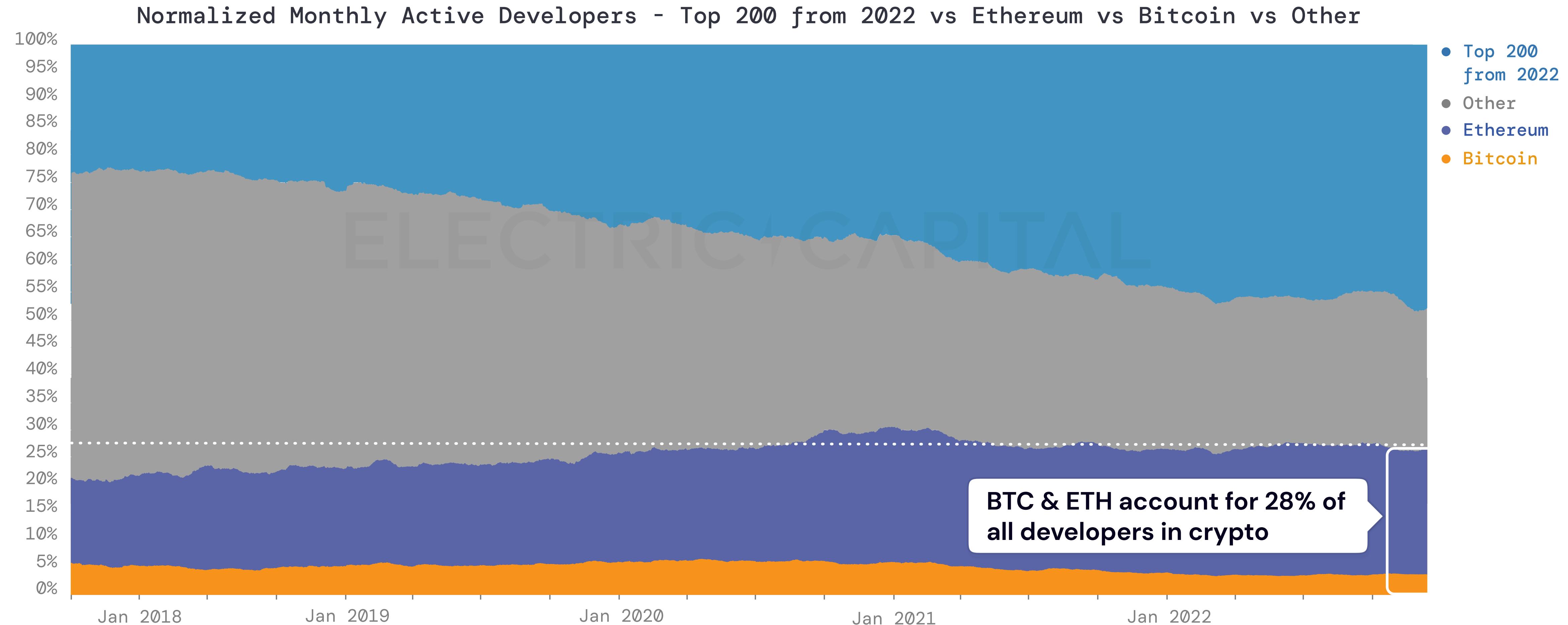


# HEAVY CONTRIBUTORS STAY: FULL-TIME DEVELOPERS ONLY ACCOUNT FOR 5% OF CHURN

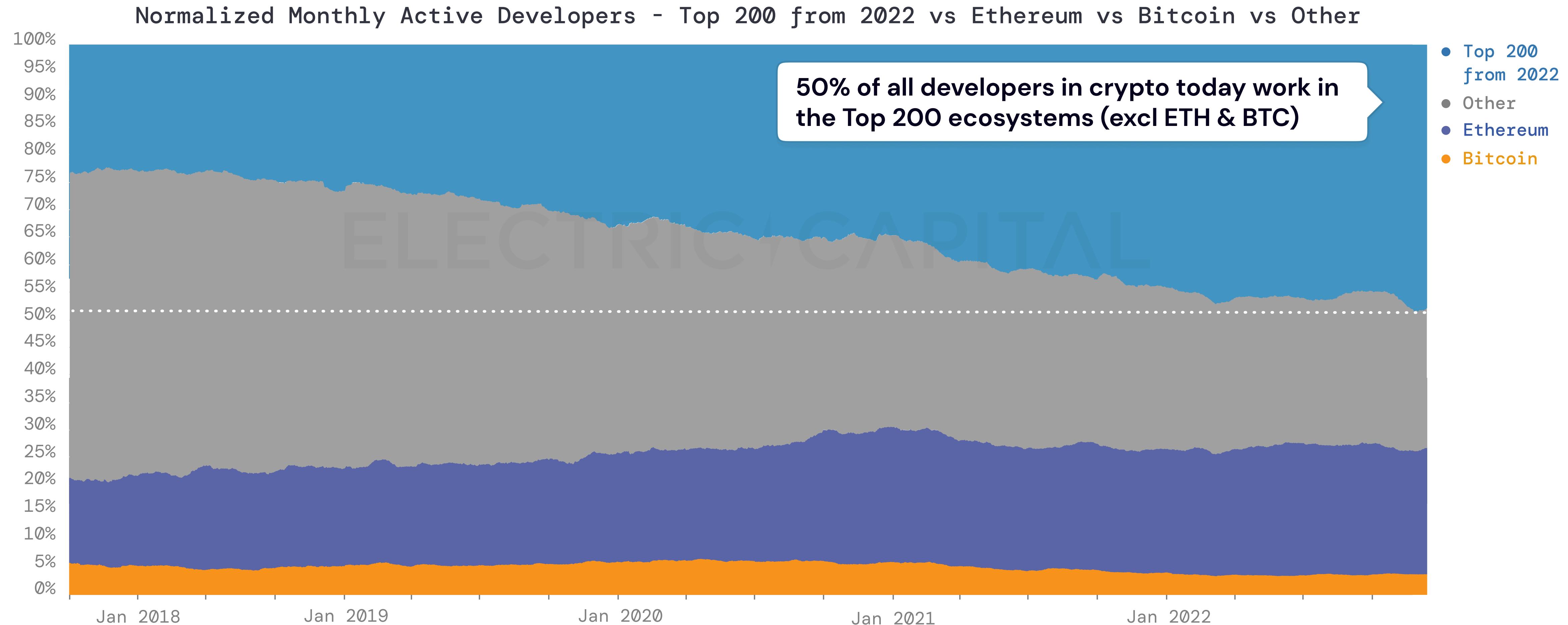


WHAT ARE THESE DEVELOPERS WORKING ON?  
LET'S SEGMENT BY ECOSYSTEMS

# BITCOIN & ETHEREUM ACCOUNT FOR 28% OF ALL DEVELOPERS IN CRYPTO



# 50% OF DEVELOPERS WORK IN THE TOP 200 ECOSYSTEMS BY NETWORK VALUE OUTSIDE OF BITCOIN & ETHEREUM





LET'S DEEP DIVE INTO BITCOIN, ETHEREUM,  
AND OTHER TOP 200 ECOSYSTEMS...

02

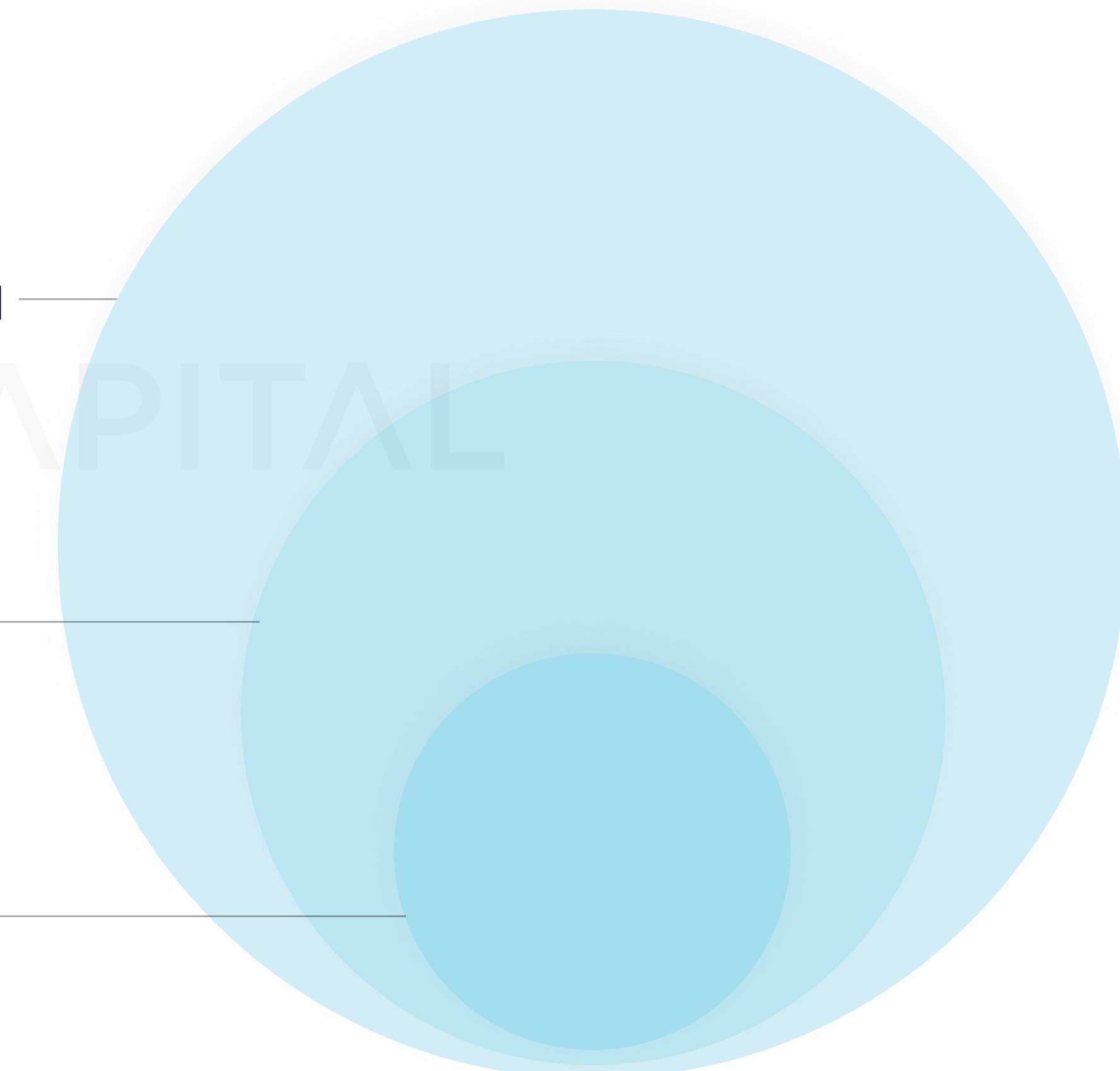
# ECOSYSTEM DEEP DIVE

# ECOSYSTEMS ARE COMPRISED OF COMMUNITY AND PROTOCOL LEVEL DEVELOPERS

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## Ecosystem Developers

Developers roll into a broad ecosystem of related communities with shared security at the base layer. Examples: Ethereum, Solana, Polygon, and NEAR.



## Community Developers

Developers working on decentralized applications, tooling, docs, wallets, and anything else furthering the project.

## Protocol Developers

Working on the core protocol only

# COMMUNITY EXAMPLE: OPTIMISM

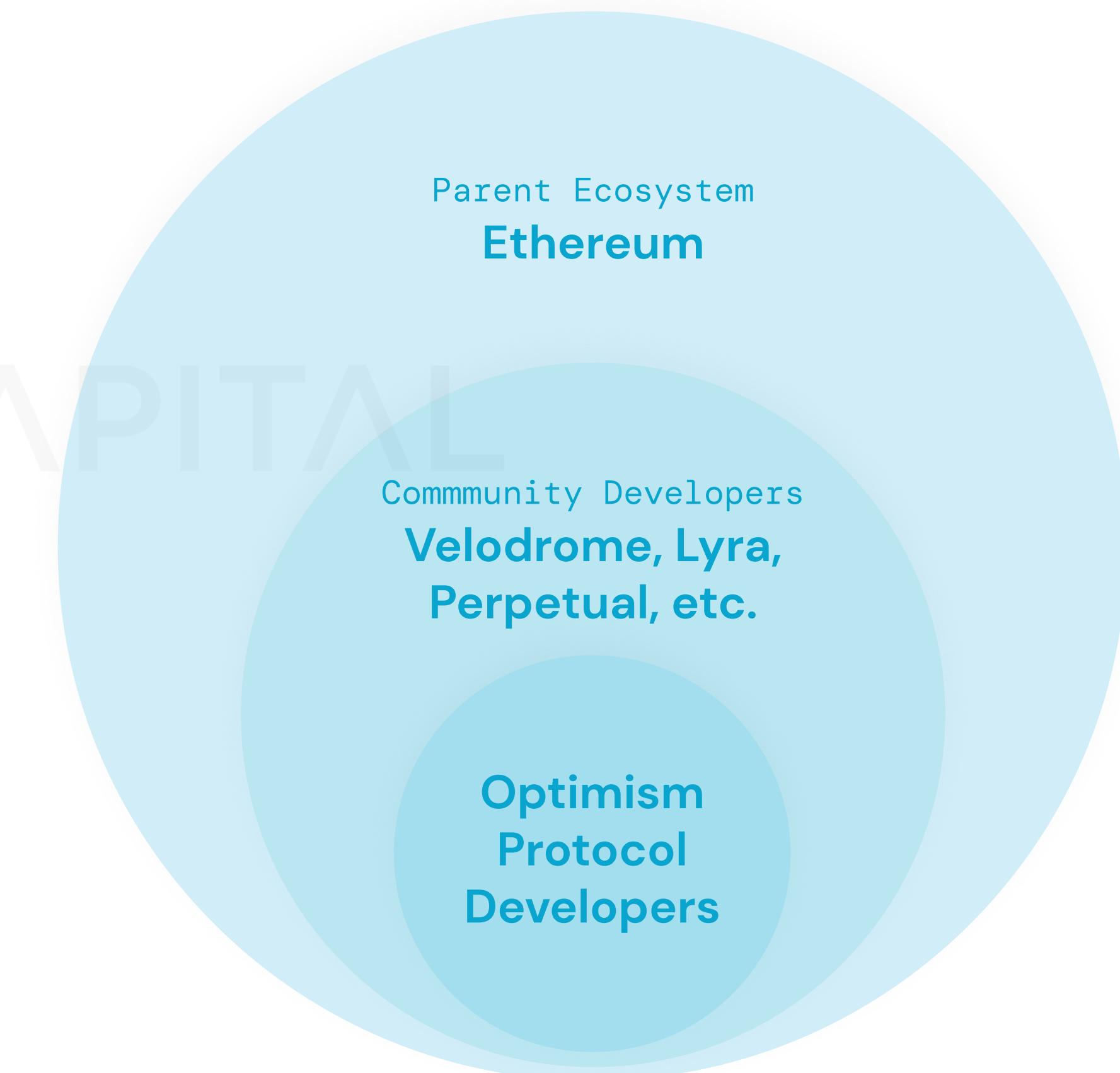
Communities can live in ecosystems; the Optimism ecosystem lives inside the Ethereum ecosystem.

## Optimism Community

- Velodrome
- Lyra
- Perpetual Protocol
- Sonne Finance
- & many more!

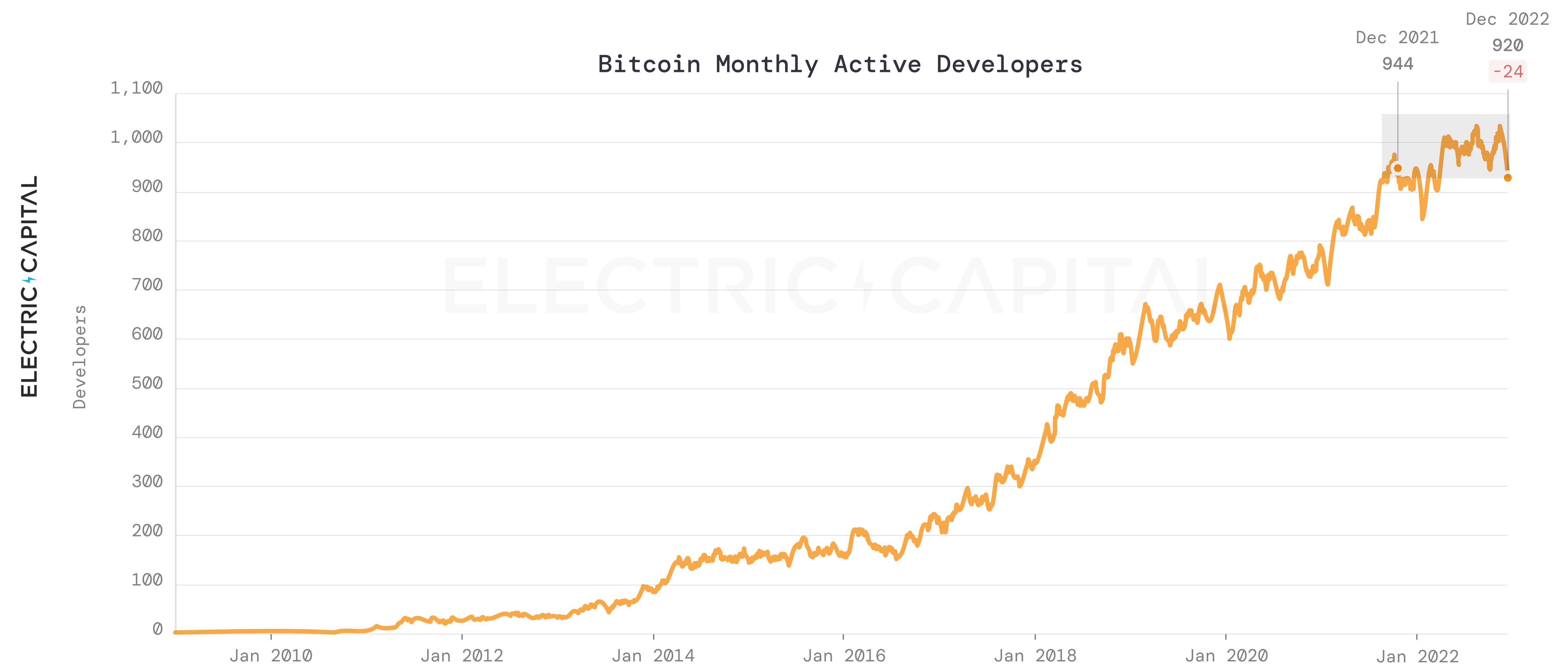
## Optimism Protocol

- Contracts (L1 and L2 smart contracts for Optimism)
- Cannon (fault prover)

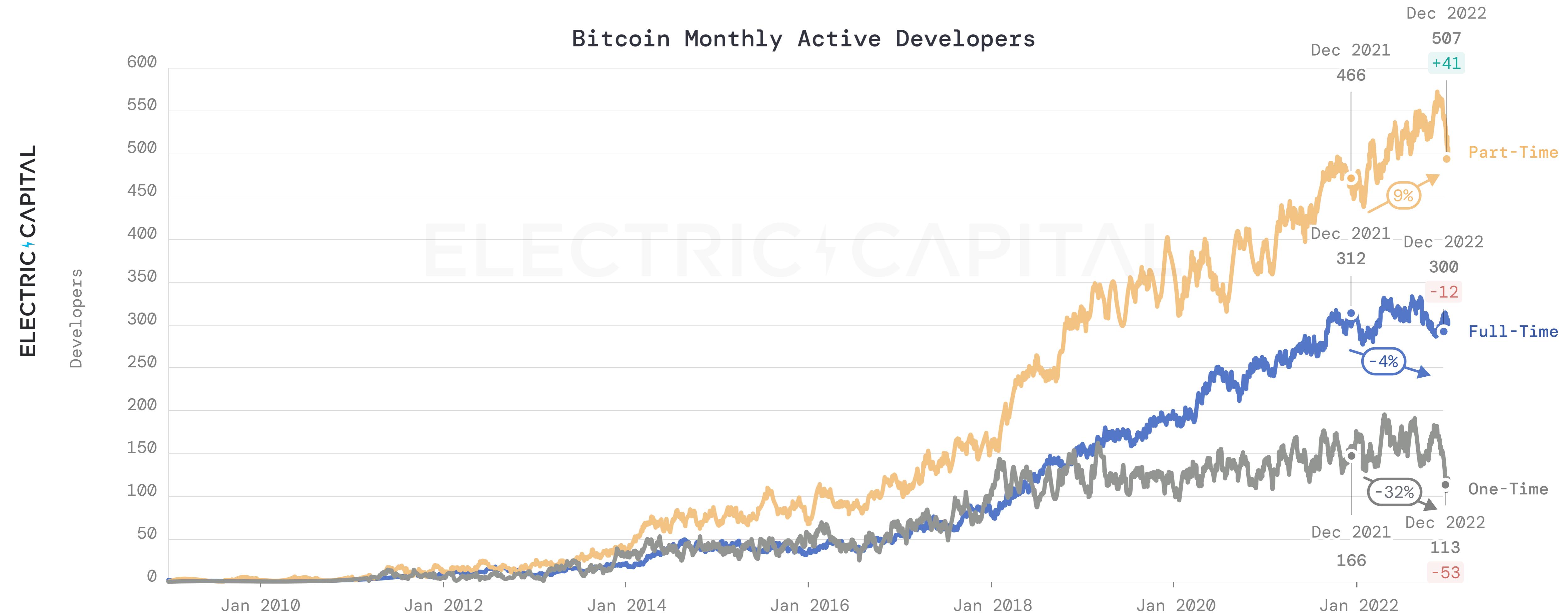


BITCOIN

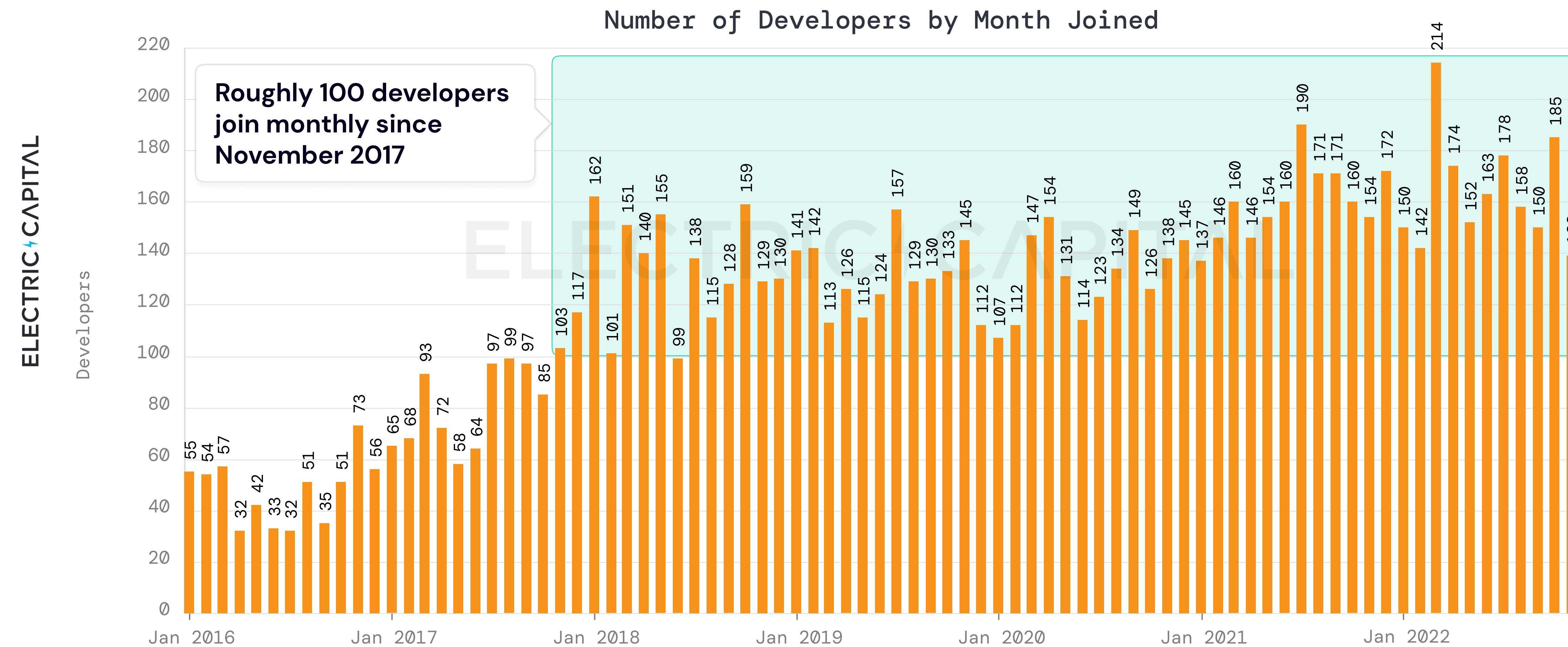
# BITCOIN MONTHLY ACTIVE DEVS ARE FLAT BETWEEN DEC 2021 AND DEC 2022



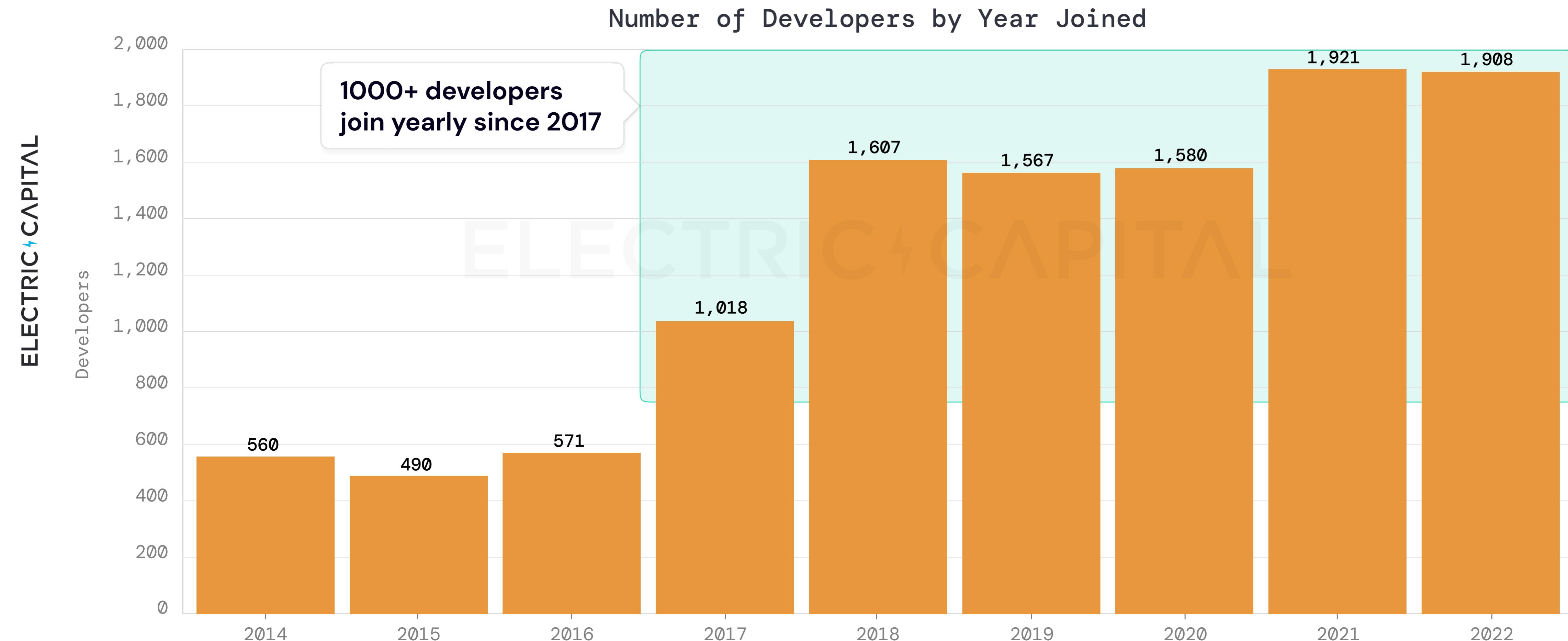
# BITCOIN: MOST YOY LOSS COMES FROM ONE-TIME DEVELOPERS (-32%)



# 100+ NEW DEVELOPERS CONTRIBUTE TO BITCOIN PROJECTS EVERY MONTH



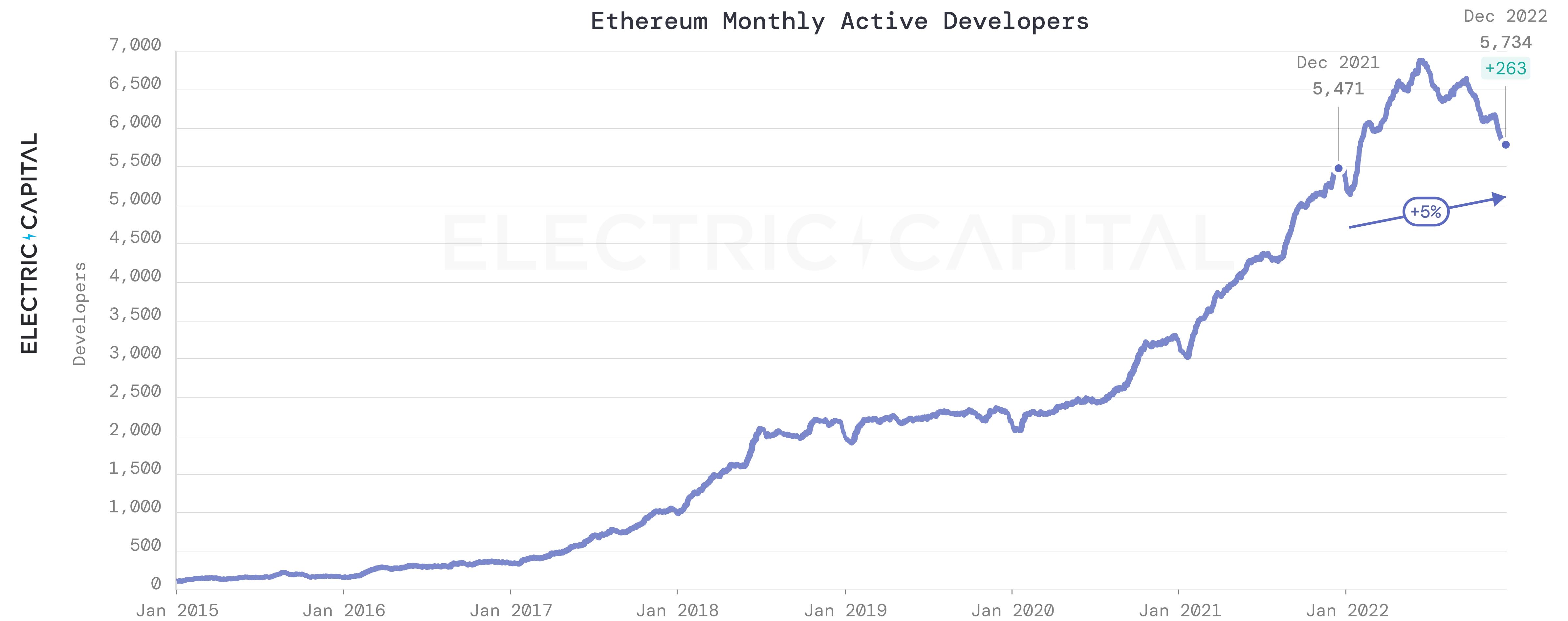
# +1,000 NEW BITCOIN DEVELOPERS PER YEAR ACROSS MARKET CONDITIONS



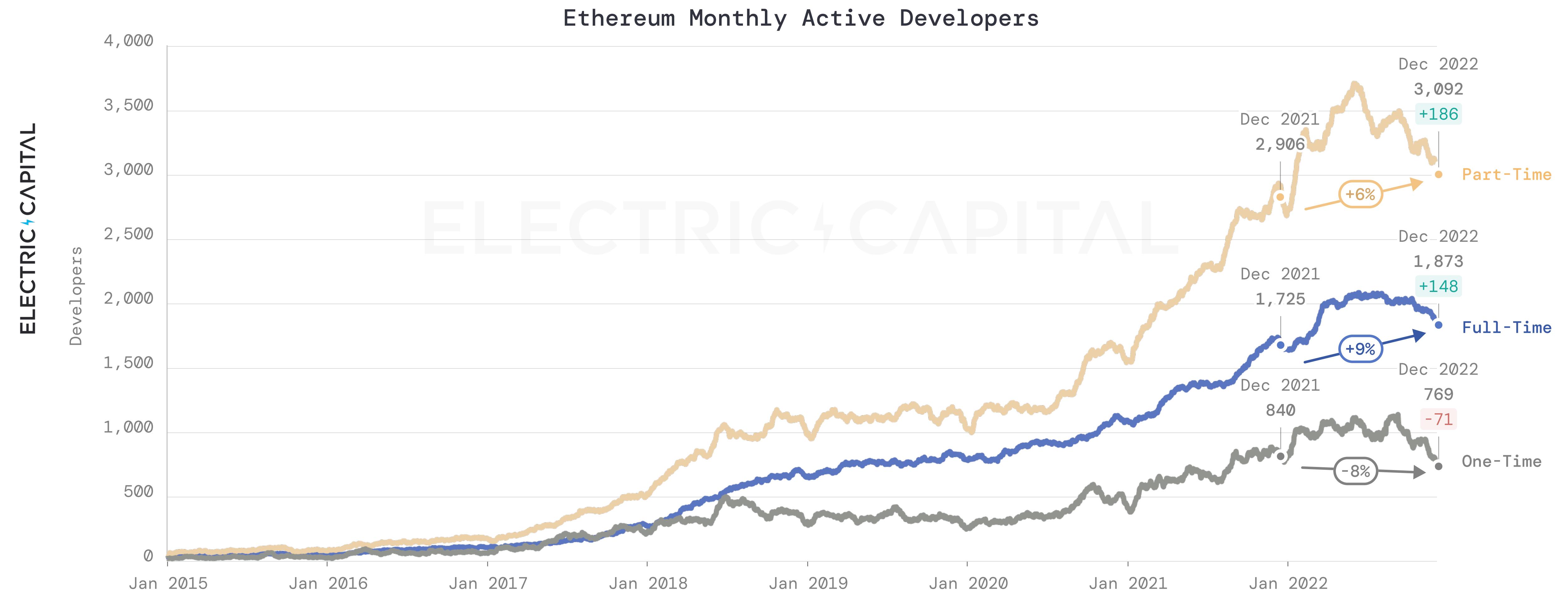


ETHEREUM

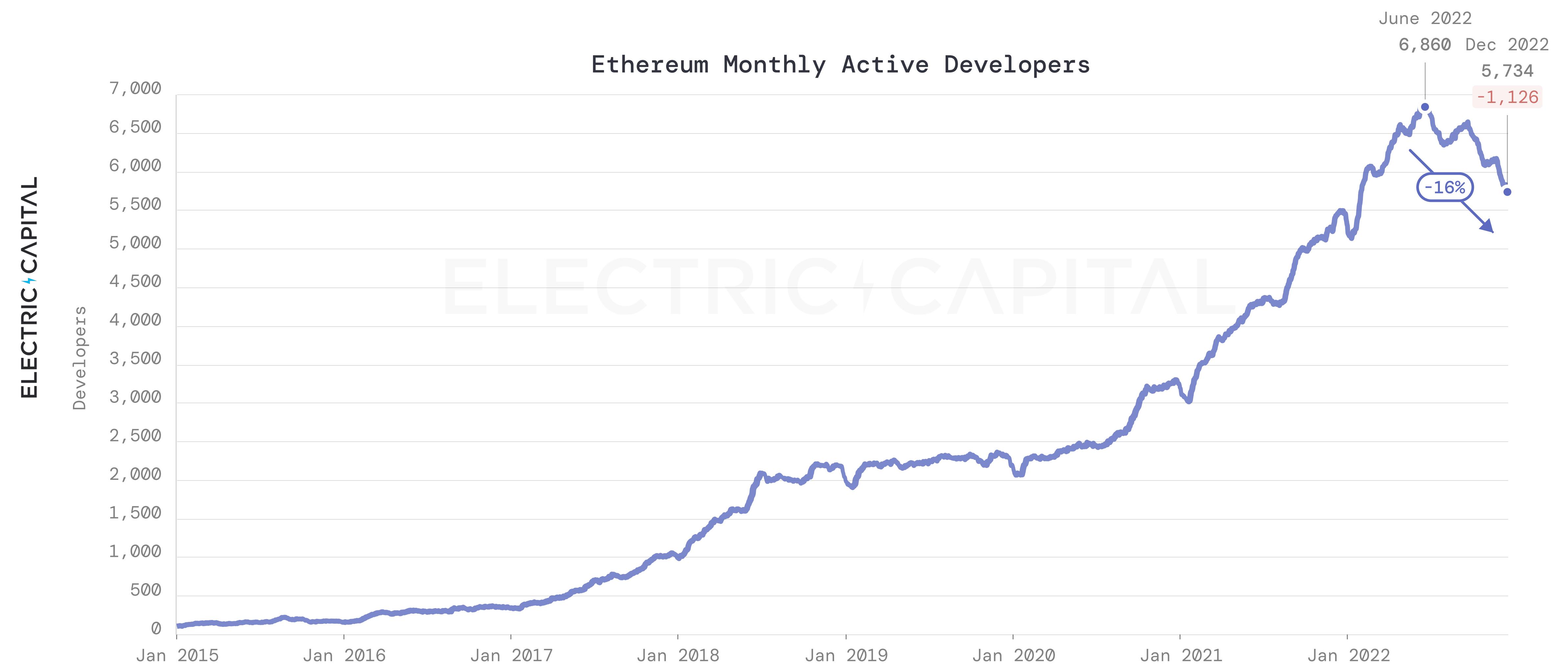
+5% MONTHLY ACTIVE ETHEREUM DEVELOPERS FROM DEC 2021 TO DEC 2022



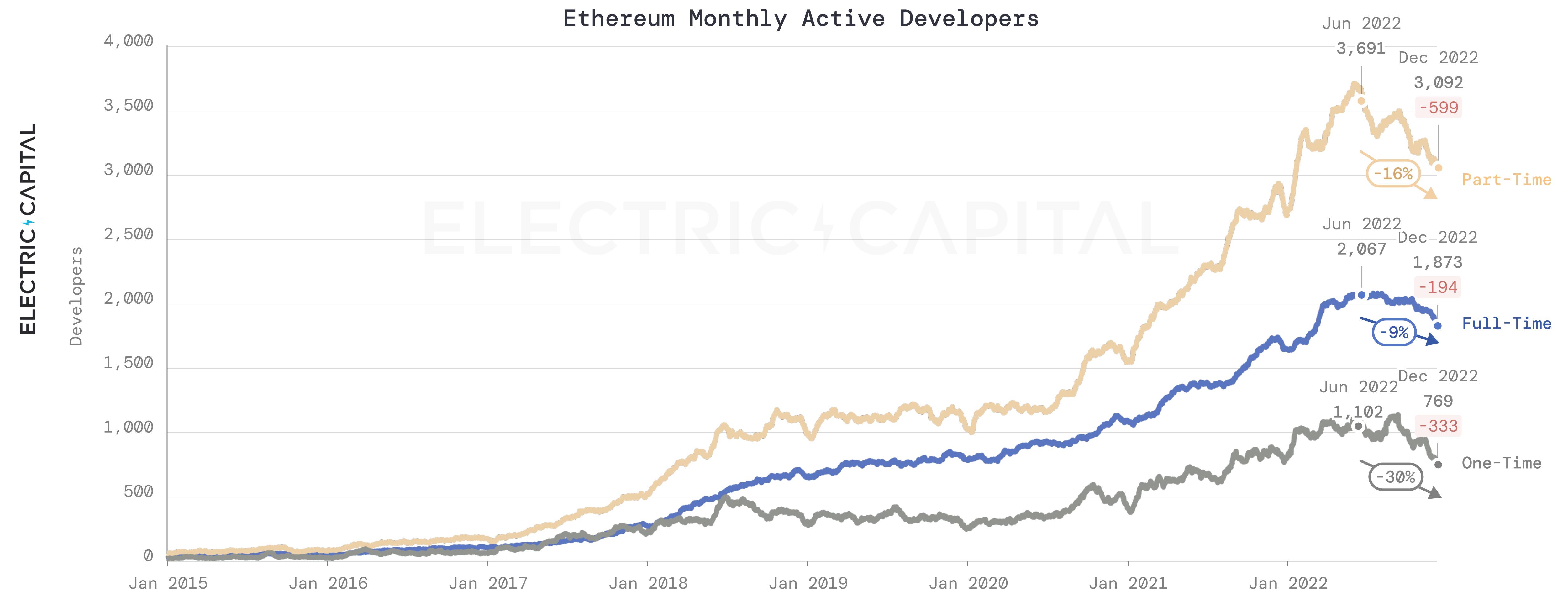
ETHEREUM'S GROWTH COMES FROM FULL-TIME (+9%) AND PART-TIME (+6%)  
DEVELOPERS, LOSSES COME FROM ONE-TIME DEVELOPERS (-8%)



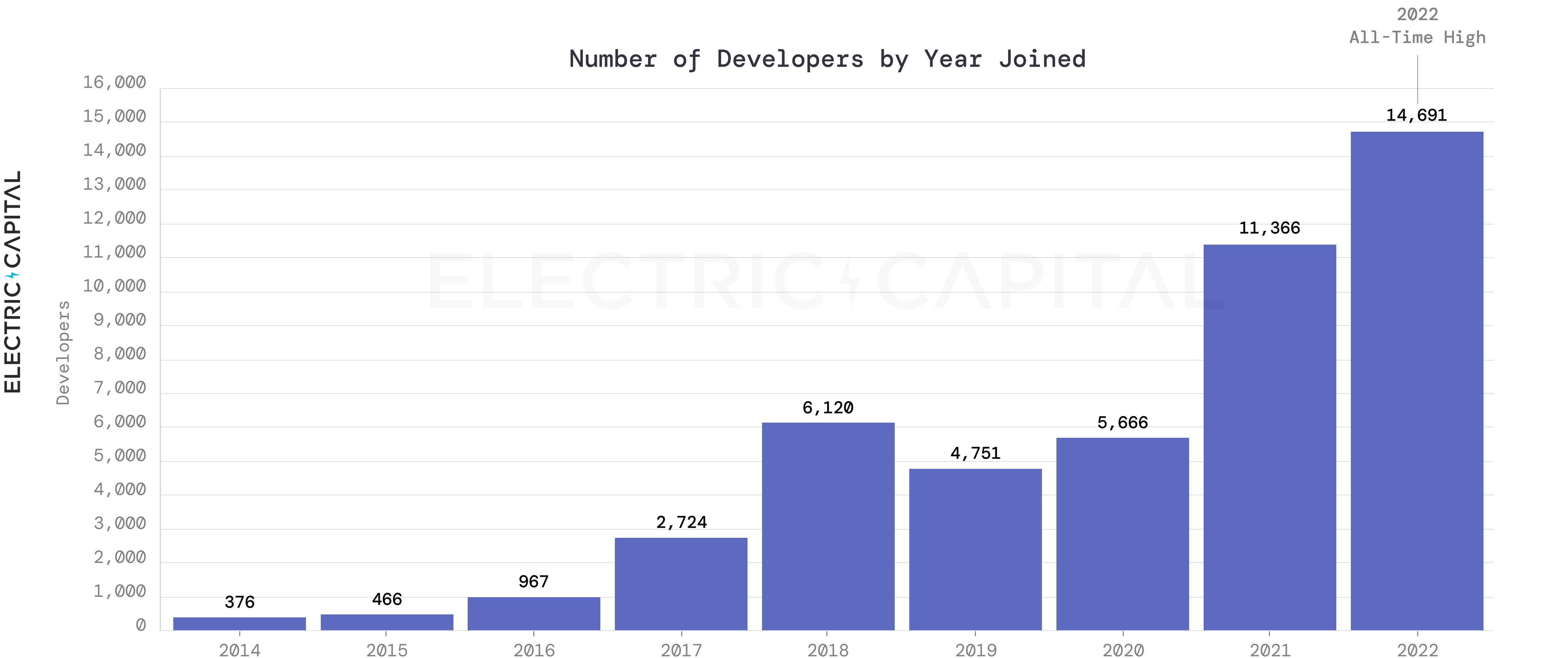
# SINCE ALL-TIME HIGH: -16% DECLINE IN MONTHLY ACTIVE ETHEREUM DEVS



# SINCE ATH: MOST LOSS COMES FROM ONE-TIME (-30%) & PART-TIME (-16%) DEVS



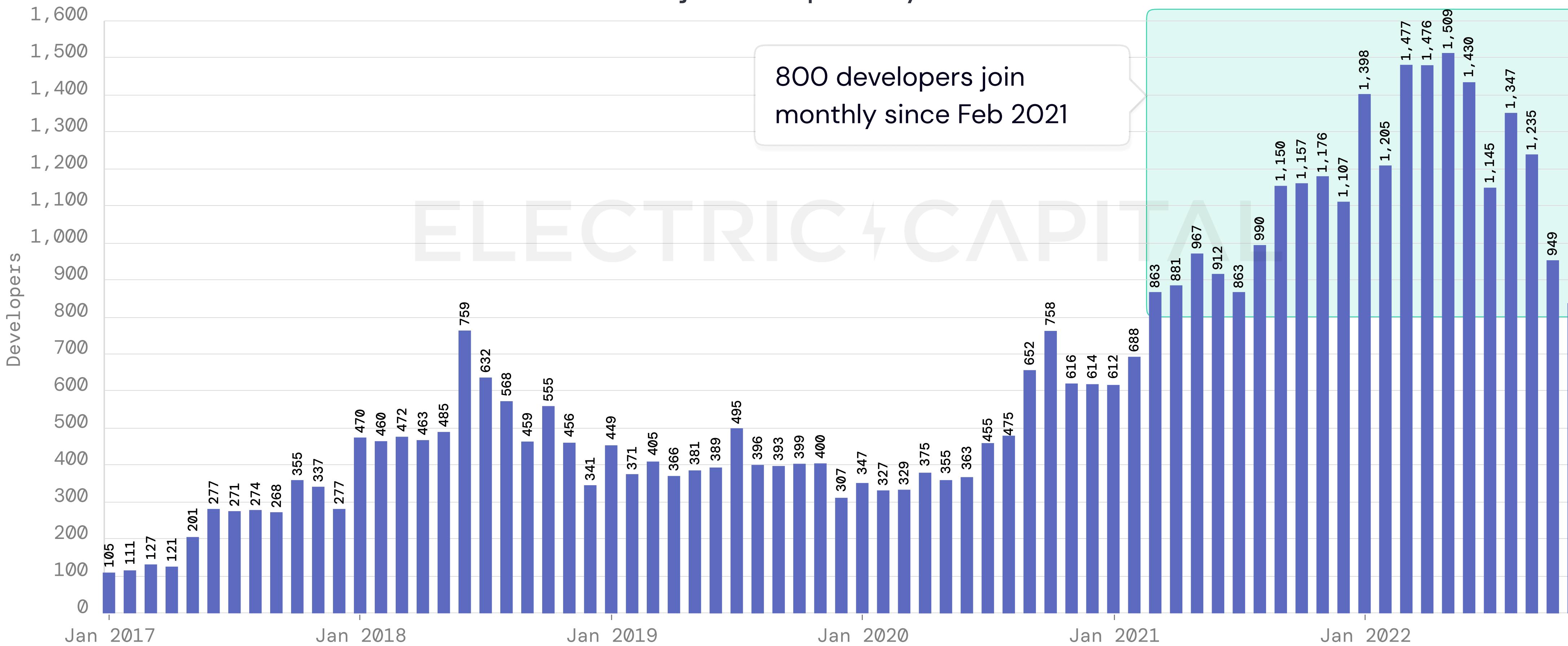
# 2022: +14,691 NEW ETHEREUM DEVELOPERS, THE HIGHEST IN HISTORY



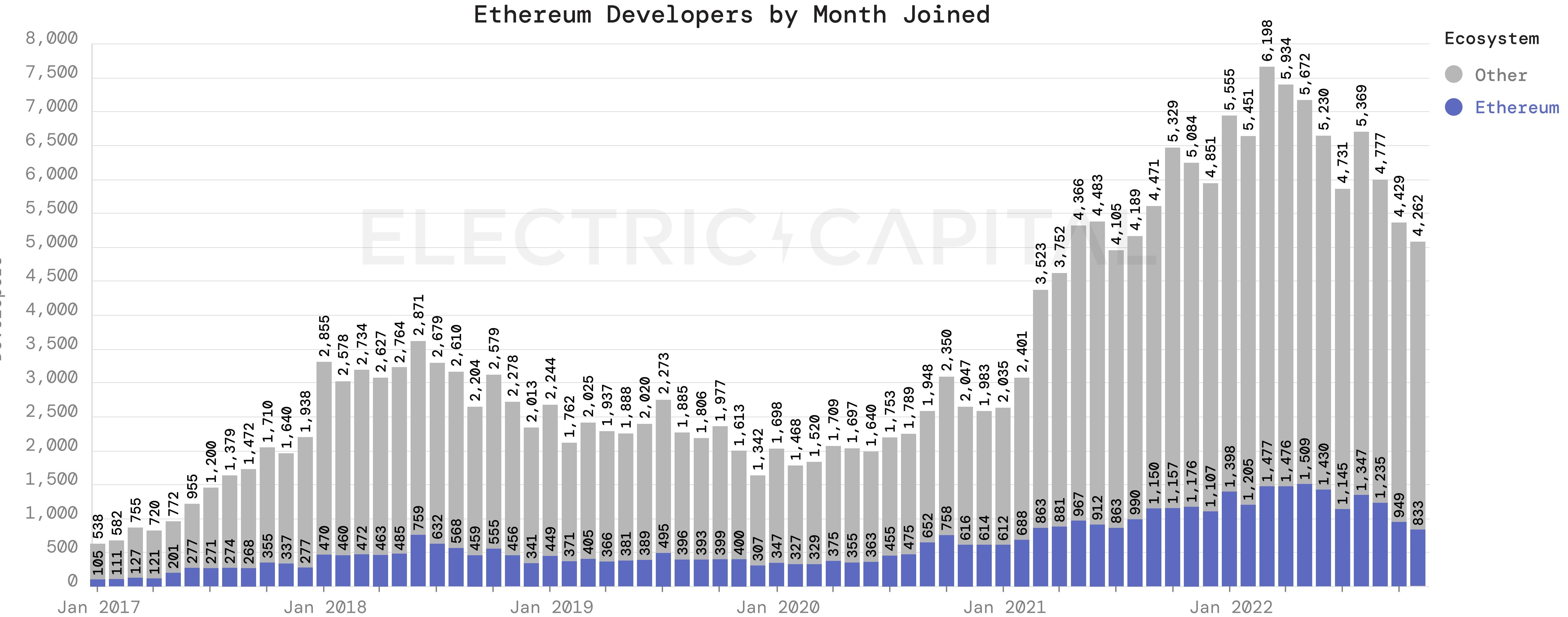
# 800+ NEW ETHEREUM DEVELOPERS PER MONTH SINCE FEB 2021

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Number of Developers by Month Joined

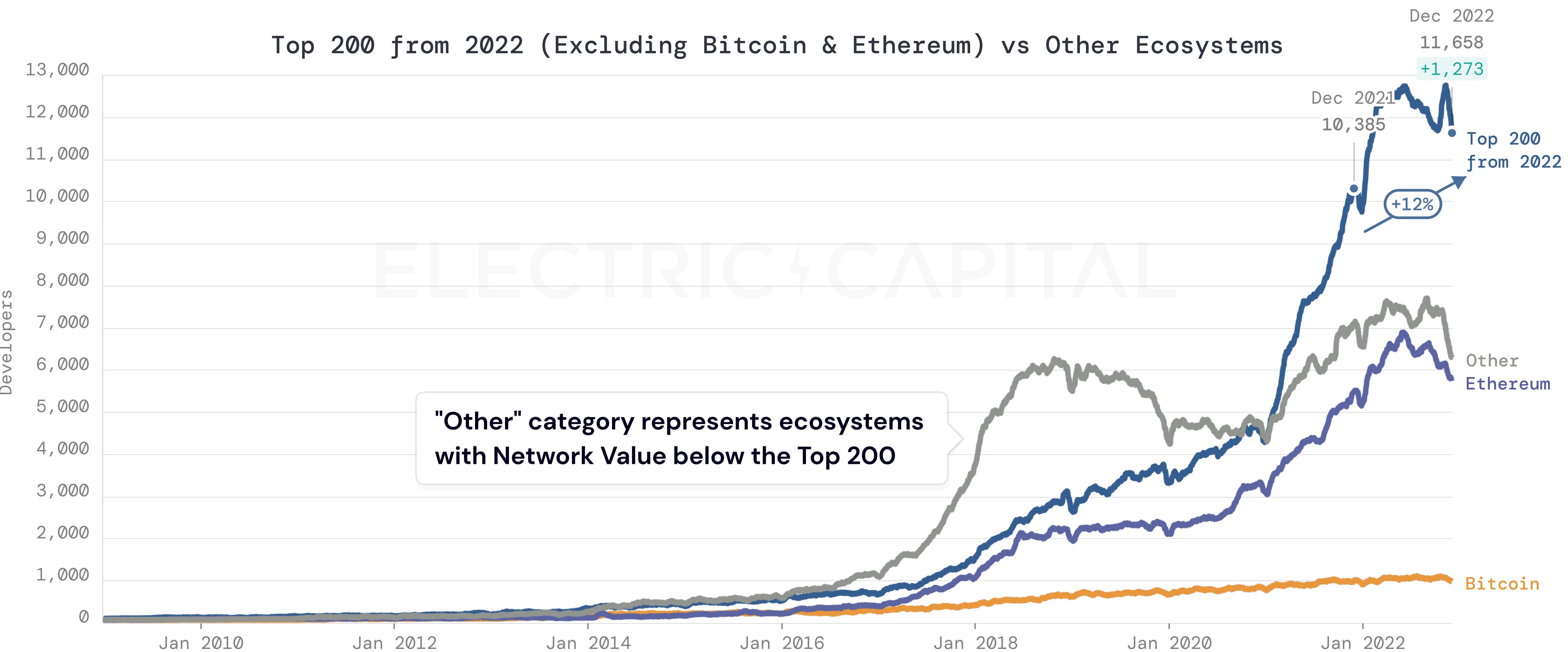


# ETHEREUM ACCOUNTS FOR 16%+ OF ALL NEW DEVELOPERS IN CRYPTO

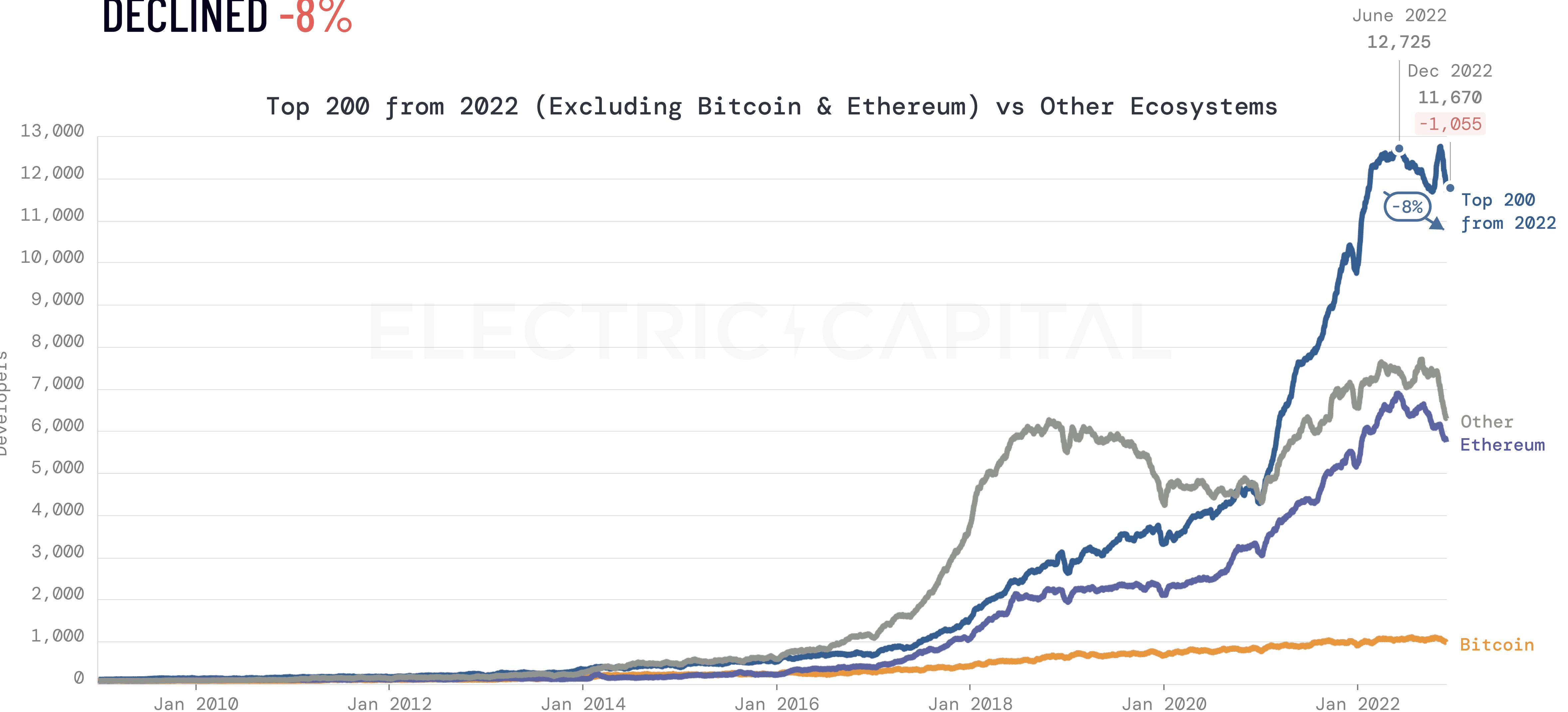
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LET'S DIVE INTO THE TOP 200 ECOSYSTEMS BY NETWORK VALUE  
OUTSIDE OF BITCOIN AND ETHEREUM...

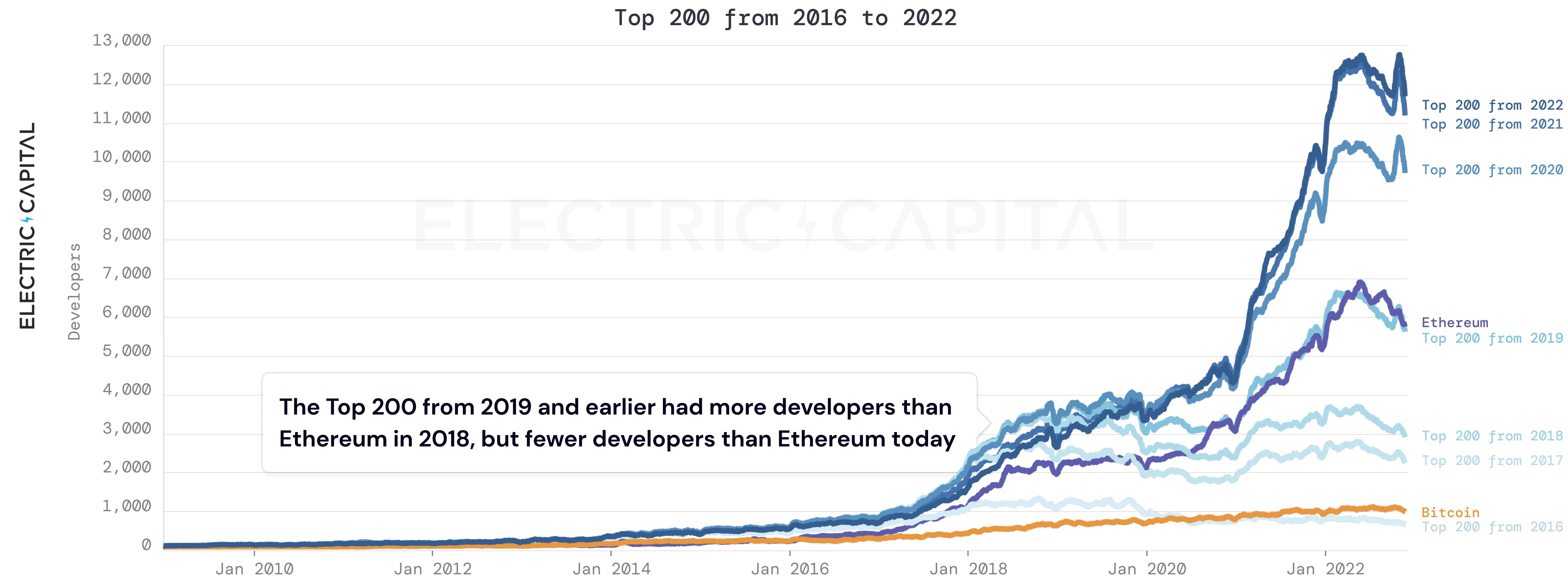
# WE CAN BREAK OUT ETHEREUM AND BITCOIN FROM THE TOP 200: THE TOP 200 GREW +12% YEAR OVER YEAR



# SINCE PEAK: IN THE TOP 200, MONTHLY ACTIVE DEVELOPERS DECLINED -8%



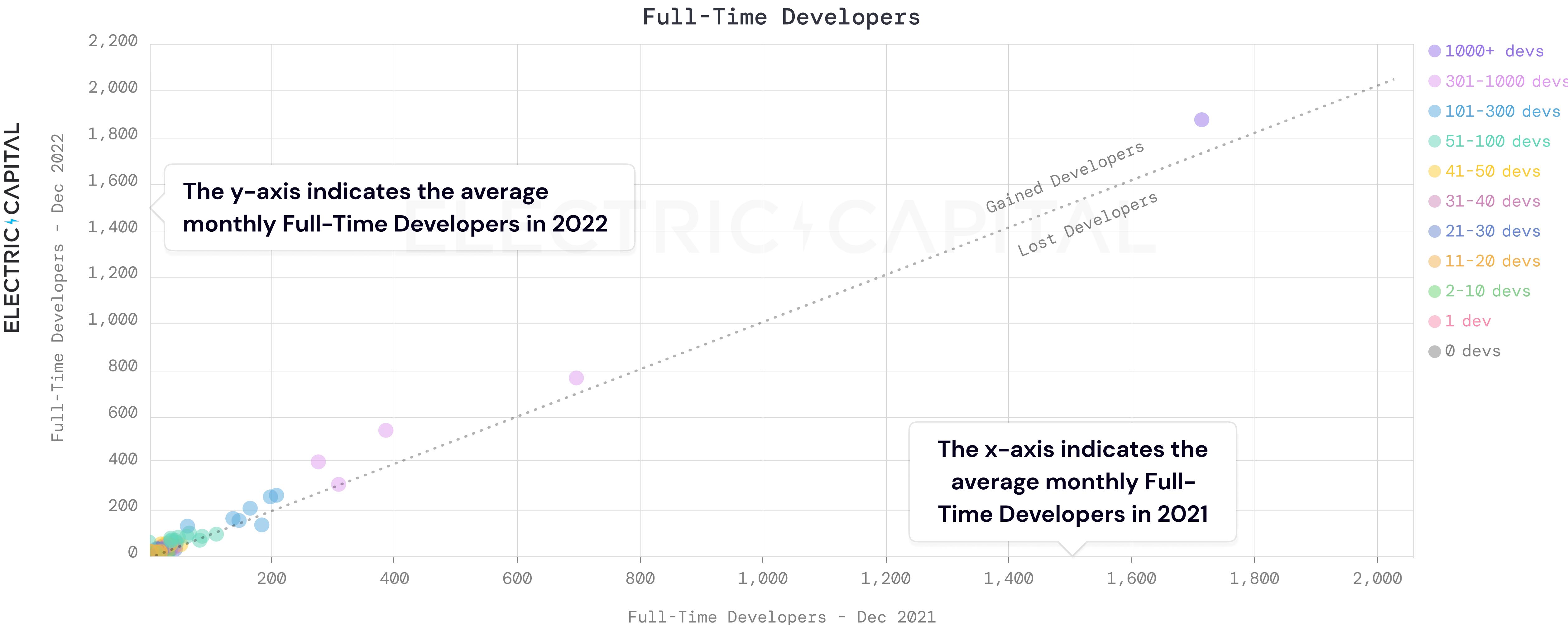
# PRIOR TOP 200 COHORTS ARE NOT AS RETENTIVE AS ETHEREUM



HOW DO INDIVIDUAL ECOSYSTEMS  
COMPARE YEAR OVER YEAR?

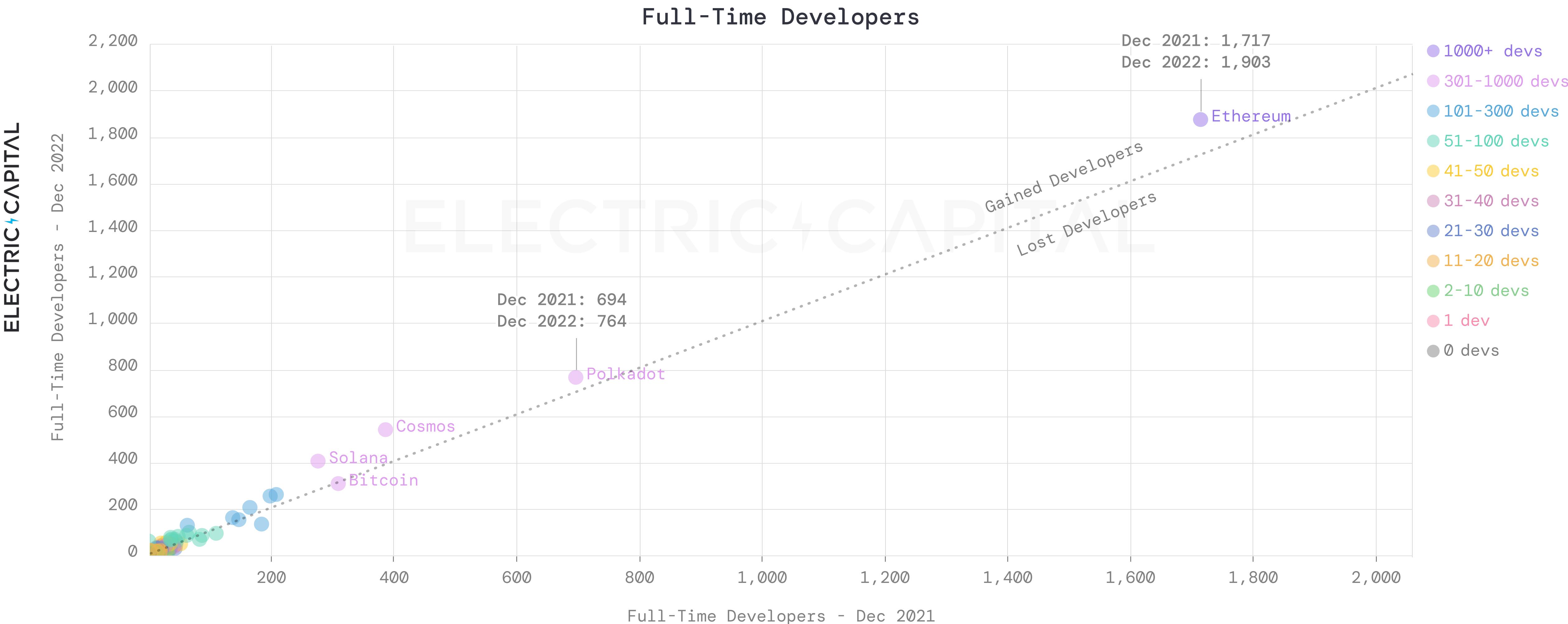
LET'S COMPARE  
DECEMBER 2021 VS DECEMBER 2022

# WE CAN COMPARE DECEMBER 2021 VS DECEMBER 2022 TO VISUALIZE YEAR OVER YEAR DEVELOPER GROWTH FOR EACH ECOSYSTEM



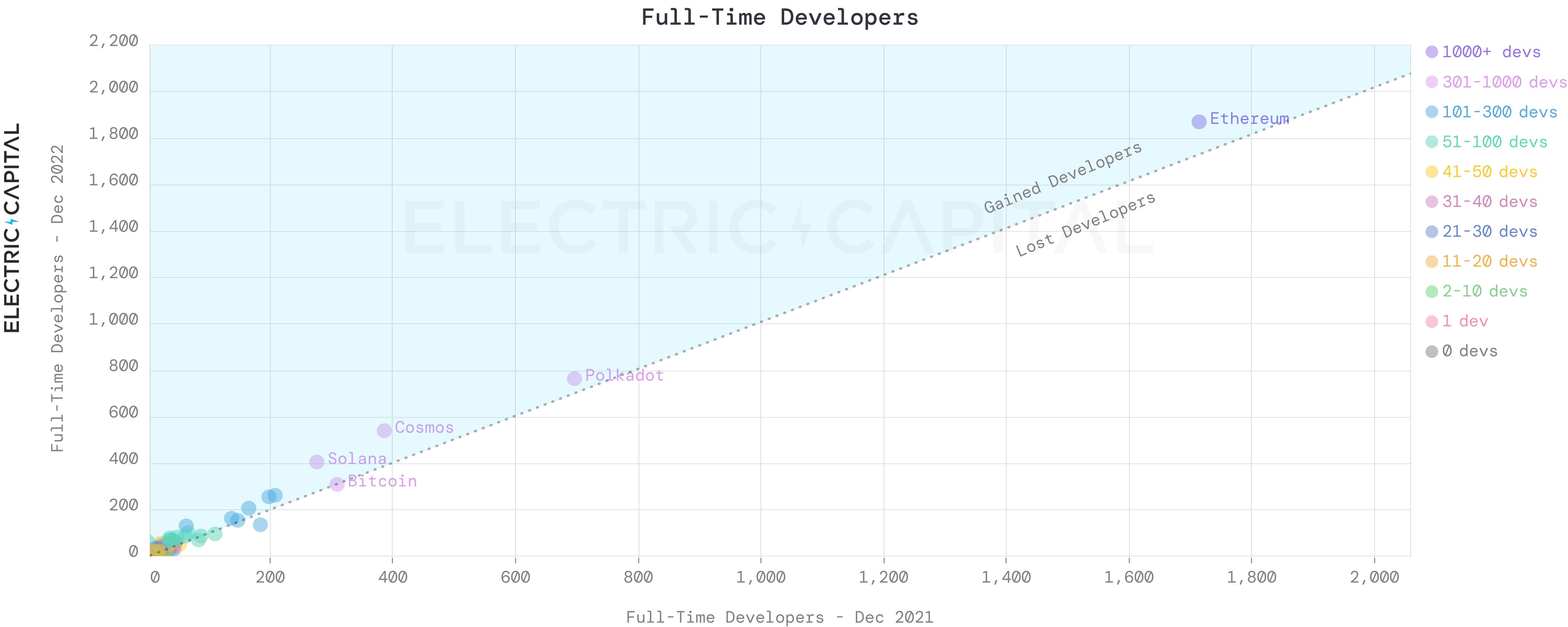
LET'S START WITH THE MOST IMPORTANT DEVELOPER SEGMENT:  
FULL-TIME DEVELOPERS

# ETHEREUM FULL-TIME DEV COMMUNITY IS 2.5X THE NEXT LARGEST COMMUNITY



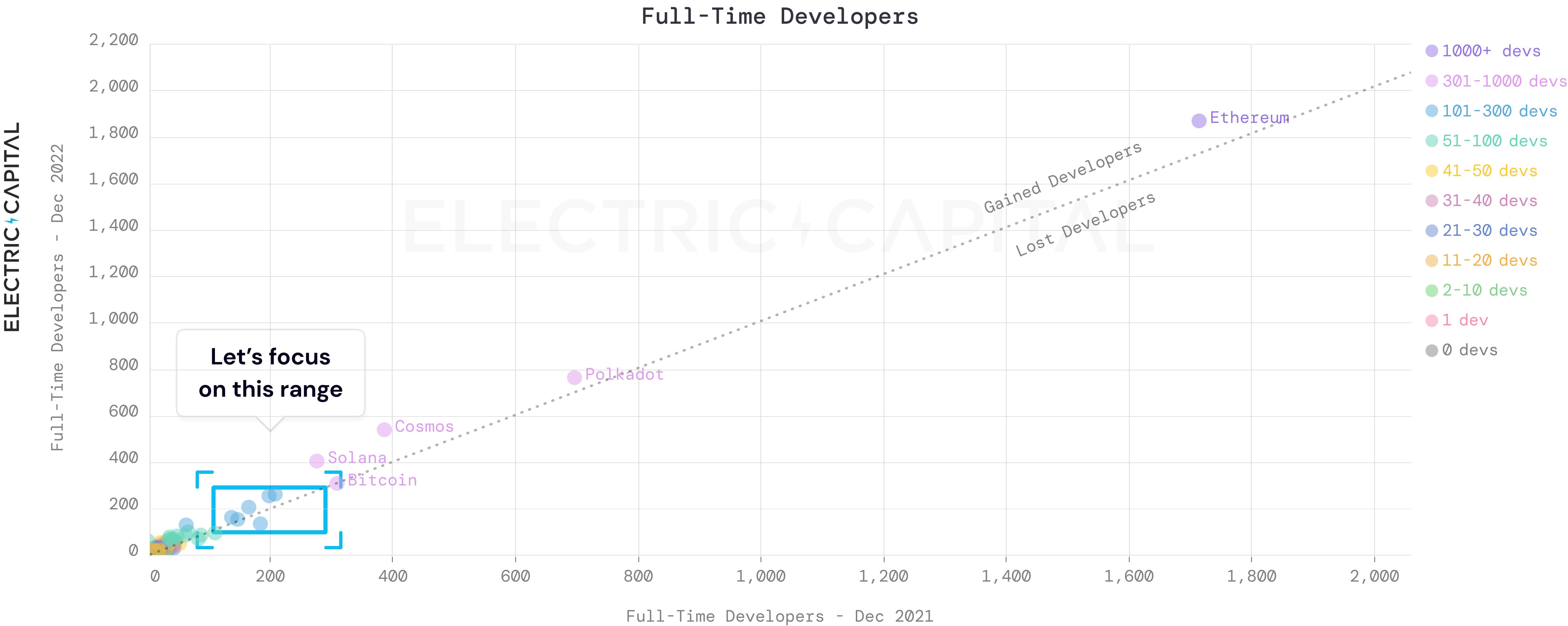
We only count open-source developers. The numbers are averages for the first 2 weeks of December before developers go on holiday at the end of the year and may differ from December numbers from earlier time series.

# ECOSYSTEMS WITH 300+ FULL-TIME DEVS ALL GREW: ETHEREUM, POLKADOT, COSMOS, SOLANA, & BITCOIN



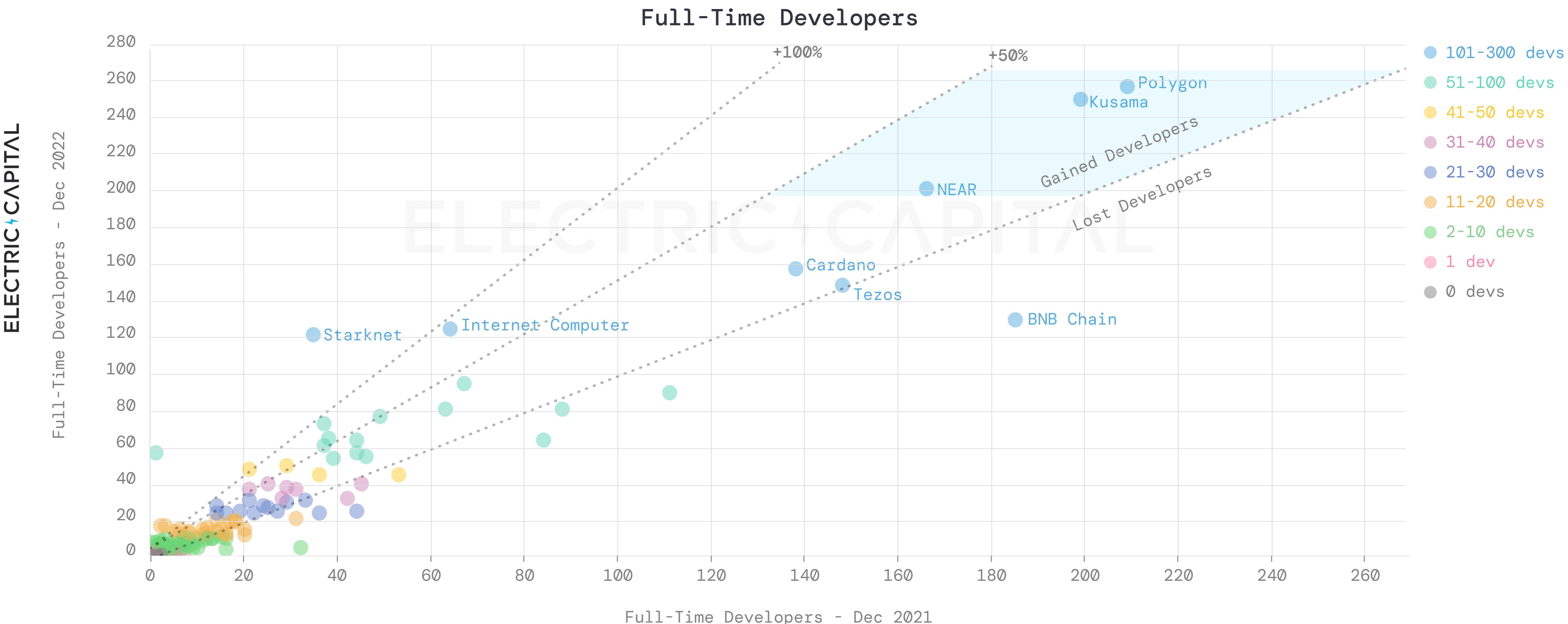
We only count open-source developers. The numbers are averages for the first 2 weeks of December before developers go on holiday at the end of the year and may differ from December numbers from earlier time series.

# LET'S ZOOM IN TO BETTER VISUALIZE CHANGE YEAR OVER YEAR FOR OTHER ECOSYSTEMS

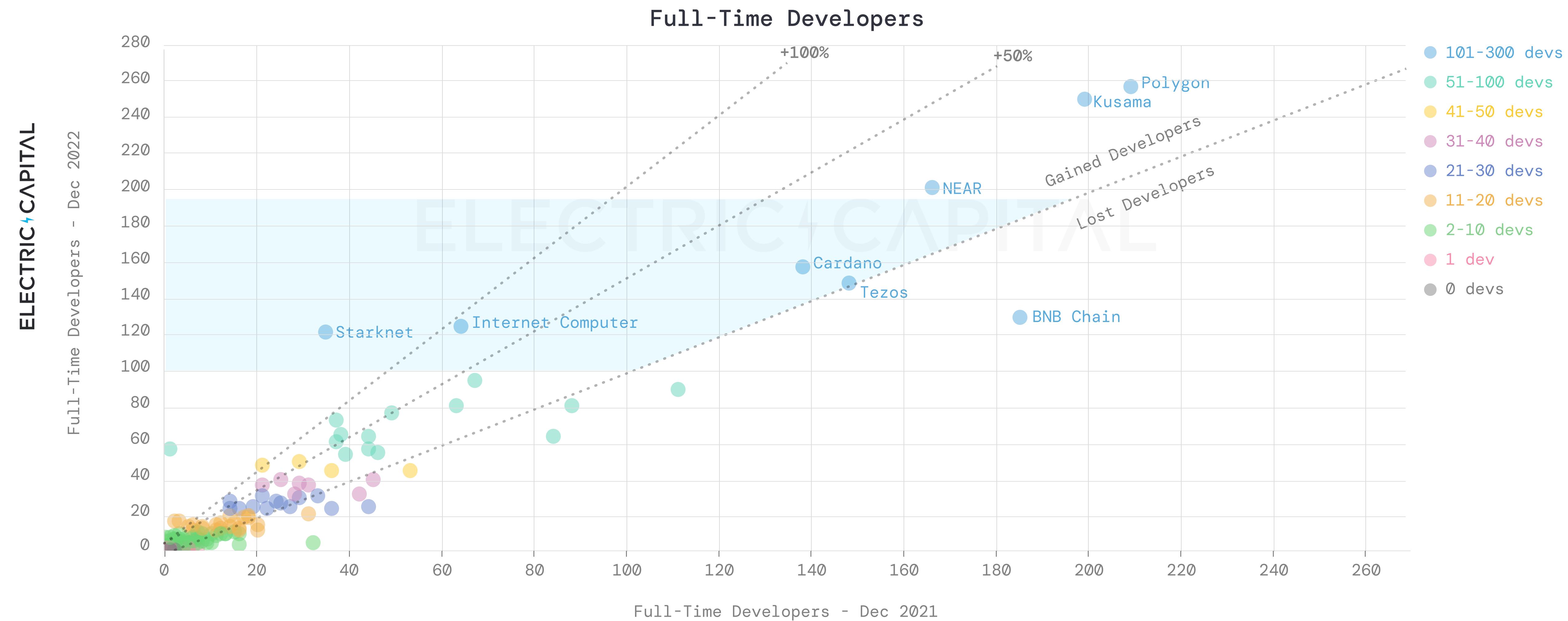


ZOOMING IN ON ECOSYSTEMS WITH 100 TO 300  
FULL-TIME DEVELOPERS...

# ECOSYSTEMS WITH 200+ FULL-TIME DEVELOPERS: KUSAMA +25%, POLYGON +22%, AND NEAR +22% GREW YEAR OVER YEAR

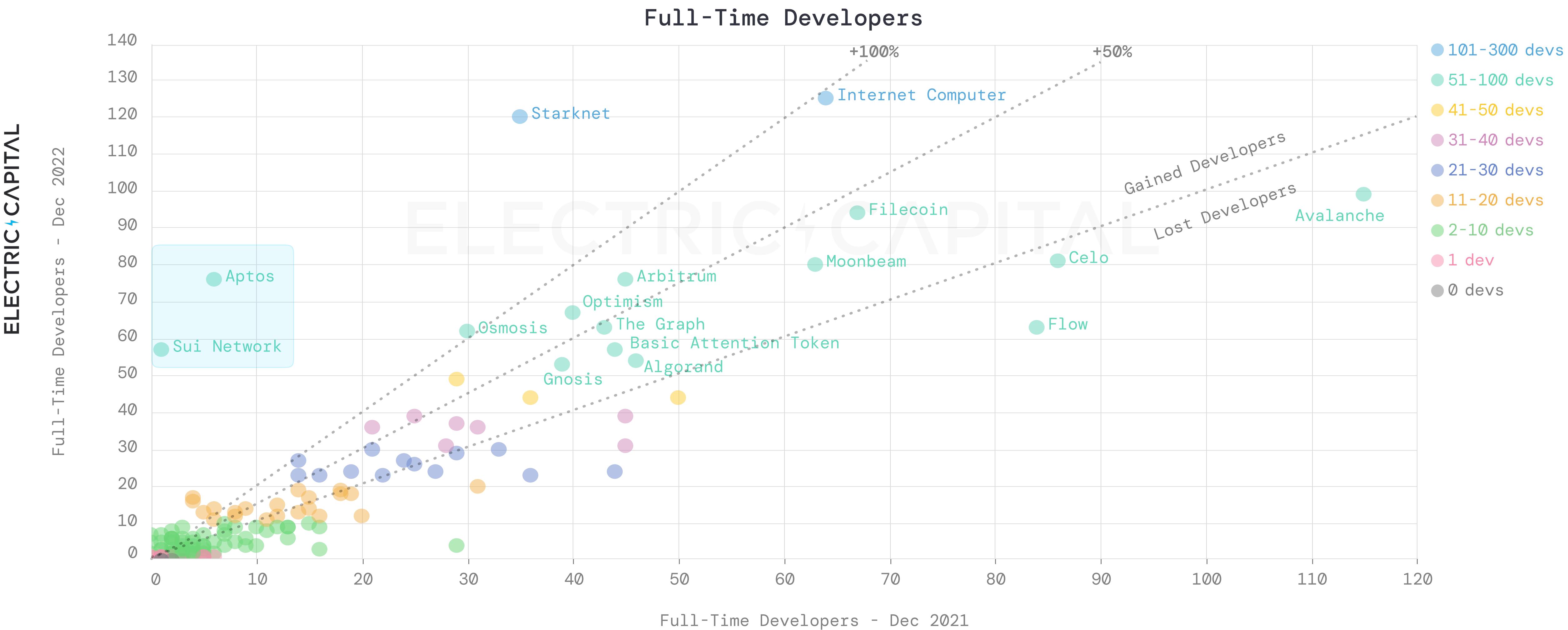


# ECOSYSTEMS WITH 100+ FULL-TIME DEVELOPERS: STARKNET +243%, INTERNET COMPUTER +94%, & CARDANO +14% GREW YOY WHILE TEZOS STAYED FLAT



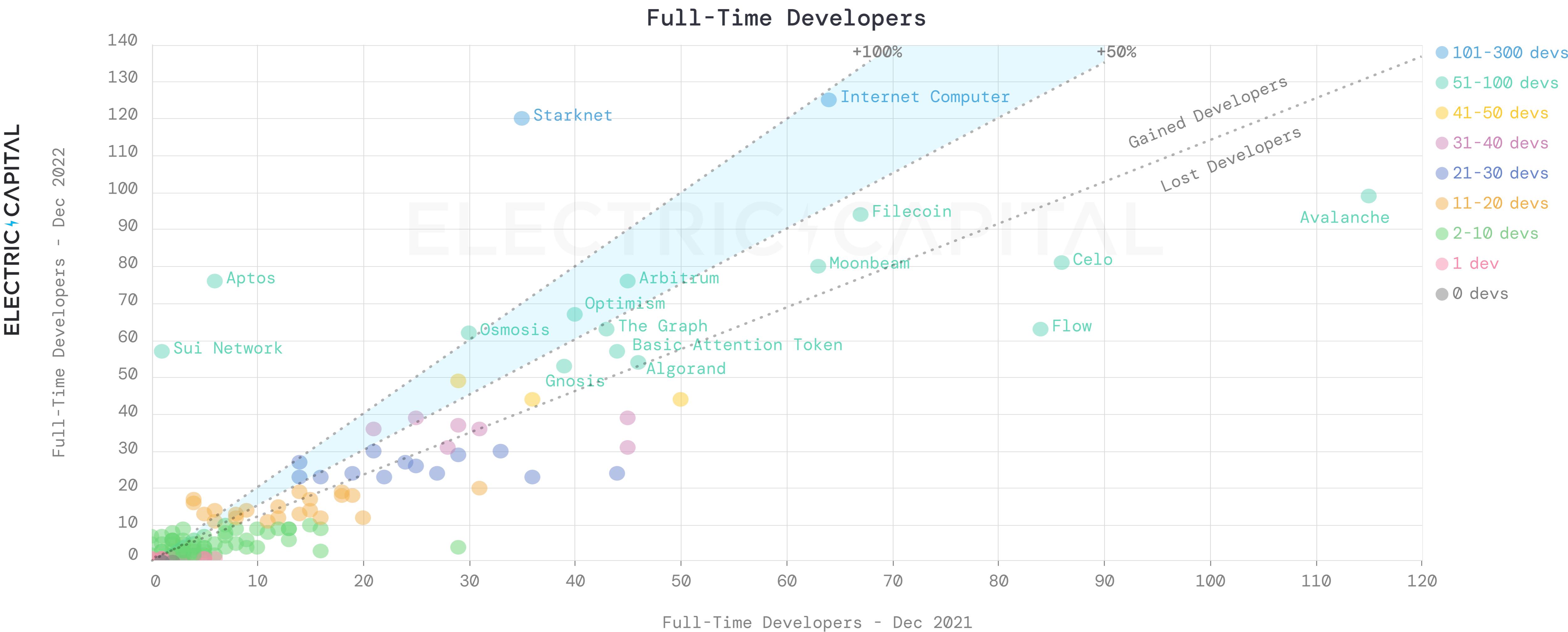
ZOOMING IN ON ECOSYSTEMS WITH 50 TO 100  
FULL-TIME DEVELOPERS...

# APOTOS & SUI ARE THE FASTEST GROWING FULL-TIME DEVELOPER ECOS OF 2022



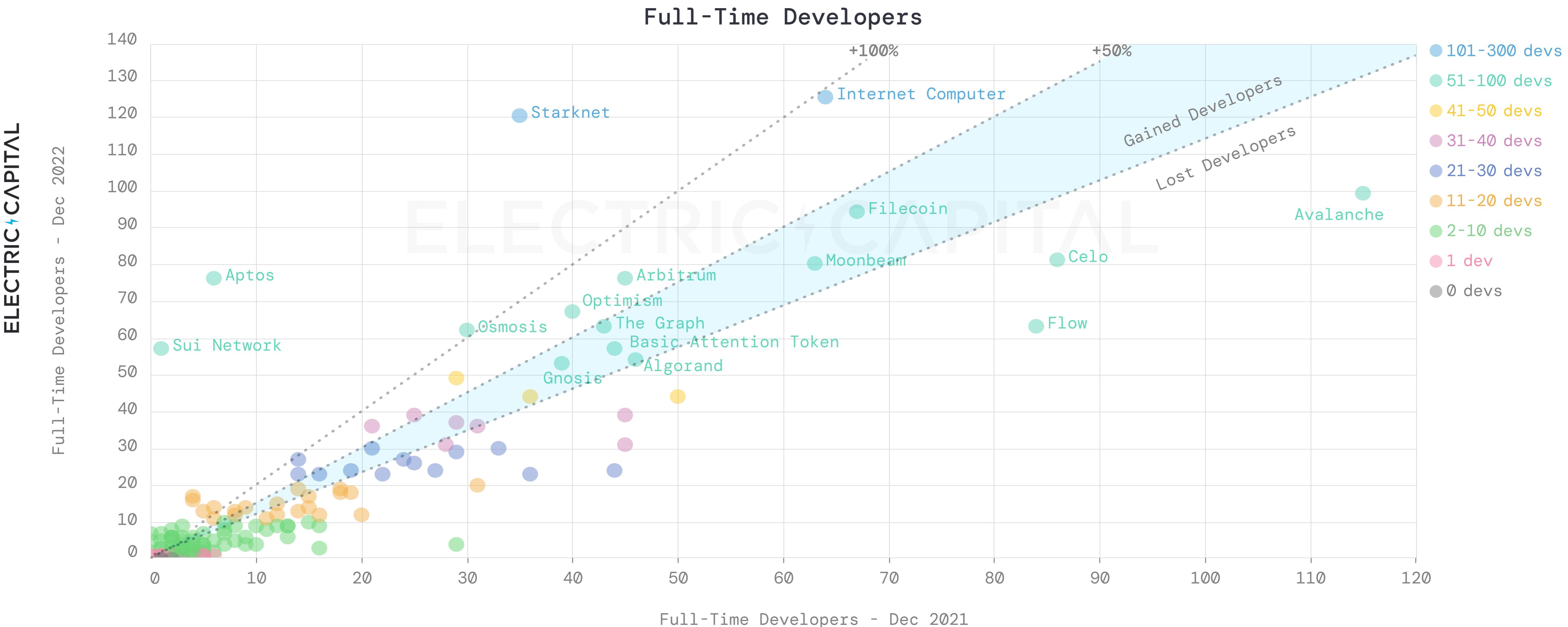
We only count open-source developers. The numbers are averages for the first 2 weeks of December before developers go on holiday at the end of the year and may differ from December numbers from earlier time series.

# ECOSYSTEMS WITH 50+ FULL-TIME DEVS: OSMOSIS +107%, ARBITRUM +68%, AND OPTIMISM +68% GREW YEAR OVER YEAR



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# THE GRAPH +47%, FILECOIN +40%, GNOSIS +36%, BASIC ATTENTION TOKEN +30%, MOONBEAM +27%, ALGORAND +17% GAINED DEVS YOY





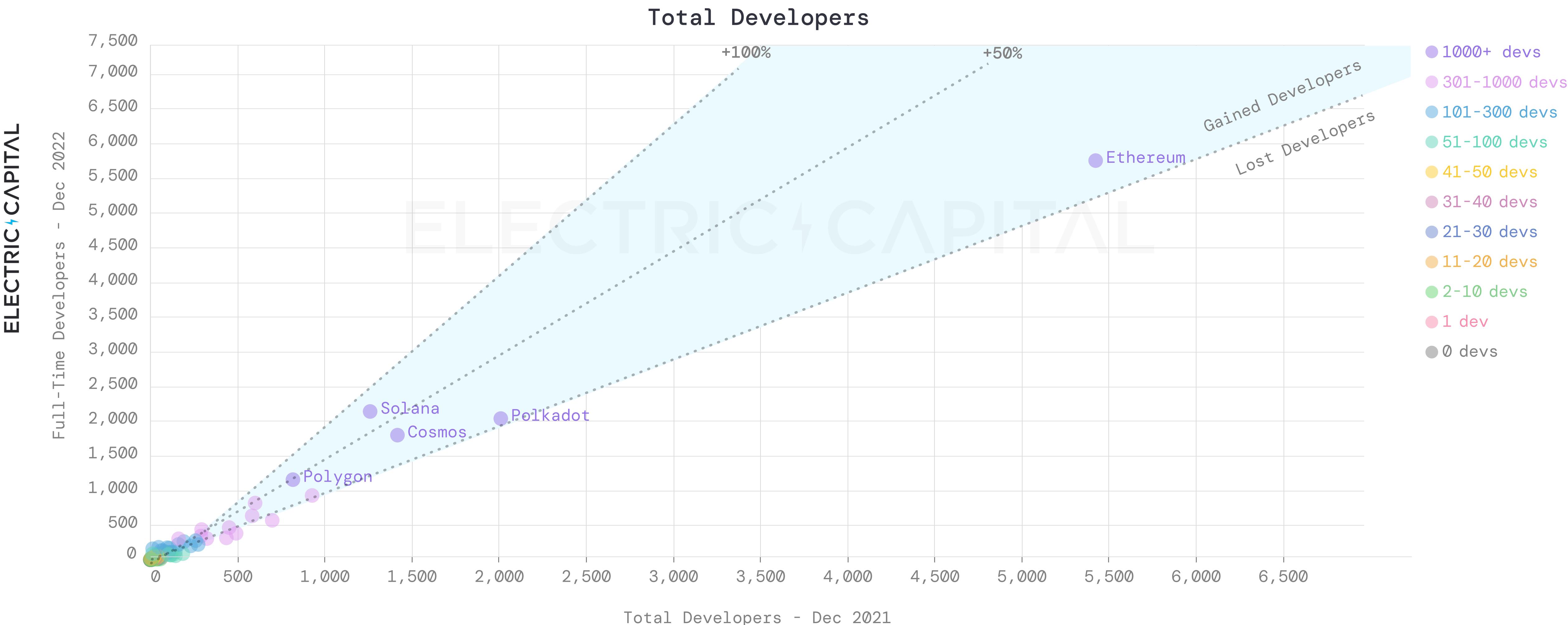
BY TOTAL DEVELOPERS...

# ETHEREUM IS THE LARGEST TOTAL (FULL-TIME + PART-TIME + ONE-TIME) DEVELOPER ECOSYSTEM AND **2.8X** LARGER THAN THE NEXT



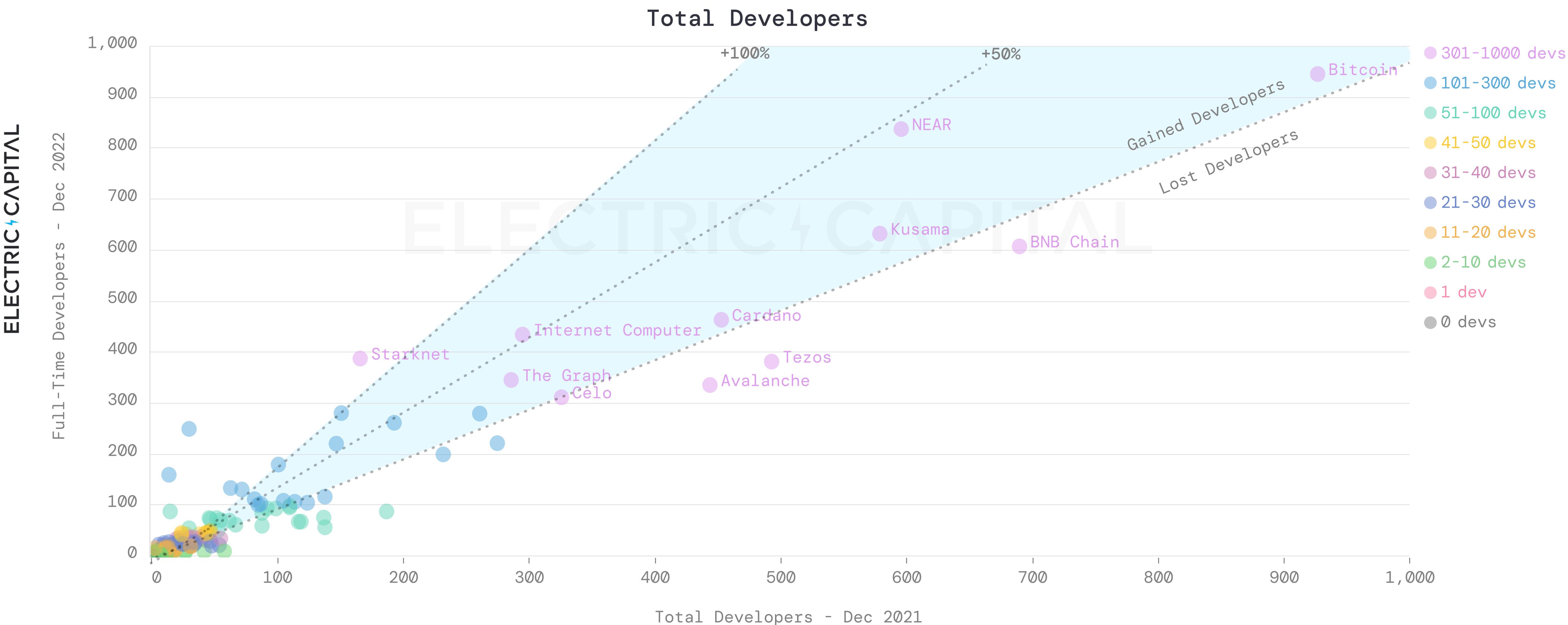
We only count open-source developers. The numbers are averages for the first 2 weeks of December before developers go on holiday at the end of the year and may differ from December numbers from earlier time series.

# ECOSYSTEMS WITH 1,000+ TOTAL DEVELOPERS GREW: SOLANA +83%, POLYGON +40%, COSMOS +25%, AND POLKADOT +2%



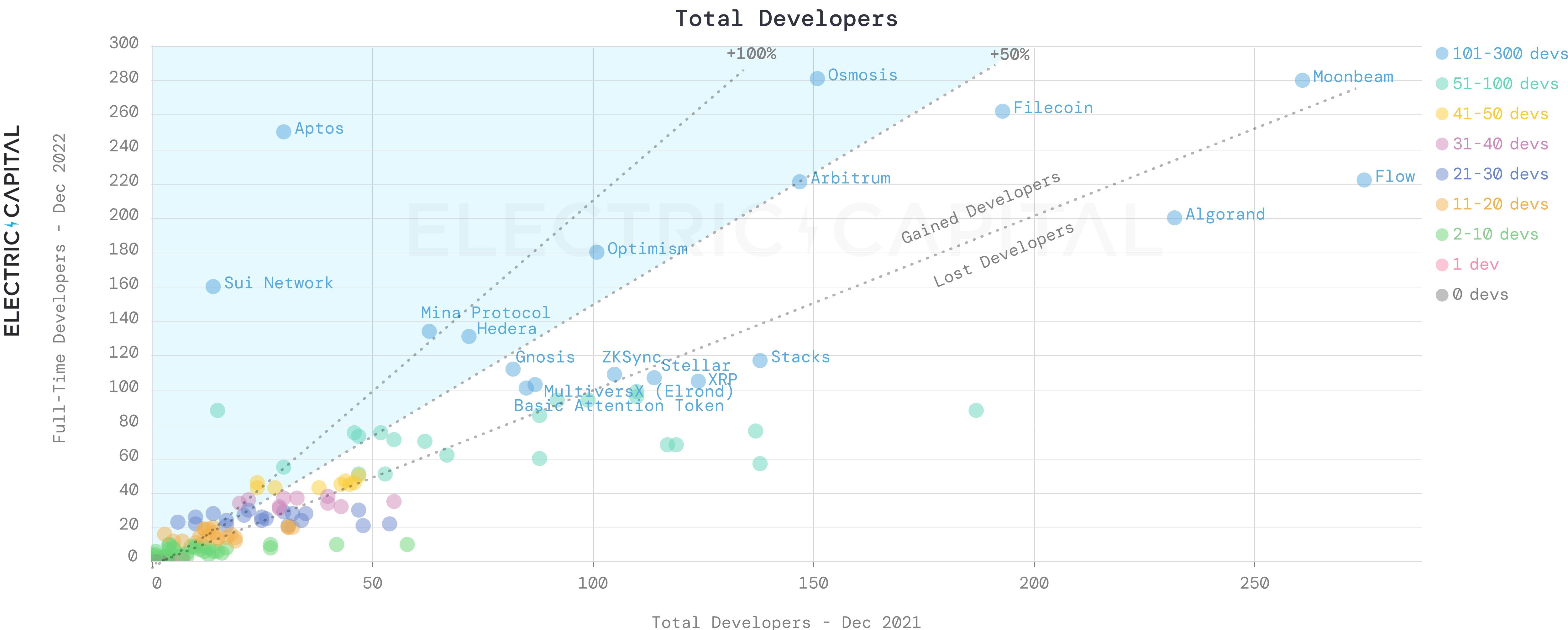
We only count open-source developers. The numbers are averages for the first 2 weeks of December before developers go on holiday at the end of the year and may differ from December numbers from earlier time series.

# ECOSYSTEMS WITH 300+ TOTAL DEVS: STARKNET +134%, ICP +48%, NEAR +41%, THE GRAPH +21%, KUSAMA +9%, BITCOIN +2%, CARDANO +2%, & CELO FLAT



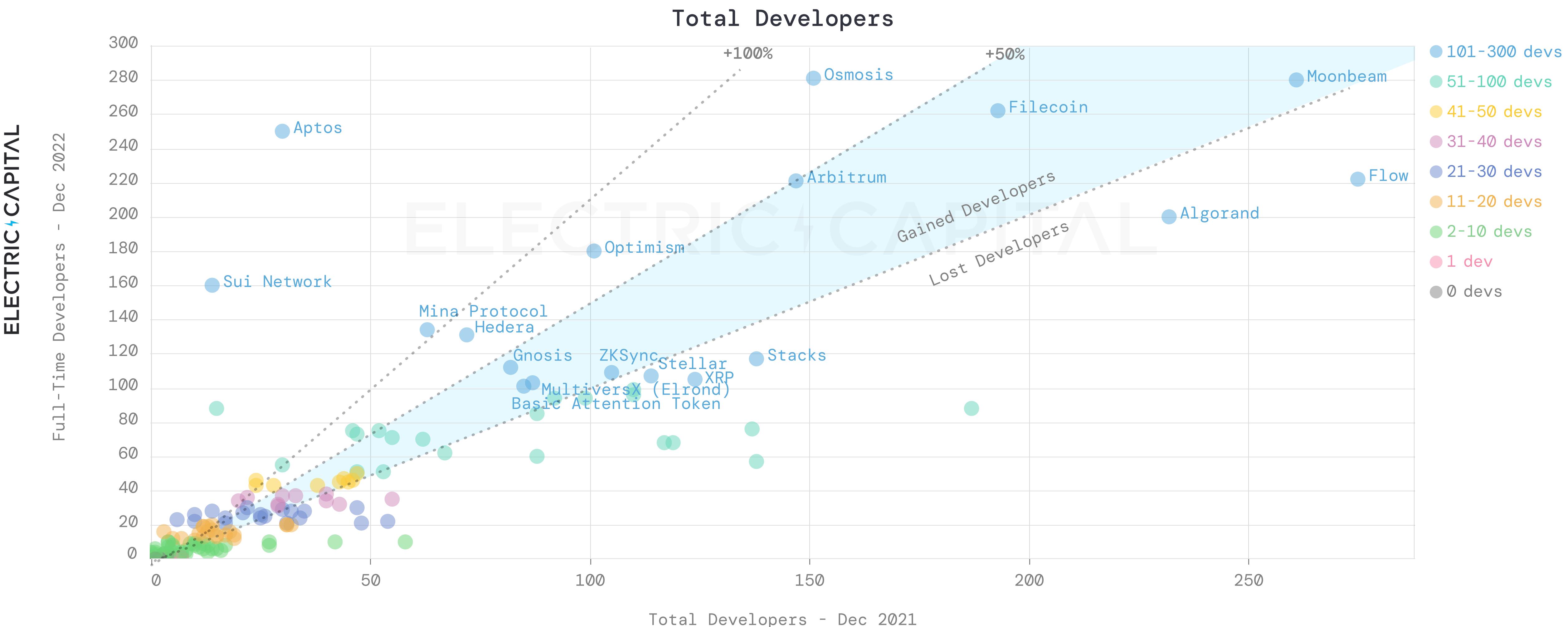
We only count open-source developers. The numbers are averages for the first 2 weeks of December before developers go on holiday at the end of the year and may differ from December numbers from earlier time series.

ECOSYSTEMS WITH 100+ TOTAL DEVS: SUI +1,043%, APTOS +733%, MINA +113%, OSMOSIS +86%, HEDERA +82%, OPTIMISM +78%, & ARBITRUM +50%

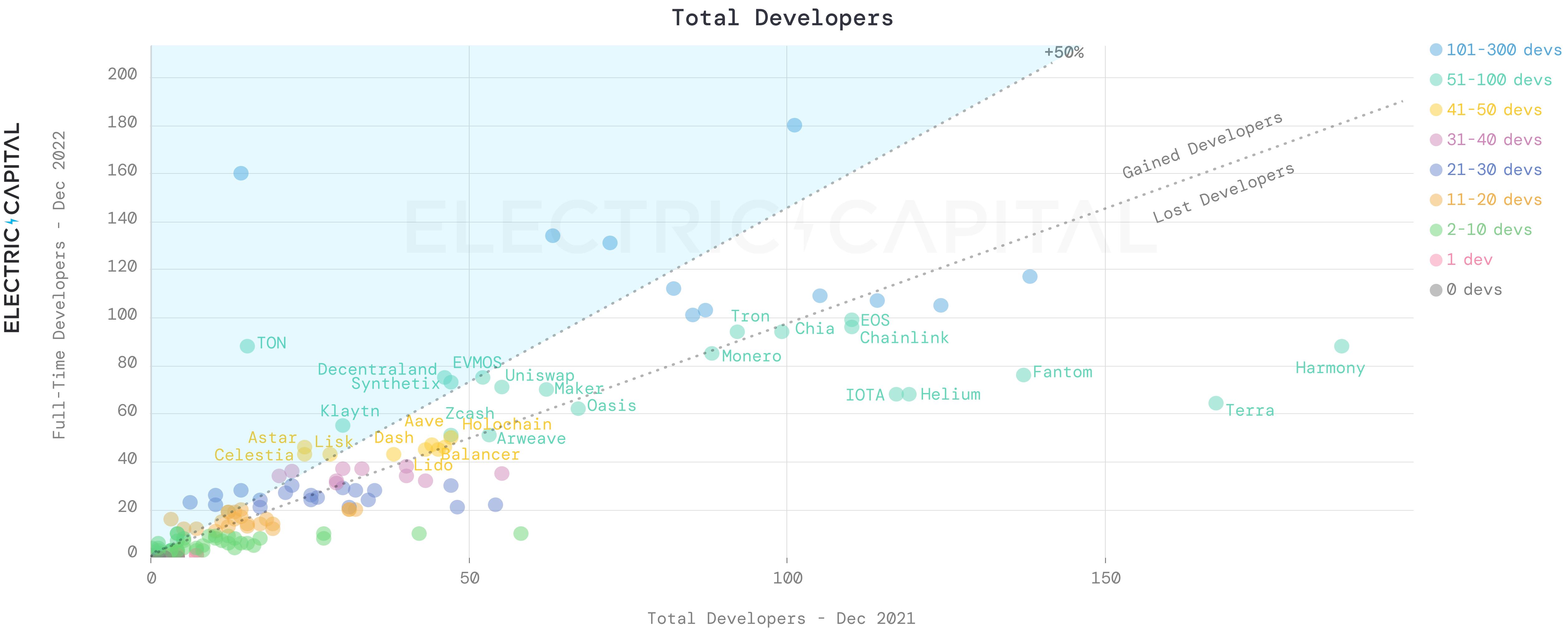


We only count open-source developers. The numbers are averages for the first 2 weeks of December before developers go on holiday at the end of the year and may differ from December numbers from earlier time series.

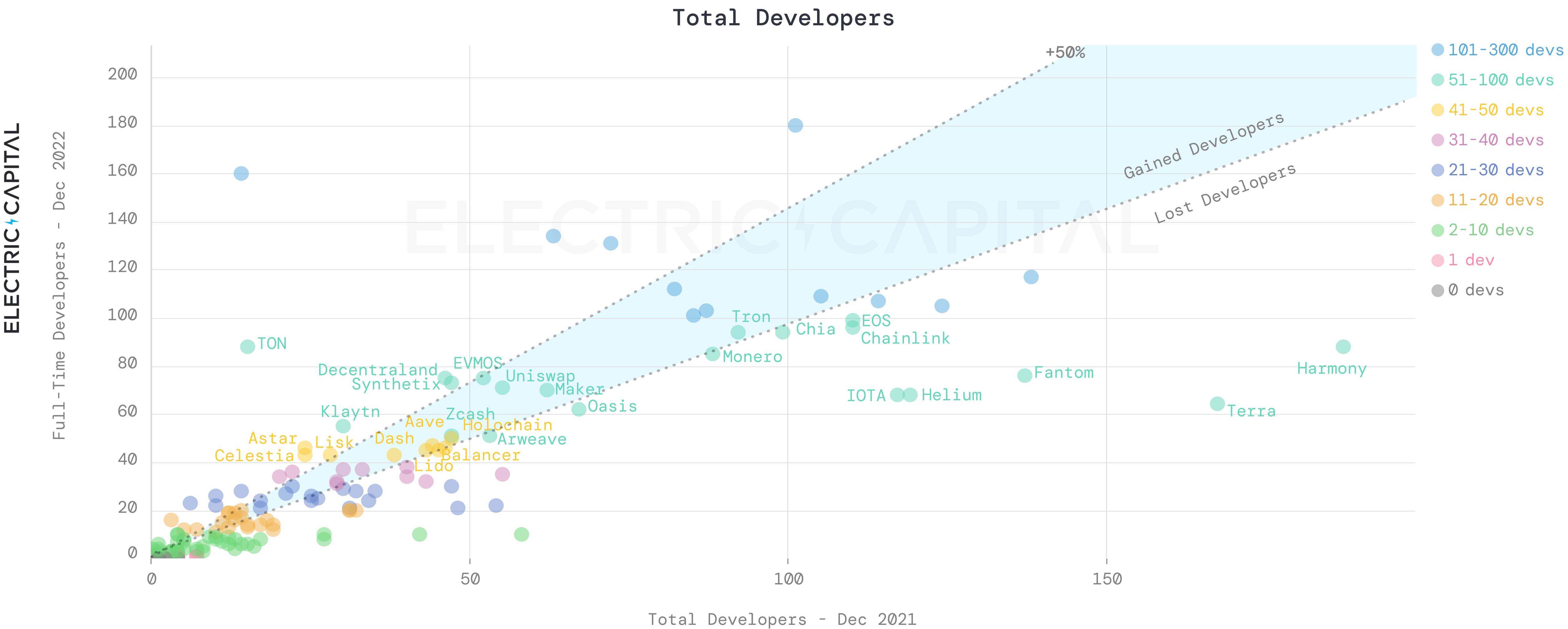
**ECOSYSTEMS WITH 100+ TOTAL DEVS: GNOSIS +37%, FILECOIN +36%, BASIC ATTENTION TOKEN +19%, MULTIVERSX +18%, MOONBEAM +7%, & ZKSYNC +4%**



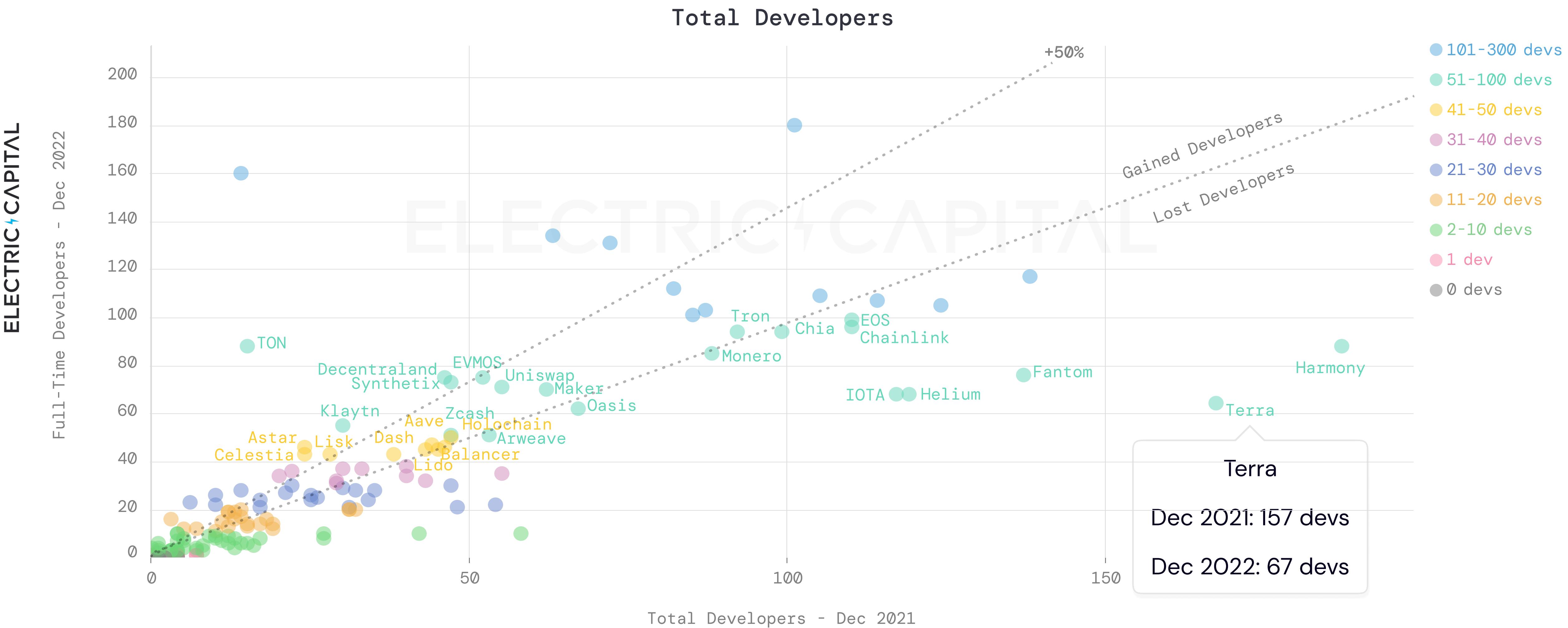
ECOSYSTEMS WITH 40+ TOTAL DEVS: TON +487%, ASTAR +92%, KLAYTN +83%, CELESTIA +79%, DECENTRALAND +63%, SNX +55%, & LISK +55%



**ECOS WITH 40+ TOTAL DEVS CONT'D: EVMOS +44%, UNISWAP +29%, DASH +13%, MAKER +13%, ZCASH +9%, HOLOCHAIN +7%, AAVE +6%, LIDO +5%, TRON +2%, BALANCER & WAVES FLAT**

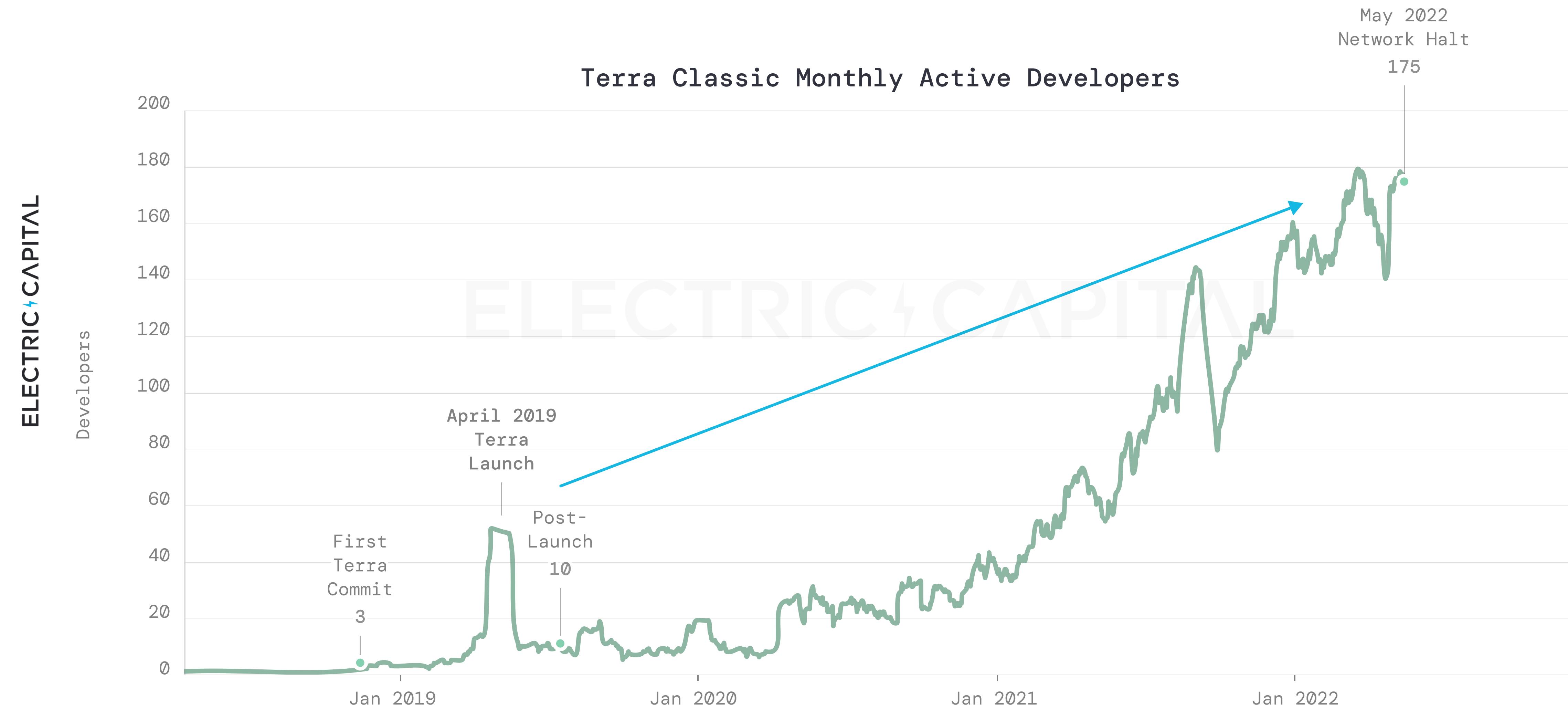


# TERRA IS DOWN -57% TOTAL DEVELOPERS...WHAT HAPPENED TO TERRA?



# WHAT HAPPENED TO TERRA?

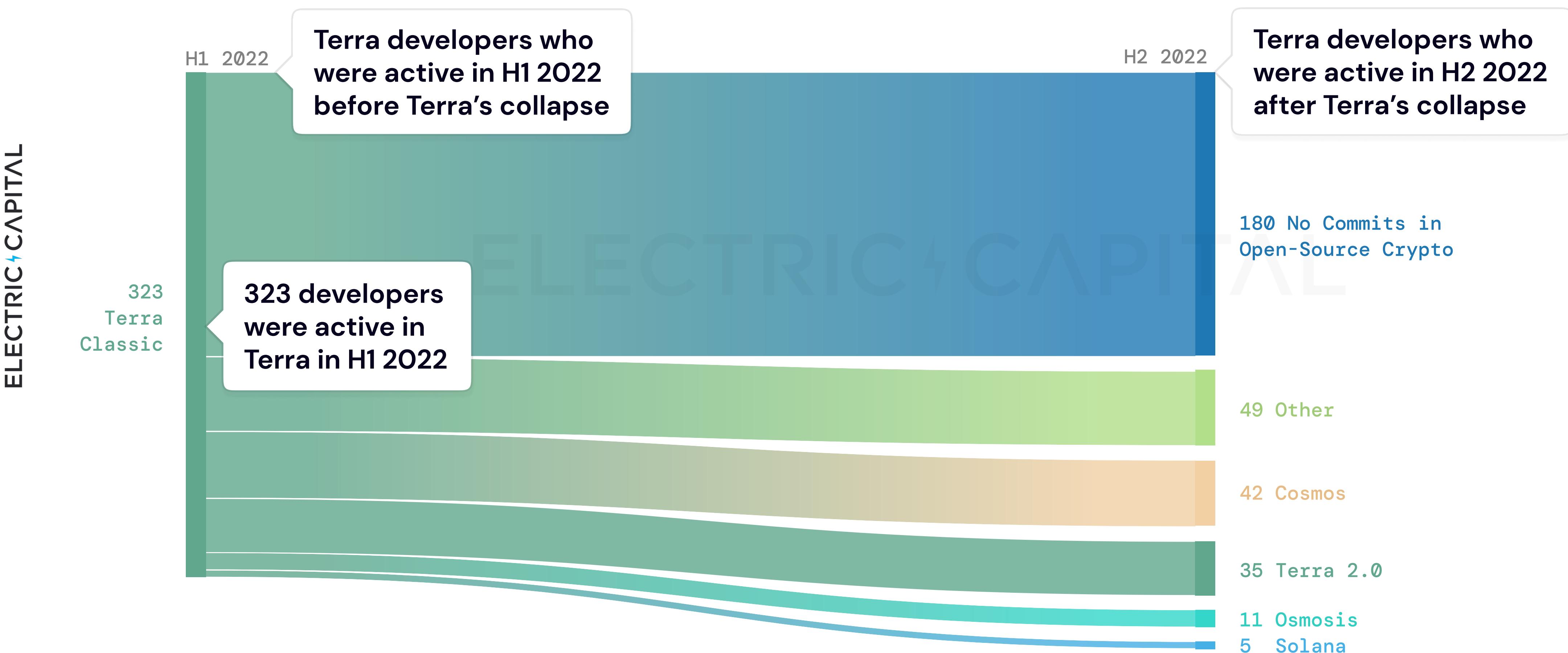
# TERRA GREW TO 175 DEVELOPERS IN 3.5 YRS FROM LAUNCH TO NETWORK HALT



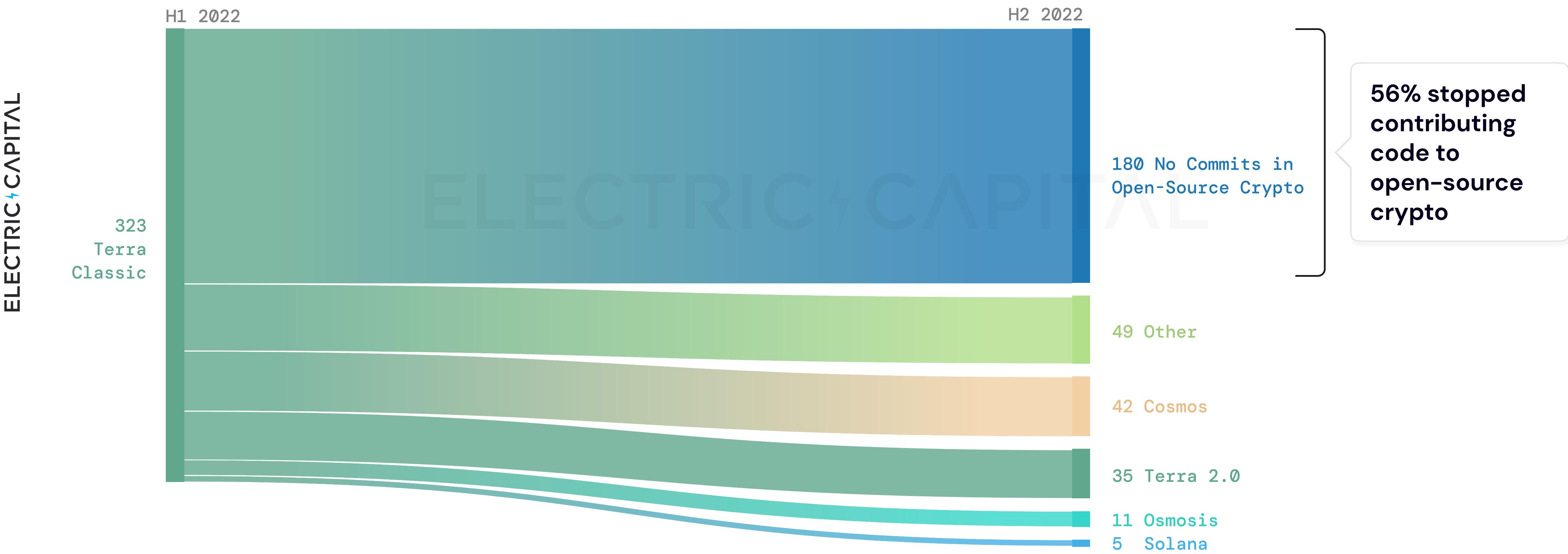
# 7 DAYS AFTER THE NETWORK HALTED, TERRA 2.0 LAUNCHED



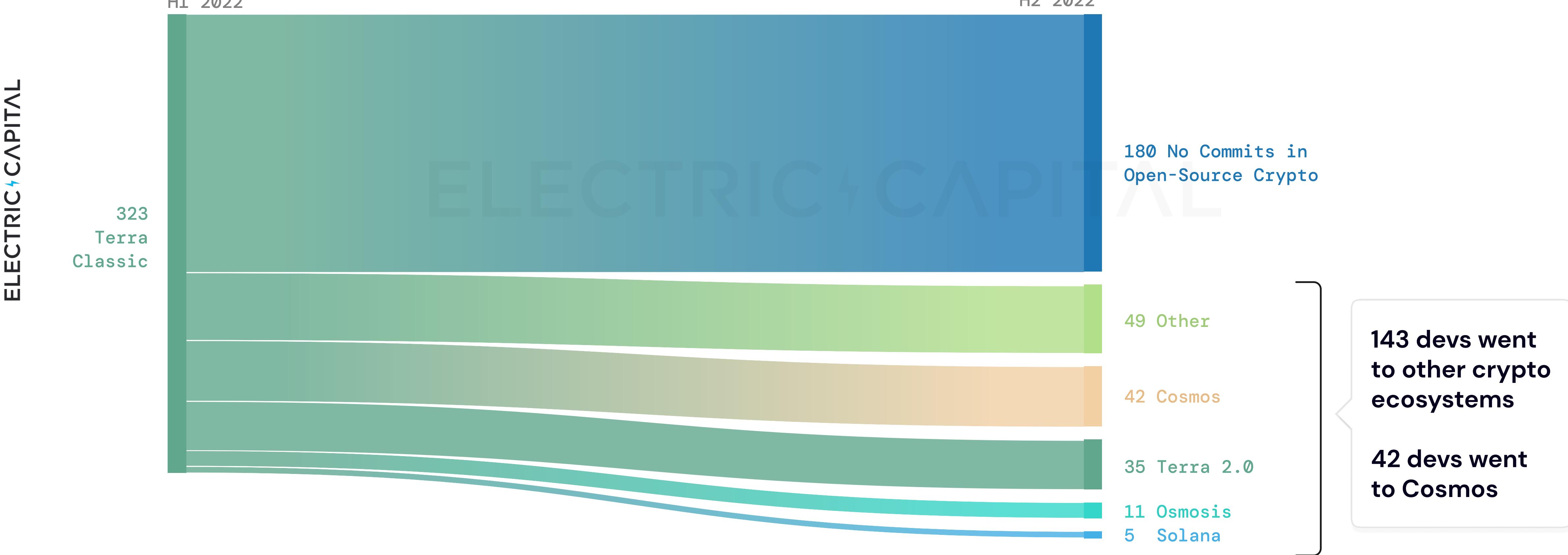
# LET'S LOOK AT WHERE ACTIVE TERRA DEVELOPERS WENT AFTER TERRA'S COLLAPSE



# 56% OF TERRA DEVS ACTIVE IN H1 2022 STOPPED CONTRIBUTING TO OPEN SOURCE CRYPTO REPOSITORIES



# 42% OF TERRA DEVELOPERS MIGRATED TO ANOTHER CRYPTO ECOSYSTEM: THE LARGEST SHARE WENT TO COSMOS (13%)



# 9% OF TERRA DEVS BEGAN CONTRIBUTING TO TERRA 2.0

ELECTRIC+CAPITAL



180 No Commits in  
Open-Source Crypto

49 Other

42 Cosmos

35 Terra 2.0

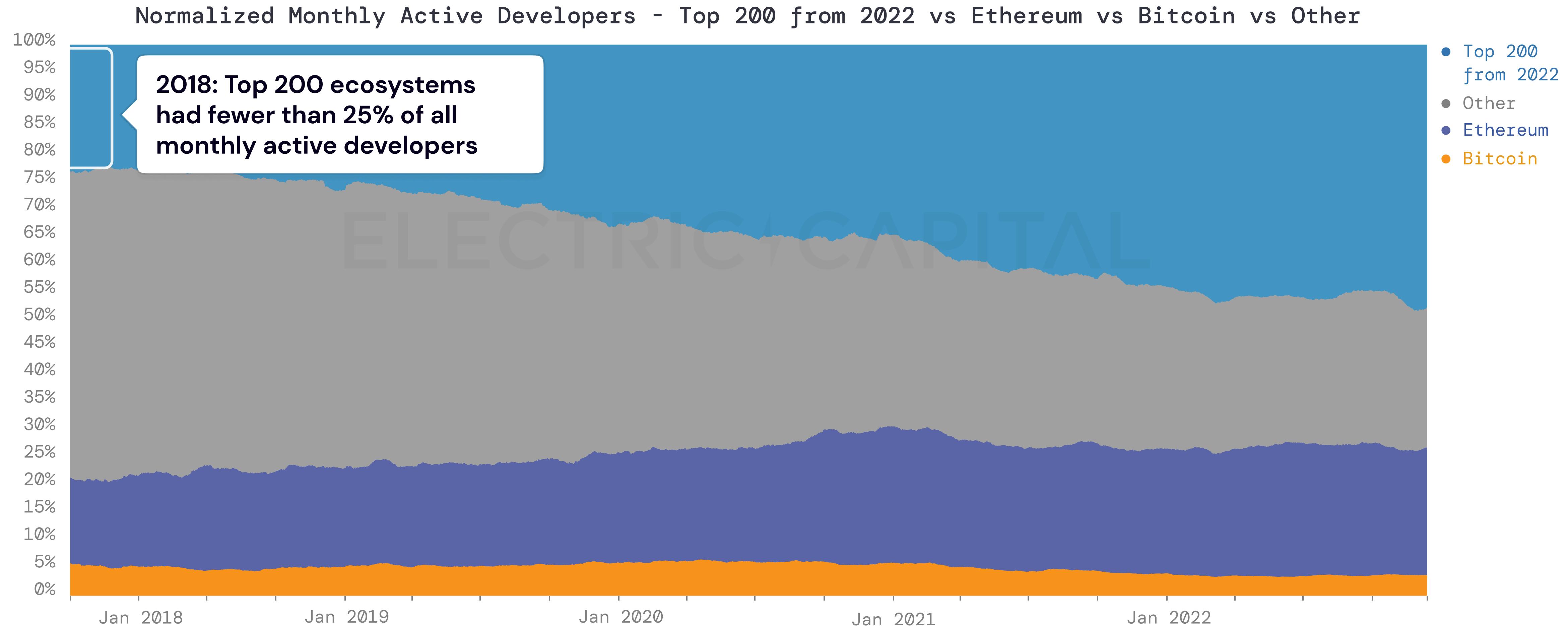
11 Osmosis

5 Solana

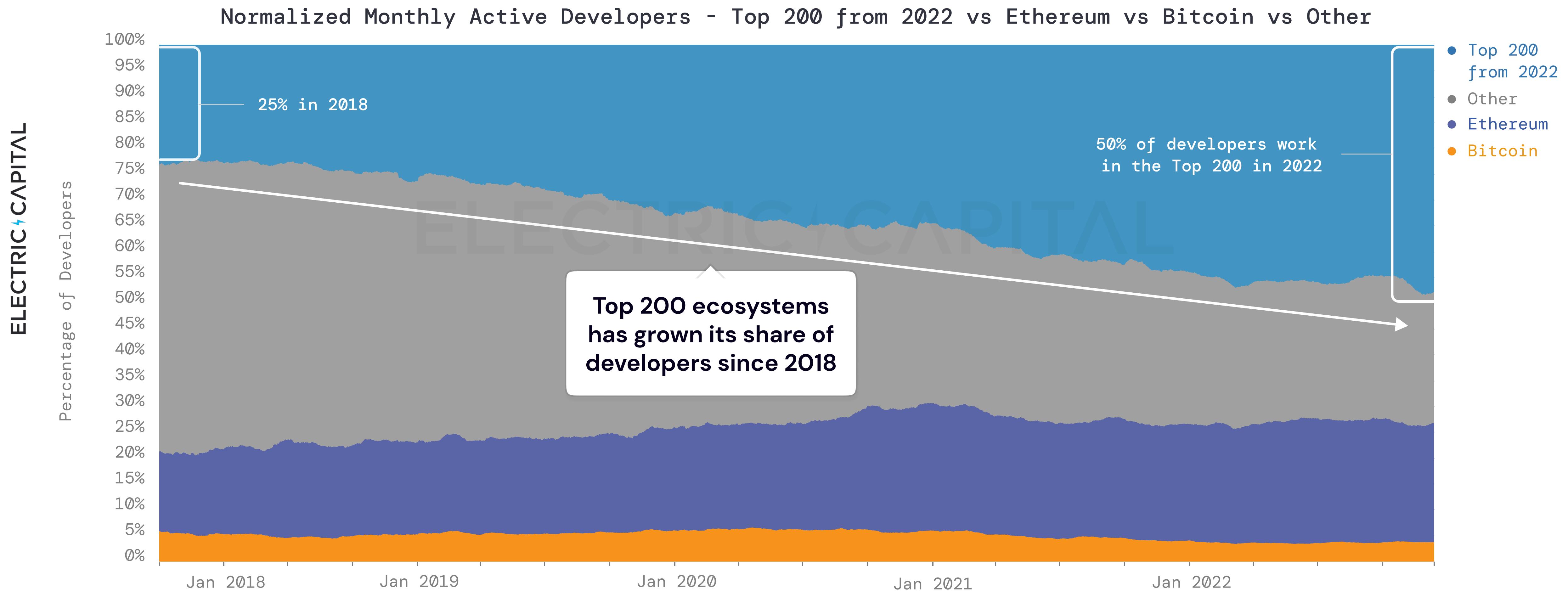
28 devs from the  
original Terra project  
went on to contribute  
to Terra 2.0

ZOOMING OUT, LET'S COMPARE TODAY'S BEAR MARKET  
TO THE PRIOR ONE IN 2018...

# IN 2018, THE TOP 200 ECOSYSTEMS HAD FEWER THAN 25% OF TOTAL MONTHLY ACTIVE DEVELOPERS...



# BUT THE TOP 200 ECOSYSTEMS HAVE GROWN TO 50% OF ALL ACTIVE DEVS

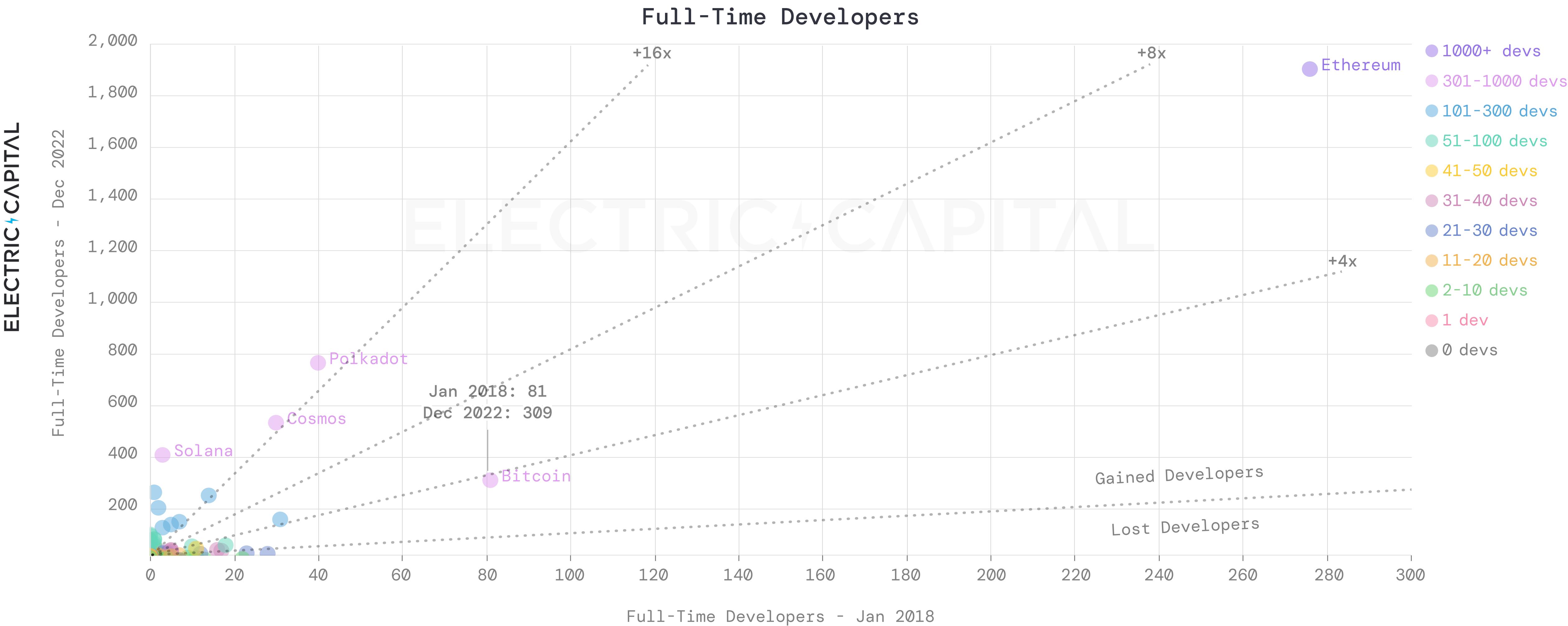


WHICH ECOSYSTEMS ACCOUNT FOR MOST OF THE DEVELOPER GROWTH?

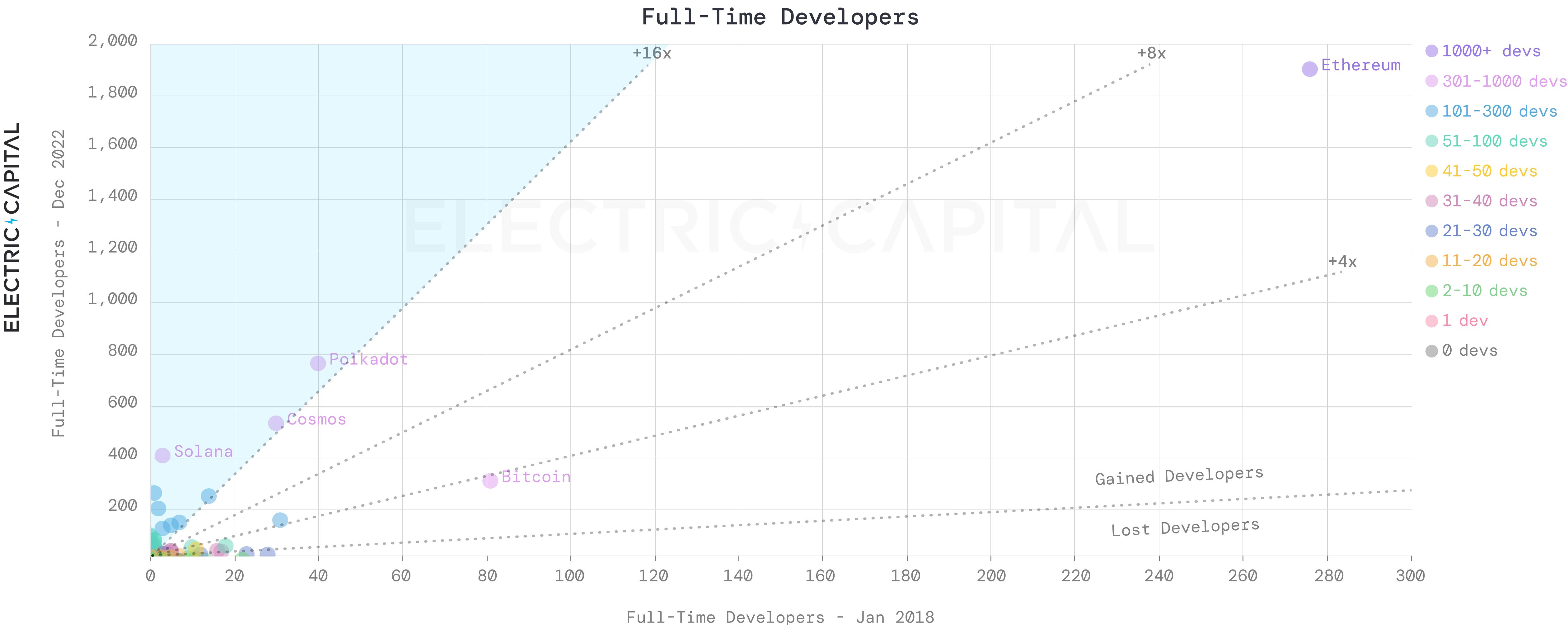
LET'S COMPARE  
JANUARY 2018 VS DECEMBER 2022

LET'S START WITH THE MOST IMPORTANT DEVELOPER SEGMENT:  
FULL-TIME DEVELOPERS

# SINCE 2018: BITCOIN +4X GROWTH IN FULL-TIME DEVELOPERS

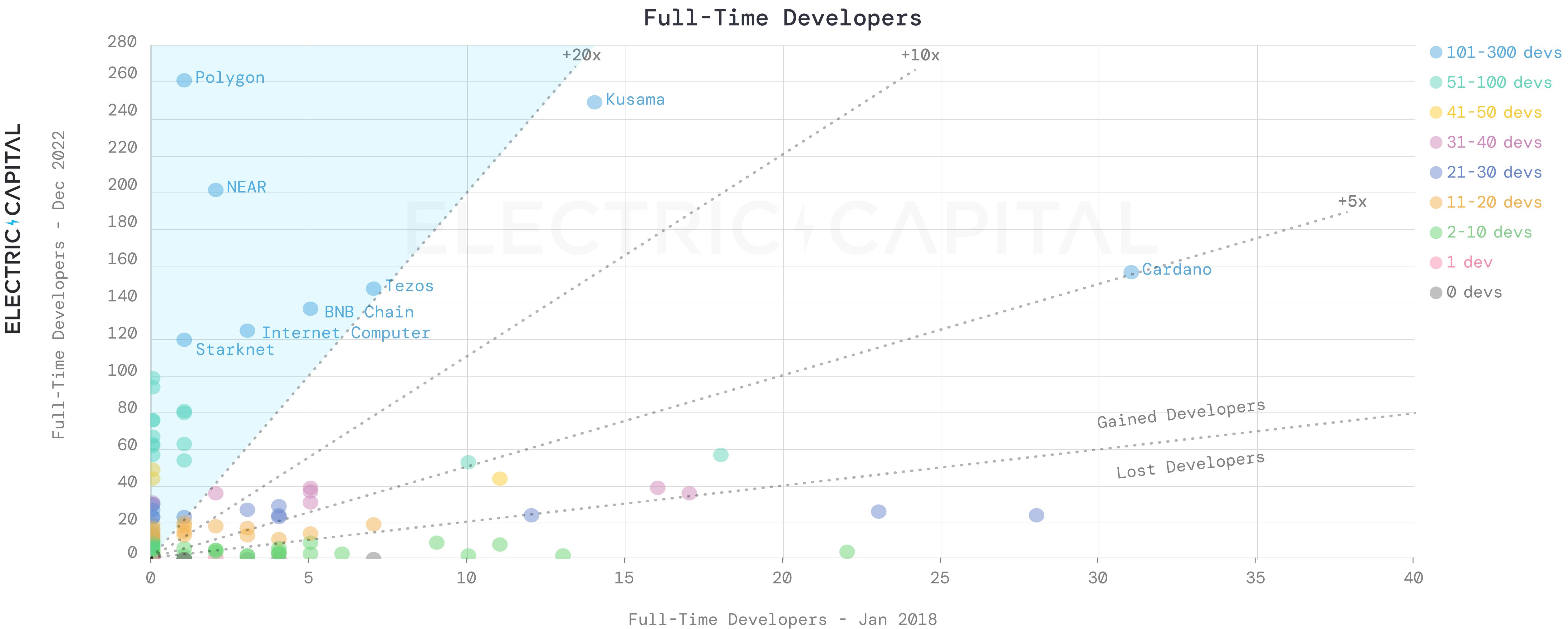


# SINCE 2018: POLKADOT, COSMOS, & SOLANA GREW **16X+** TO 400+ FULL-TIME DEVS



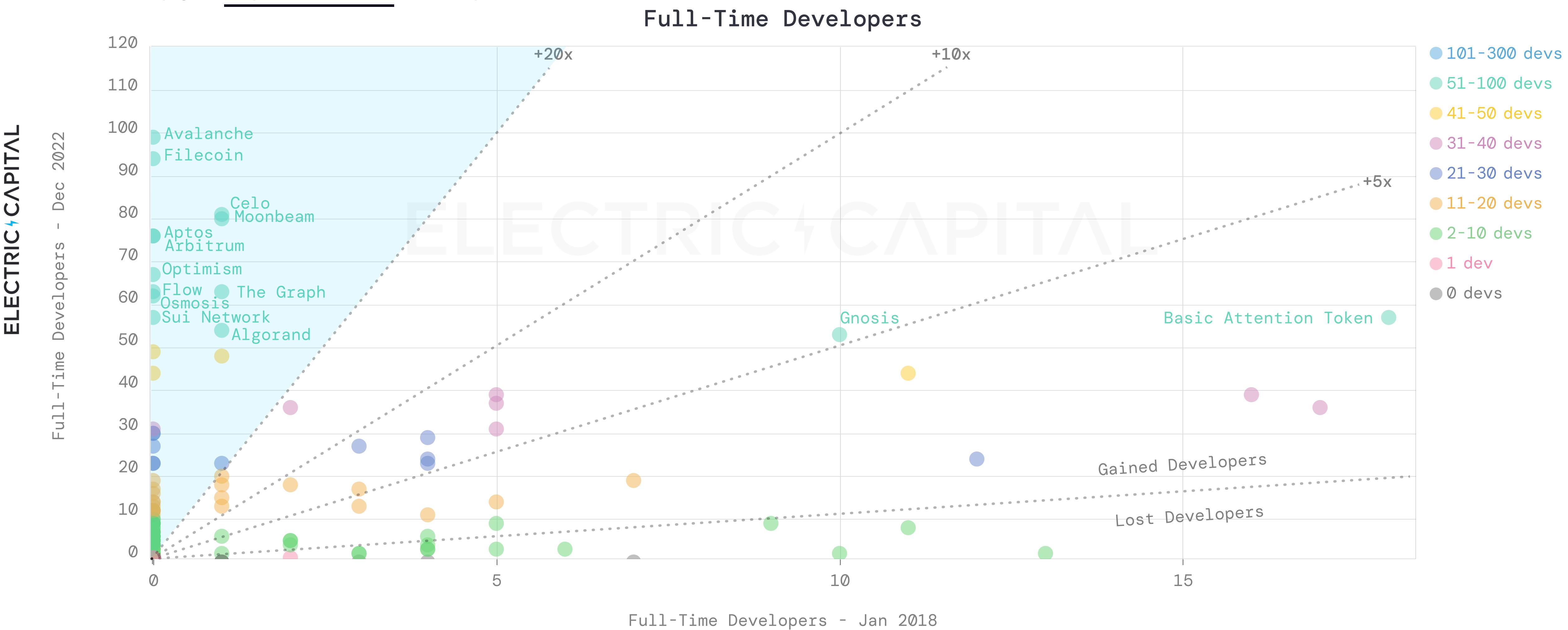
We only count open-source developers. The numbers are averages for the first 2 weeks of December before developers go on holiday at the end of the year and may differ from December numbers from earlier time series.

# SINCE 2018: POLYGON, NEAR, TEZOS, BNB, INTERNET COMPUTER, & STARKNET GREW 20X+ TO 120+ FULL-TIME DEVS



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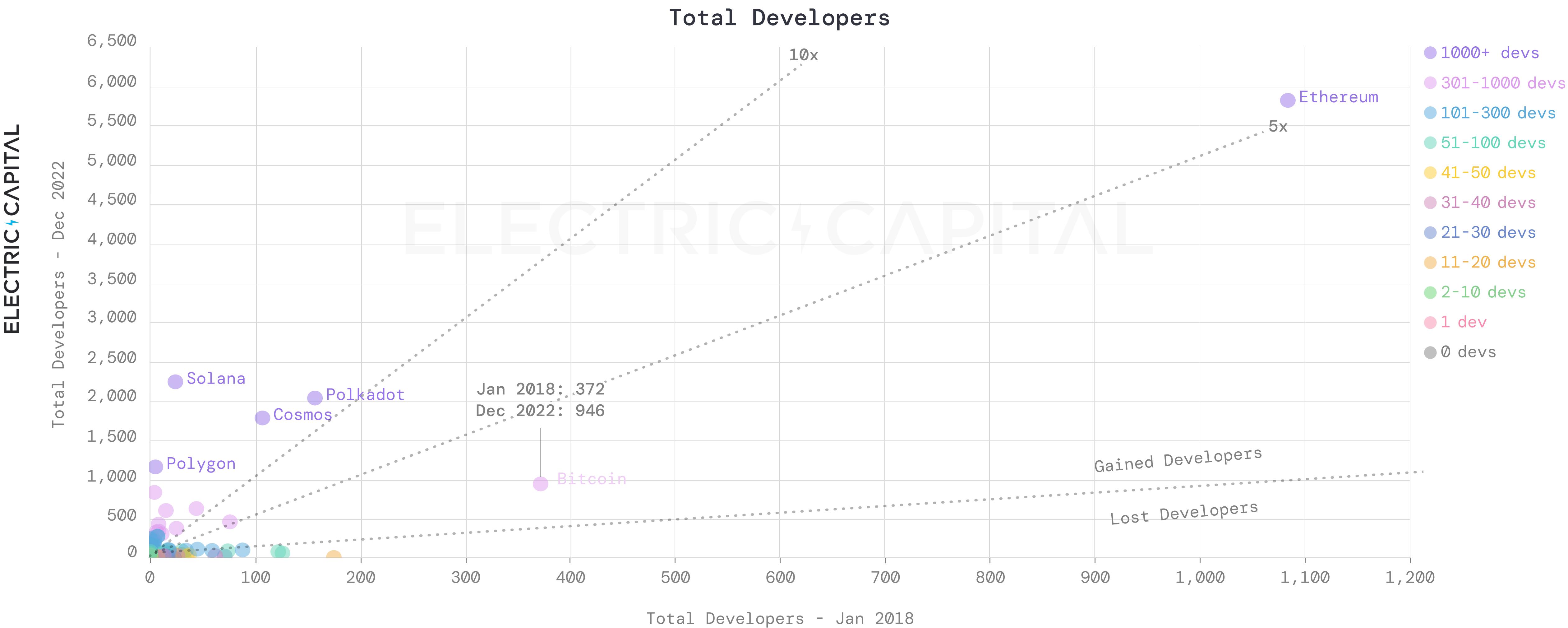
# SINCE 2018: AVALANCHE, FILECOIN, CELO, MOONBEAM, APTOS, ARBITRUM, OPTIMISM, FLOW, THE GRAPH, OSMOSIS, SUI, & ALGORAND GREW TO 50+ FULL-TIME DEVS





BY TOTAL DEVELOPERS...

# SINCE JAN 2018: BITCOIN +3X GROWTH IN TOTAL DEVELOPERS

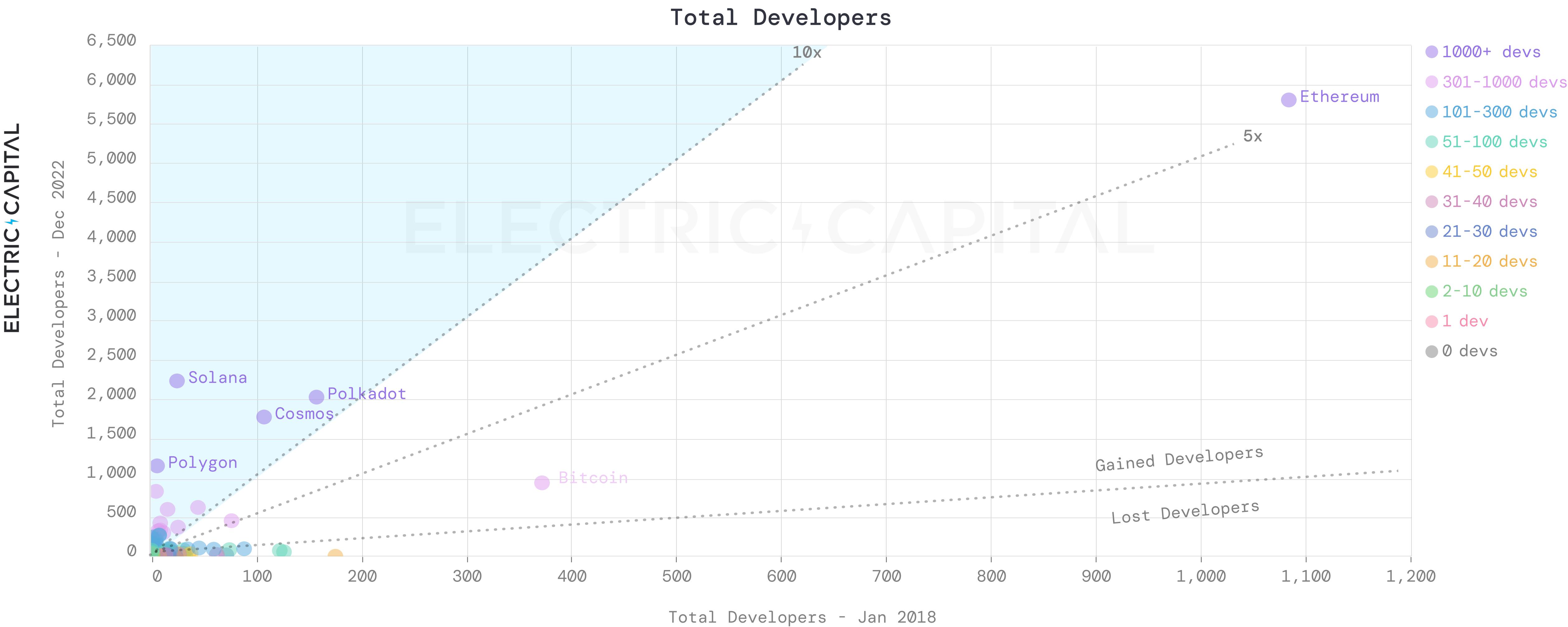


# ETHEREUM WAS THE BIGGEST ECOSYSTEM IN 2018 AND GREW TOTAL DEVS +5X

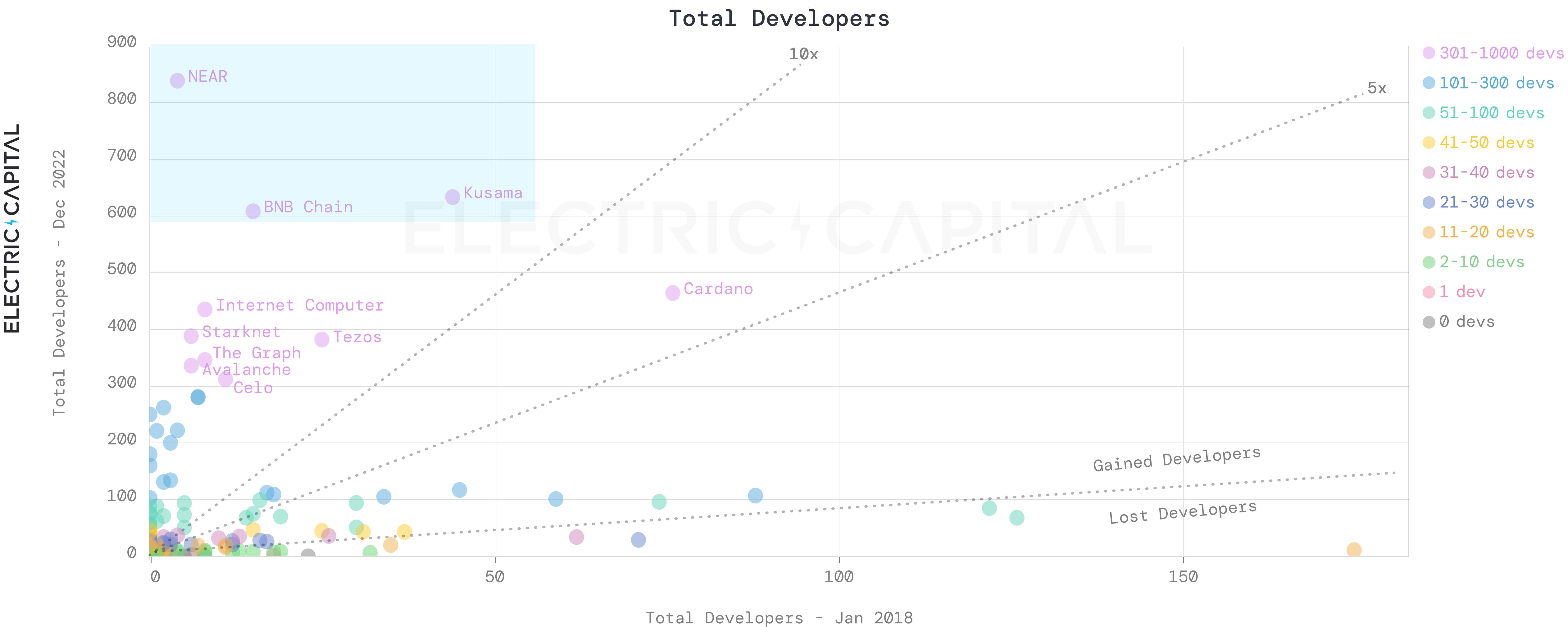


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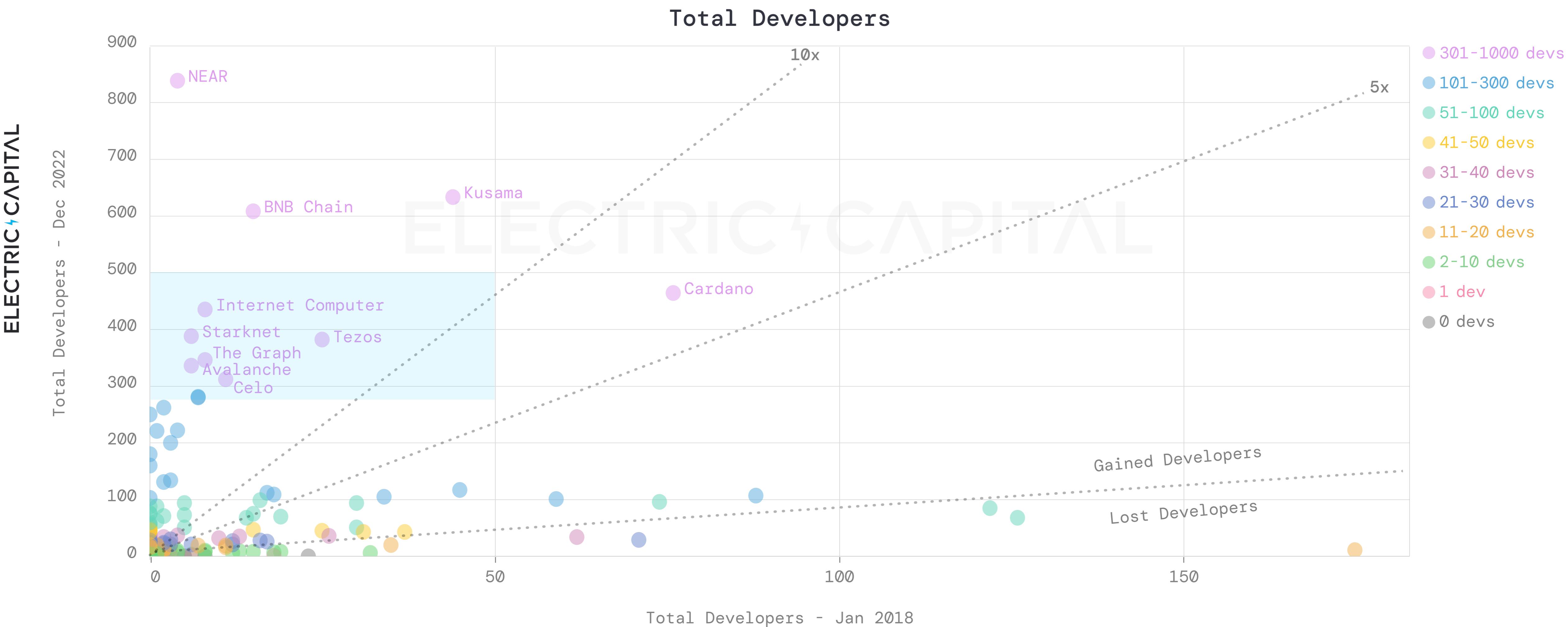
# SOLANA, POLKADOT, COSMOS, & POLYGON GREW FROM <200 DEVS IN 2018 TO 1000+ TOTAL DEVS IN 2022



# NEAR, KUSAMA & BNB HAD <50 DEVS IN 2018 AND NOW HAVE 600+ TOTAL DEVS



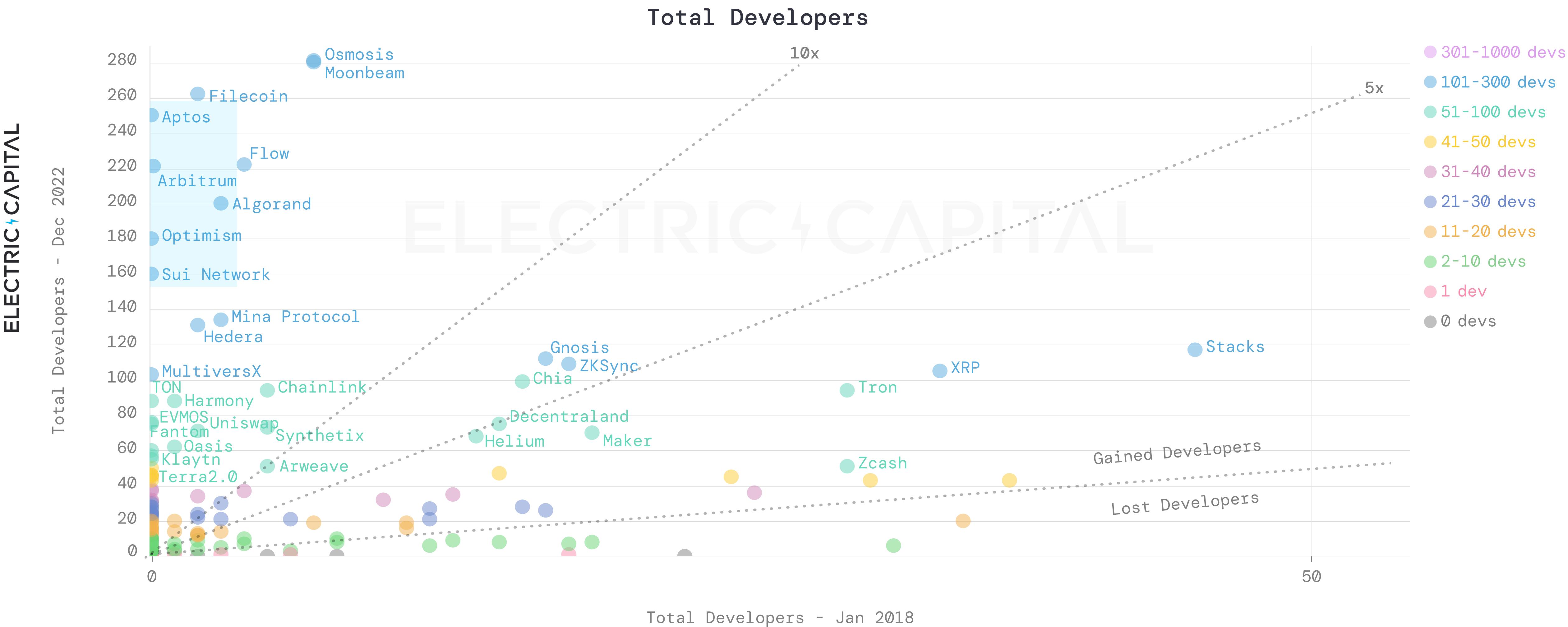
# INTERNET COMPUTER, STARKNET, TEZOS, THE GRAPH, AVALANCHE, & CELO HAD <50 DEVS AND NOW HAVE 300+ DEVS



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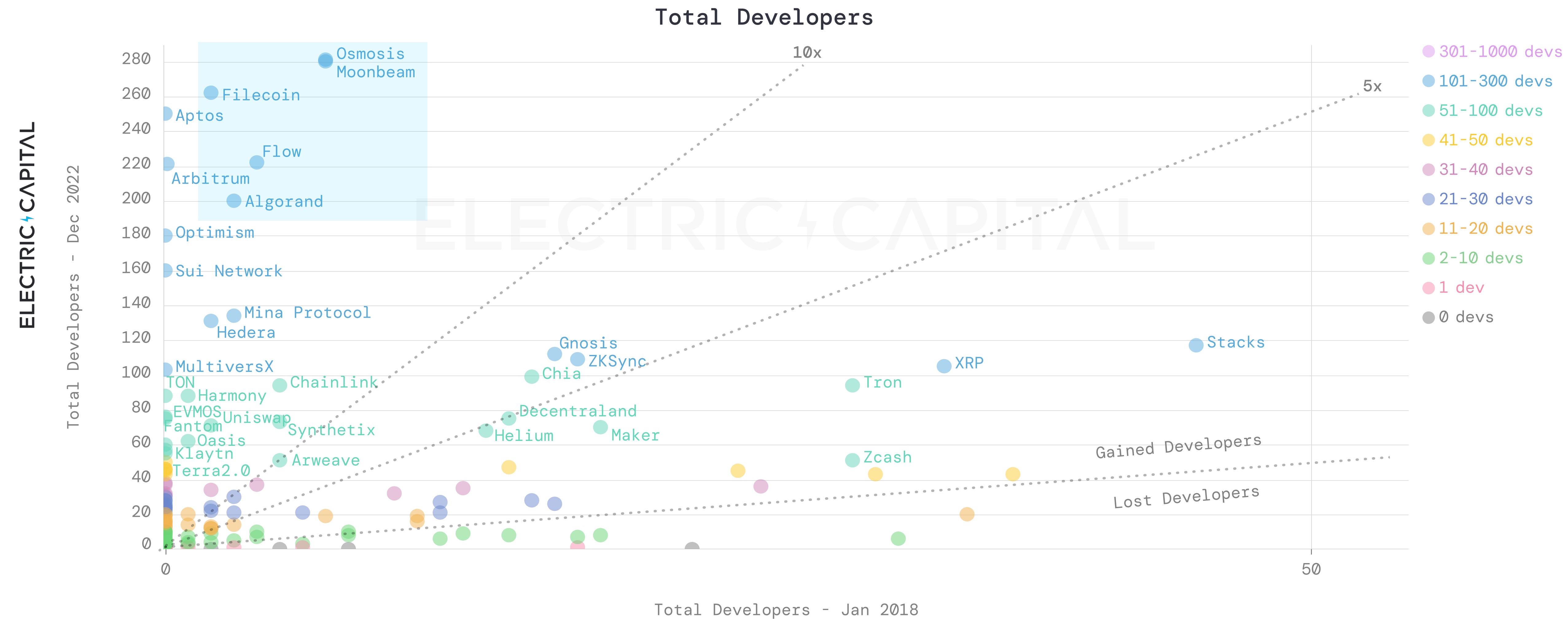
ZOOMING IN ON ECOSYSTEMS WITH 40 TO 200 TOTAL DEVELOPERS...

# APOTOS, ARBITRUM, OPTIMISM, AND SUI ARE ECOSYSTEMS THAT DID NOT EXIST IN 2018 & NOW HAVE 150+ TOTAL DEVS

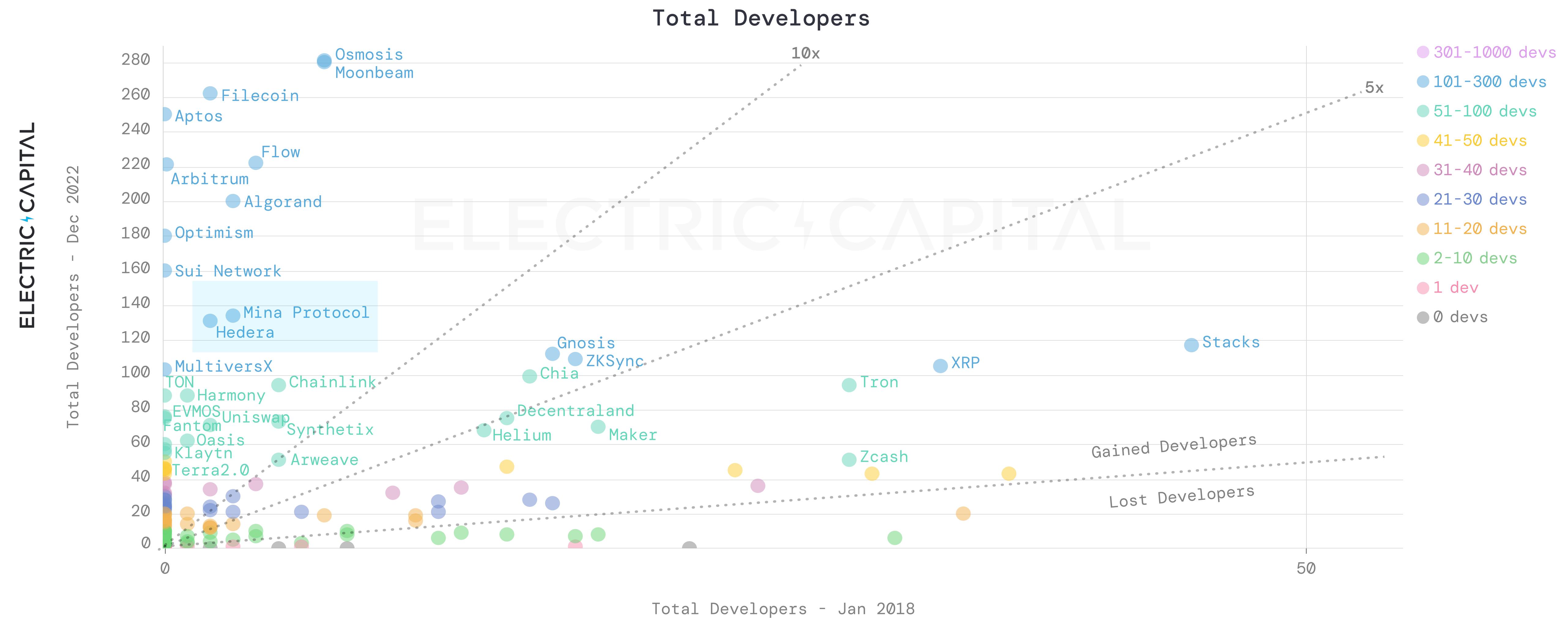


We only count open-source developers. The numbers are averages for the first 2 weeks of December before developers go on holiday at the end of the year and may differ from December numbers from earlier time series.

# FILECOIN, ALGORAND, FLOW, OSMOSIS, & MOONBEAM HAVE 200+ TOTAL DEVS FROM FEWER THAN 10 DEVS IN JAN 2018

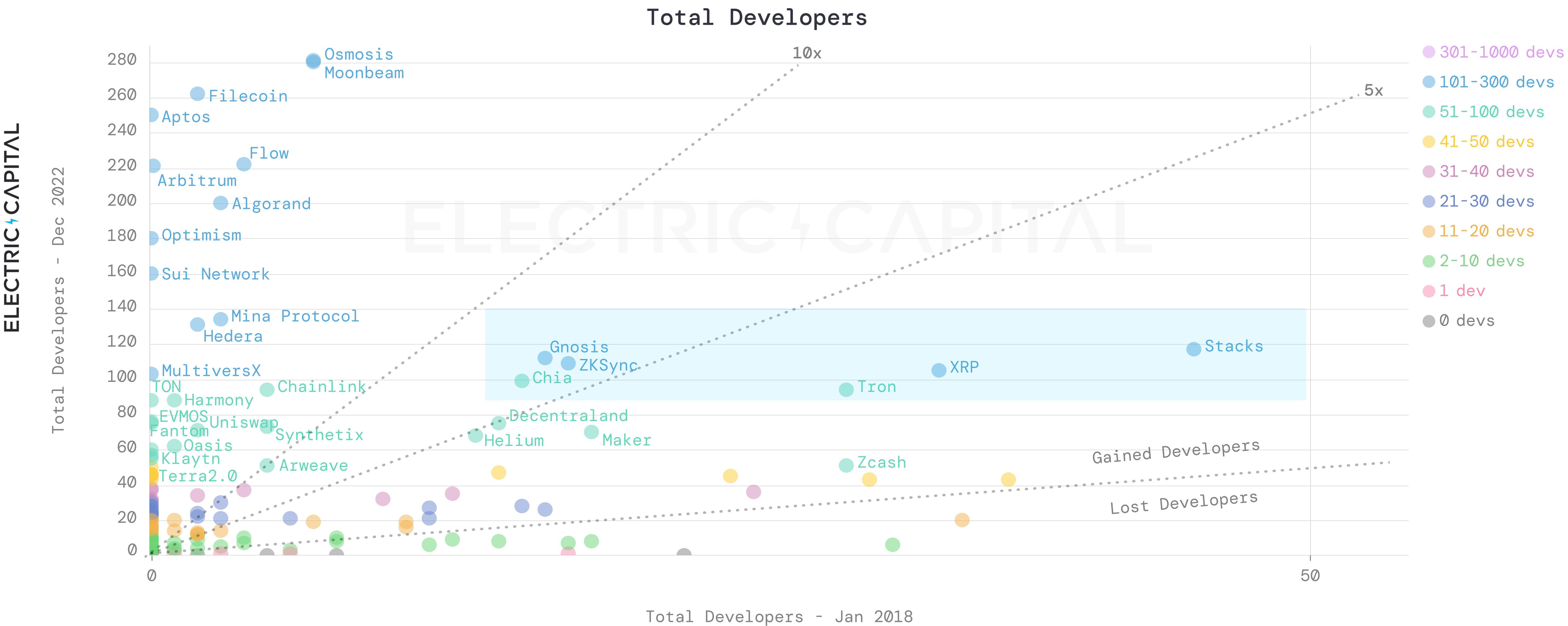


# MINA & HEDERA HAVE 130+ TOTAL DEVS FROM FEWER THAN 5 DEVS IN JAN 2018



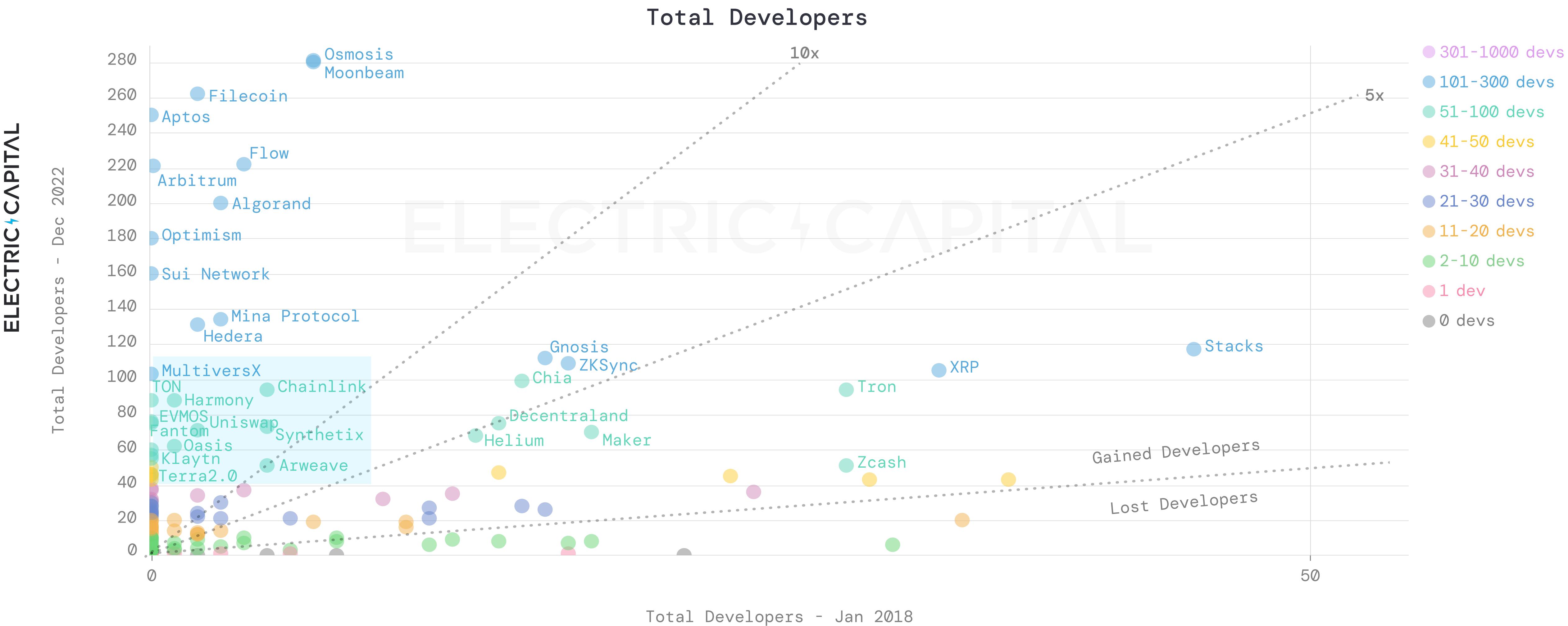
We only count open-source developers. The numbers are averages for the first 2 weeks of December before developers go on holiday at the end of the year and may differ from December numbers from earlier time series.

# SINCE 2018: GNOSIS +7X, ZKSYNC +6X, XRP +3X, STACKS +3X TO 100+ TOTAL DEVS



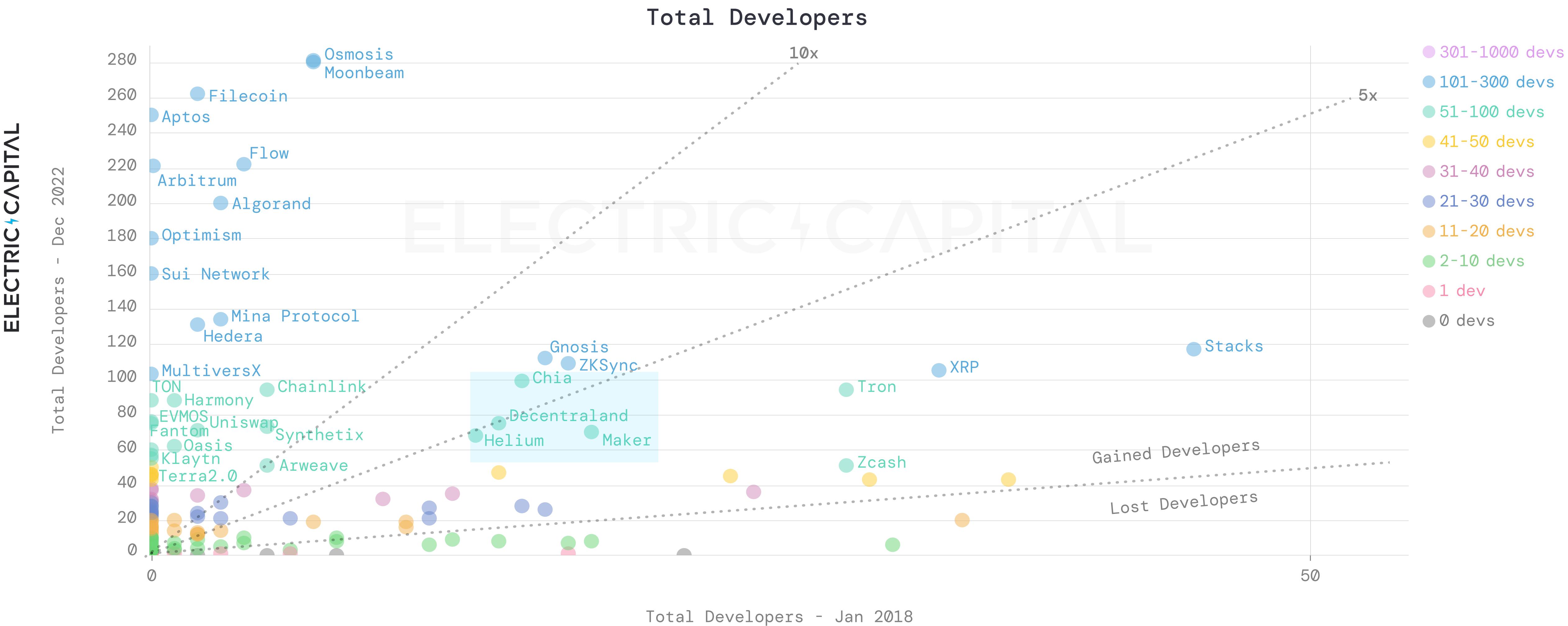
We only count open-source developers. The numbers are averages for the first 2 weeks of December before developers go on holiday at the end of the year and may differ from December numbers from earlier time series.

# MANY ECOSYSTEMS GREW TO 40+ TOTAL DEVS FROM FEWER THAN 5 DEVS IN 2018



We only count open-source developers. The numbers are averages for the first 2 weeks of December before developers go on holiday at the end of the year and may differ from December numbers from earlier time series.

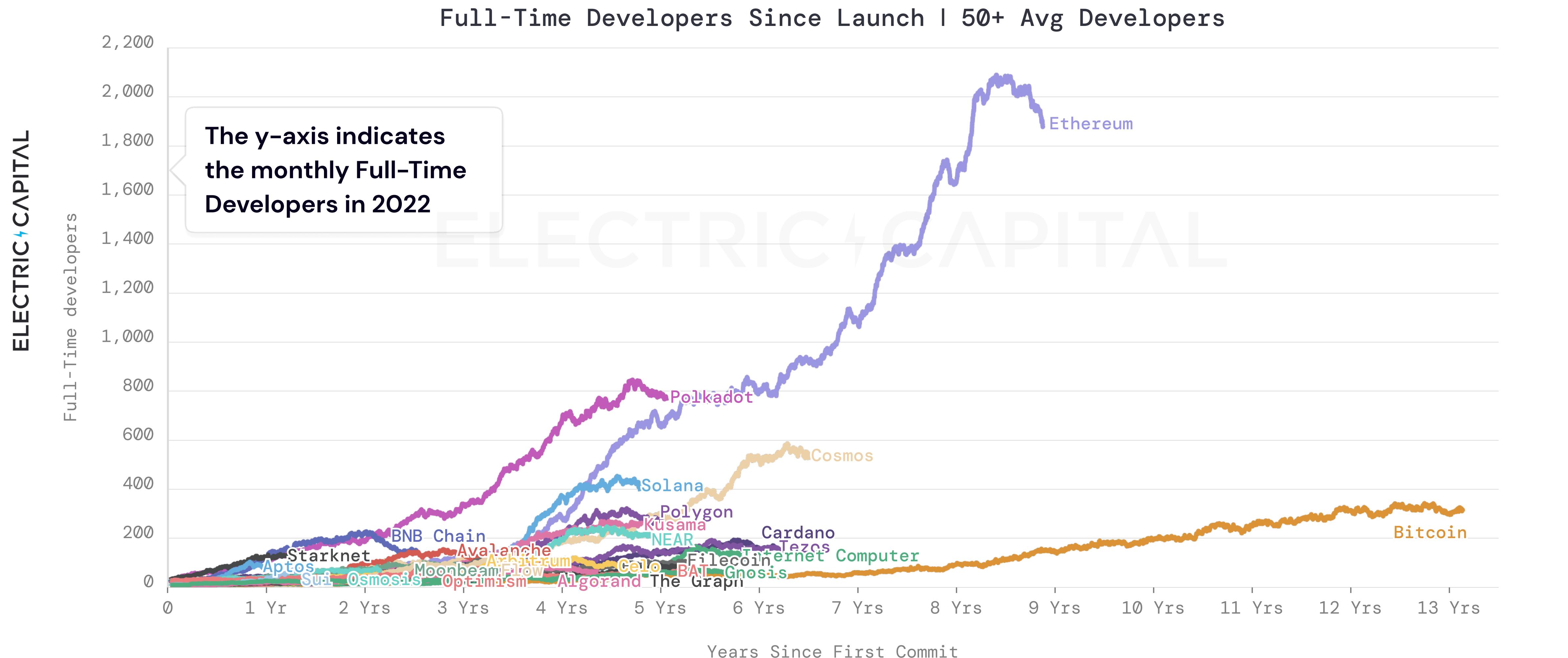
# CHIA, DECENTRALAND, HELIUM, & MAKER GREW 3X+ TO 60+ TOTAL DEVS



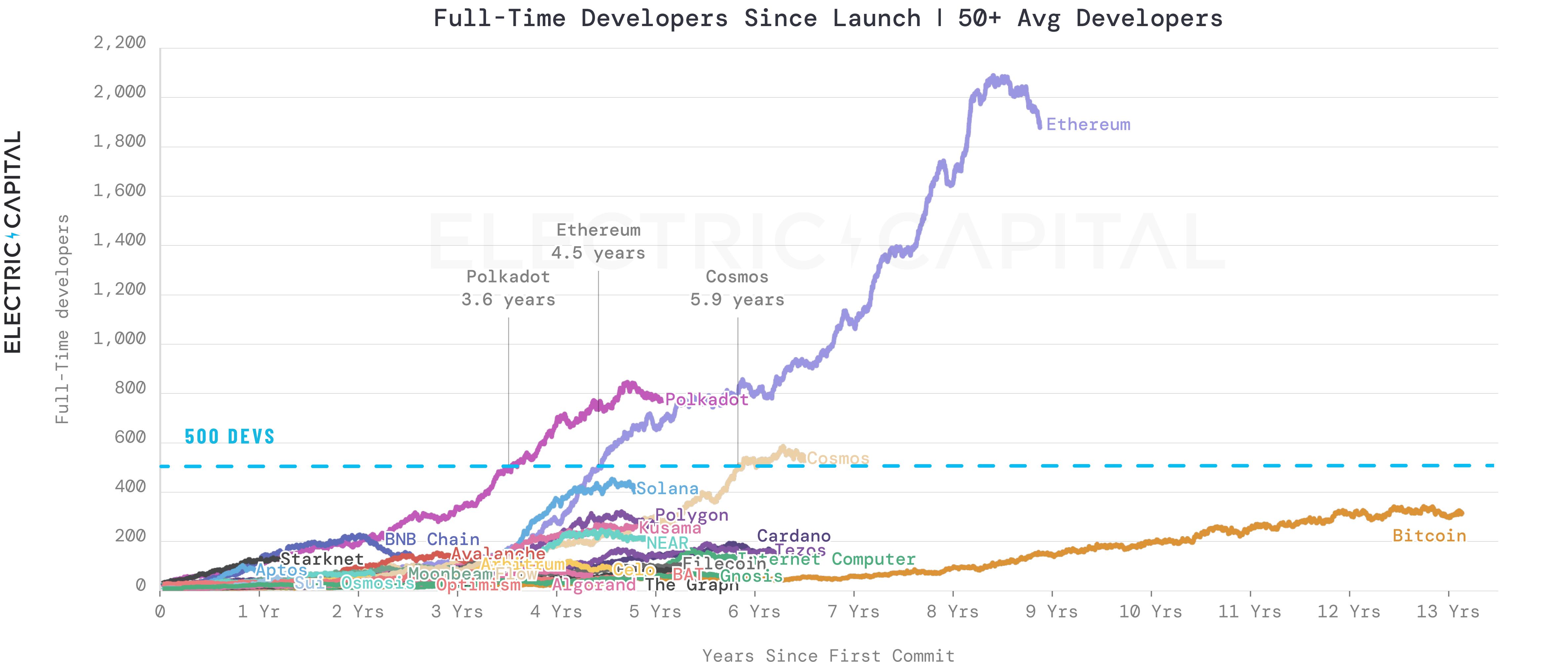
BUT THESE ECOSYSTEMS BEGAN AT DIFFERENT TIMES.  
LET'S NORMALIZE BY THE DAY OF THEIR FIRST COMMIT...

LET'S FOCUS ON THE MOST IMPORTANT DEVELOPER SEGMENT:  
FULL-TIME DEVELOPERS

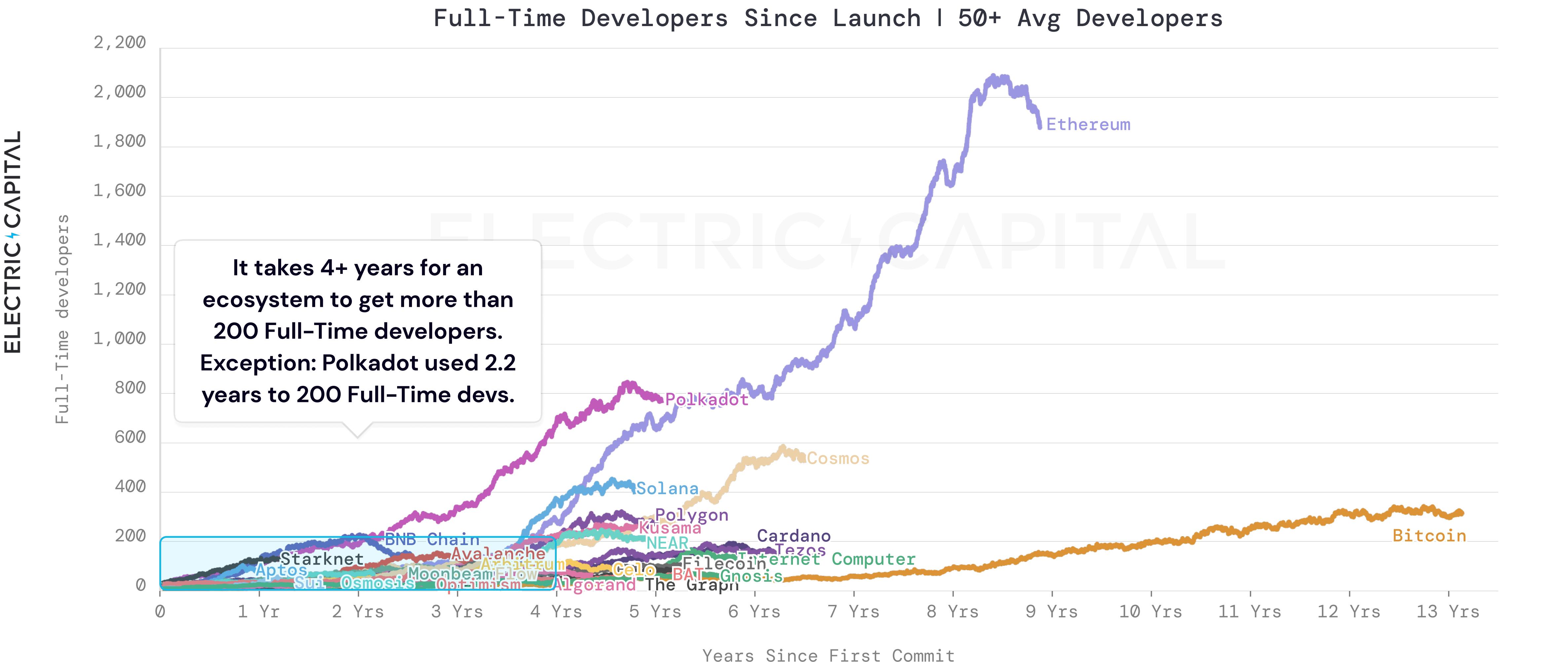
# WE CAN COMPARE DEVELOPER GROWTH BY INDEXING TO THE DAY OF THE FIRST COMMIT



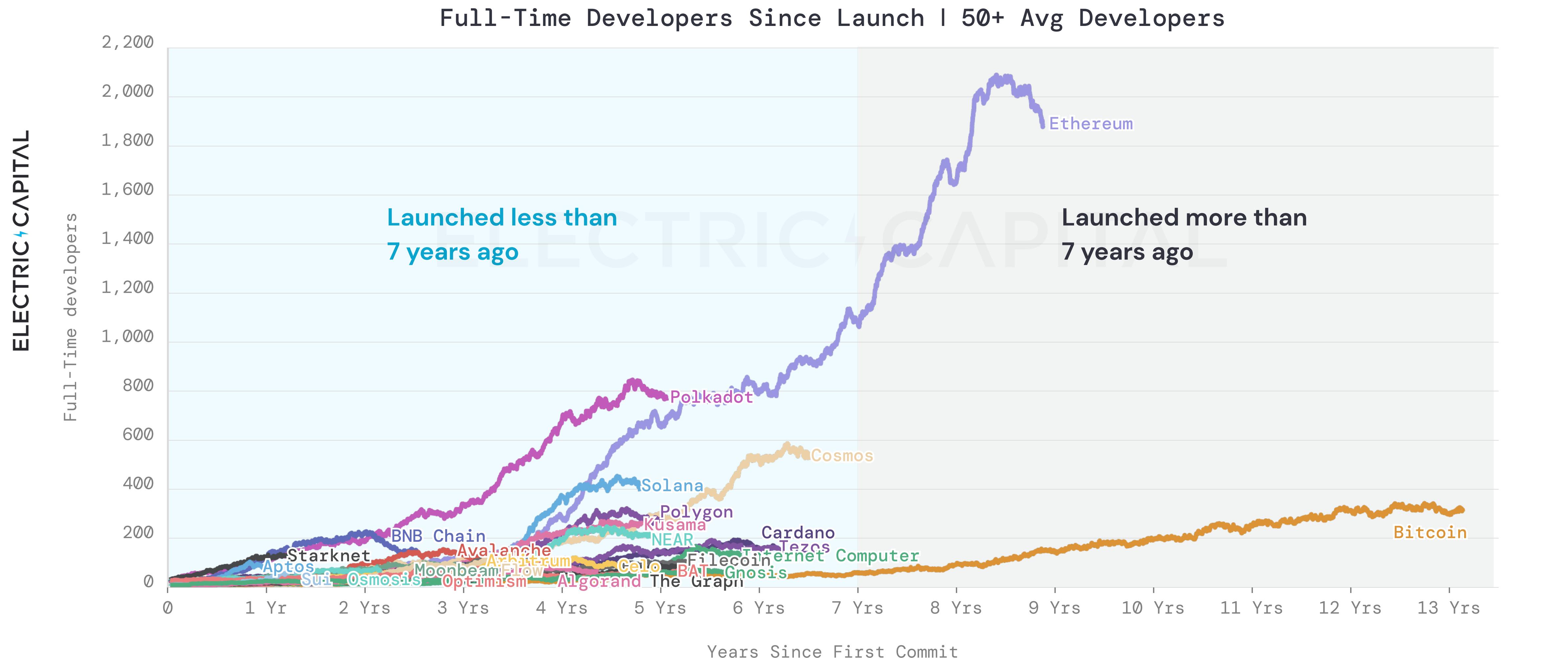
# ETHEREUM, POLKADOT, & COSMOS TOOK DIFFERENT PATHS TO GROW TO 500+ FULL-TIME DEVELOPERS



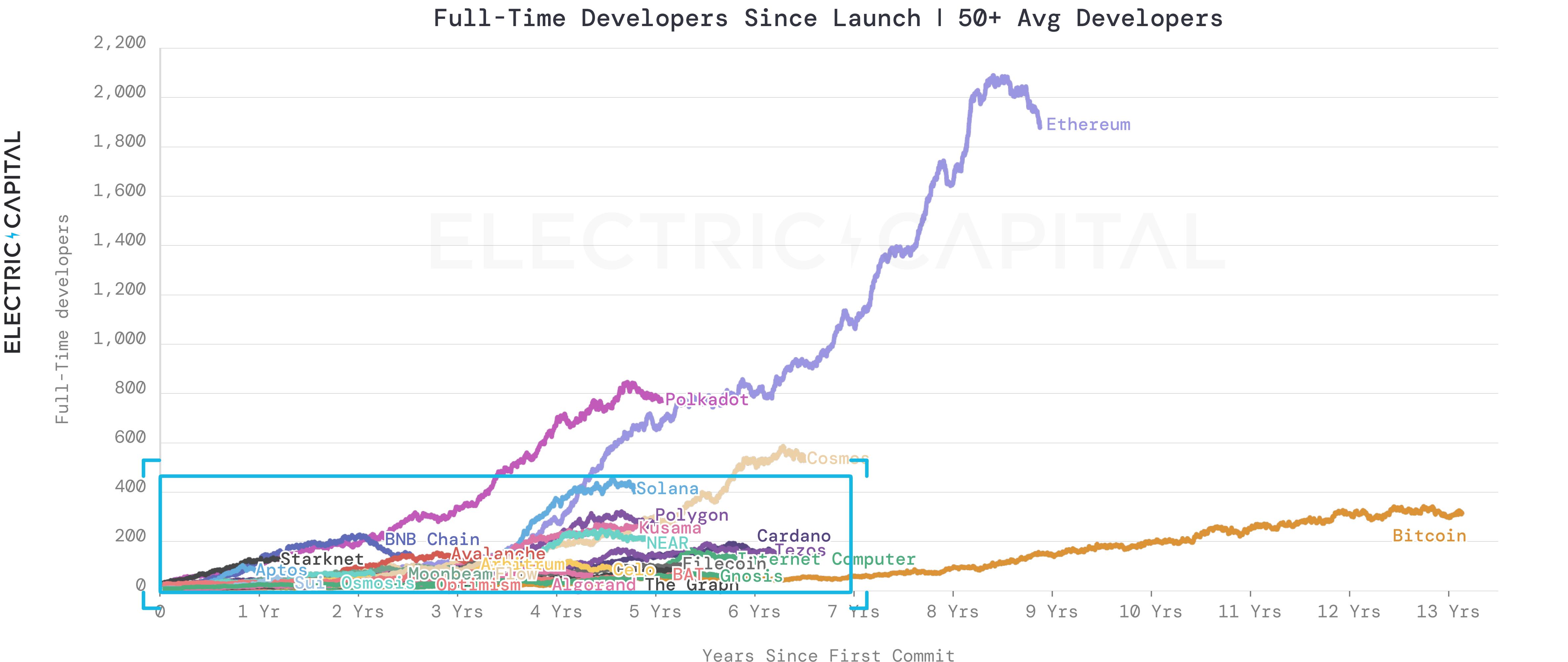
# IT USUALLY TAKES 4+ YEARS TO GROW TO 200+ FULL-TIME DEVS



# EXCLUDING BTC & ETH, ALL TOP 200 ECOSYSTEMS WITH 50+ FULL-TIME DEVS LAUNCHED UNDER 7 YEARS AGO

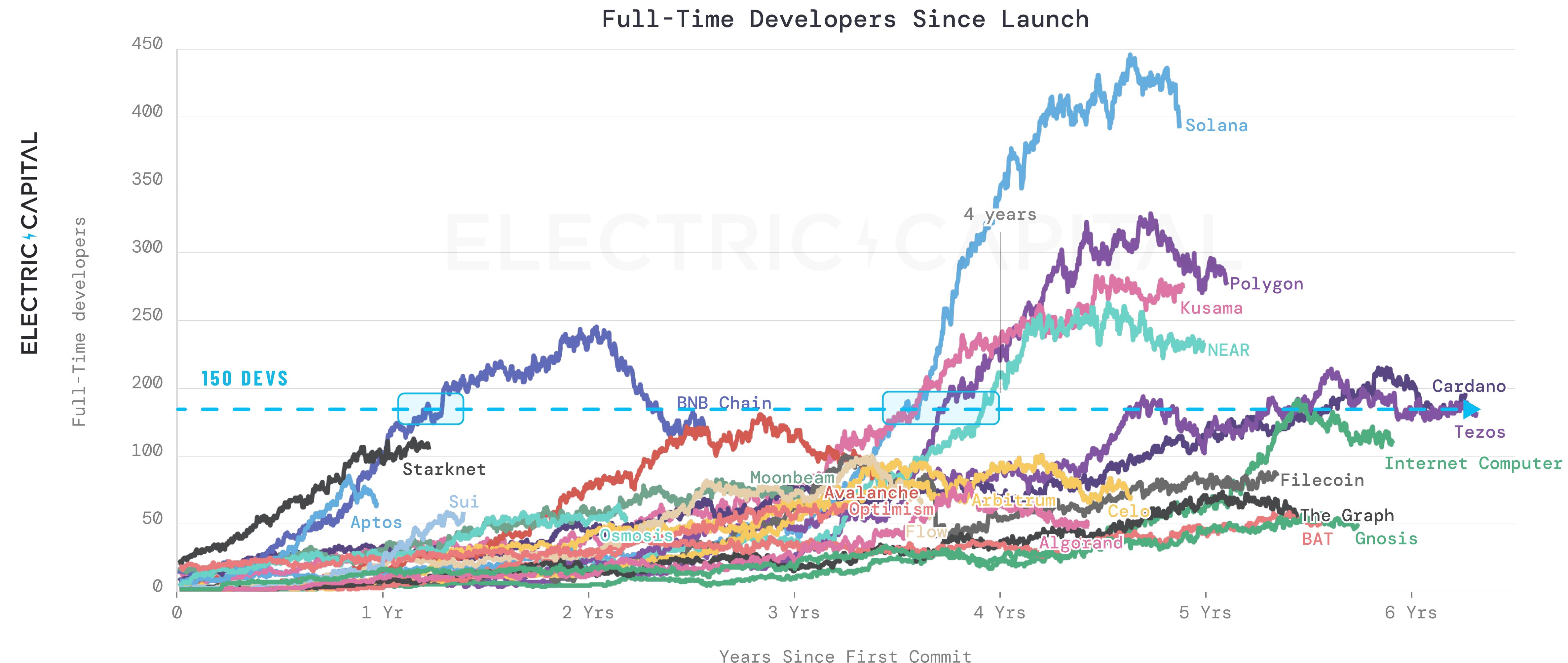


# NEXT, LET'S ZOOM IN ON EMERGING ECOSYSTEMS

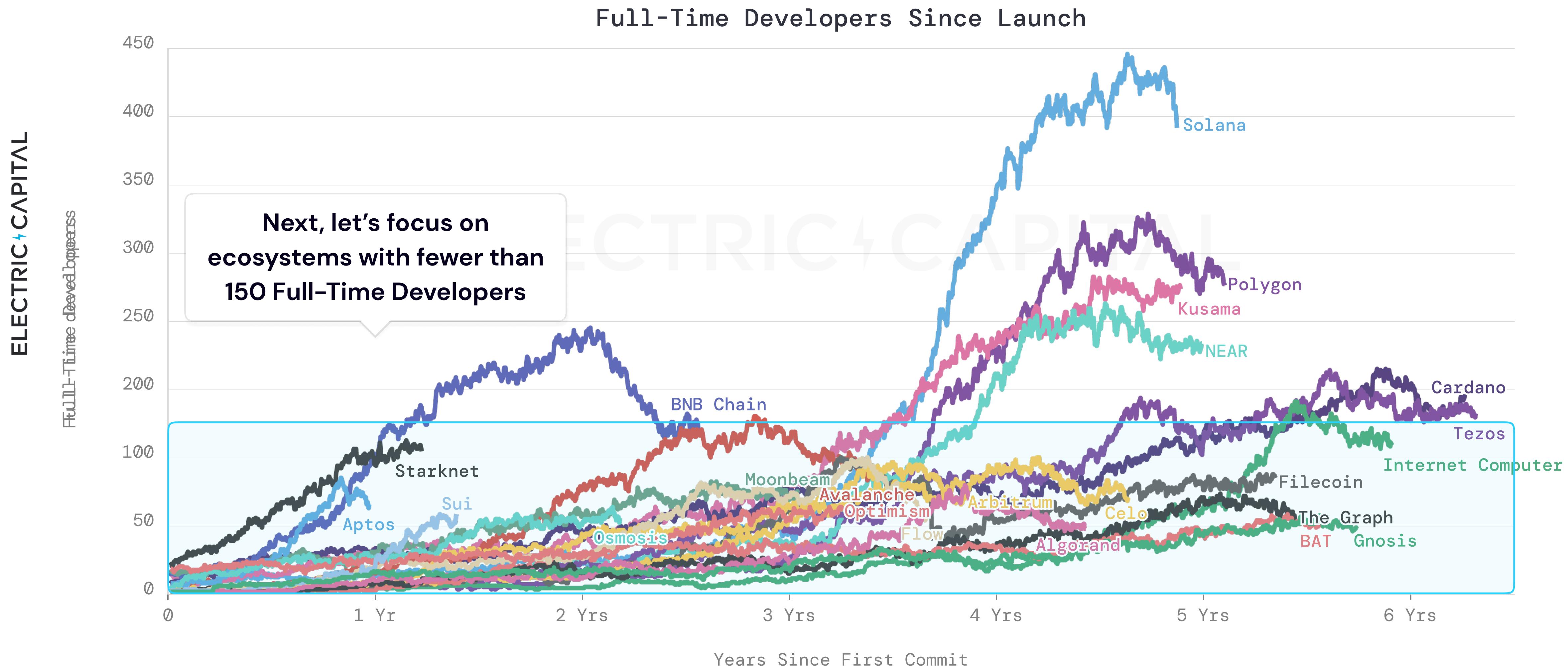


ZOOMING IN ON EMERGING ECOSYSTEMS...

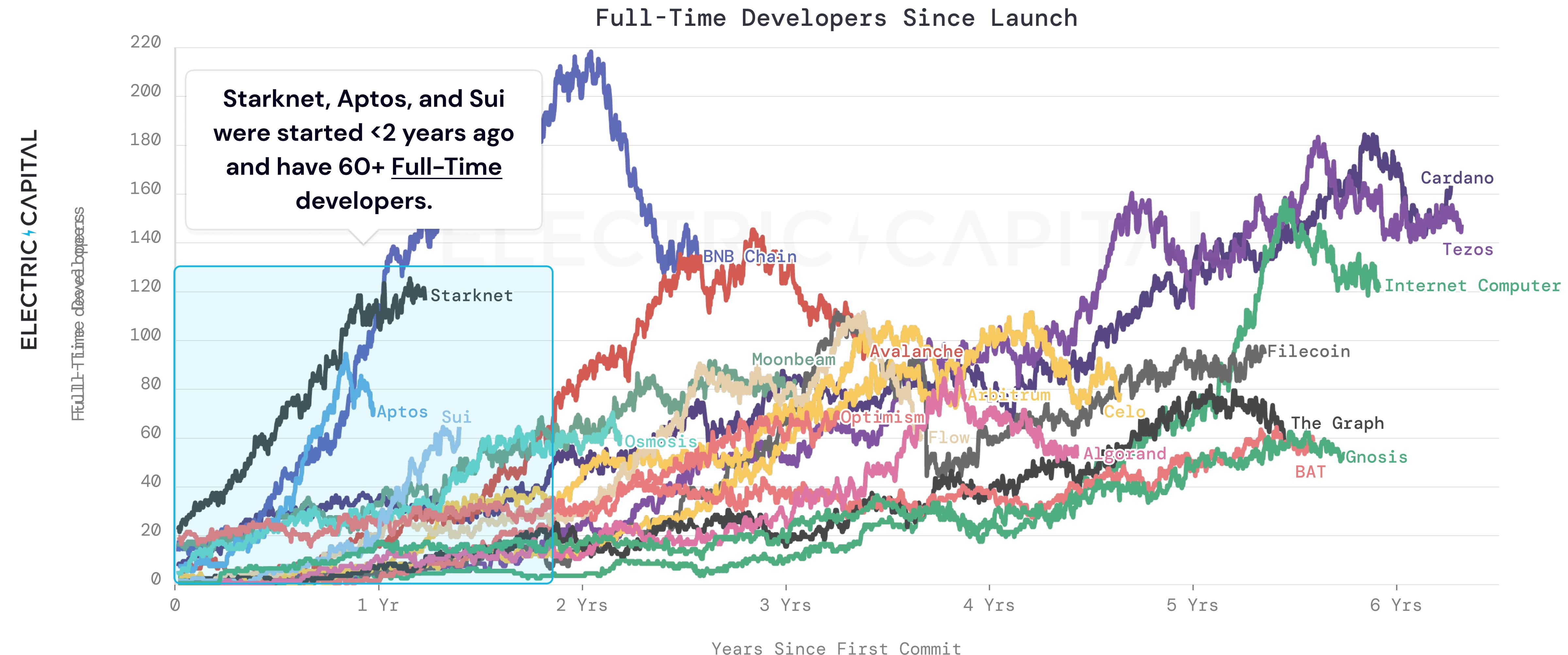
# SOLANA, POLYGON, KUSAMA, NEAR, & BNB TOOK FEWER THAN 4 YEARS TO GROW TO 150 FULL-TIME DEVS: THE FASTEST OF EMERGING ECOSYSTEMS



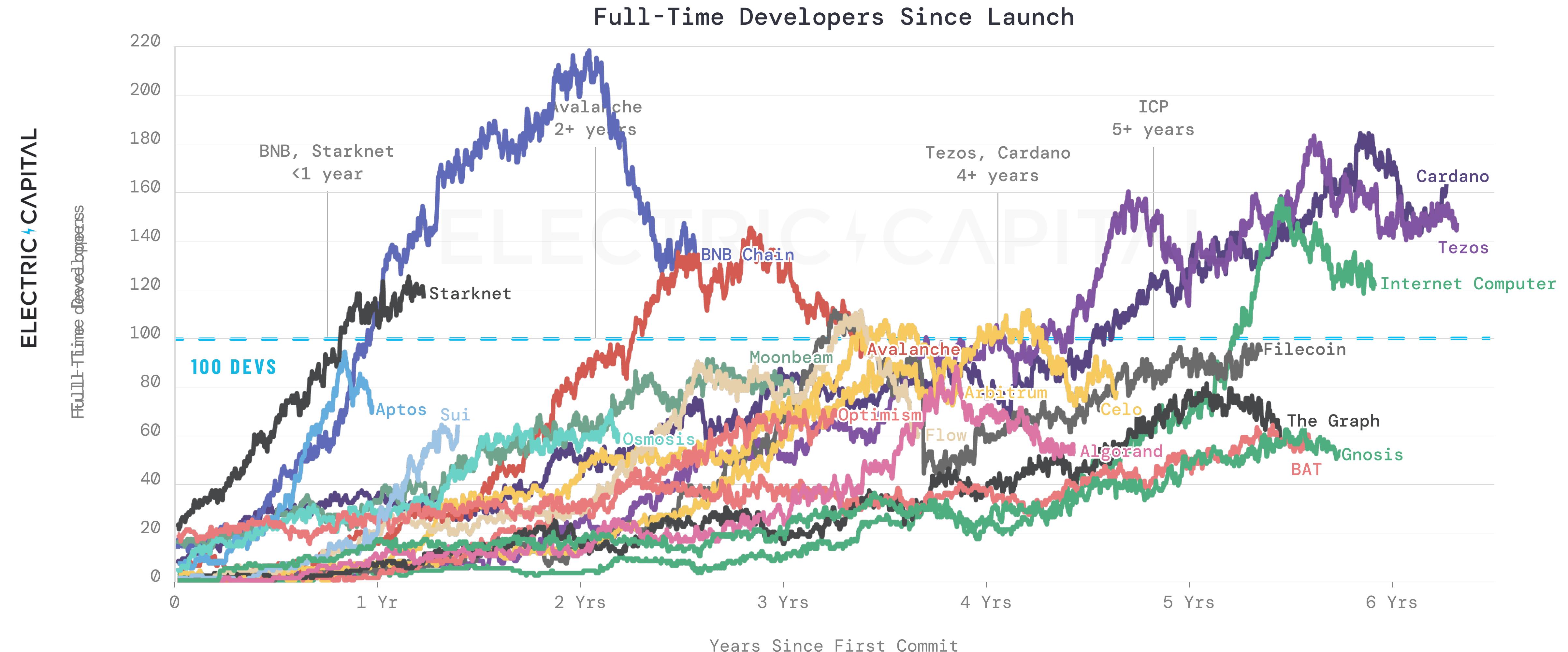
# LET'S FOCUS ON ECOSYSTEMS UNDER 150 FULL-TIME DEVELOPERS



# ECOSYSTEMS UNDER 2 YEARS OLD: STARKNET, APTOS, & SUI HAVE 60+ FULL-TIME DEVELOPERS; STARKNET HAS THE MOST AT ALMOST 120 FULL-TIME DEVELOPERS

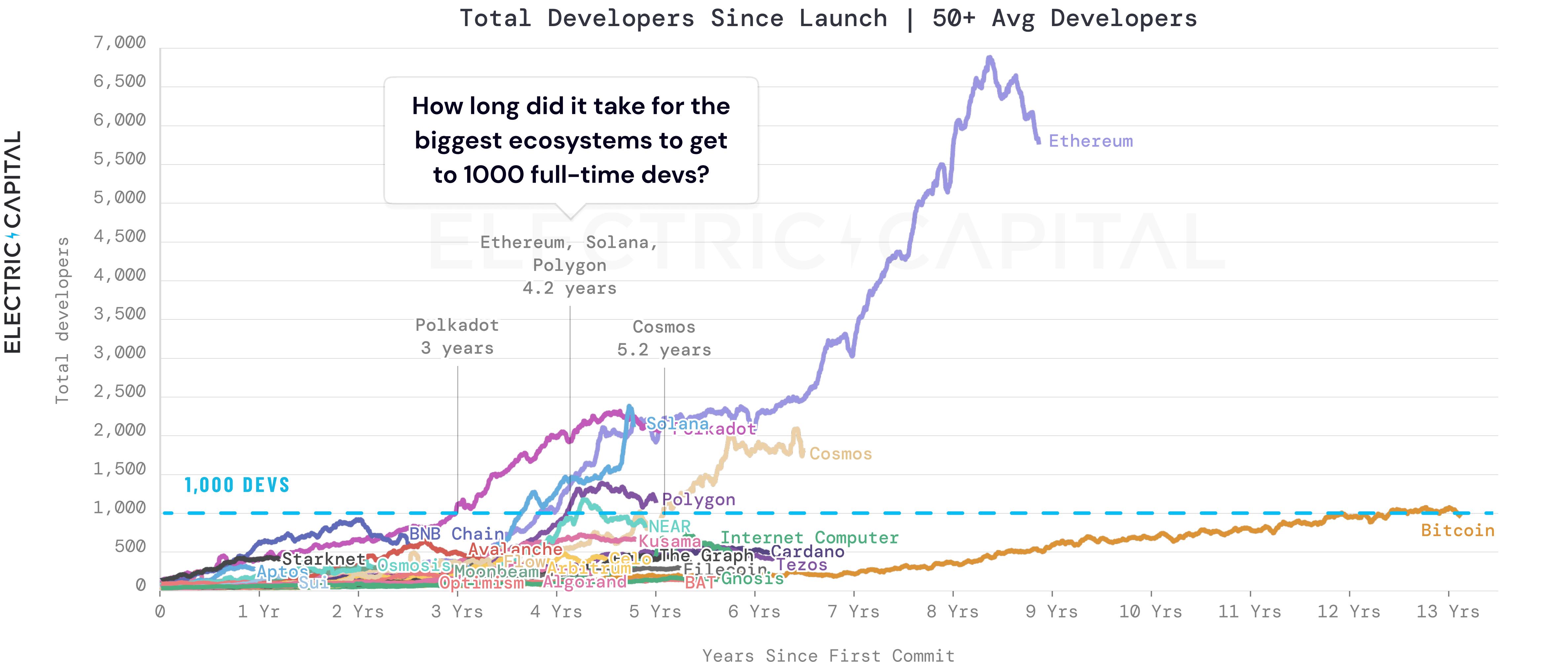


# STARKNET, BNB, AVALANCHE, CARDANO, TEZOS, & ICP TOOK DIFFERENT PATHS TO GROW TO 100+ FULL-TIME DEVELOPERS

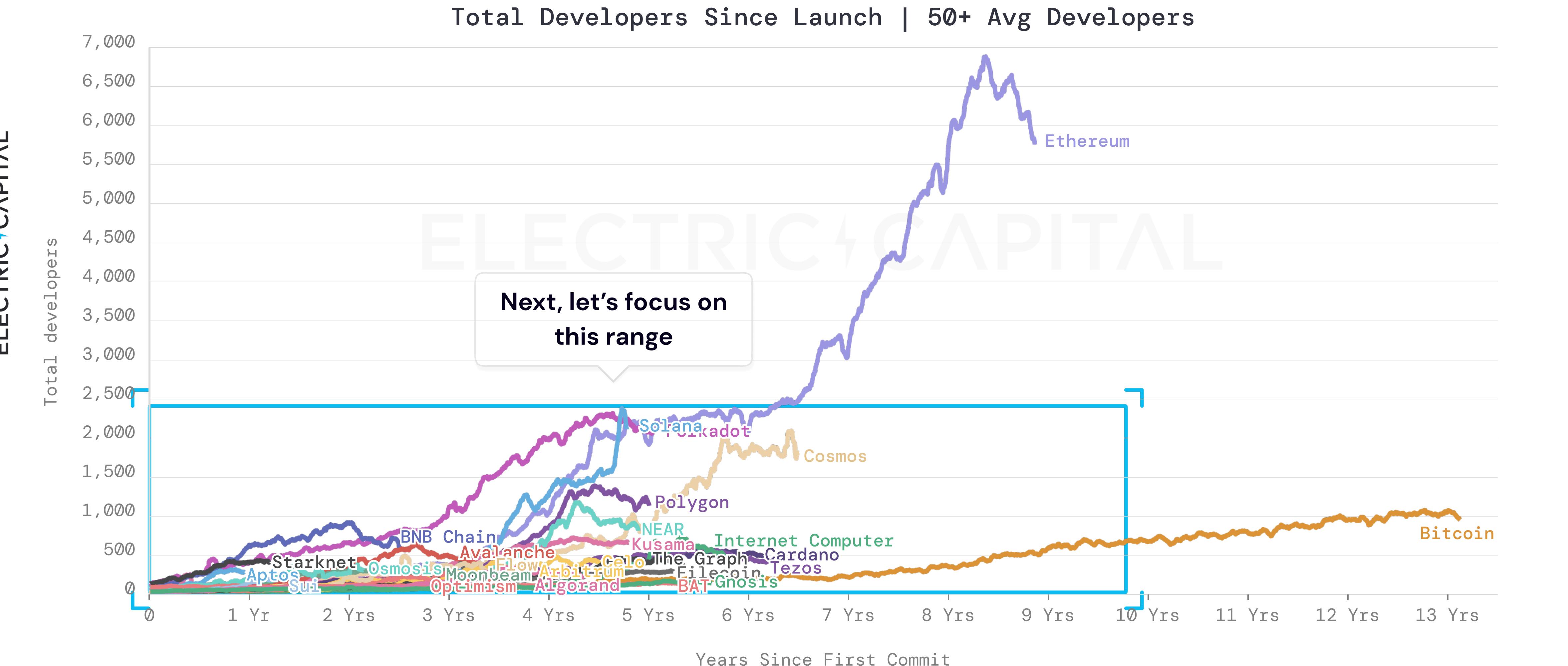


WHAT ABOUT TOTAL DEVELOPERS  
(FULL-TIME + PART-TIME + ONE-TIME)  
ACROSS THESE ECOSYSTEMS?

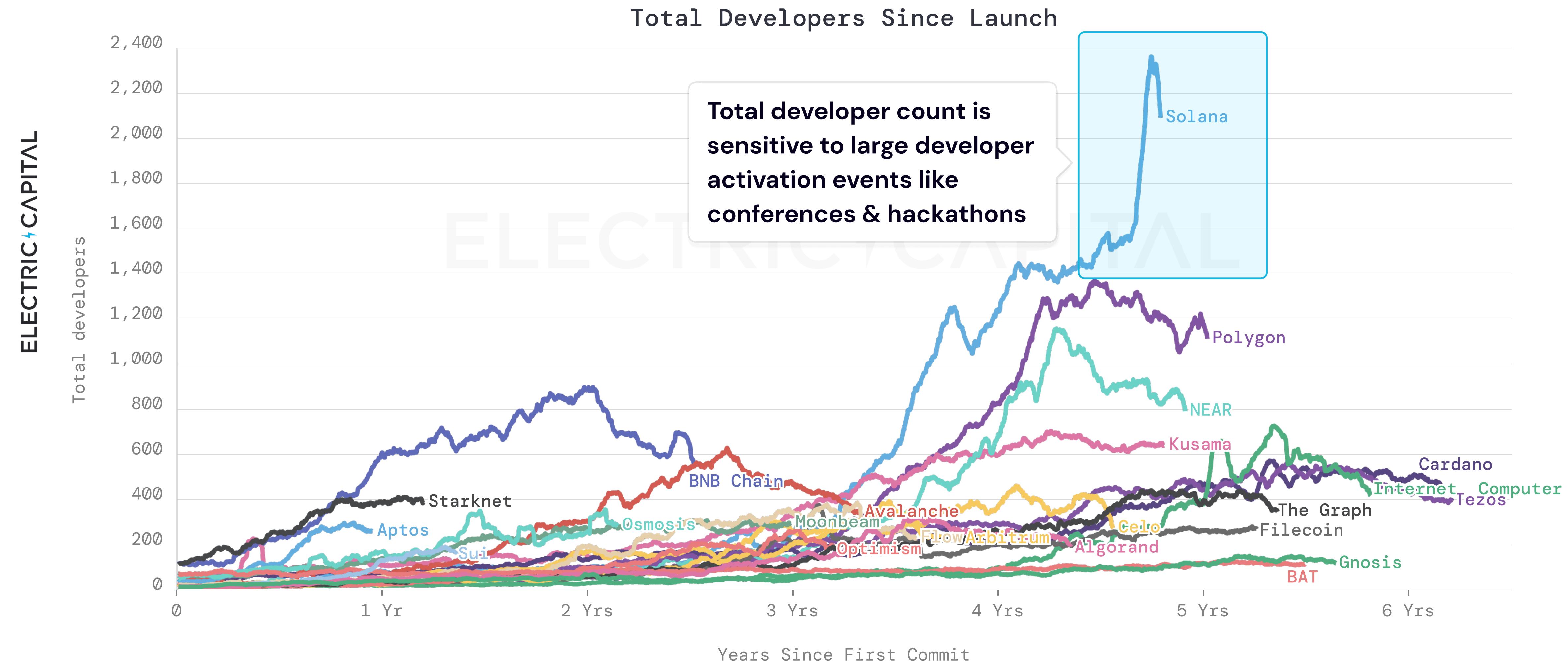
# ETHEREUM, POLKADOT, SOLANA, POLYGON & COSMOS TOOK DIFFERENT PATHS TO GROW TO 1000+ TOTAL DEVELOPERS



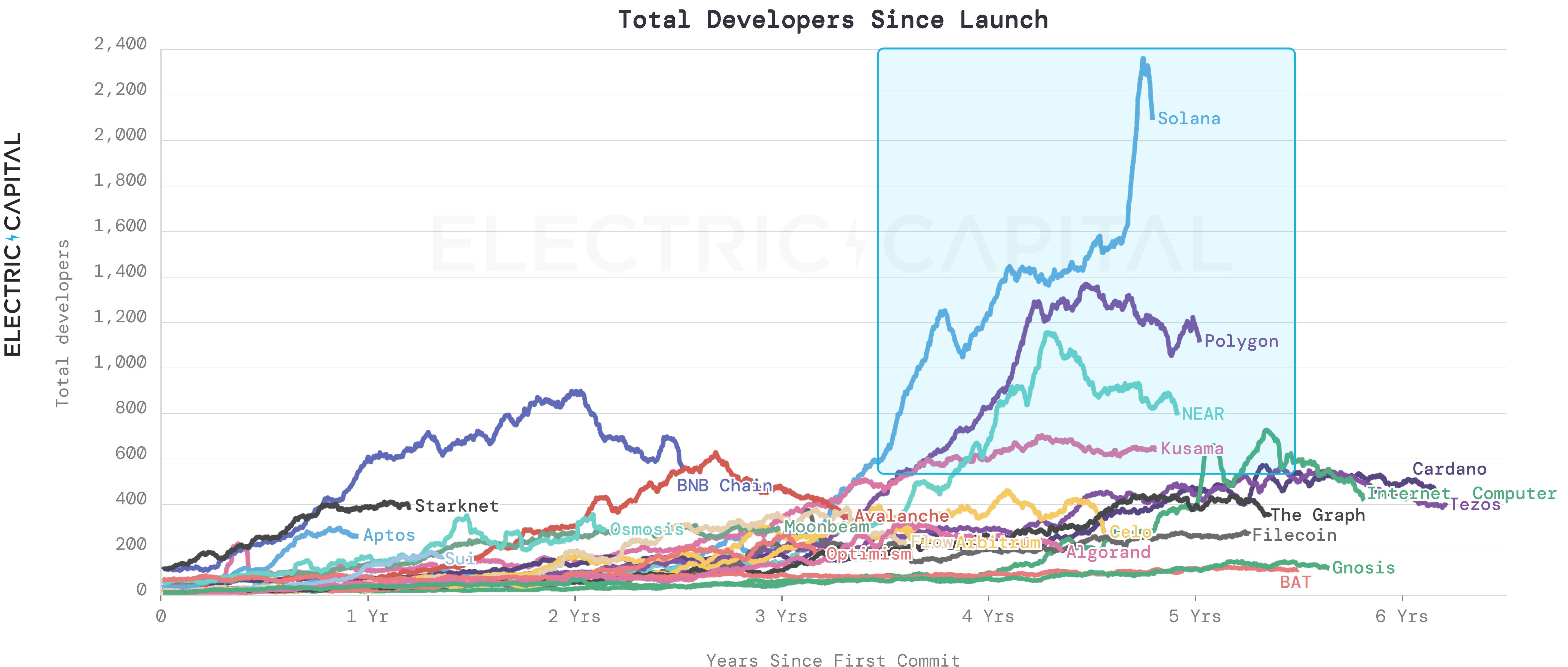
# LET'S FOCUS ON EMERGING ECOSYSTEMS



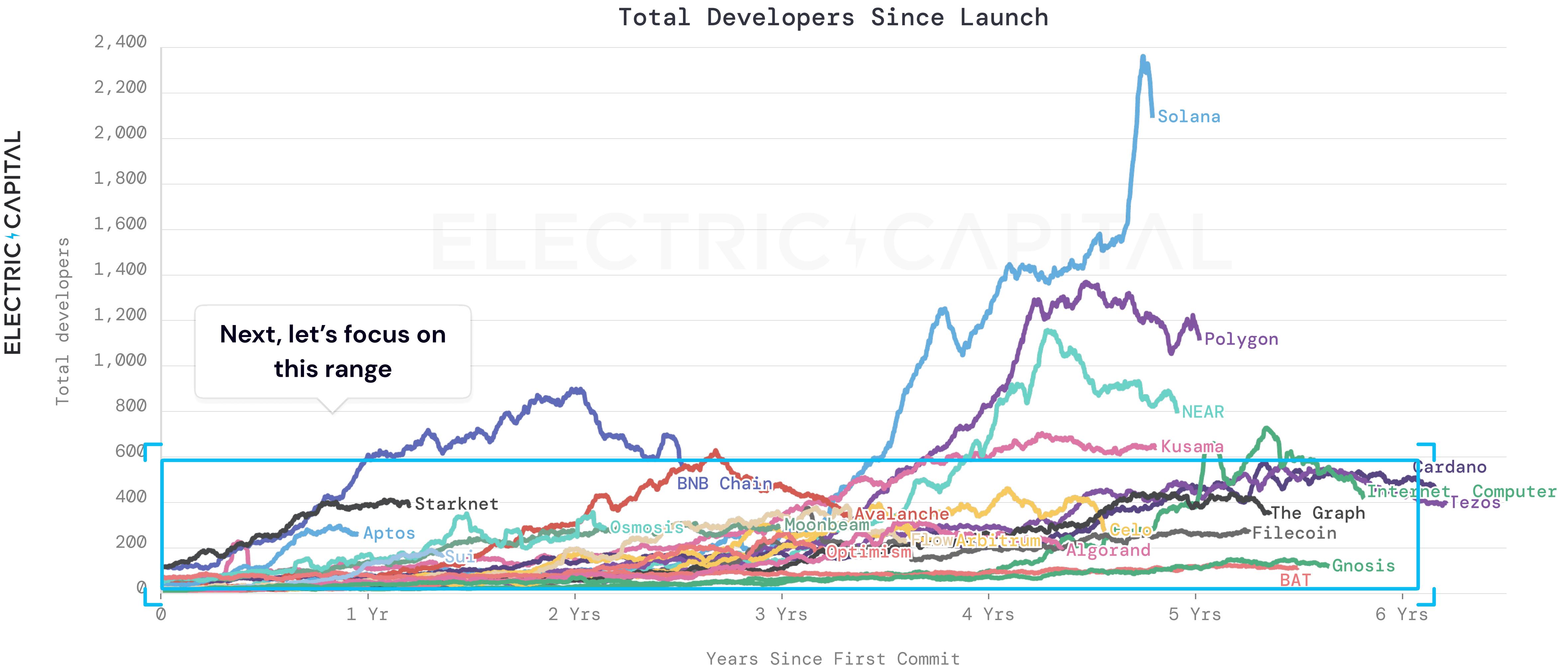
# SOLANA SPIKED TO 2000+ TOTAL DEVS IN NOV 2022, DURING BREAKPOINT & WITH HACKATHON ACTIVITY. THIS IS WHY FULL-TIME DEVS IS A CRITICAL METRIC



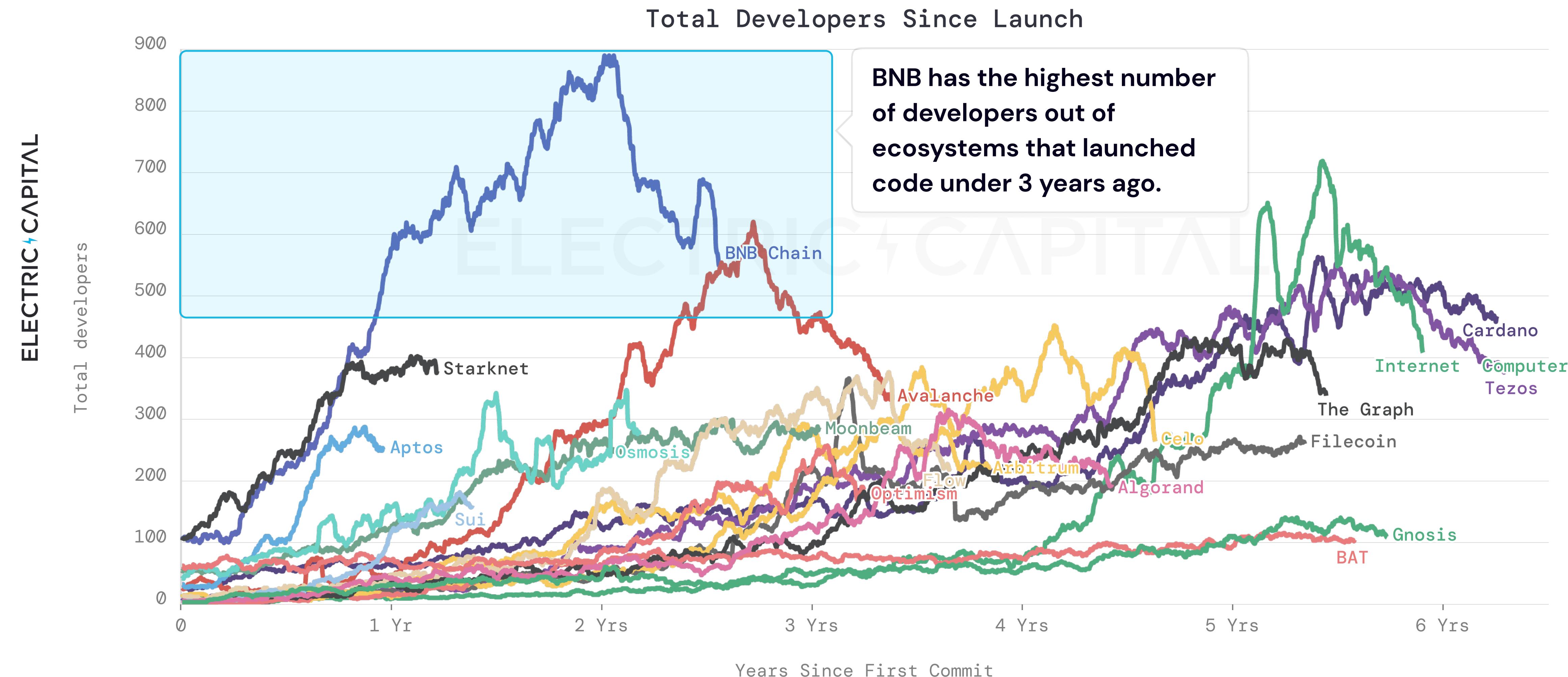
# SOLANA, POLYGON, NEAR, & KUSAMA HAVE THE MOST TOTAL DEVS (600+)



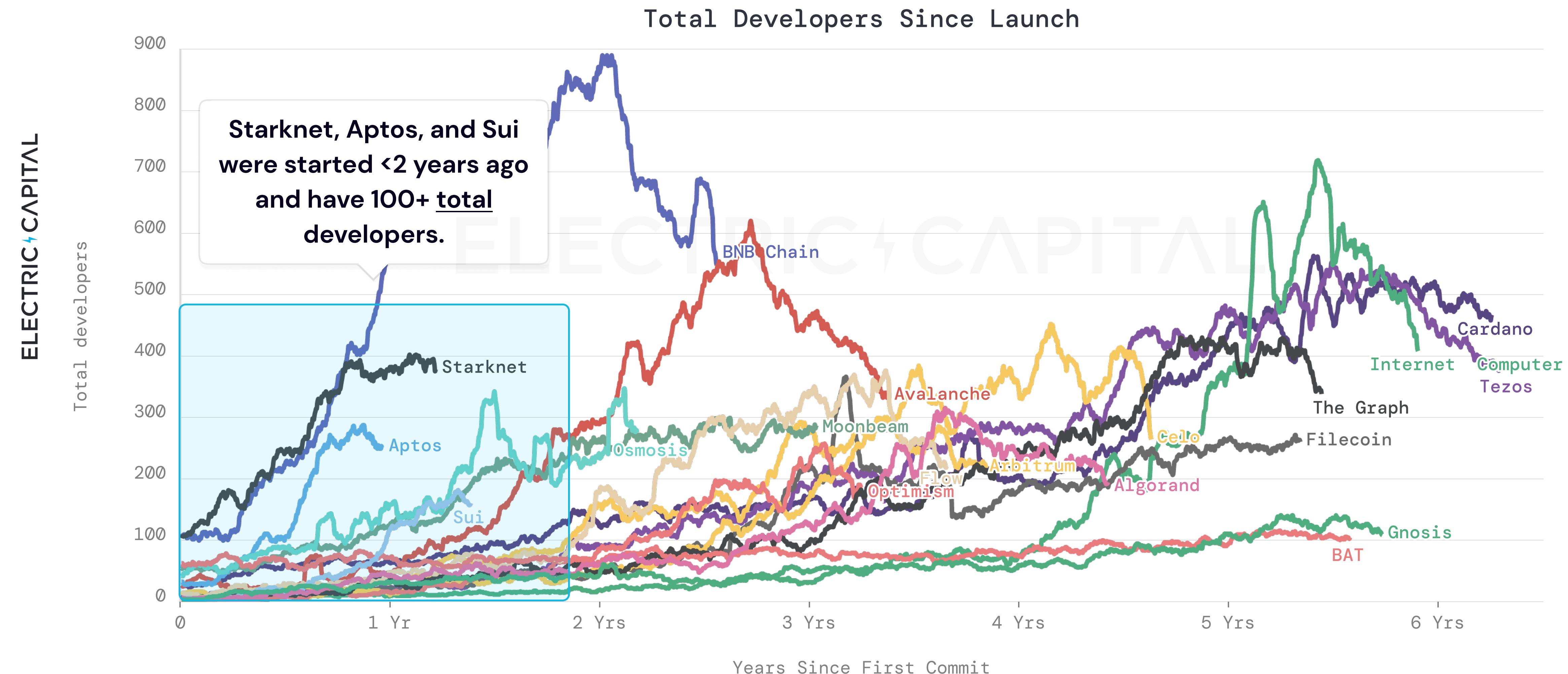
# LET'S FOCUS ON EMERGING ECOSYSTEMS WITH UNDER 600 TOTAL DEVELOPERS



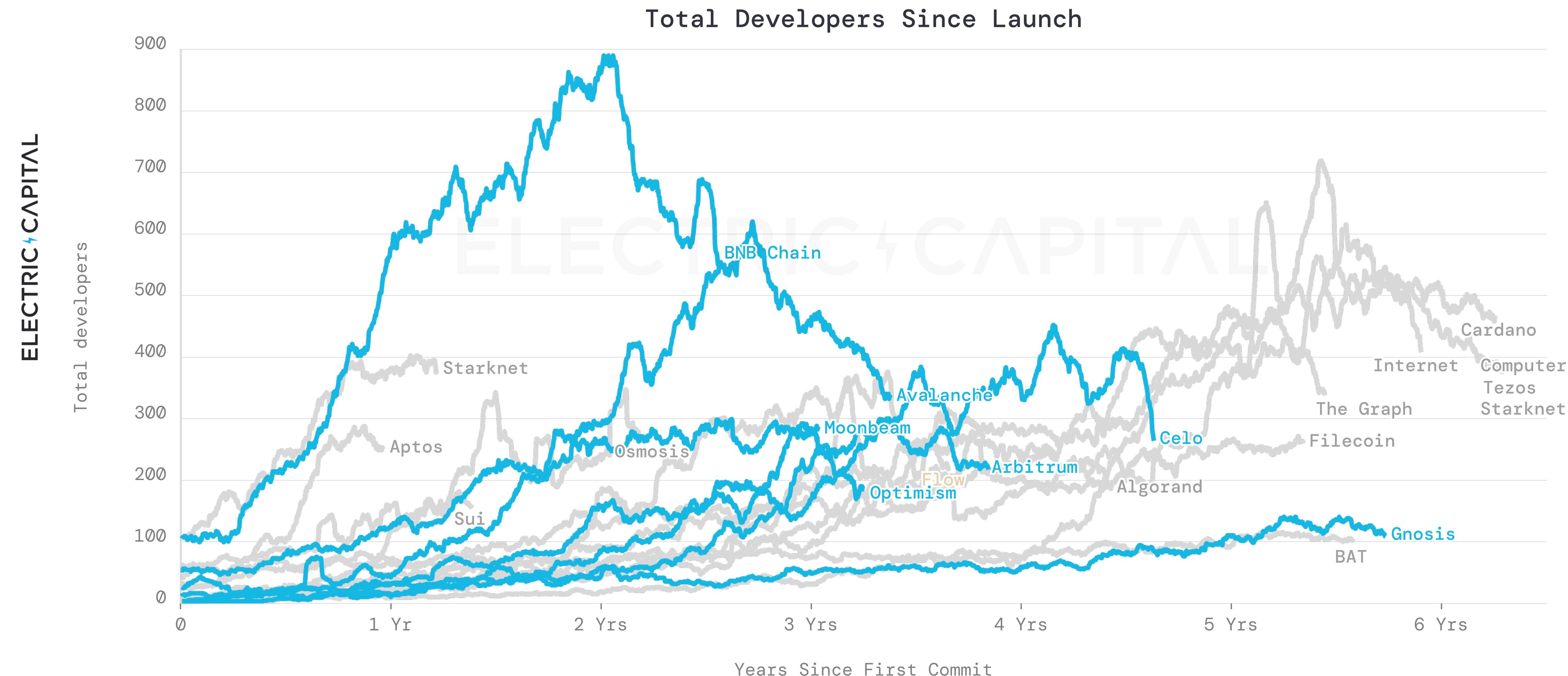
# BNB HAS THE MOST TOTAL DEVELOPERS FOR PROJECTS UNDER 3 YEARS OLD, DESPITE ITS RECENT DECLINE IN DEVELOPERS



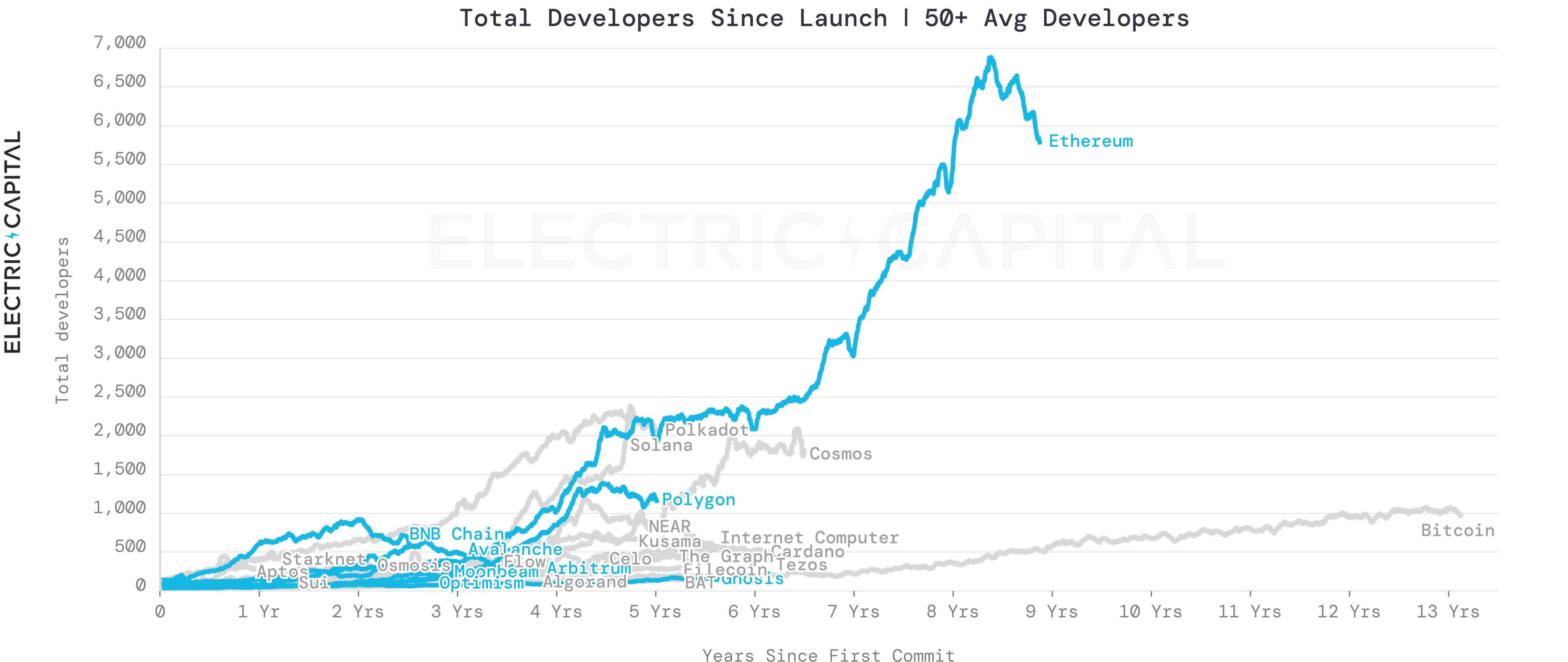
# ECOSYSTEMS UNDER 2 YEARS OLD: STARKNET, APTOS, & SUI HAVE 100+ TOTAL DEVELOPERS; STARKNET HAS THE MOST AT ALMOST 400 TOTAL DEVS



# MANY OF THE TOP EMERGING ECOSYSTEMS ARE EVM-COMPATIBLE: BNB, AVALANCHE, MOONBEAM, ARBITRUM, OPTIMISM, CELO, & GNOSIS

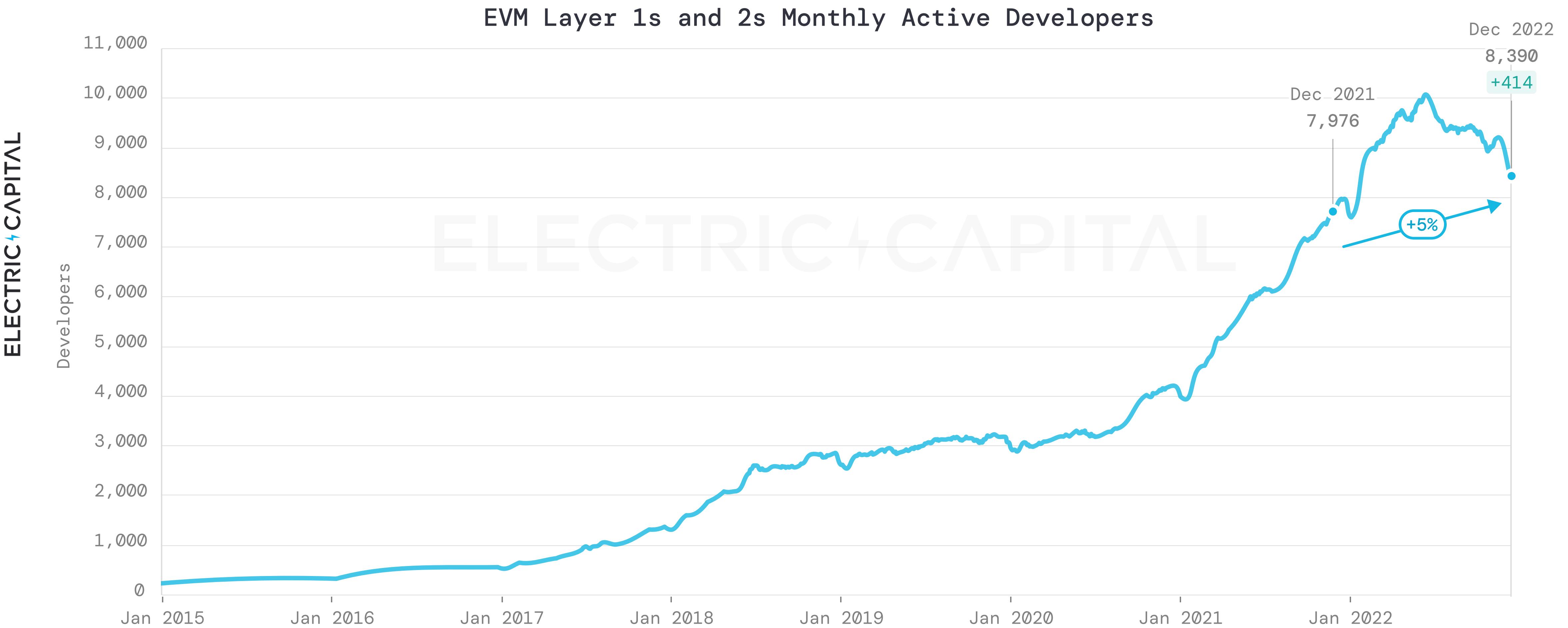


# ZOOMING BACK OUT...EMV-COMPATIBLE ECOSYSTEMS ARE 37% OF ALL ECOSYSTEMS WITH 50+ FULL-TIME DEVS

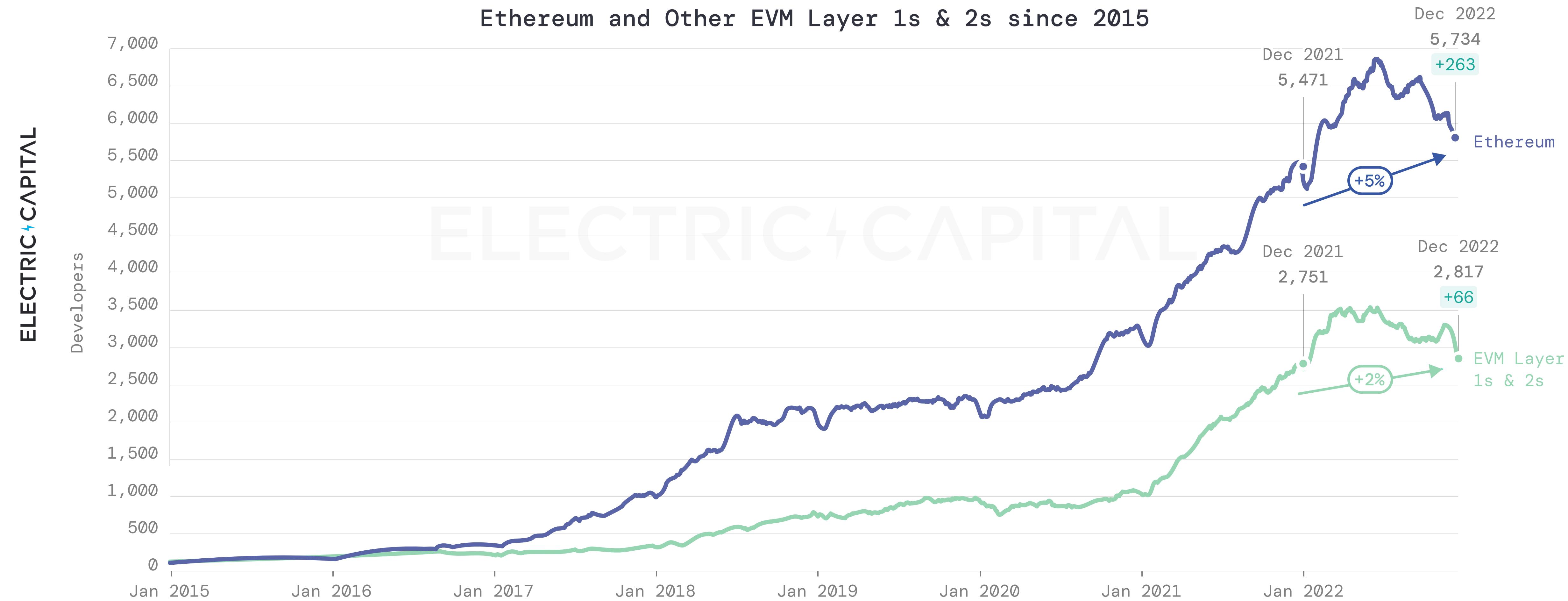


ETHEREUM VIRTUAL MACHINE HAS EMERGED AS A CORE TECHNOLOGY.  
LET'S LOOK AT EVM-COMPATIBLE LAYER-1 AND LAYER-2 CHAINS...

# ACROSS EVM CHAINS: +414 MONTHLY TOTAL DEVELOPERS; +5% YEAR OVER YEAR



# ETHEREUM GREW BY +5% YEAR OVER YEAR; EVM-COMPATIBLE LAYER-1S AND L2S OUTSIDE ETHEREUM GREW BY +2%

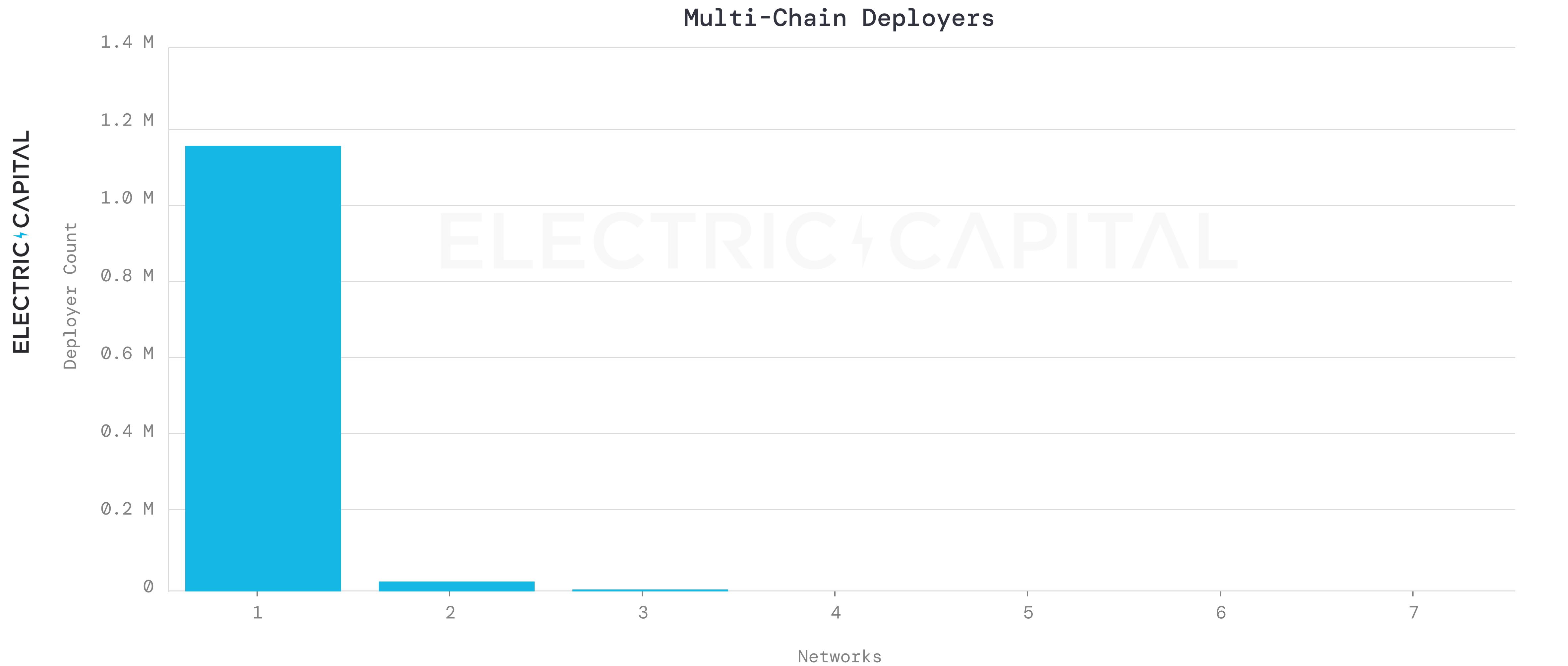


Some Developers work across EVM Layer-1s and Ethereum. The sum of these two lines will be greater than total developers in EVM-compatible chains.

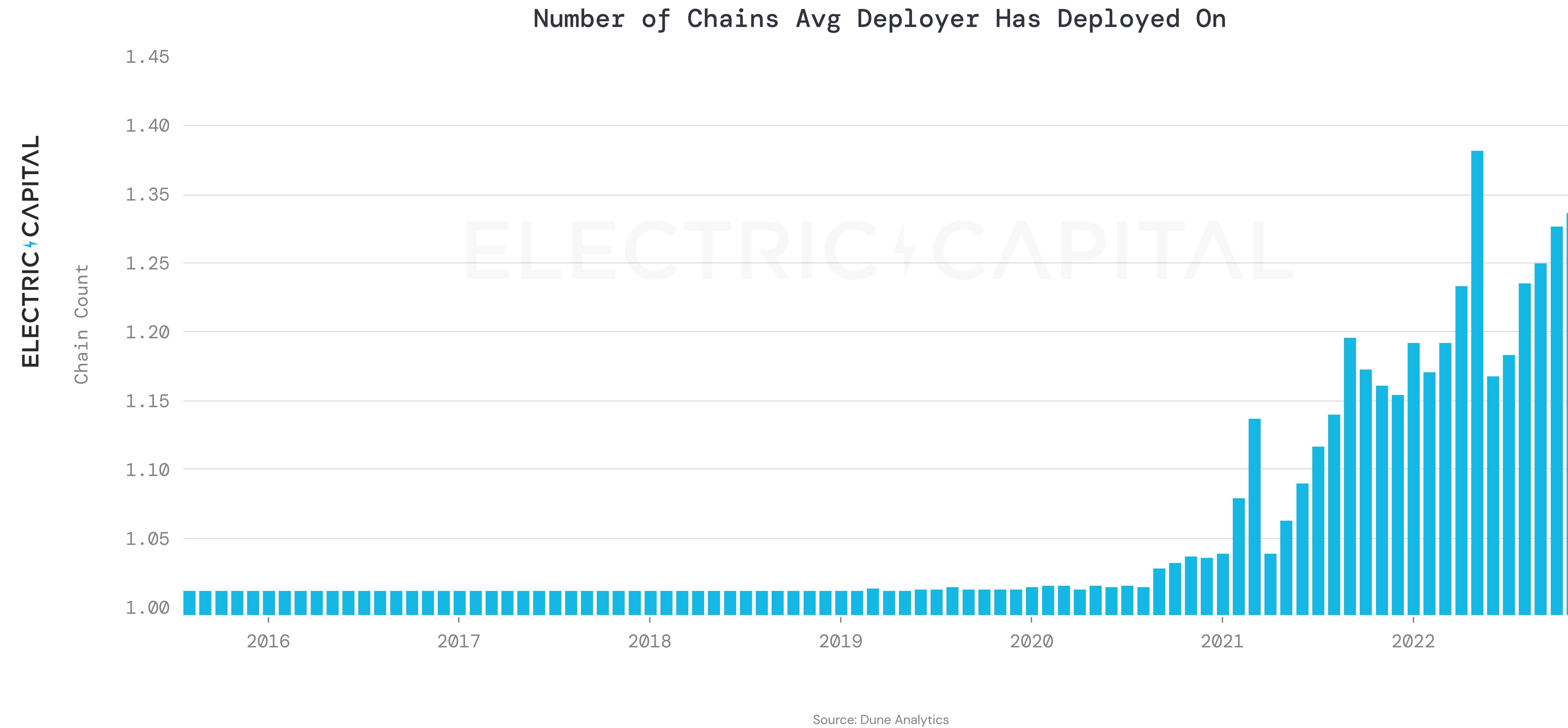
DO DEVELOPERS IN EVM-COMPATIBLE ECOSYSTEMS  
STAY IN ONE ECOSYSTEM OR WORK ACROSS MULTIPLE?

LET'S TAKE A LOOK AT CONTRACT DEPLOYMENTS  
ON CHAIN...

# ACROSS EVM ECOSYSTEMS: MOST ACCOUNTS ONLY DEPLOY CONTRACTS TO ONE CHAIN...



...BUT THE AVERAGE NUMBER OF CHAINS THE DEPLOYER HAS DEPLOYED ON HAS INCREASED OVER TIME



HOW CAN WE ACCOUNT FOR THE DEVELOPERS WORKING  
ACROSS MULTIPLE CHAINS?

# ECOSYSTEMS MAY INCLUDE MULTI-CHAIN DEVELOPERS

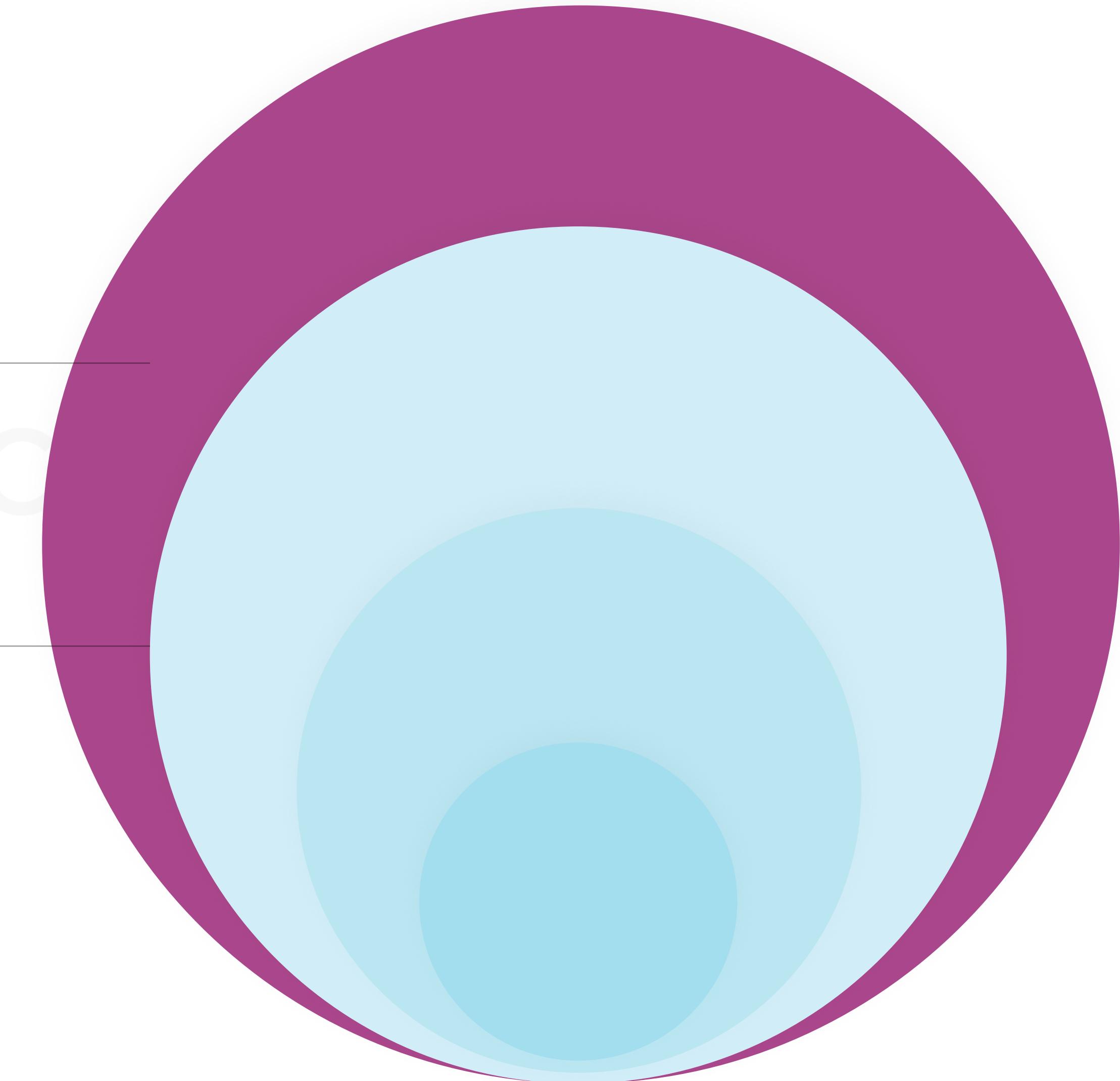
ELECTRIC<sup>+</sup>CAPITAL

## Multi-Chain Developers

Developers work on applications that are deployed across multiple ecosystems

## Primary Developers

Developers working exclusively on an ecosystem



# MULTI-ECOSYSTEM EXAMPLE: SUSHI

Many applications like Sushi build on Optimism and also build in other ecosystems. Sushi is part of Optimism's multi-chain community.

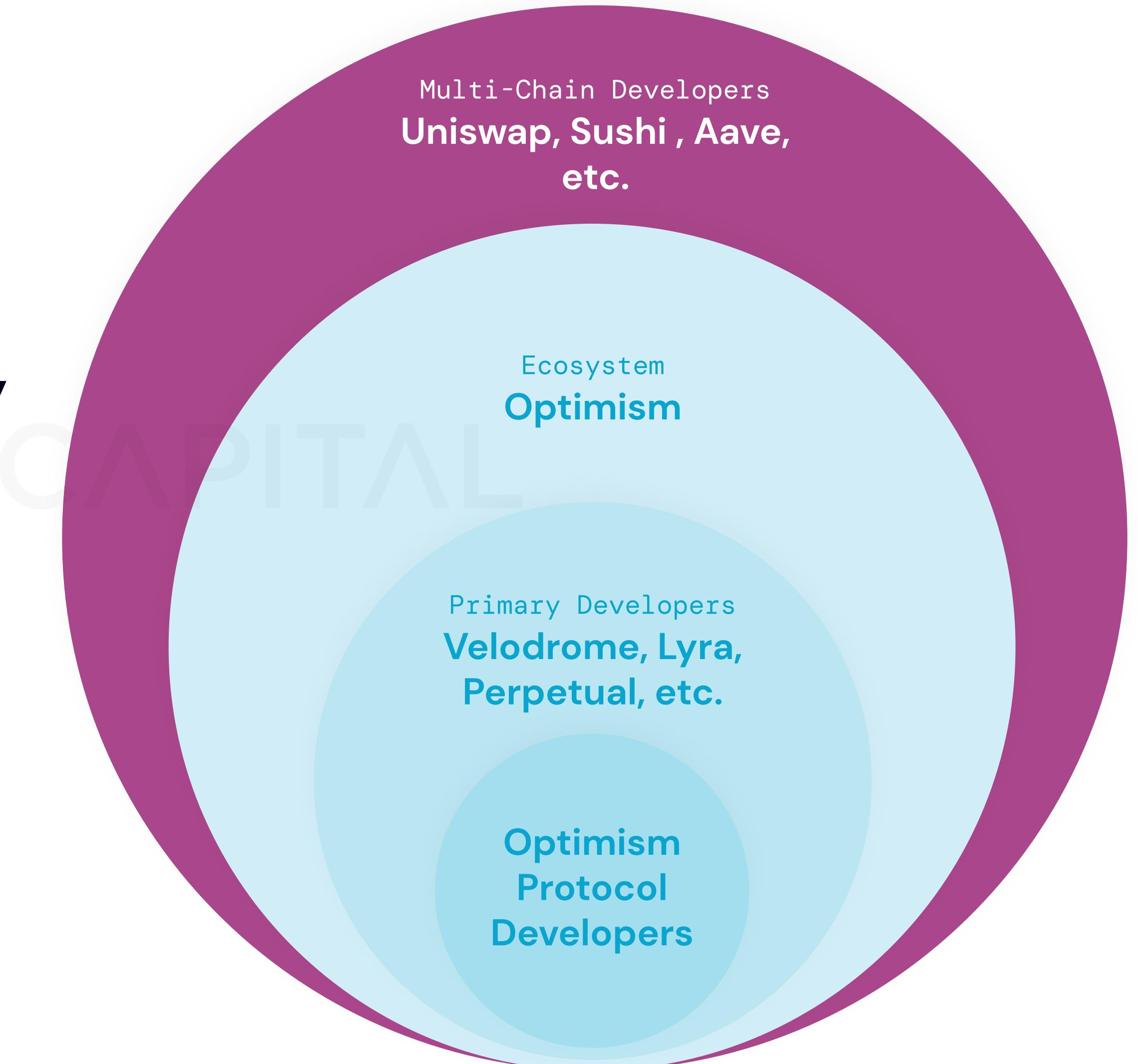
ELECTRIC+CAPITAL

## Optimism Community

- Velodrome
- Lyra
- Perpetual Protocol
- Sonne Finance

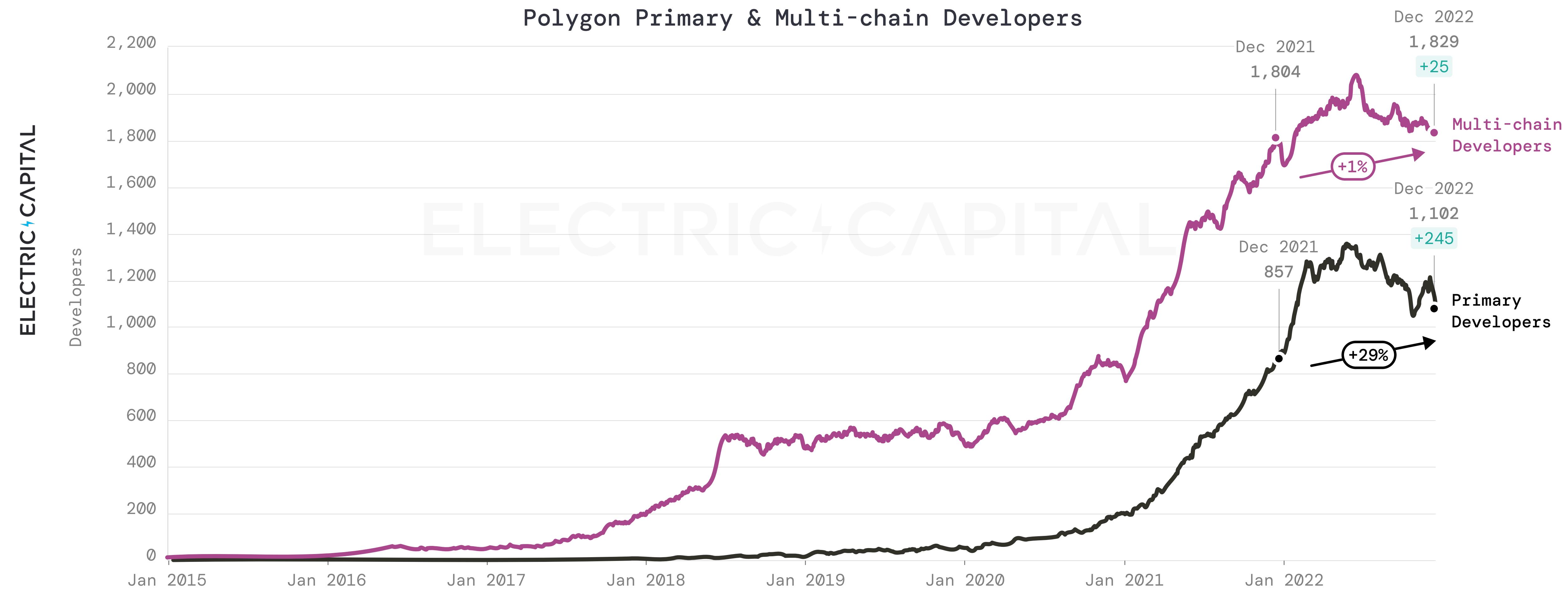
## Multi-Chain Community

- Uniswap
- Sushi
- Aave
- Curve

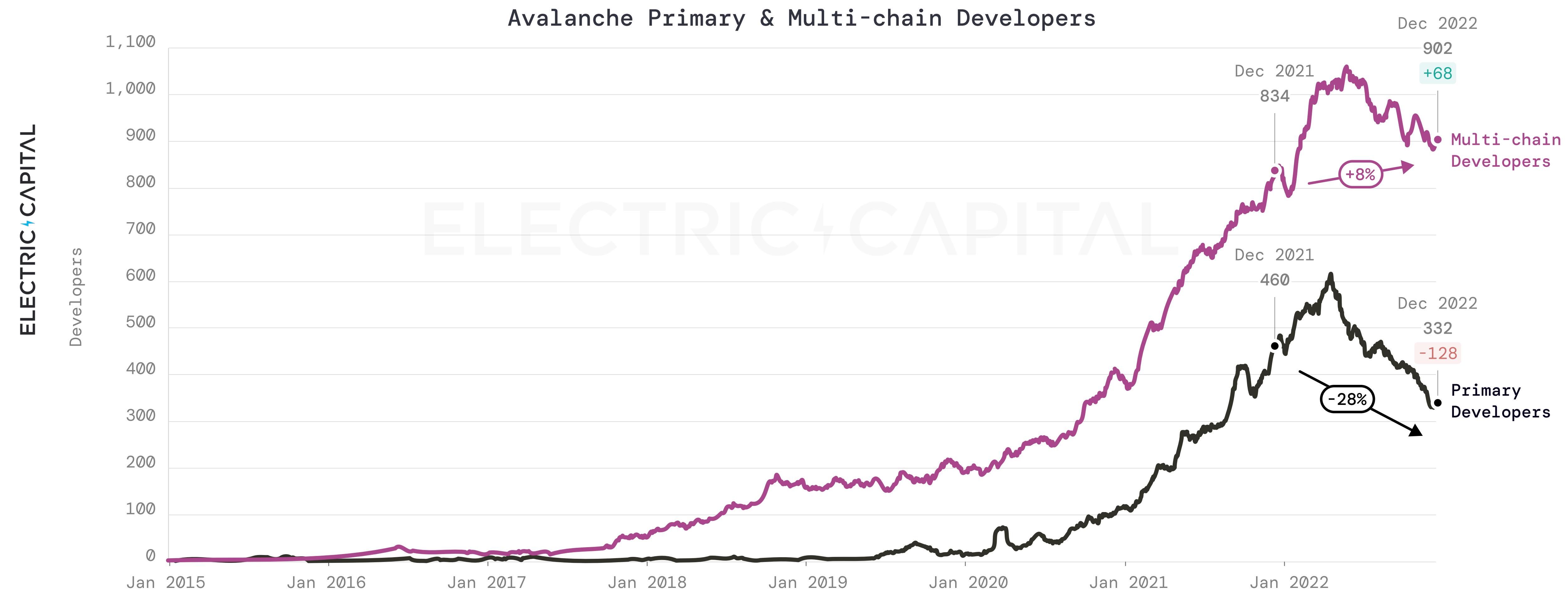


HOW ARE MULTI-CHAIN DEVS GROWING  
IN COMPARISON TO PRIMARY DEVS?

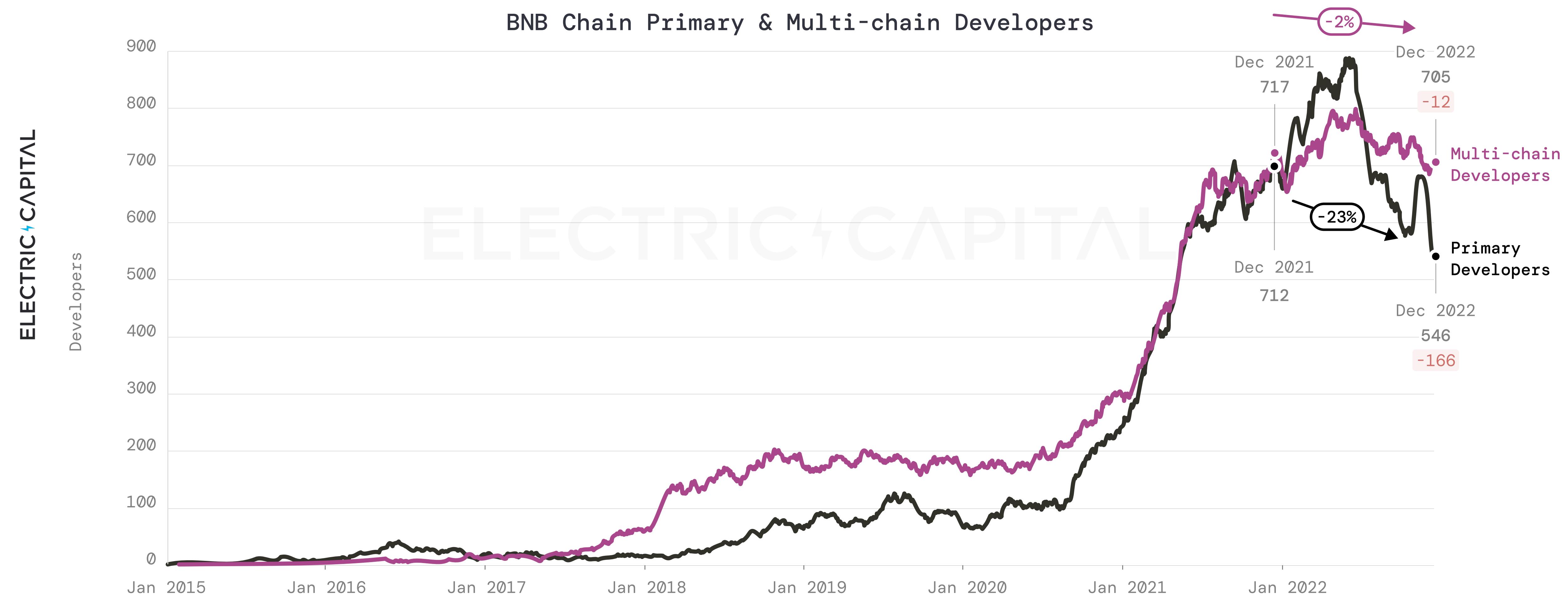
# POLYGON PRIMARY DEVELOPER GROWTH (+29%) OUTPACES THE GROWTH OF MULTI-CHAIN DEVELOPERS BUILDING ON POLYGON (+1%) YEAR OVER YEAR



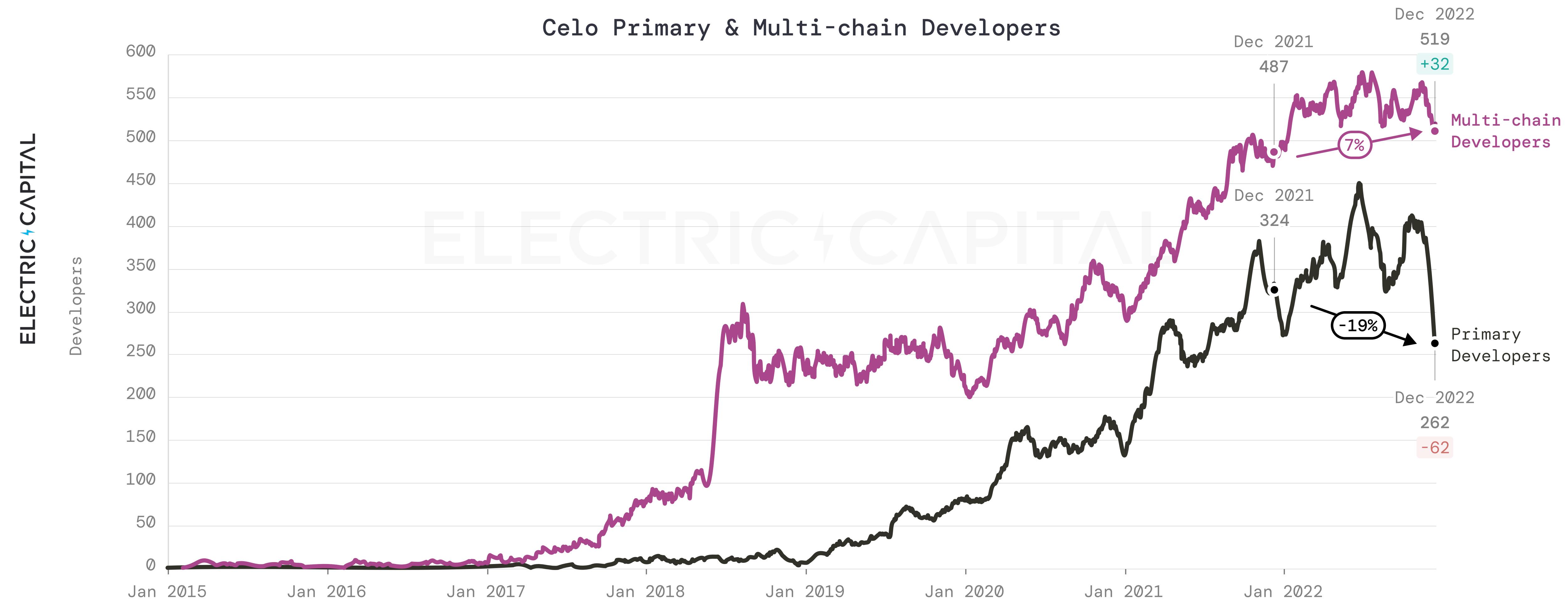
# AVALANCHE LOST PRIMARY DEVELOPERS (-28%) WHILE MULTI-CHAIN DEVELOPERS BUILDING ON AVALANCHE GREW (+8%)



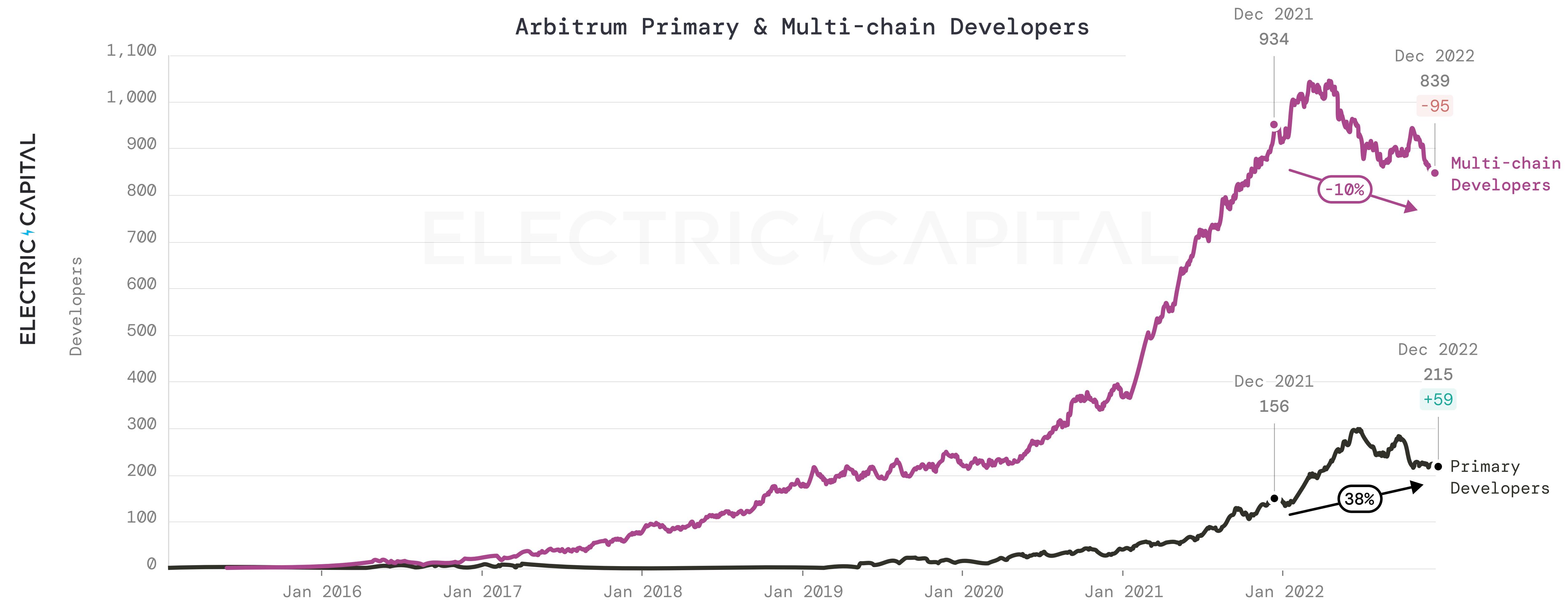
# BNB CHAIN HAS STEADY MULTI-CHAIN DEVELOPERS DESPITE -23% DECREASE IN PRIMARY DEVELOPERS



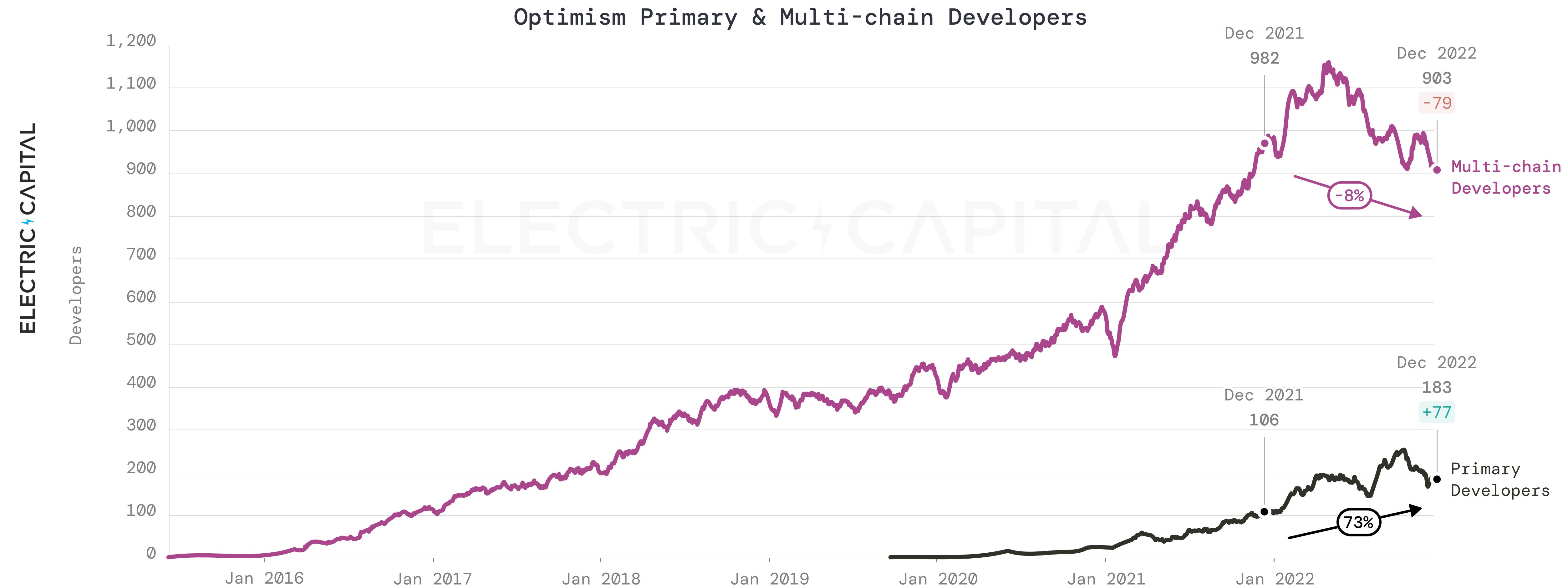
# CELO LOST PRIMARY DEVELOPERS (-19%) WHILE MULTI-CHAIN DEVELOPERS BUILDING ON CELO GREW (+7%)



# ARBITRUM HAS 4X MORE MULTI-CHAIN DEVS THAN PRIMARY DEVS; ARBITRUM GAINED PRIMARY DEVELOPERS (+38%) WHILE MULTI-CHAIN FELL (-10%)



# OPTIMISM HAS 5X MORE MULTI-CHAIN DEVELOPERS THAN PRIMARY DEVS; PRIMARY DEVELOPERS GREW (+73%) WHILE MULTI-CHAIN FELL (-8%)



03

# CRYPTO USE CASES

# WHICH TYPES OF CONTRACTS HAVE THE MOST USAGE? WE CAN LOOK AT THE TOP 10 CONTRACTS ON ETHEREUM AS A PROXY

Ethereum Top Gas Spenders 2022

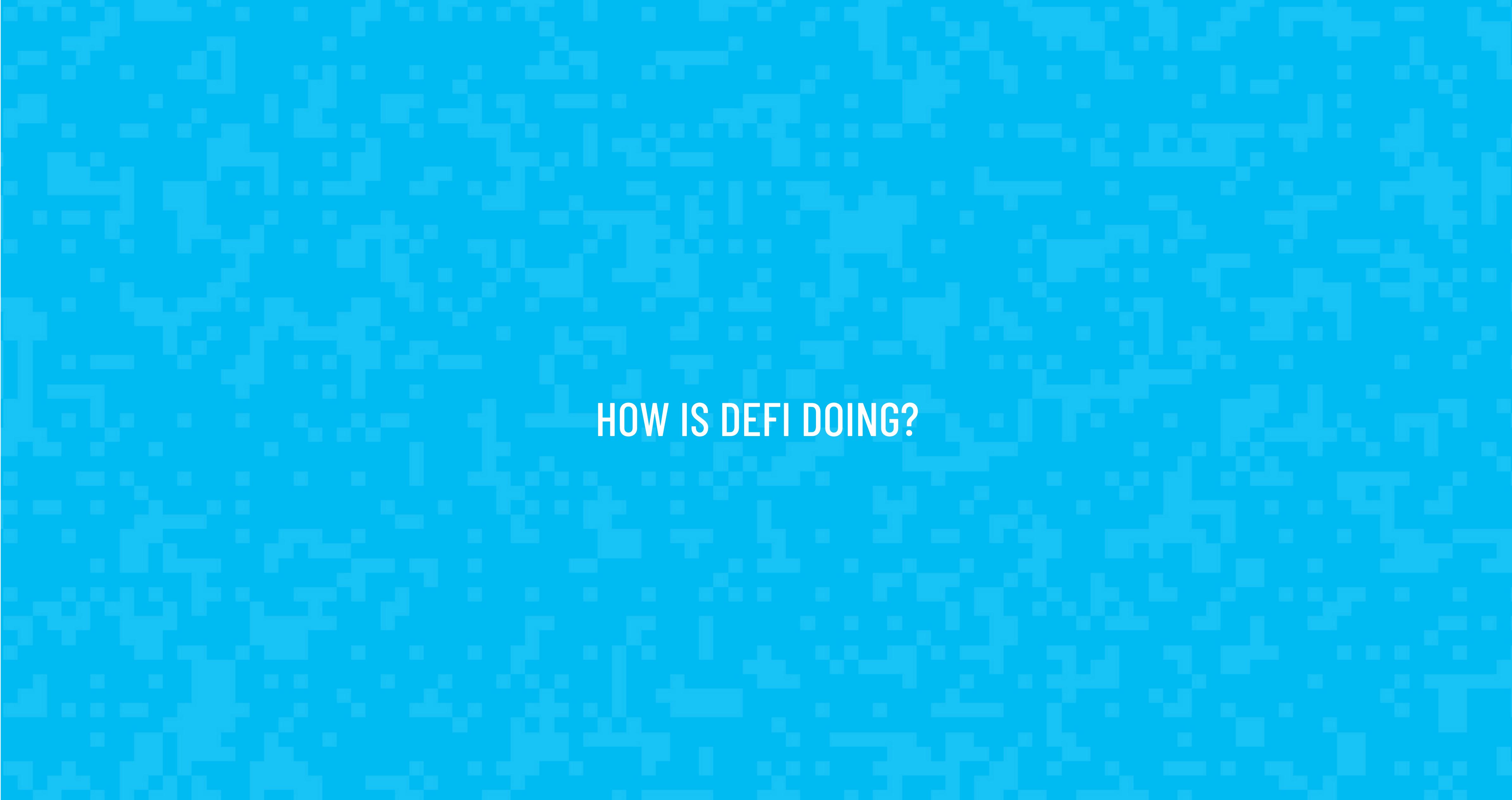
Contract	Total Gas Used
OpenSea	4,334,117,632,808
Uniswap	3,919,697,333,356
Tether USD	1,405,935,751,040
Metamask Swap	609,881,691,496
USD Coin	568,398,116,132
StrongBlock	536,836,567,423
Ethereum Name Service	512,870,655,513
CoinTool: XEN Batch Minter	500,994,713,214
1inch	481,029,227,108
XEN Crypto	406,036,682,483
Gem	388,856,356,641
Wrapped Ether	245,957,059,556
Coinbase	215,425,749,000
Optimism: Canonical Transaction Chain	189,456,150,997

Gas is the amount a user is willing to pay for a service on Ethereum.

# DEFI & NFTS ARE THE MOST POPULAR USE CASES: DEFI & NFTS CONTRACTS ARE 7 OF THE TOP 10 CONTRACTS BY GAS USAGE

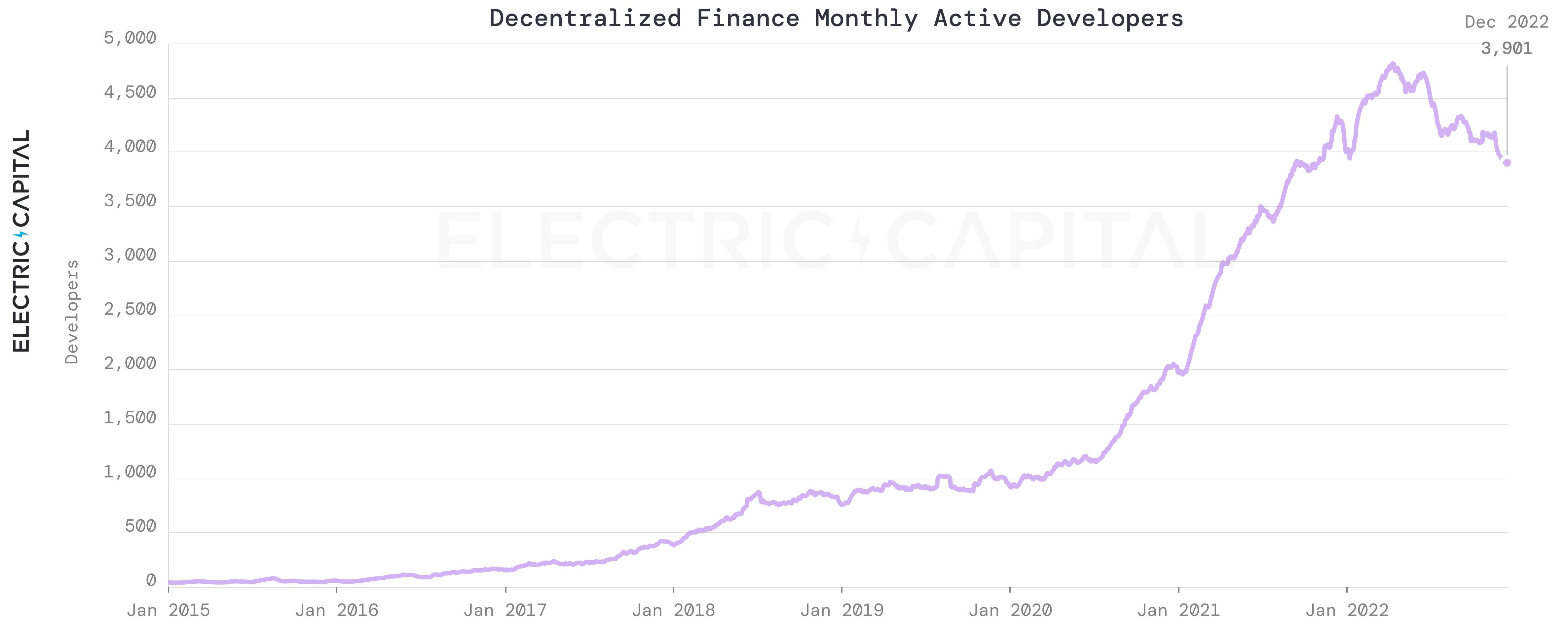
## Ethereum Top Gas Spenders 2022

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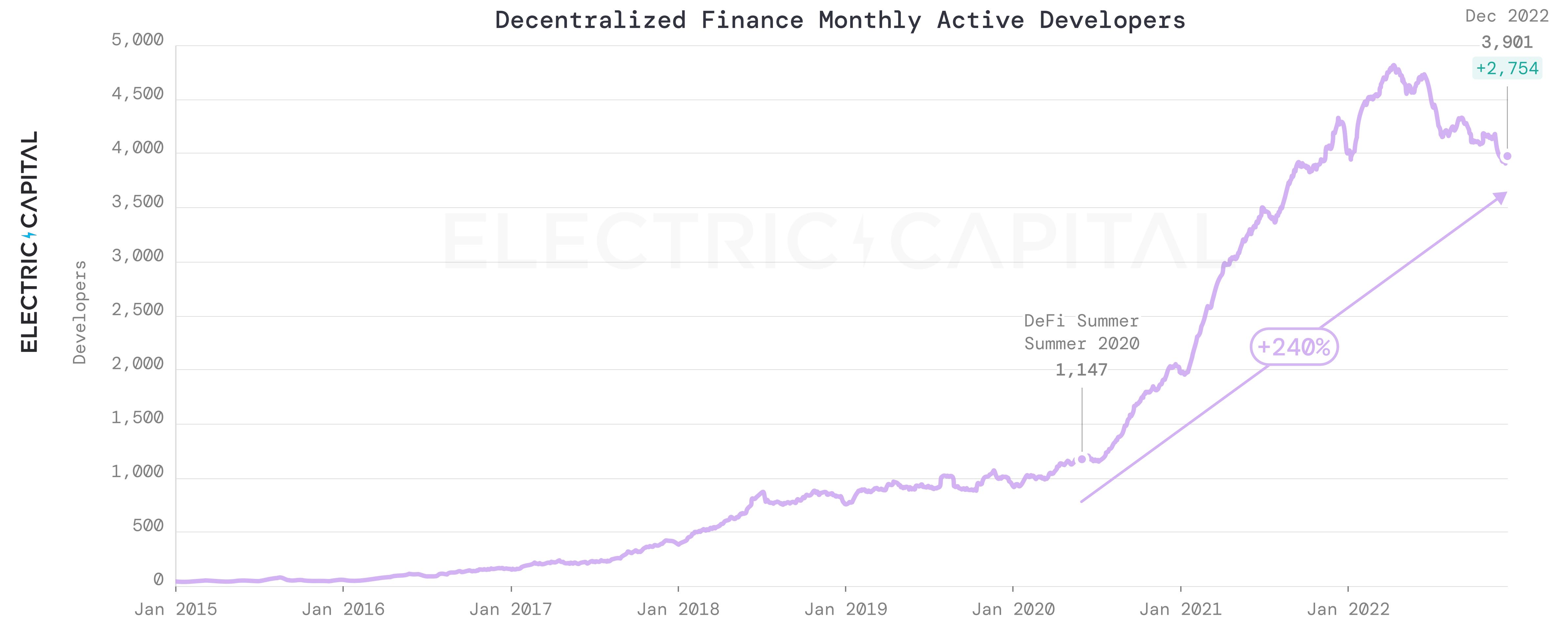


HOW IS DEFI DOING?

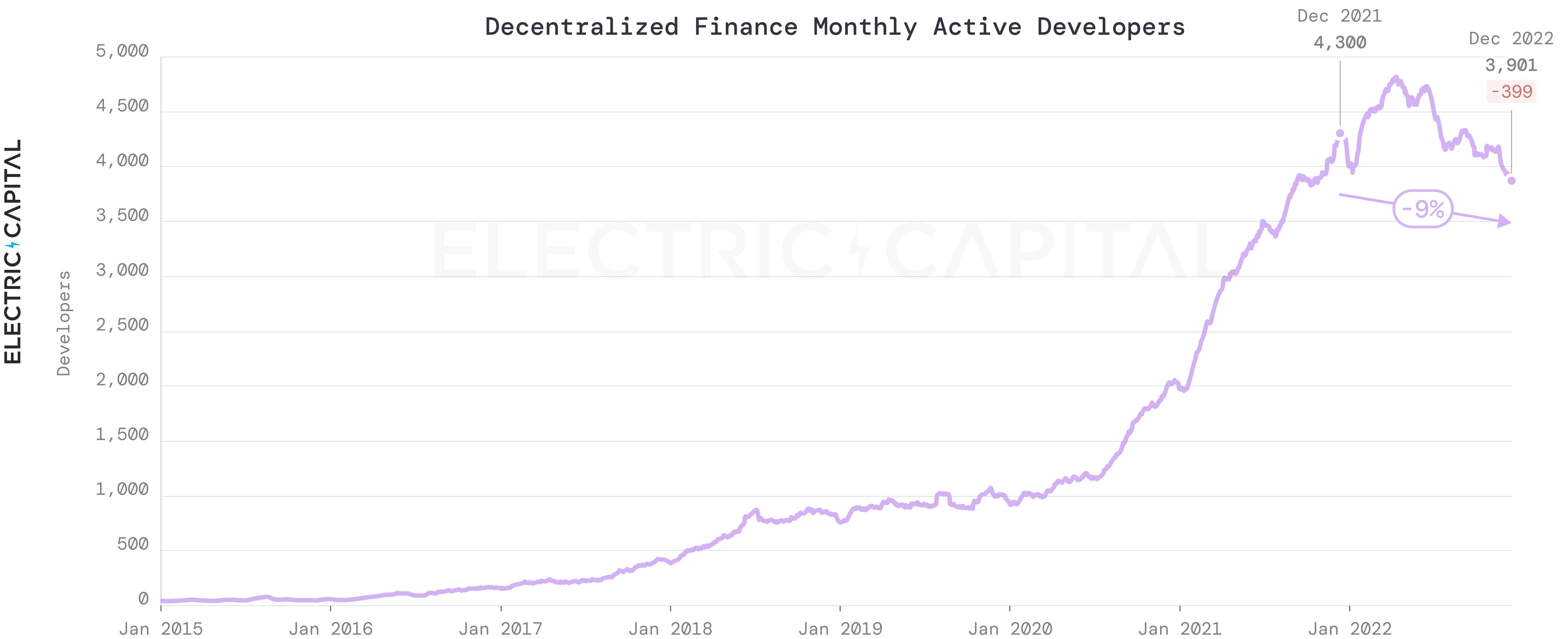
# 3,901 MONTHLY ACTIVE DEVELOPERS WORK IN DEFI ACROSS L1 AND L2 ECOSYSTEMS



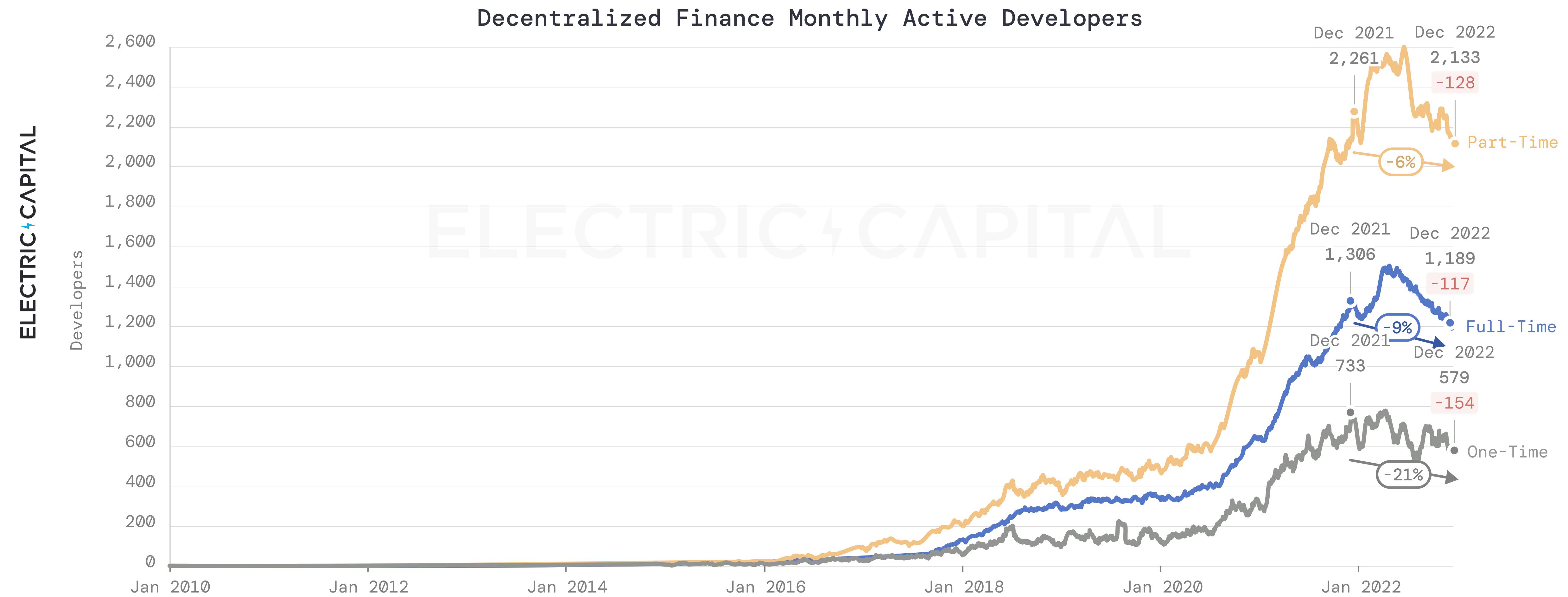
+240% MONTHLY DEVELOPERS SINCE DEFI SUMMER 2020



# -9% DEFI MONTHLY ACTIVE DEVELOPERS FROM DECEMBER 2021 TO DECEMBER 2022

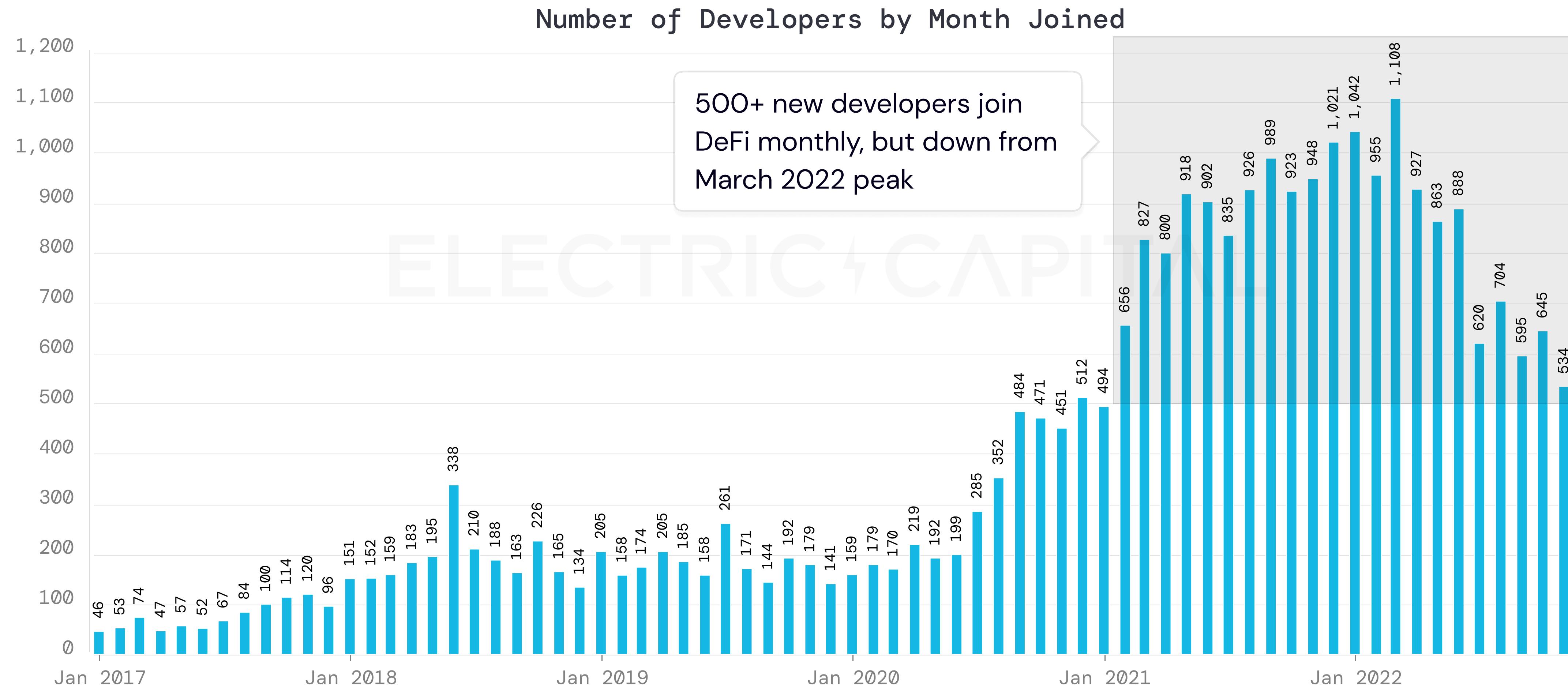


# ONE-TIME (-21%), FULL-TIME (-9%), & PART-TIME (-6%) DEVS DOWN ACROSS DEFI



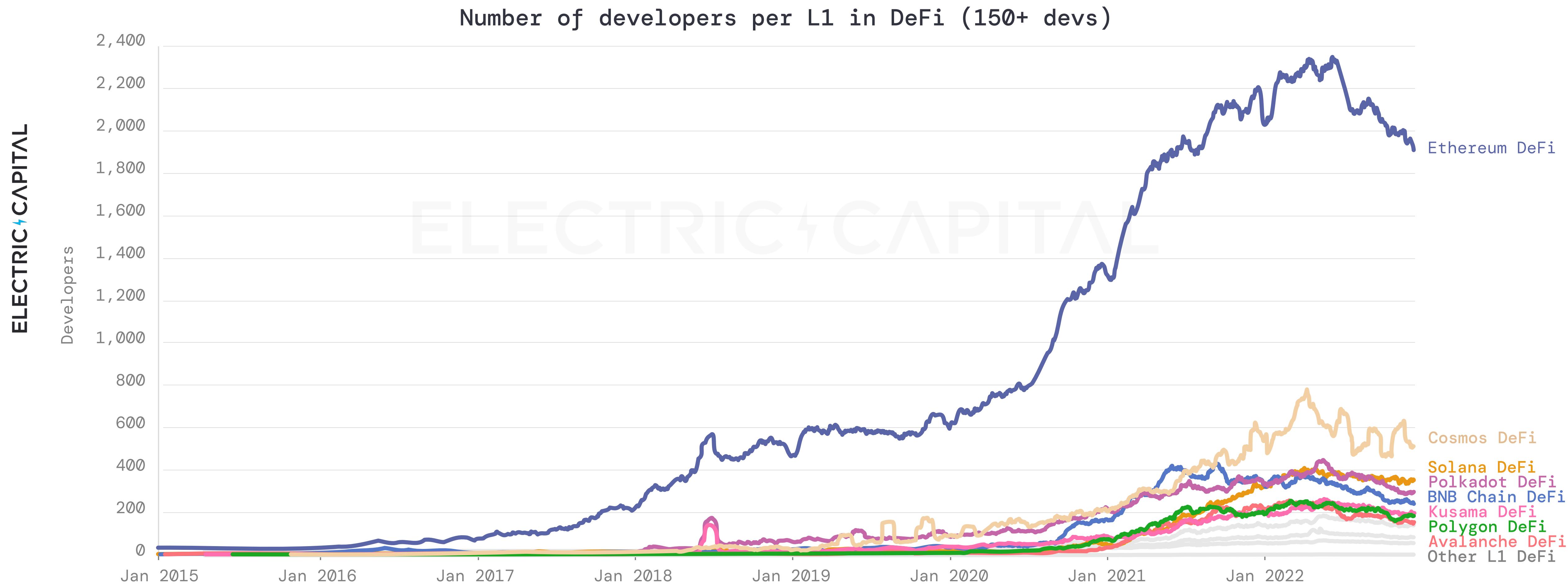
# 500+ NEW DEVELOPERS PER MONTH CONTINUE TO JOIN DEFI, BUT DOWN FROM PEAK

ELECTRIC+CAPITAL

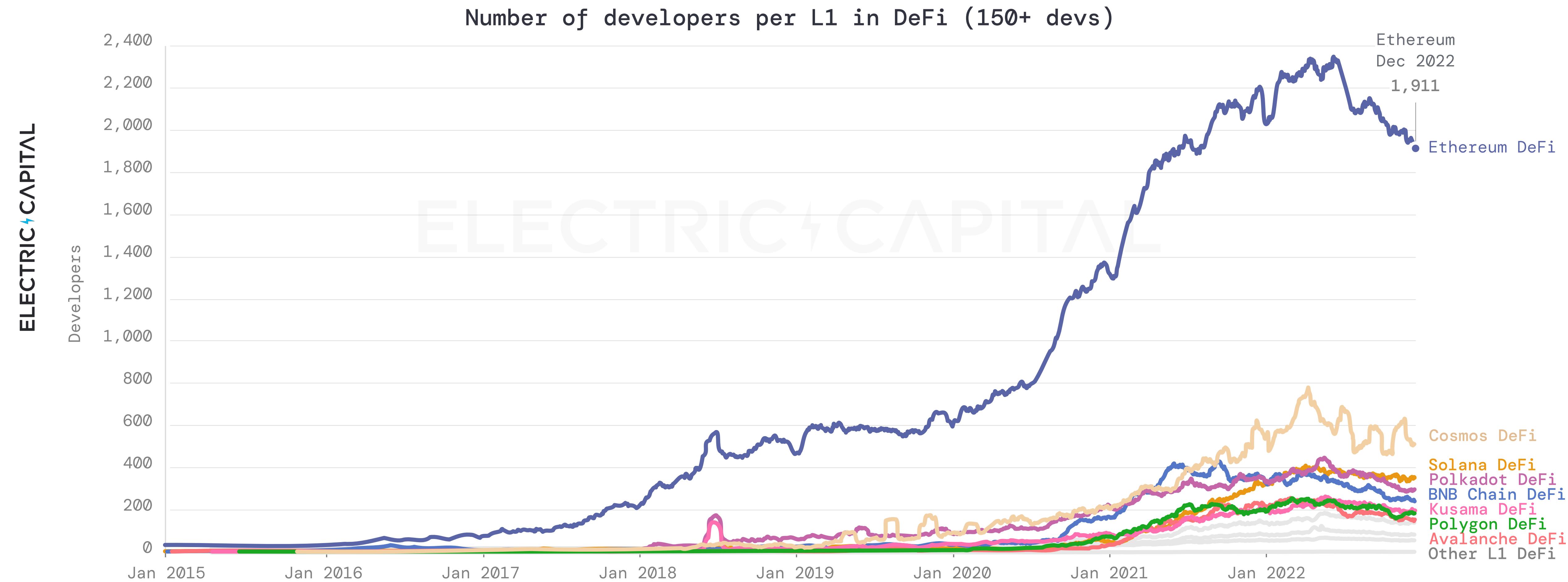


## HOW HAS DEFI GROWN ACROSS LAYER 1 CHAINS?

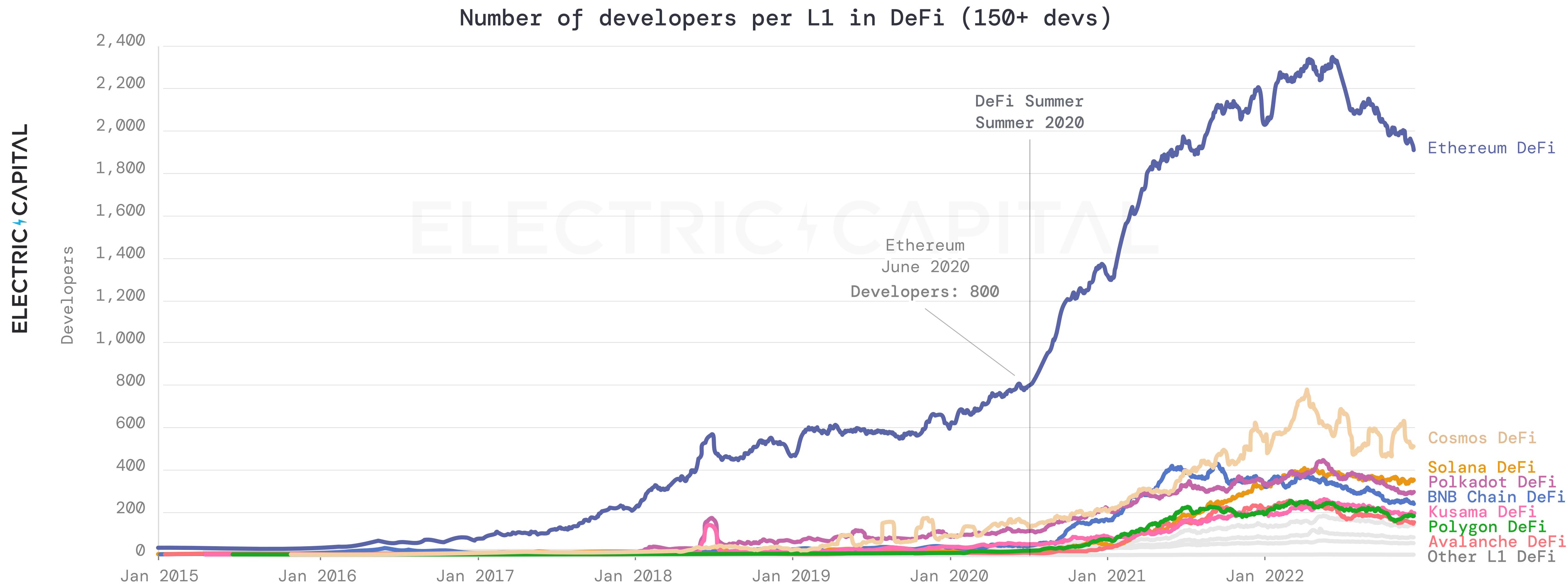
# ETHEREUM, COSMOS, SOLANA, POLKADOT, BNB, KUSAMA, POLYGON, & AVALANCHE HAVE THE LARGEST DEFI DEVELOPER ECOSYSTEMS WITH 150+ DEFI DEVELOPERS



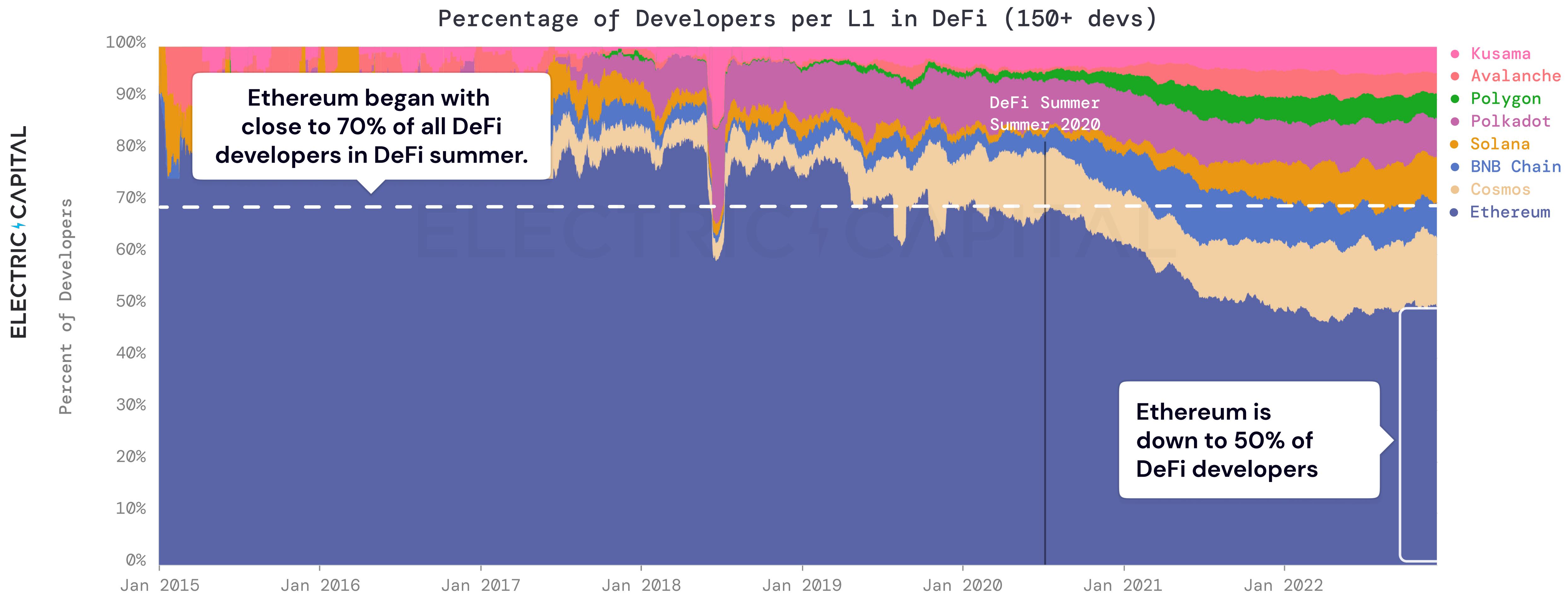
# ETHEREUM IS THE BIGGEST DEFI ECOSYSTEM WITH 1,911 MONTHLY DEVs; COSMOS DEFI IS SECOND WITH 512; SOLANA DEFI IS THIRD WITH 348

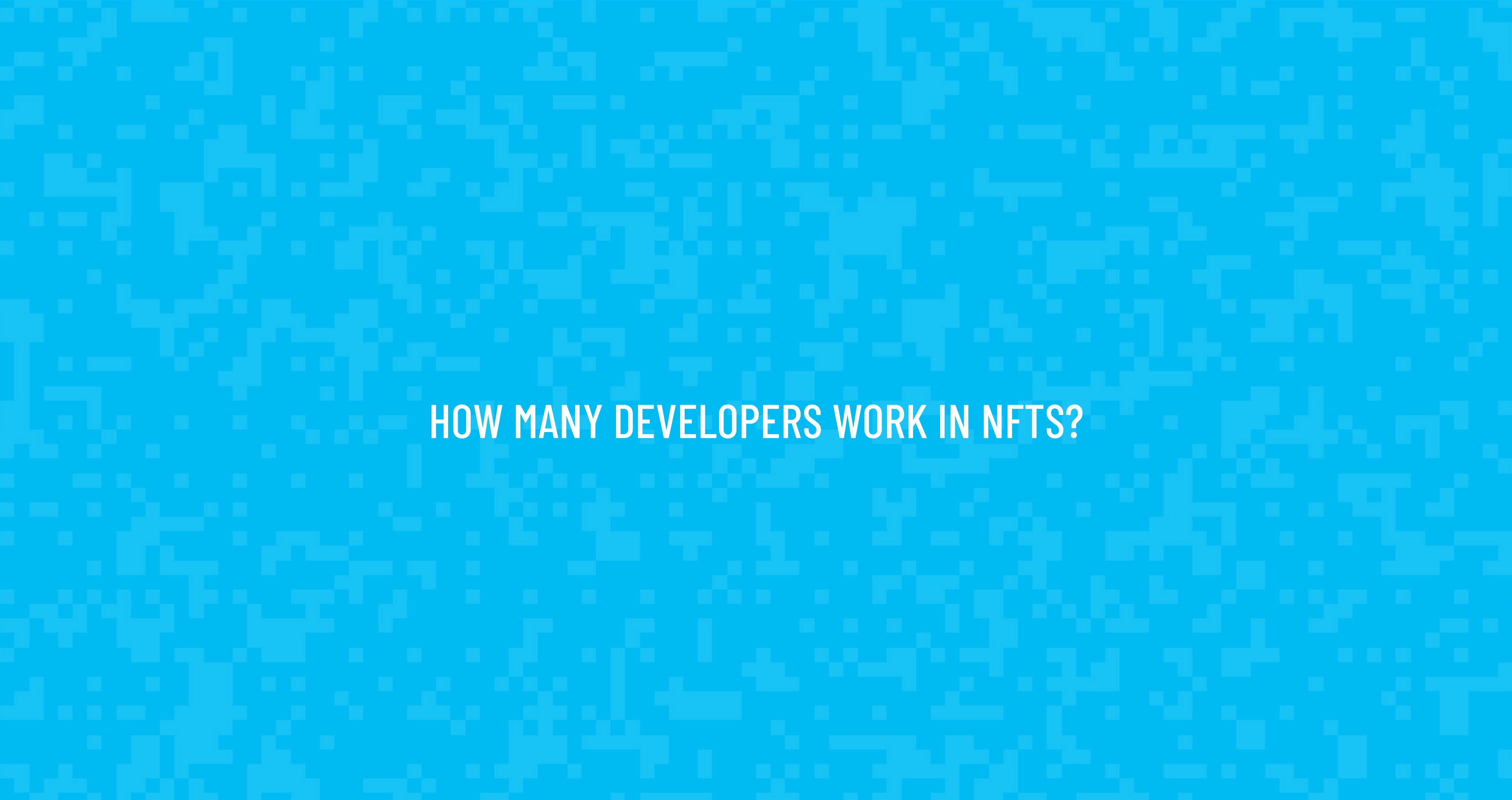


# ETHEREUM BEGAN WITH 4X MORE DEFI DEVELOPERS THAN ANY OTHER LAYER 1 ECOSYSTEM DURING DEFI SUMMER



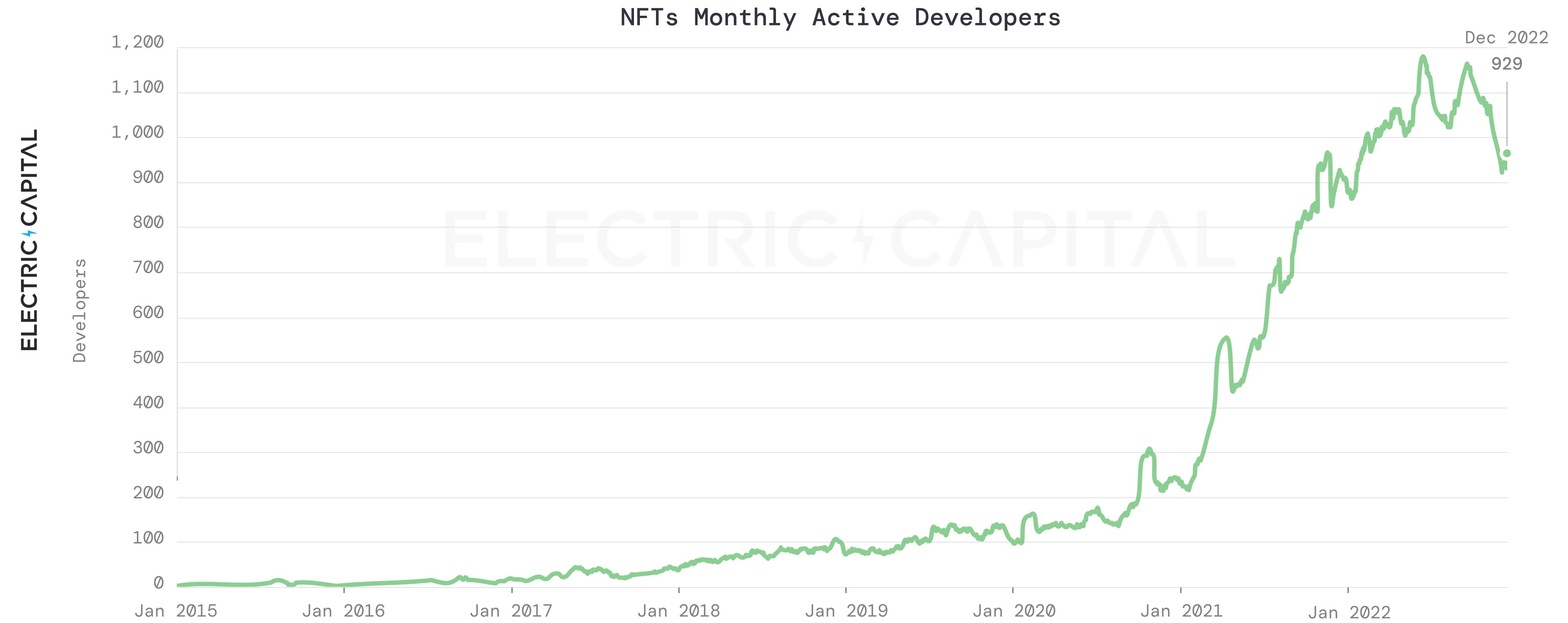
# TODAY, 50% OF DEFI DEVELOPERS CONTRIBUTE TO ECOSYSTEMS OUTSIDE OF ETHEREUM, UP FROM 30% DURING DEFI SUMMER



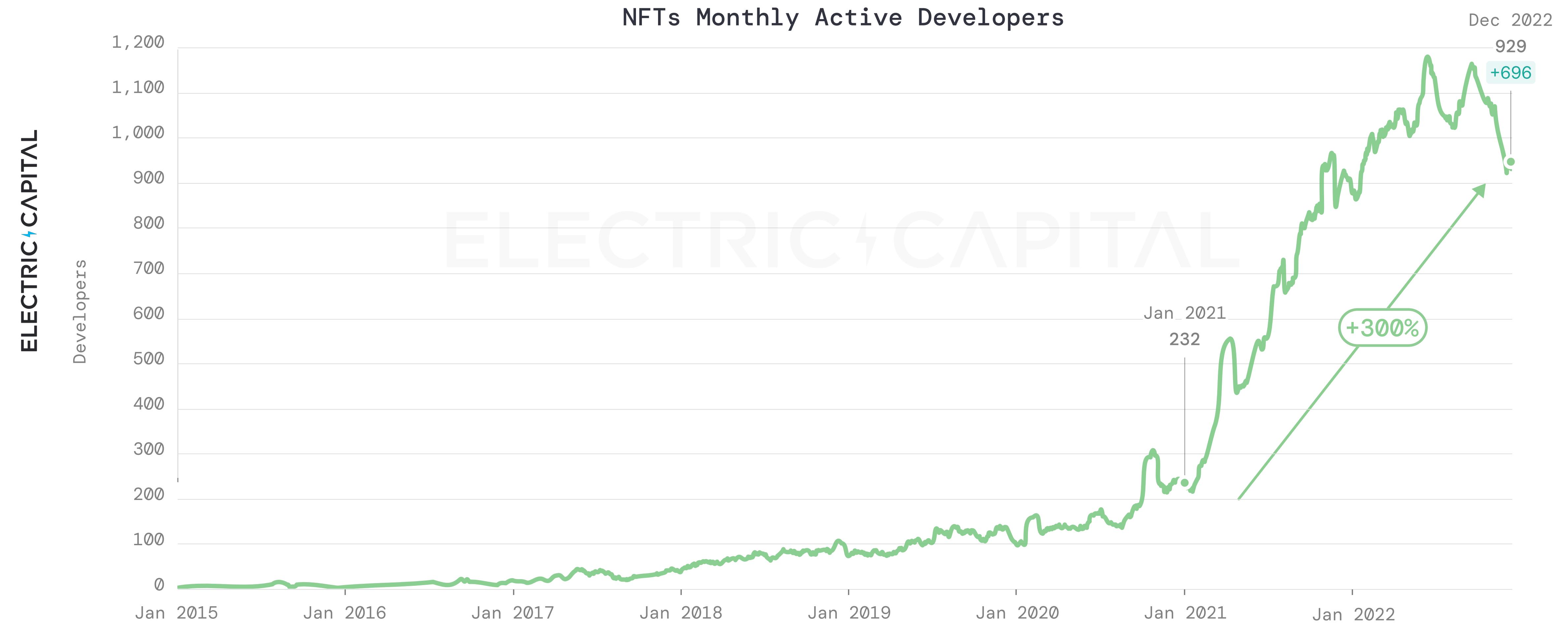


HOW MANY DEVELOPERS WORK IN NFTS?

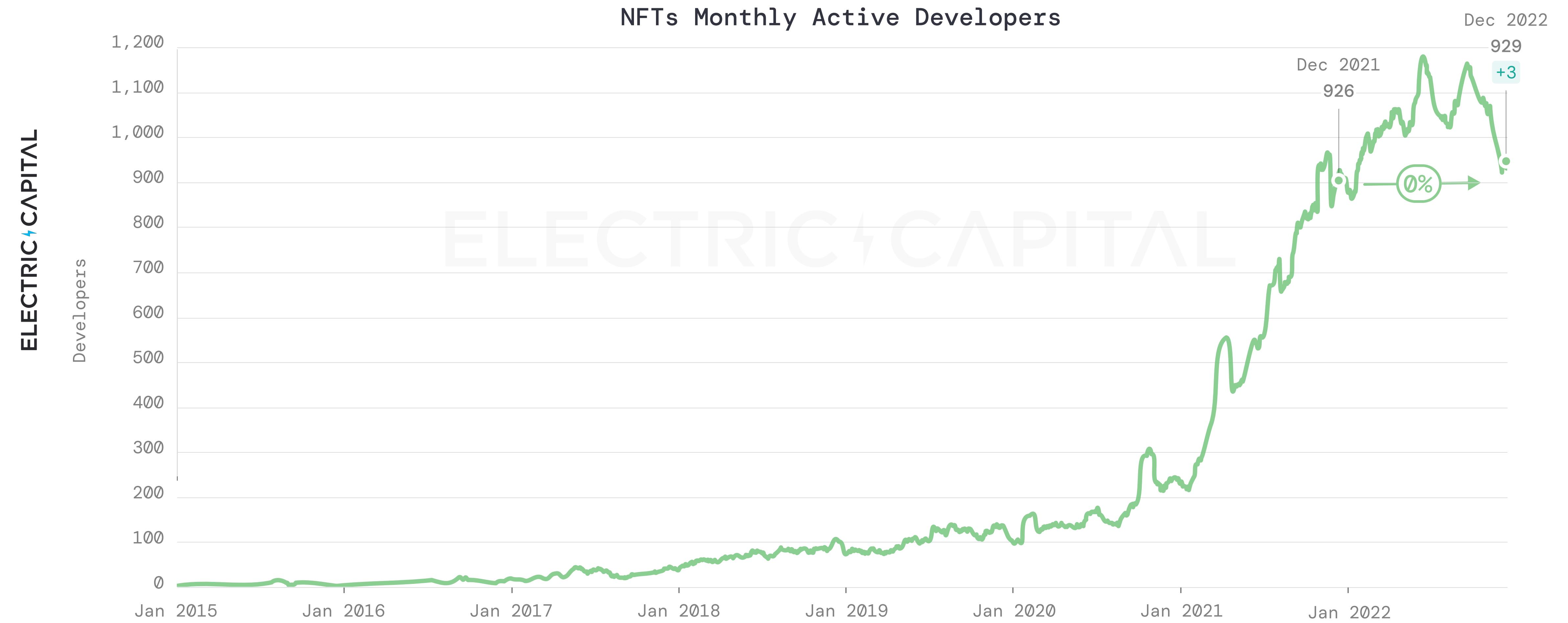
# 929 MONTHLY ACTIVE OPEN-SOURCE DEVELOPERS WORK IN NFTS



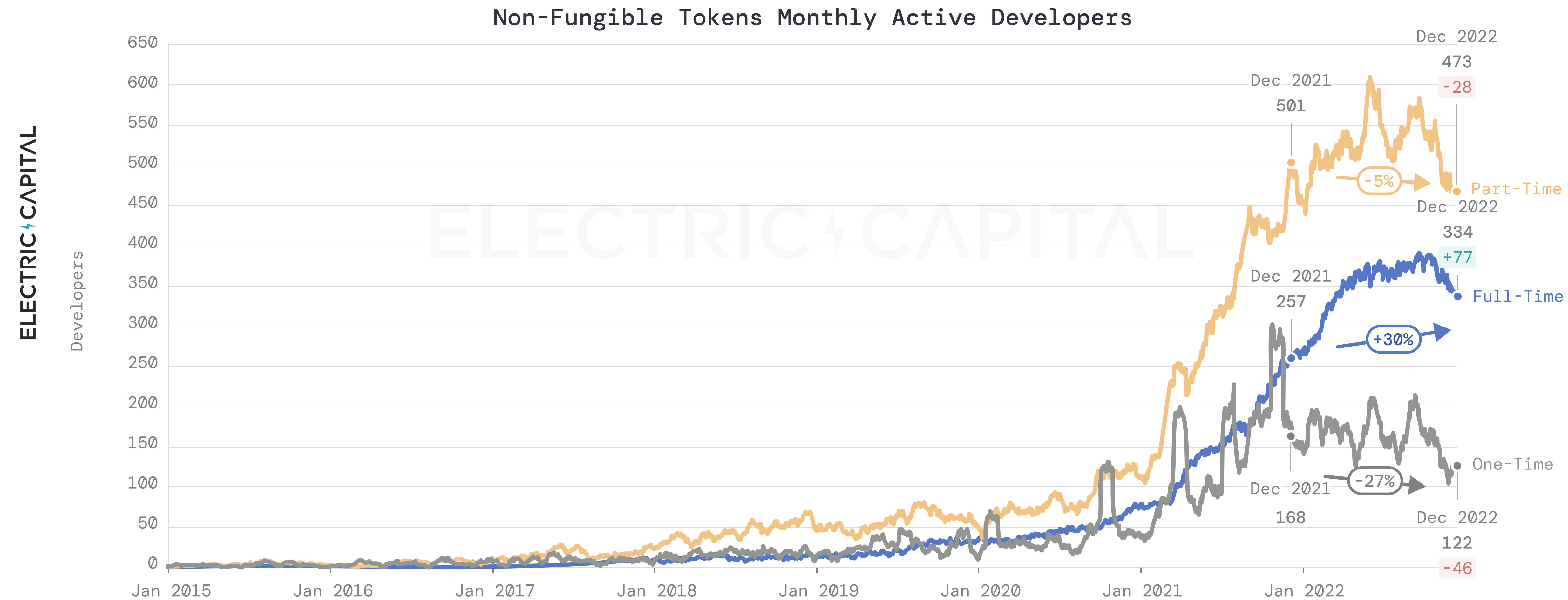
+299% MONTHLY NFT DEVELOPERS SINCE JAN 2021



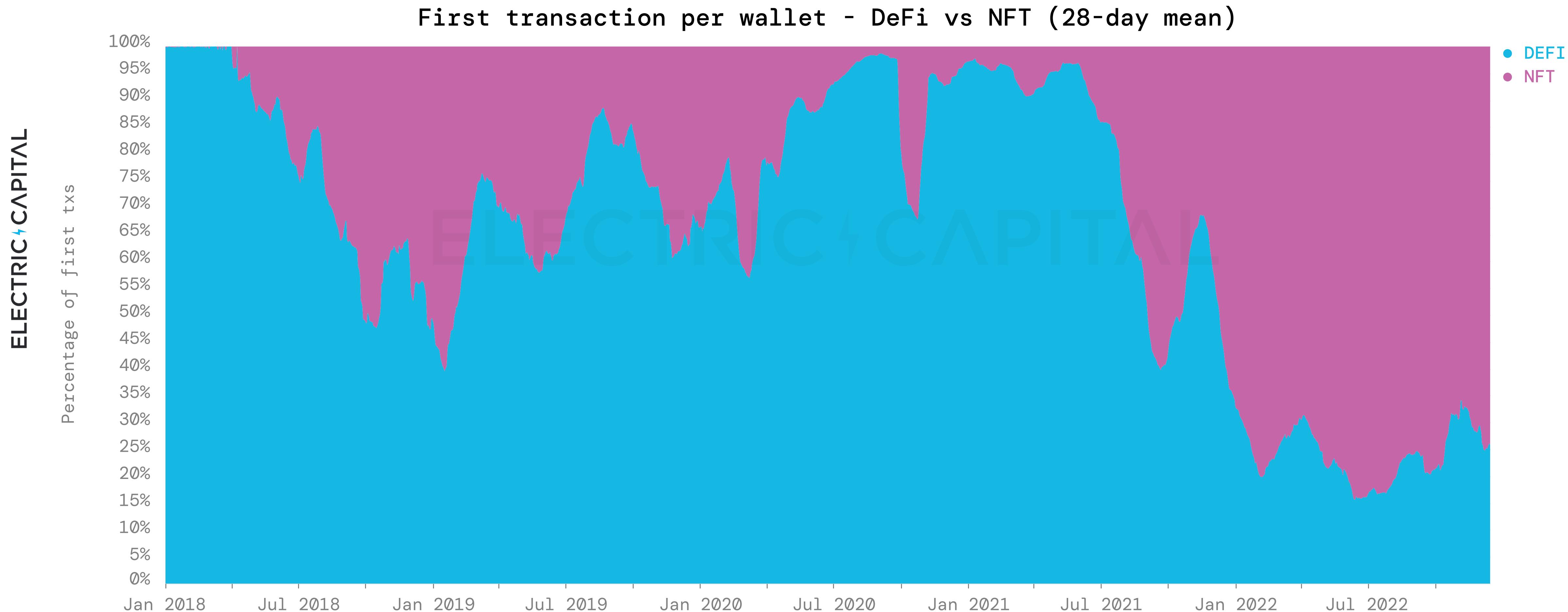
# THE NUMBER OF NFT MONTHLY DEVELOPERS IS FLAT YOY



# NFT'S YOY GROWTH COMES FROM FULL-TIME (+30%), LOSSES COME FROM ONE-TIME (-27%) AND PART-TIME (-5%) DEVELOPERS



# INCREASINGLY, A NEW WALLET'S FIRST ACTION IS IN NFTS: 80% WALLETS' FIRST TRANSACTION WAS RELATED TO NFTS IN 2022



# DEVELOPER ENGAGEMENT IS NOT THE BEST LENS FOR ALL ECOSYSTEMS

## NFTs, Gaming, and DAOs

Aggregate developer metrics alone may be misleading and may not be the correct leading indicator to consider for NFTs, Gaming, and DAOs.

In these use cases, a relatively small number of developers can build reusable components and the amount of smart contract code written will be small relative to community engagement. For example, a very small amount of code written by just one developer might drive a large PFP (Profile Picture) NFT community. Or in the case of games, the majority of code may be off chain and closed-source, thereby making extrapolation from on-chain and open-source data very noisy.

We believe community engagement signals are an important and complementary leading indicator for the NFT, Gaming, and DAO markets. We are working on several novel ways to gather community data and signals and will share our results as they become available.

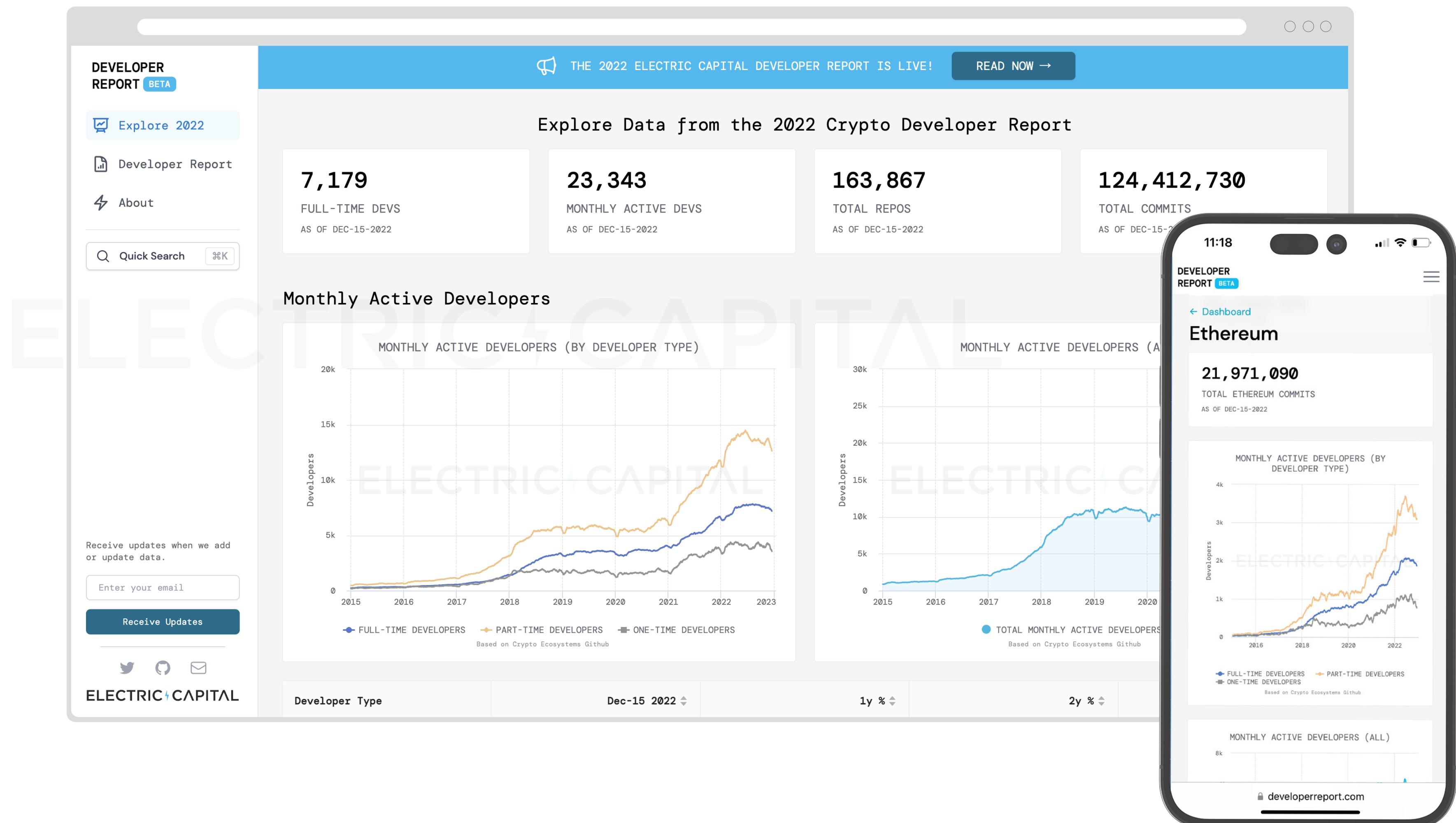
04

DEVELOPERREPORT.COM

# DIVE INTO DATA: DEVELOPERREPORT.COM

We are excited to launch [DeveloperReport.com](https://developerreport.com) to showcase the data that goes into creating our annual Developer Report. Our aim is to provide a transparent, open, data source for the community.

We will be adding more visualizations, more data, and moving towards more real-time updates at [DeveloperReport.com](https://developerreport.com). We will continue to publish an annual Developer Report with detailed analysis on an annual basis as well.



THANK YOU

## HELP MAP THE CRYPTO ECOSYSTEM

Our ecosystem map on GitHub continues to be open  
so that anyone can contribute.

**Submit a pull request in our Github:**  
[github.com/electric-capital/crypto-ecosystems](https://github.com/electric-capital/crypto-ecosystems)

We will use this data for our reports going forward and  
for [DeveloperReport.com!](http://DeveloperReport.com)



# THANK YOU

<b>Adeniyi</b> @EmanAbio	<b>Chris Ackermann</b> @chrsackermann	<b>Illia Polosukhin</b> @ilblackdragon	<b>Kyle L</b> @kylelangham	<b>Pavla</b> @daemia10	<b>Sunny Aggarwal</b> @sunny97
<b>Akriti Vij</b> @AkritiVij	<b>Christian Hresko</b>	<b>Jack Zampolin</b> @jackzampolin	<b>Lina Lu</b>	<b>Raphaël Guilleminot</b> @raphelectric	<b>Urban</b> @uosvald
<b>Alexander Graebe</b>	<b>David Sedgwick</b>	<b>Jacob Creech</b> @jacobvcreech	<b>Lomesh D</b> @lomeshdutta	<b>Raj Gokal</b> @rajgokal	<b>Vik Kalghatgi</b> @vik_kalghatgi
<b>Alvin Kan</b> @alvin_kan	<b>Dan Saber</b> @dansabermetrics	<b>Jelena</b> @jelenaaa_____	<b>Loren Cookson</b>	<b>Rene</b> @RegenRene	<b>Vlad Grichina</b> @vgrichina
<b>Andrea Muttoni</b> @muttonia	<b>Danielle Harris</b> Look Look Studio	<b>Jesse Wiley</b> @mrjwiley	<b>Lorny P</b> @lornyelle	<b>Rodrigo Mendoza</b> @rOdms	<b>Weilei Yu</b> @WeileiY
<b>Anuke</b> @anukeganegoda	<b>David Feiock</b> @davidfeiock	<b>Jim Yang</b> @proofstake	<b>Maksym Zavershynskyi</b> @mzavershynskyi	<b>Roham Gharegozou</b> @roham	<b>Will Corcoran</b> @corcoranwill
<b>Austin Federa</b> @Austin_Federa	<b>Dawn Song</b> @dawnsongtweets	<b>Jonathan Victor</b> @jnthsnvctr	<b>Marko Baricevic</b> @markObaricevic	<b>Rumeel Hassain</b> @RumeelHussain	<b>Will Cove</b> @WillCove
<b>Ben White</b> @BenWhiteJamin	<b>Diwaker Gupta</b> @diwakergupta	<b>Joey Bender</b> @josephbender	<b>Marek</b> @marek_	<b>Sam Blackshear</b> @b1ackd0g	<b>Xochitl Cazador</b> @xochitlcazador
<b>Bram Cohen</b> @bramcohen	<b>Eric Nakagawa</b> @ericnakagawa	<b>Jordan Kail</b>	<b>Mefrem</b>	<b>Sargonas</b> @sargonas	<b>Yiwei H.</b>
<b>Brian Henhsi</b> @bhenhsi	<b>Eric Zietlow</b> @EricZietlow	<b>Josh Ford</b>	<b>Moritz</b> @cryptoschindler	<b>Santi Balaguer</b> @santibalaguer	<b>Zaki Manian</b> @zmanian
<b>Brian McKenna</b> @brian_p_mckenna	<b>Evan Cheng</b> @EvanWeb3	<b>Karim</b> @karimpb	<b>Neil H</b> @neilhar_	<b>Stani</b> @StaniKulechov	
<b>Brittany L</b> @br_ttany	<b>Gene Hoffman</b> @hoffmang	<b>Kenny Rogers</b> @KenTheRogers	<b>Nikhil Ranjan</b> @niklabh	<b>Stef Sprinz</b>	
<b>Catrina Wang</b>	<b>Greg</b> @Greg_Nazario	<b>Kori</b> @koritual	<b>Oliver Bett</b>	<b>Stephanie Marin</b>	
<b>Chase Barker</b> @therealchaseeb	<b>HQ Han</b> @duckie_han	<b>Kuleen</b> @knimkar	<b>Ollie Corbisiero</b>	<b>Steve Lee</b> @moneyball	
			<b>Pavel Kudinov</b>		

# THANK YOU GITHUB CONTRIBUTORS

2075 @marcobahn	christianschmitz	evilboyajay @evilboyajay	jdbender66	neosavvy @adamparrish	robert-zaremba	tezms
Oxlyd @Oxlyd	clarus @guillaumeclaret	falkonprods @drewfalkman	jonathanpdunne @JonPDunne	nicolasochem @nicolasochem	RomarQ @RodrigoQuelhas	tezos-stuff
Oxneil	ctrlaltdel	farmerdiamonds	jordan-tezos	nikhildfinity	rube-de	themacexpert
Oxrmvda0	dantrevino @dantrevino	fhb191309	JosephKnecht-lab	nilscodes @NilsCodes	ryancwalsh	thenic95
advanderveer	darkverbito	fiftyeightandeight	Kazik435	notEduardo	schimih	trgarrett
aguillon	dchoi27	forgetso	kimsk @kimsk	nud3l @dominik0_	scrutinously	tudorhedged
Akibalogh	dedushky	gabrieljaegerde	KittiBorissza	ollicorbisiero	sergiimk	upsorber
algodevstats @algodevstats	denver-s	germanD	letmejustputthishere	owocki	shaelilwang	waterrecreation
AnshuJalan @aj_jalan	diwakergupta @diwakergupta	gfox1 @graeme_fox	lourkeur lourkeur	paradigma-cl @CheckParadigma	shapeman @shapeman2004	wileyj
arrudagates	doranoda	gregnazario @greg_nazario	lucasdcf @lucasdcf	pascuin	sjriddle @SamuelJRiddle	wischli @WilliamFreude
baabaabet001	dvkam	hieudd @hieudaosw	lurpis	peopledrivemecrazy @shriji	SlowestTimelord @SlowestTimelord	wyn @karoshibee
BadgerAnn	edisonOxyz @edisonOxyz	hskang9 @hskang0525	m-kus	philippem	snow-farmer @yieldyak_	xcolwell @xcolwell
bmgentile @bmgentile	eherrerosj @eherrerosj	hstove @heynky	mando222	PoorMansChiaFarm	SnowPrimate @OxPrimata	xrdavies @xrdavies
bogachevant0n @bogachev_anton	elasticLove1	imotai @TaizeWang	markgenuine	pranaydotparity	spazcoin	XTZNews @XTZNews
BowTiedDeployer @BowTiedDeployer	elliotkennedy	ItasMattWebb	MarvinQuevedo	Primate411	StephenFluin @stephenfluin	yyolk @yyolk
btspoony	Eltairovy @Elena_Von_Tsss	j-vp @j00324	mistertoucan	mshankarrao	RaekwonIII @RaekwonIII	zakhikhan
CassFairiesClub @CassFairieClub	EnergyTrade @_EnergyTrade_	jalehman @jlehman_	mutobui stefan_muto	muttoni @muttonia	SUGURSEO	zamrokk @benji_fuentes
catskillnft @CatSkillNFT	ericnakagawa @ericnakagawa	nathanduft44	nathanduft44	richardyu65	RichAyotte @RichAyotte	SwiftAdviser @SwiftAdviser

05

# APPENDIX

# COMMIT COUNTING METHODOLOGY: NOT ALL CODE COMMITS ARE CREATED EQUAL

## Forks

Only new code counts towards developer activity. We omit code and developer activity from merging changes from the upstream codebase.

## Fingerprinting

Fingerprinting is a technique used to identify commits originating from upstream projects. We look at the files and lines changed, the commit message, committer, author, and associated dates. This eliminates copy/pasted code from counting towards an ecosystem.

## Commits from Integrating Open Source Libraries

Integrating common libraries does not count toward code activity.

## Branches

We look at commits from all branches (master/development, etc.) and tags. We look beyond Github's default view, which can be incomplete.

## Limitations

We only look at open-source repositories. There are many repositories that are not yet open-source. However, we are planning to enrich the open-source code data with deployed on-chain smart contract code.

# HOW ARE DEVELOPERS COUNTED?

## Developers

We count original code authors as developers. This means that a developer who merges a pull request is not an active developer on the project, but the original authors of the commits are.

## Full-Time Contributors

Contributed code 10+ days out of a month

## Part-Time Contributors

Contributed code fewer than 10 days out of a month

## One-Time Contributors

Contributed code once in a rolling 3-month window

## Monthly Developer

We count commits during the next 28 days of the commit happening to generate more stability in the data

## Top-200 category

Any ecosystem that has been in the Top 200 rank by network valuation for at least 90 days in the corresponding year

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