

ELECTRIC⚡CAPITAL

# U.S. Share of Crypto Developers is Shrinking

March 2023

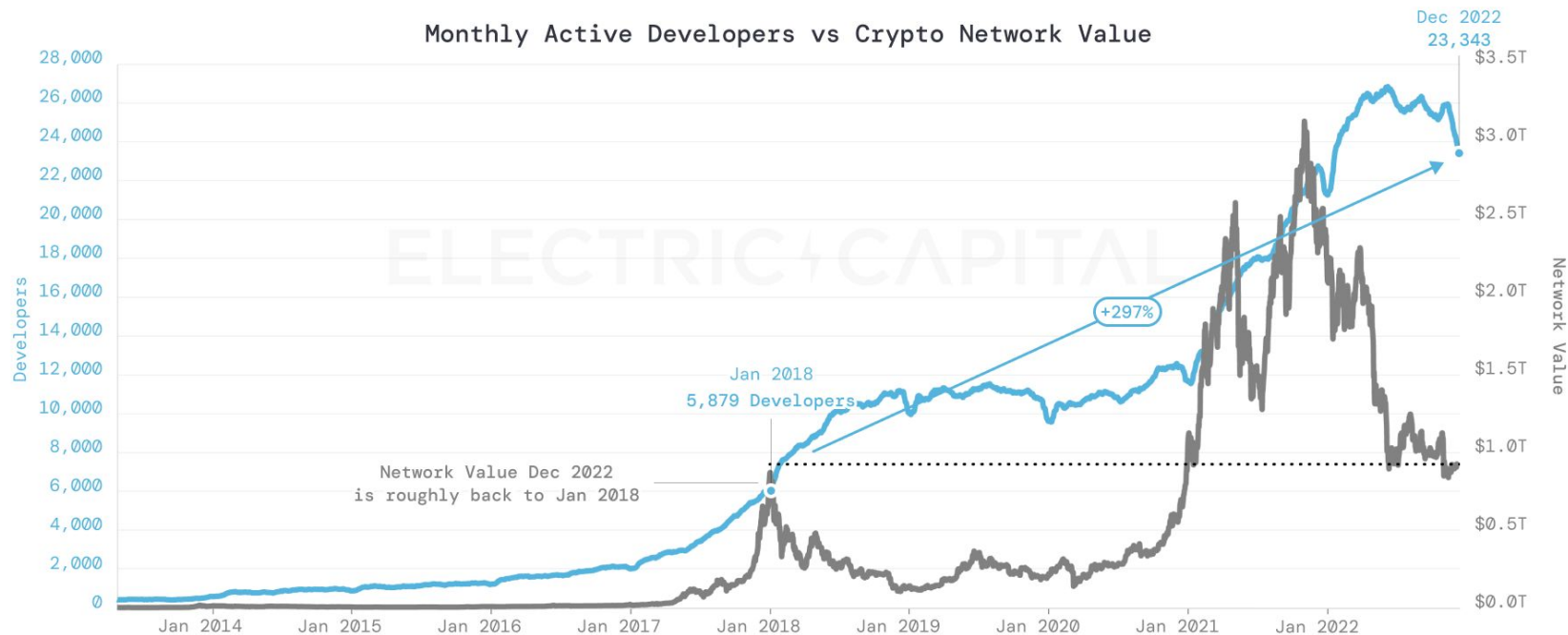
# The U.S. is losing its lead in Web3 software engineers



- Over 23,343 open source software engineers are responsible for a market worth over \$1 trillion currently.
- The U.S. has lost market share to emerging markets such as India and Ukraine.
- The U.S. is losing 2 percent market share per year for the last five years and is now down to 29% market share. This threatens US preeminence in finance and technology.
- If current growth rates continue, we anticipate 1 million new open source software engineering jobs will be created by 2030. There are likely 3M new non-technical roles that will also be created by 2030.



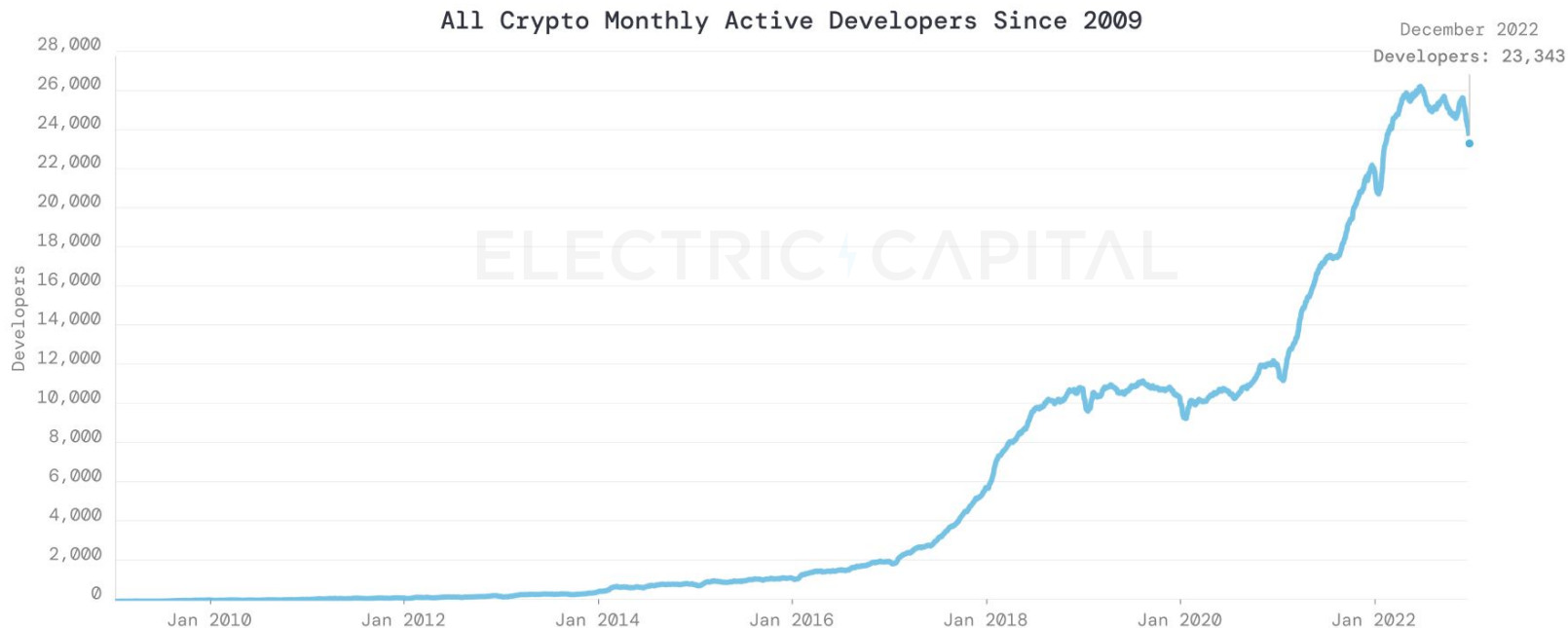
# Developers are sticky: network value is roughly back to January 2018 levels, but monthly active developers increased **+297%**





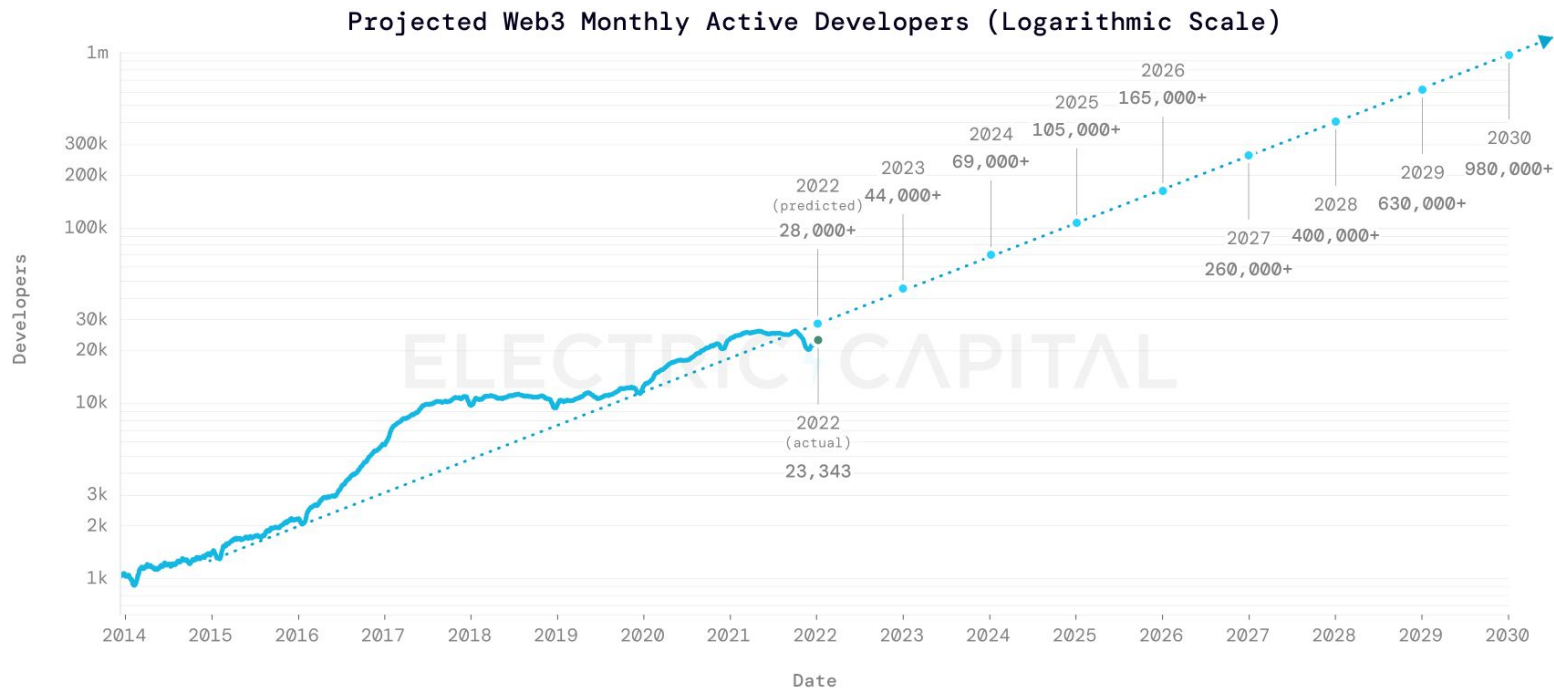
# Crypto developer ecosystem keeps growing

23,343 monthly active Crypto developers in December 2022



# The U.S. can capture the next 1 million Web3 developers

An accumulated growth model from 2017 to 2022 suggests a ~1M developer base by 2030



# Crypto Developers Location

Methodology



# Method 1: Self-reported Locations

Software developers have accounts with public information such as location or links to their other social networks. When available, we extract the country from the location data specified by the software developers in their social network accounts and their code versioning platform accounts.

With this technique we were able to extract the location country from 11,024 developers that contributed to crypto open-source development up until end of 2022.

## Sources

Twitter, GitHub

## Caveats

1. Users can input free text in the location information. A percentage of values may be false locations or unrelated values.
2. Users who move from one country to another might forget or not want to update their location information.
3. We mapped 193 countries in 33 languages, including flag emojis, 1,008 U.S. locations and the top 30 cities in the world. However, we didn't map cities in certain languages. As a result, countries like China, India, Brazil or Indonesia might be underrepresented.



## Method 2: Developers' timezones

To measure crypto software development activity, we use the timezone of the developers when they submit code to the git open-source database. Our analysis uses over 200 million such instances. The UTC offset when a developer submits code broadly indicates the longitude segments they are located in. We defined 3 broad segments: Americas (between UTC -12 and UTC -3), Europe / Africa (between UTC -2 and UTC +3) and Asia / Oceania (between UTC +4 and UTC +14).

### Source

Publicly accessible source code on GitHub and Bitbucket since 2015. Details are available at <https://github.com/electric-capital/crypto-ecosystems>

### Caveats

1. Time zones are usually shared by multiple countries and even continents. For example, U.S. time zones are shared with Canada, Central America, and Latin America. Accordingly, we can distinguish between developer activity in the Americas vs. other locations, but not within the Americas. Same thing happens with Europe and Africa, and with Asia and Oceania.
2. To evaluate this model's performance, we used Method 1 (Self-Reported Locations) as the ground truth to conclude that Method 2 has an accuracy of 85%. In other words, this time-based model is good at identifying development in the U.S.



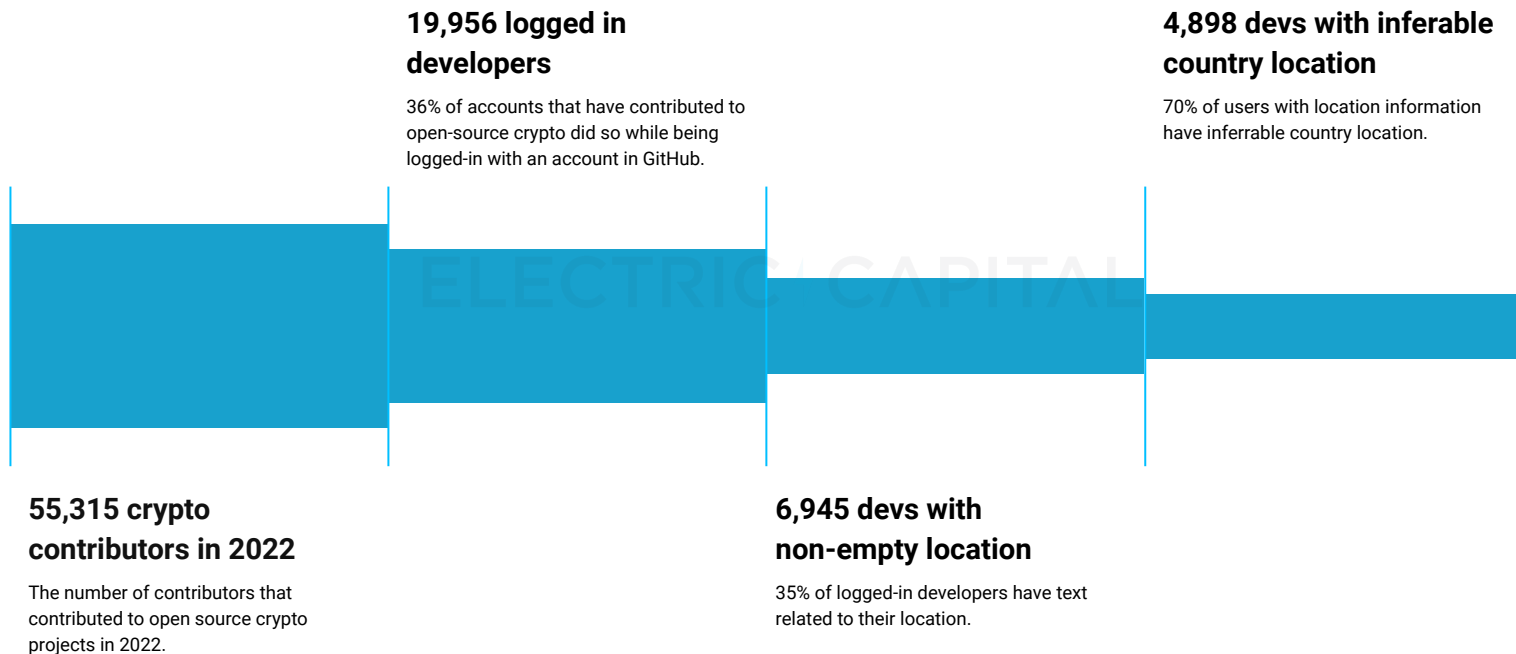
# Method #1

Self-reported Locations



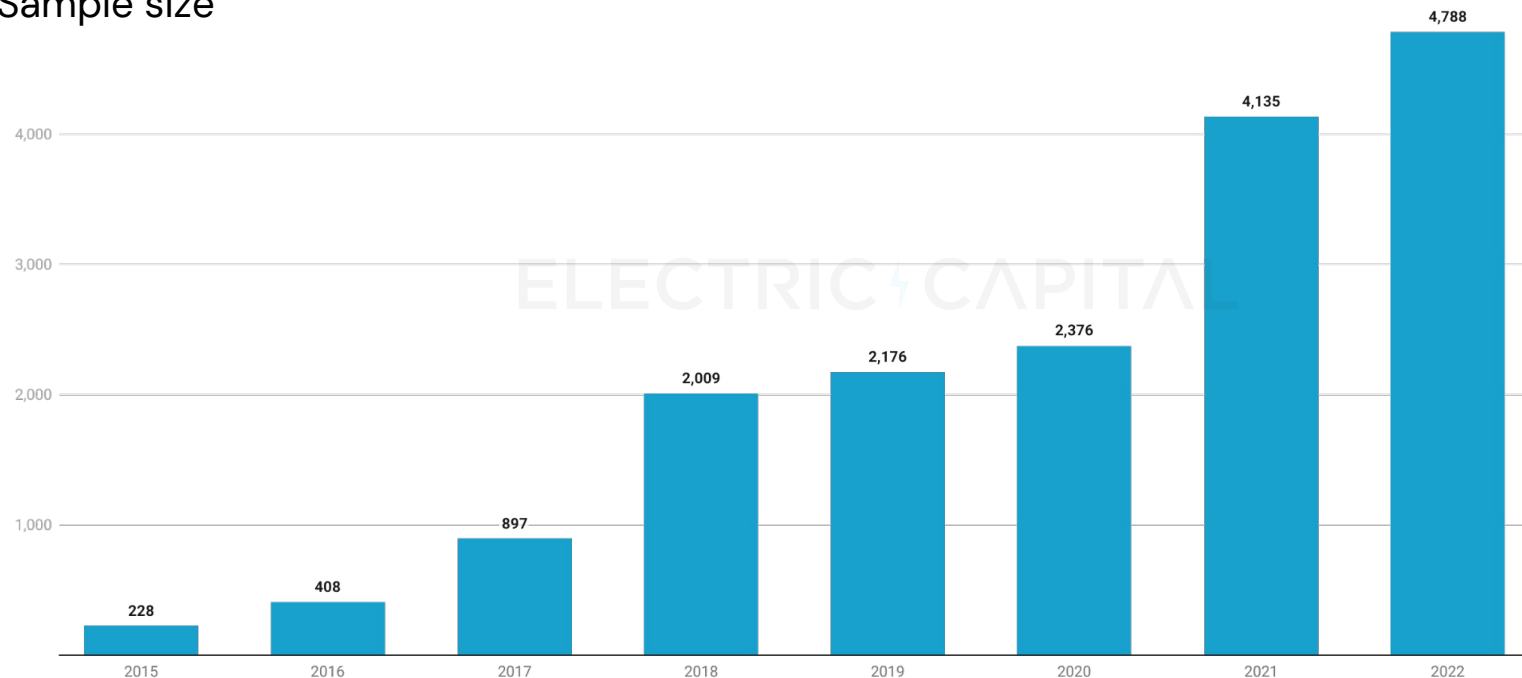
# Location data is a scarce piece of information from crypto developers

Sample size funnel (2022 only)



# The number of crypto developers with inferrable country location grows proportionally with the number of active developers

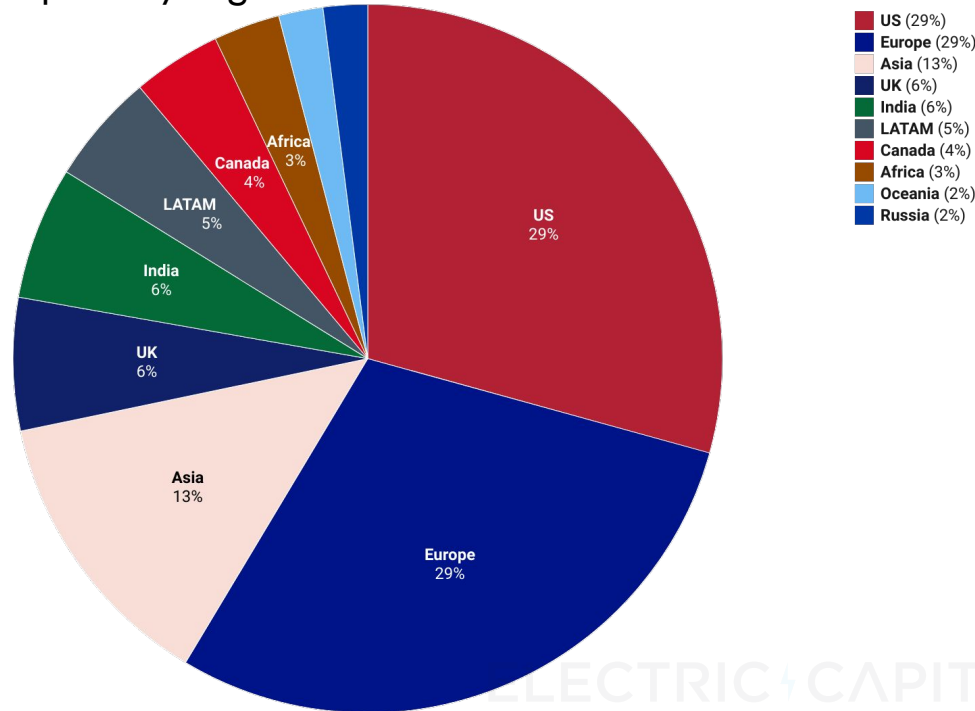
Sample size





# North America and Europe are currently home to 29% of all crypto developers each

Share of crypto developers by region in 2022

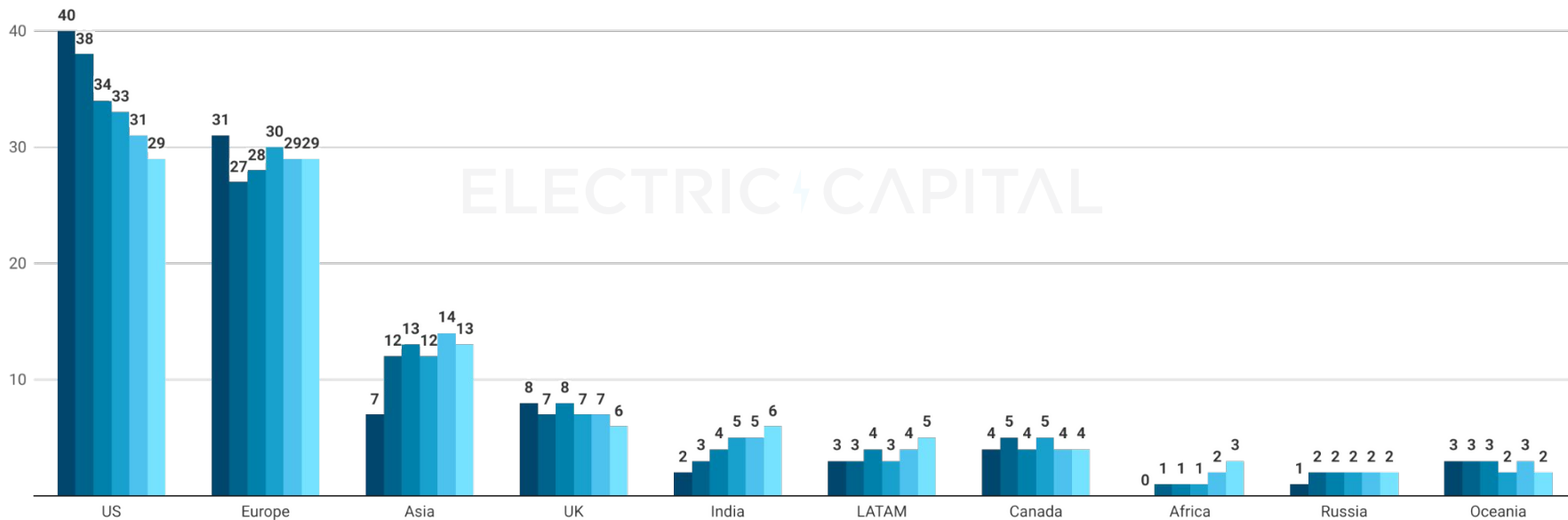




# India's crypto developer share steadily grew from 2% in 2017 to 6% in 2022

Share of crypto developers by region over time

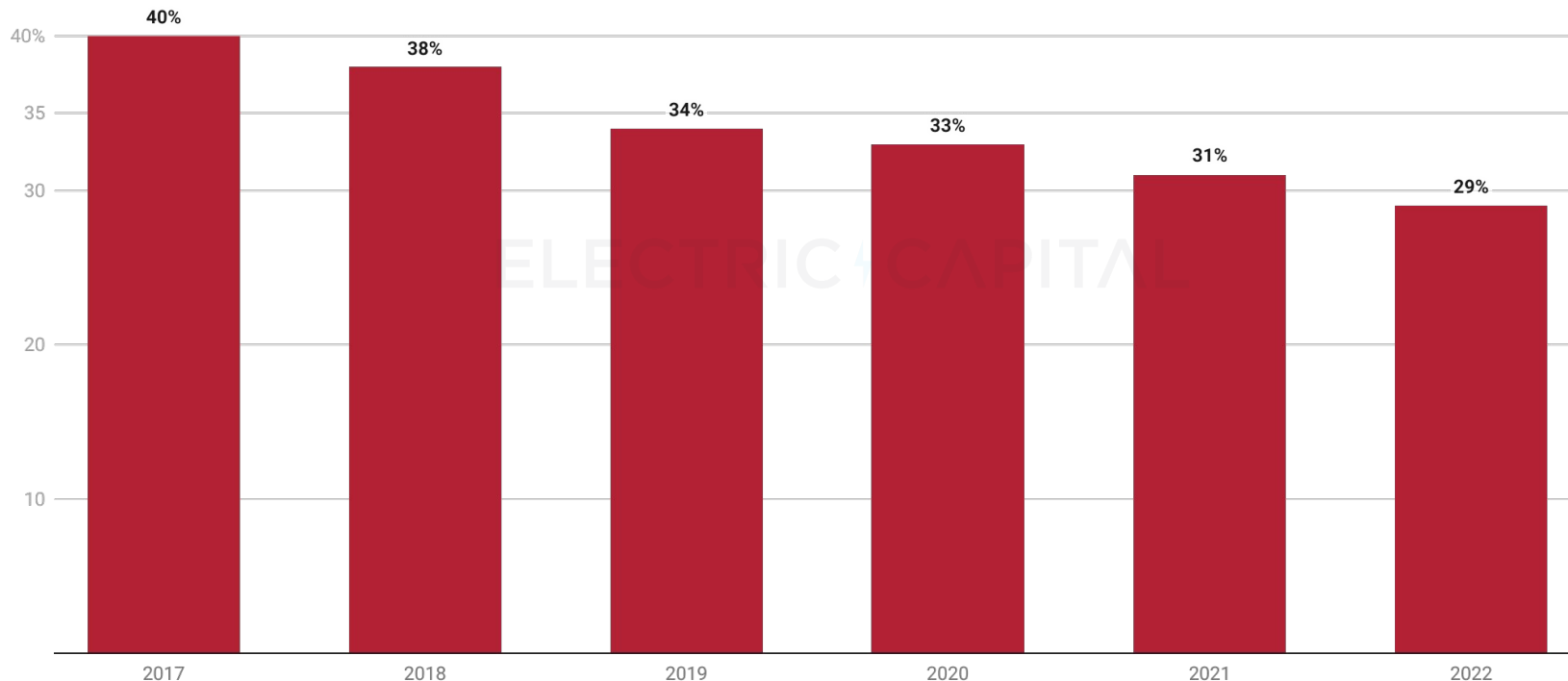
2017 2018 2019 2020 2021 2022



# U.S. is losing its lead. Around 2% share is lost every year since 2017

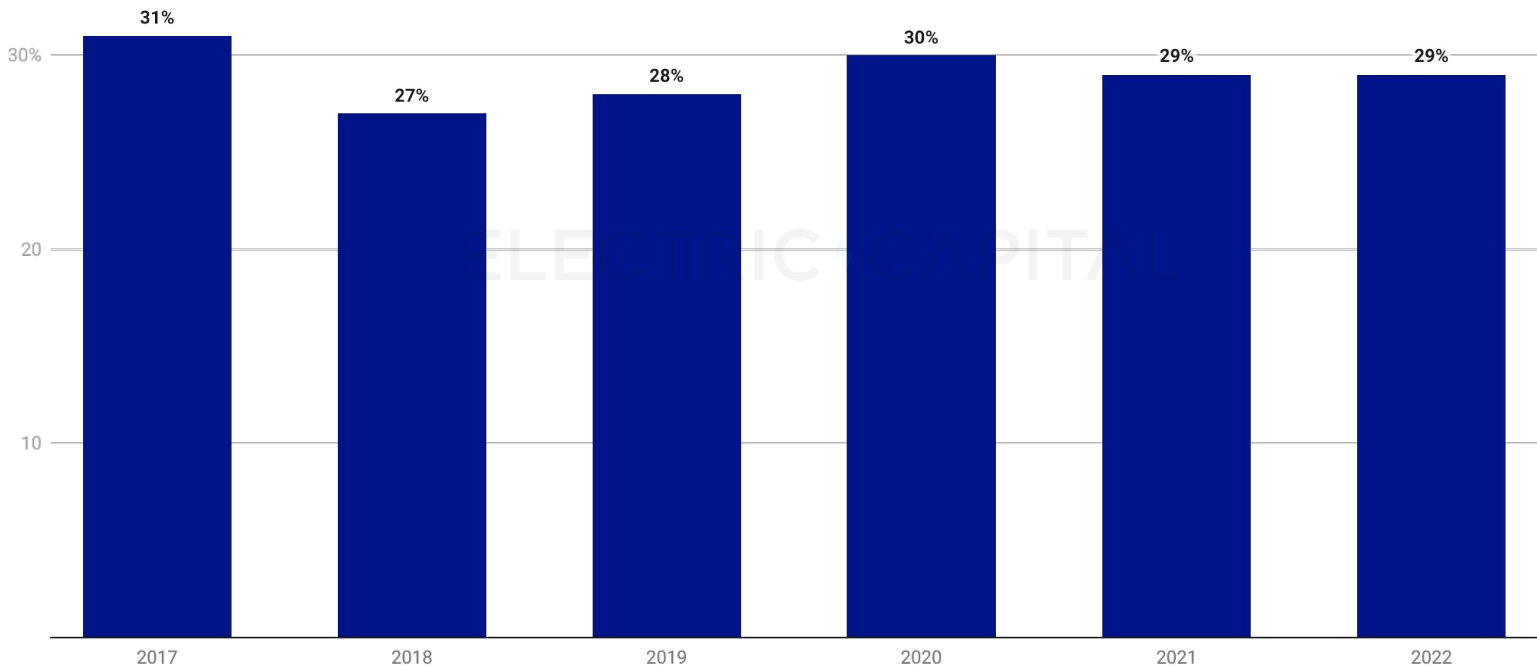


U.S.'s Share of crypto developers



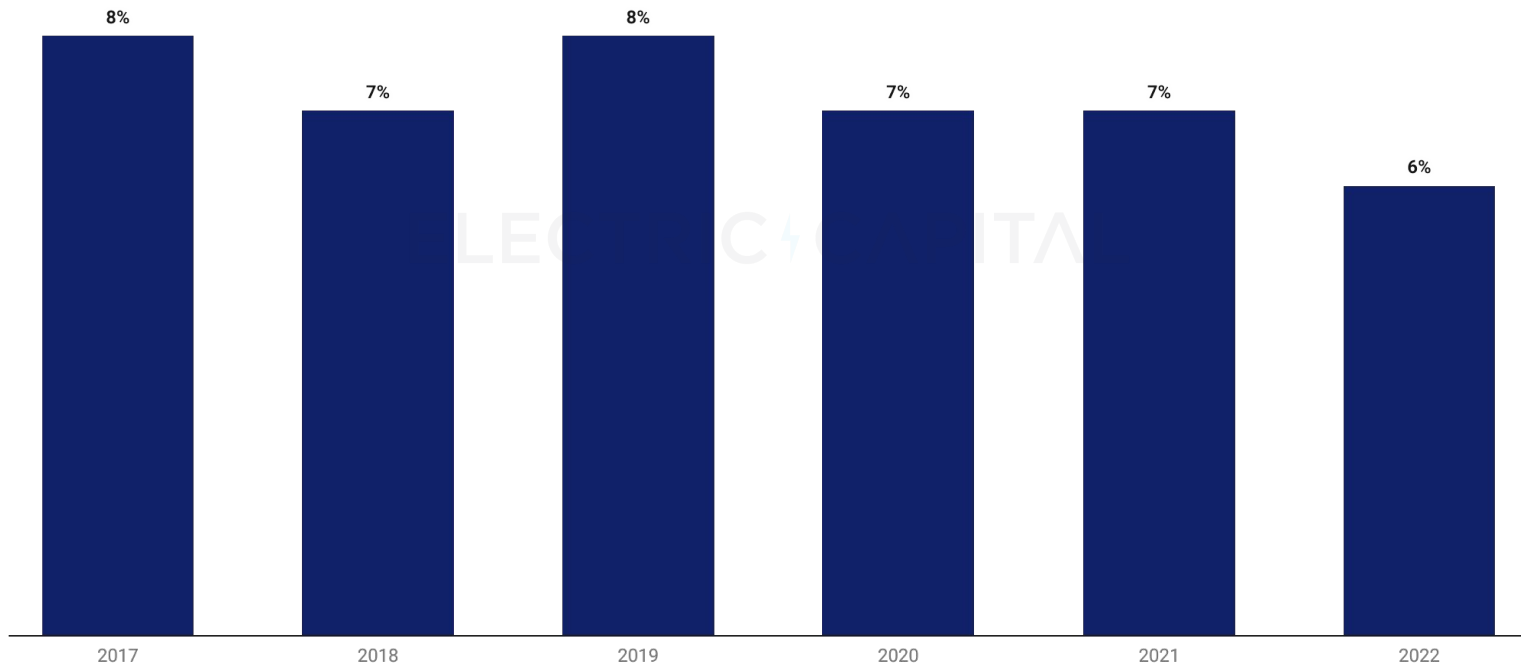
# Comparatively, Europe (excl. UK) has been able to maintain a share of crypto developers of 29%

Share of crypto developers in the E.U.



# 2022 was the first year that U.K.'s share of crypto developers went below 7%

Share of crypto developers in The U.K.



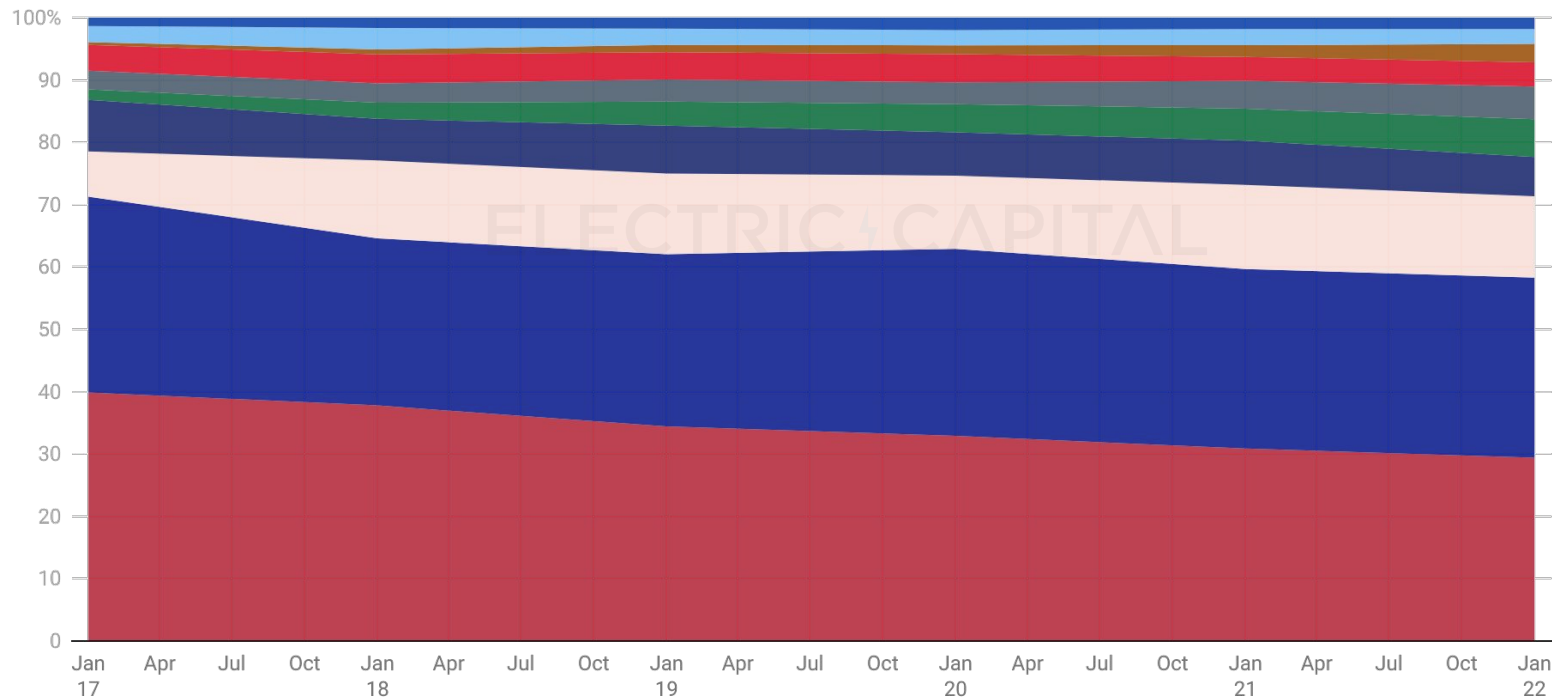




# India, Africa and LATAM are capturing crypto dev share from U.S.

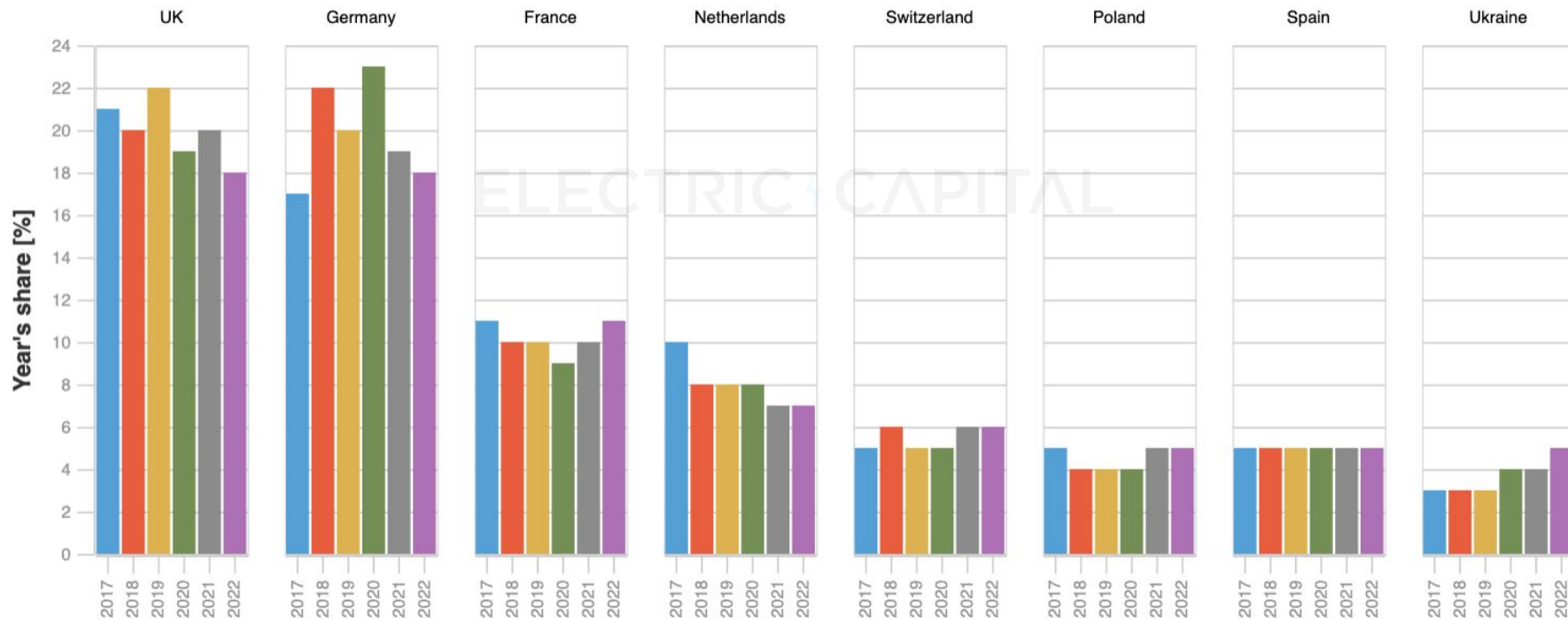
Normalized Share of crypto developers by region over time

Africa Asia Canada Europe India LATAM Oceania Russia UK US



# UK and Germany Lead Crypto Devs in Europe, but their Share Declined Slightly; Ukraine's share grew 2% in 3y

Share of crypto developers within Europe (4%+ share cut-off)



# Method #2

Developer time zones



# An alternative way of measuring location of development work

## Inferring Developer Location through Commit Timestamp Offsets

Our second method for inferring the location of developers involves analyzing the timestamps of their code commits. We use the offset between the timestamp of a developer's commit and UTC (Coordinated Universal Time) to infer their location.

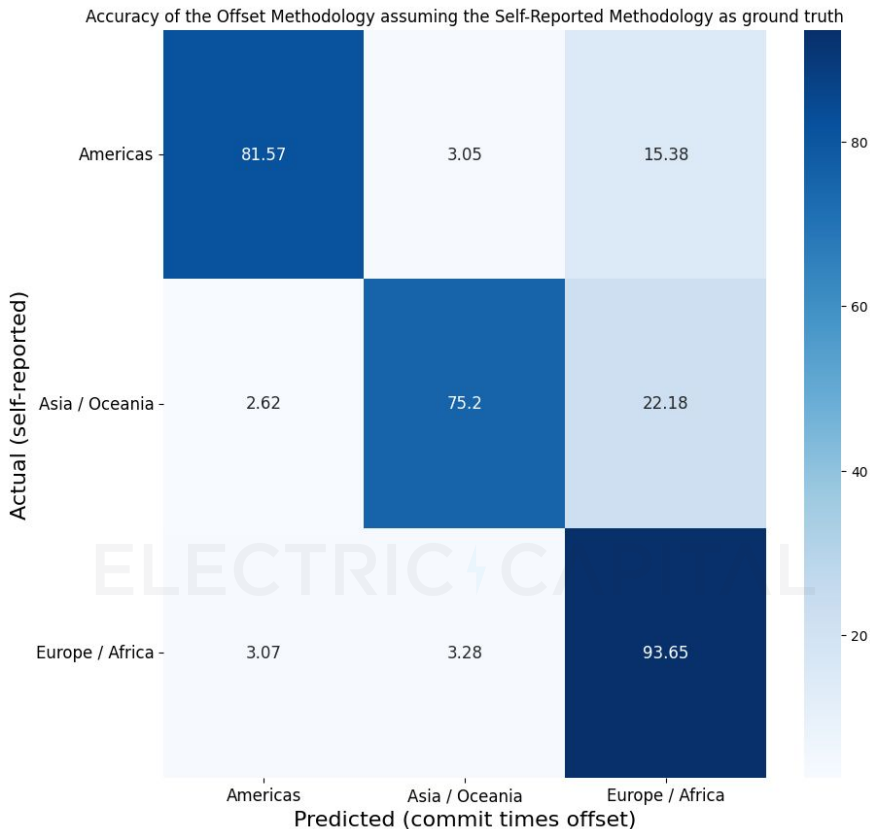
For example, if a developer commits code to a public repository between UTC -13 and UTC -3, we can infer that they are located somewhere in the Americas.

This method is interesting because it can provide a more complete picture of the global distribution of developers, even if they have not provided detailed location information on their social media profiles. Albeit being less precise than Method #1, the volume of data available with Method #2 is orders of magnitude larger than with Method #1.



# Method 2 has an accuracy of 85% if we assume Method 1 as the ground truth

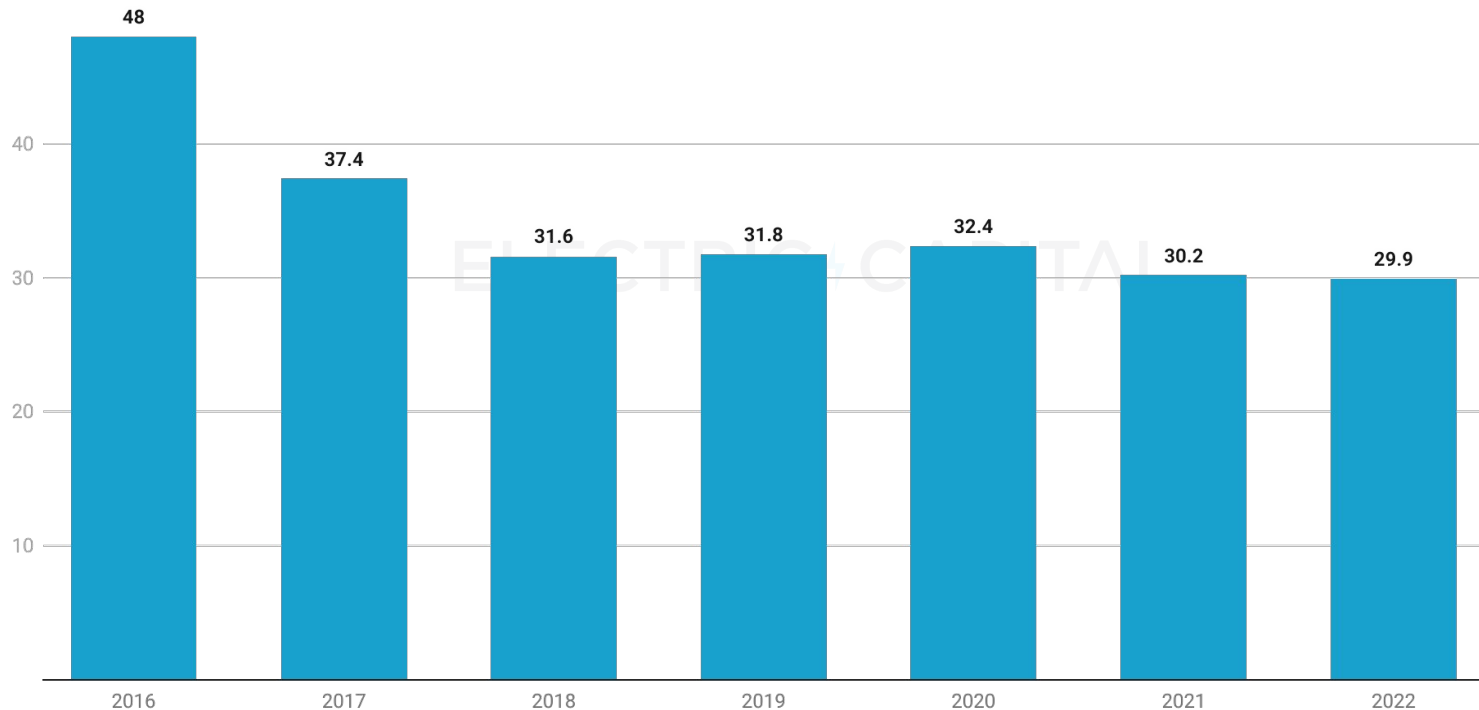
1. We divide the world into 3 wedges with common time zones / longitude ranges: Americas, Europe & Africa and Asia & Oceania
2. We use method #2 (developer's timezone) to infer the wedge to which developers might belong
3. From method #1, we map all countries to one of the three wedges
4. For each developer, we compare the inferred wedge using method #2 with the developer's actual country (from method #1)
5. We calculate the inference accuracy of method #2  $\rightarrow$  85%



# Work in The Americas is below 30% for the first time, even though LATAM is included with this method



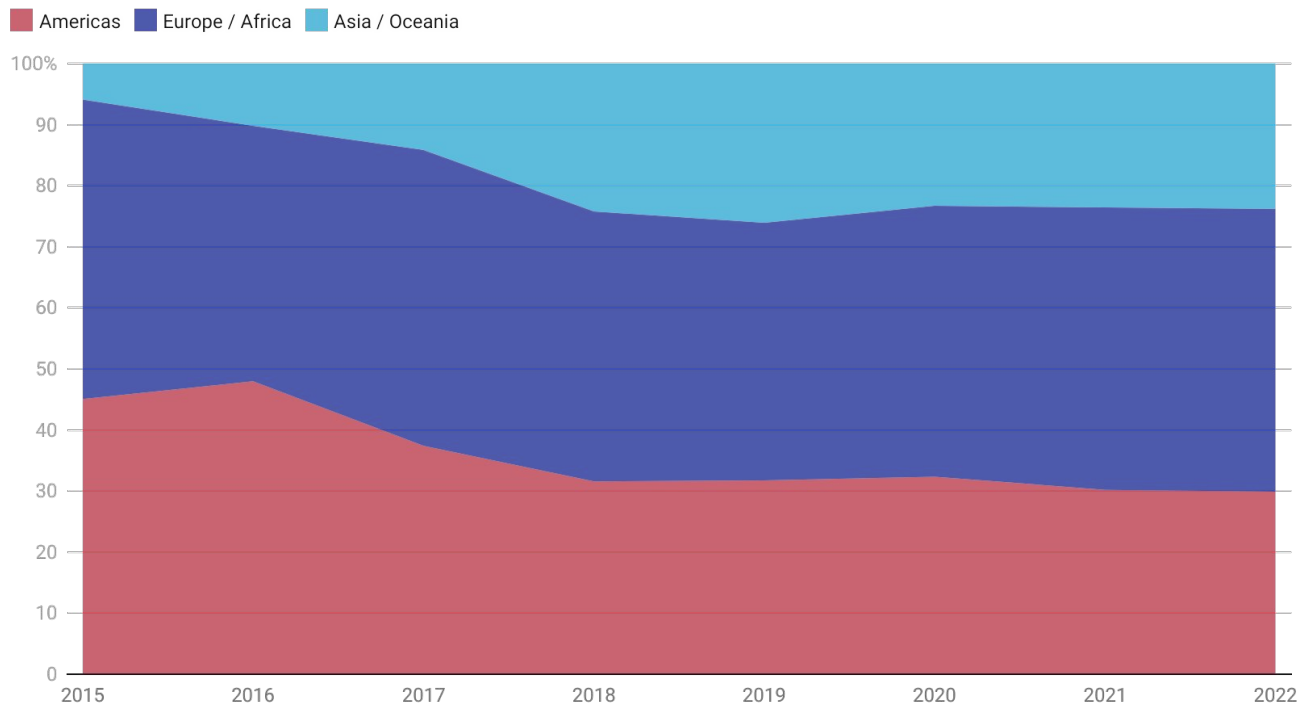
Share of crypto developers in The Americas time zones





# Countries in the Asia / Oceania regions took 3 years longer to onboard crypto developers

Share of crypto developers by timezone wedge



# Appendix

US Specific Thoughts





# Crypto is the next wave of the Internet

Blockchain and crypto technologies has exploded in popularity as a once-in-a-generation technology platform and economic opportunity. These technologies have the potential to fundamentally change money, the financial system, and the Internet more broadly.

A decentralized Internet ecosystem built on blockchain technologies, where economic value is delivered to the users of the products via tokens, is a monumental shift. What's valuable and celebrated within the industry is also the open-sourced nature of the underlying technology, which enables unparalleled security, access, and transparency.

One of the early and leading indicators of this emerging technology is in software developer engagement – the more activity (“code commits”) in the underlying software, the more vibrant the ecosystem. Due to the open-sourced nature of blockchain technology, it is possible to analyze developer activity by looking at the volume of code commits and derive important trends about the industry.

That the U.S. is increasingly losing market share in Web3 software development mean both that the developer community is getting bigger and more global, but there is **a real risk of losing the U.S.'s leadership position in finance, cryptography, and distributed systems technologies**. This presents a set of real strategic and national security concerns for the United States.



# The U.S. must move quickly to preserve preeminence in financial markets and related technologies

1. **Jobs & Financial Impact:** U.S. preeminence in blockchain software development enables the U.S. to create jobs and fuel financial inclusion, as the broader blockchain ecosystem continues to grow.
2. **Standards Influence:** By designing new protocols, U.S. engineers define the standards for financial systems and data systems. These are the SWIFT and HTTP equivalents of the modern era. Losing market share means that other countries can have larger influence over global financial and data standards.
3. **National Security:** The U.S. must shape development of new technology and financial products to reflect American values and national security objectives.