

ELECTRIC⚡CAPITAL

U.S. Share of Blockchain Developers is Shrinking

March 2023

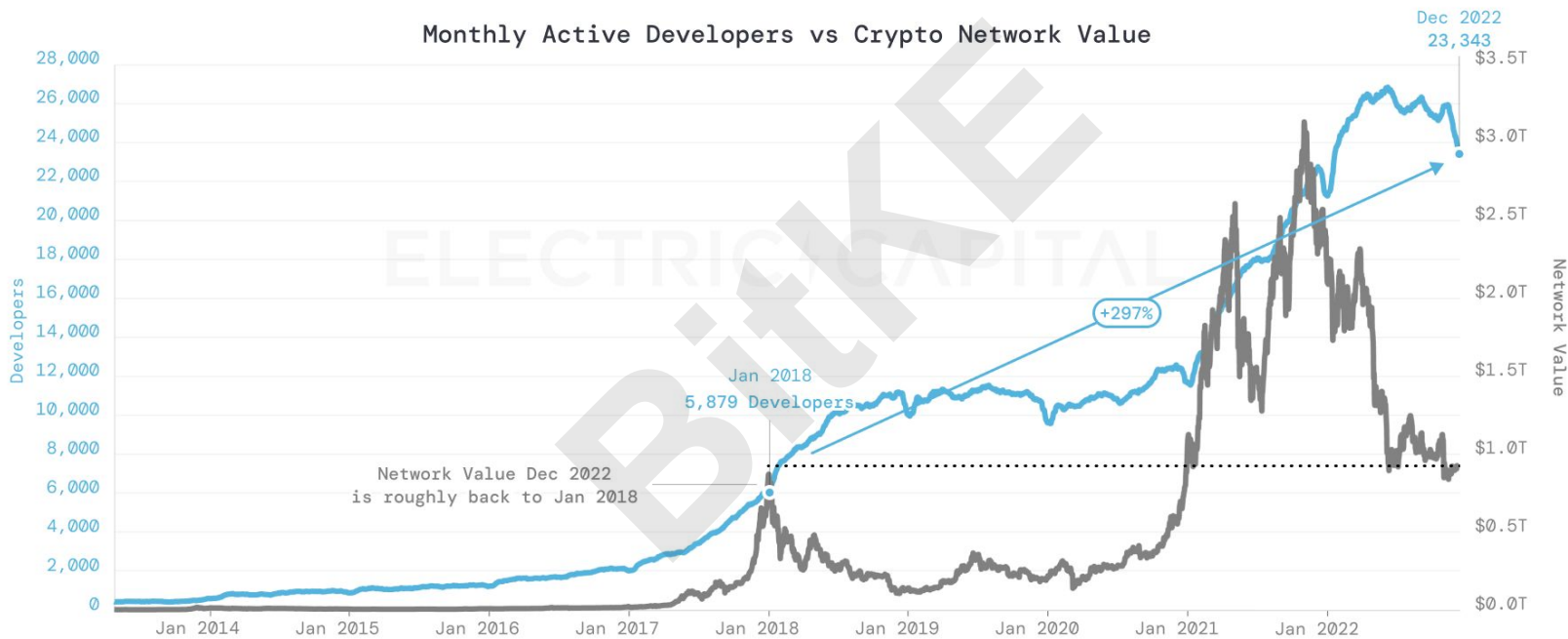


The U.S. is losing its lead in blockchain developers

- 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 from 40% market share. This threatens U.S. 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 3 million 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%**



Network Value Dec 2022 is roughly back to Jan 2018

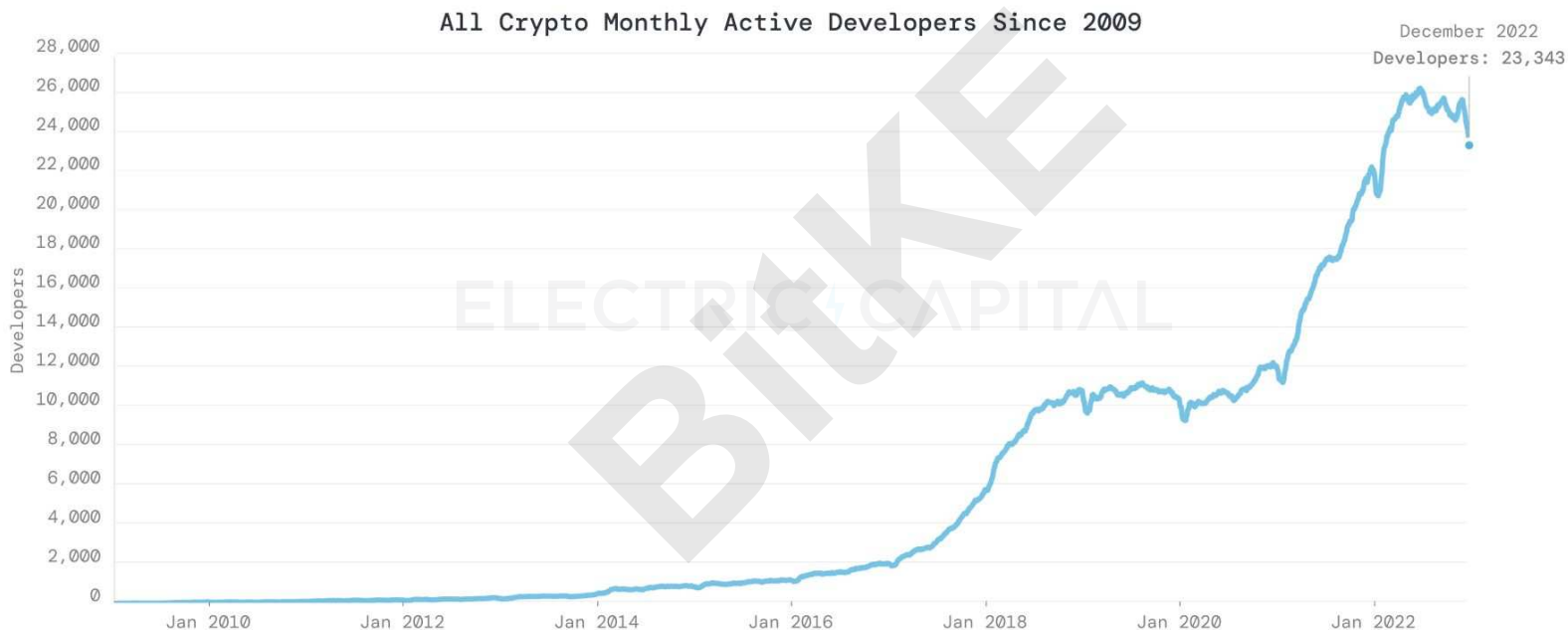
+297%

Total Network Value is the value of total crypto market cap from Coingecko.



Blockchain developer ecosystem keeps growing

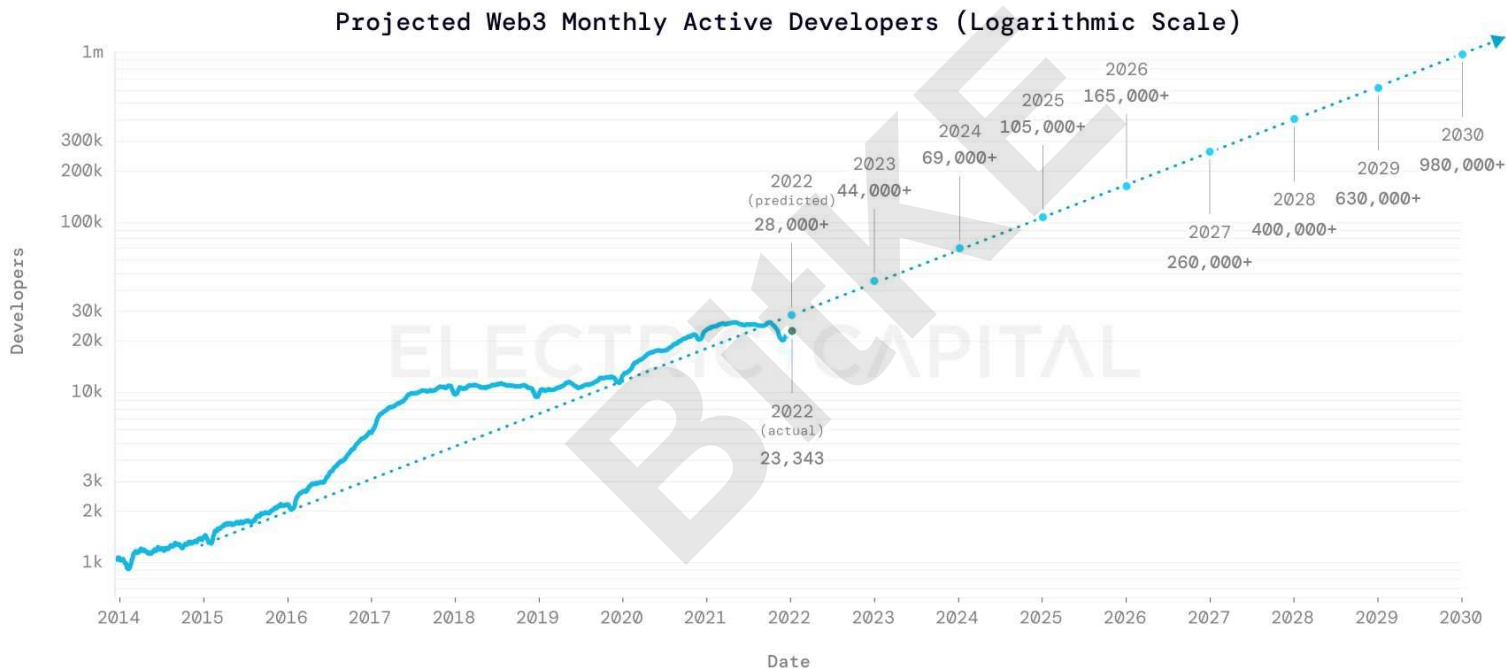
23,343 monthly active developers in December 2022





The U.S. can capture the next 1M blockchain devs

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



Blockchain Developers

Location

Methodology



Method #1: Self-Reported Locations

Software developers have accounts with public information such as location or links to their 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 blockchain 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 may be underrepresented.



Method #2: Developer Time Zones

To measure blockchain software development activity, we use the time zone 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 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. Similarly, time zones overlap between 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.

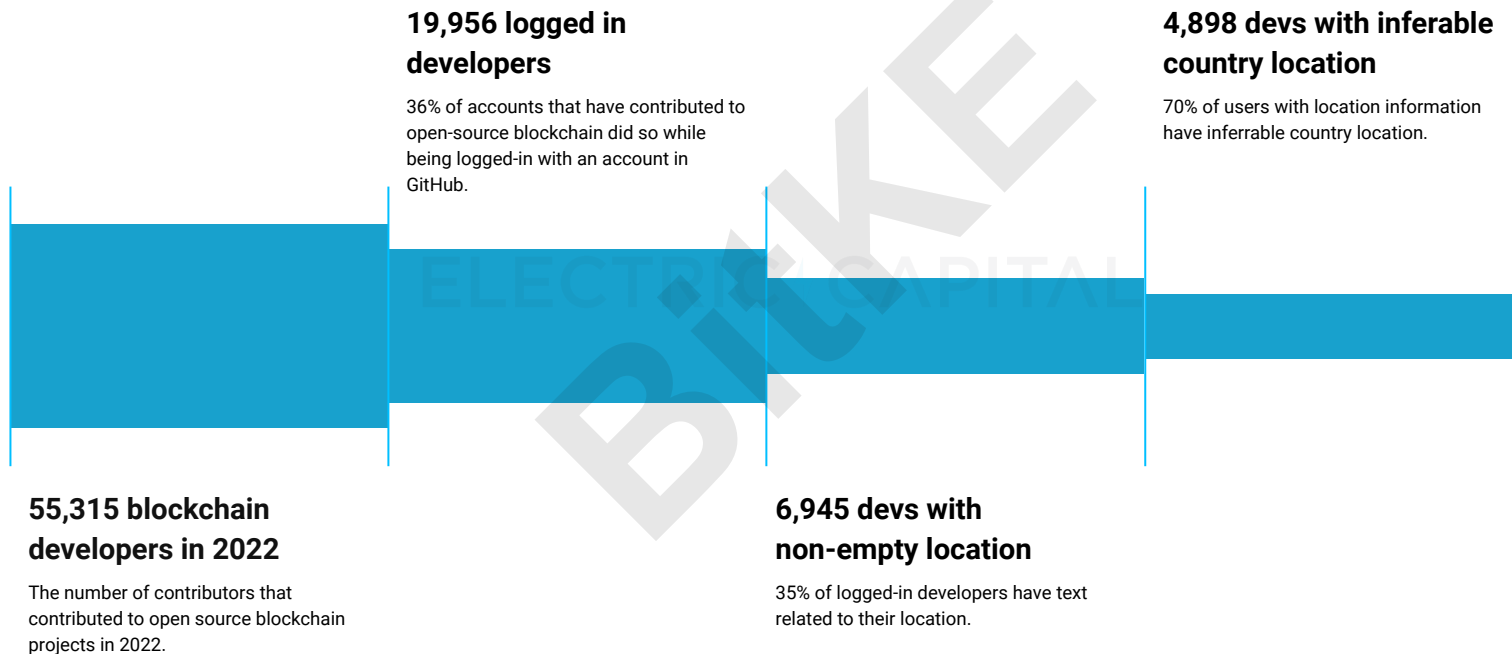
Method #1

Self-Reported Locations



Location data is a scarce piece of information from blockchain developers

Sample size funnel (2022 only)



55,315 blockchain developers in 2022

The number of contributors that contributed to open source blockchain projects in 2022.

19,956 logged in developers

36% of accounts that have contributed to open-source blockchain did so while being logged-in with an account in GitHub.

6,945 devs with non-empty location

35% of logged-in developers have text related to their location.

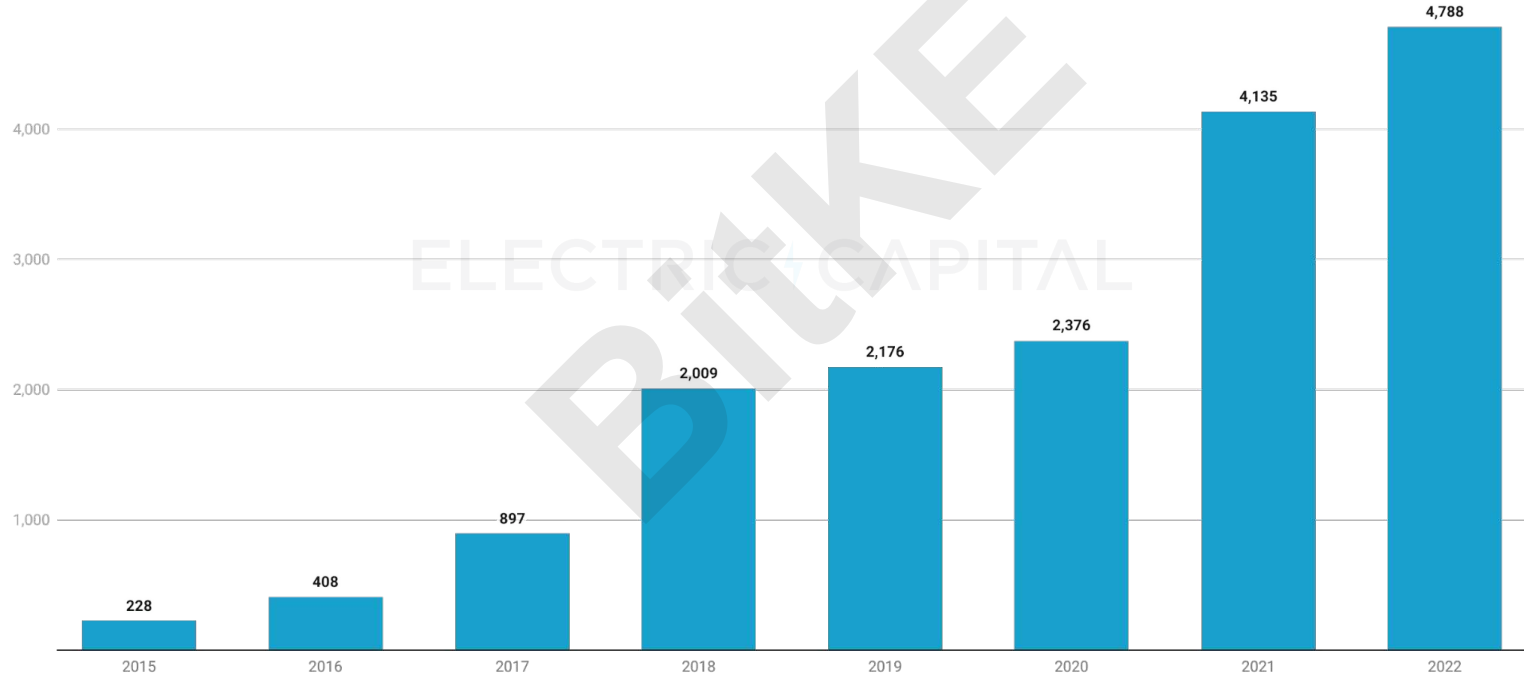
4,898 devs with inferable country location

70% of users with location information have inferable country location.



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

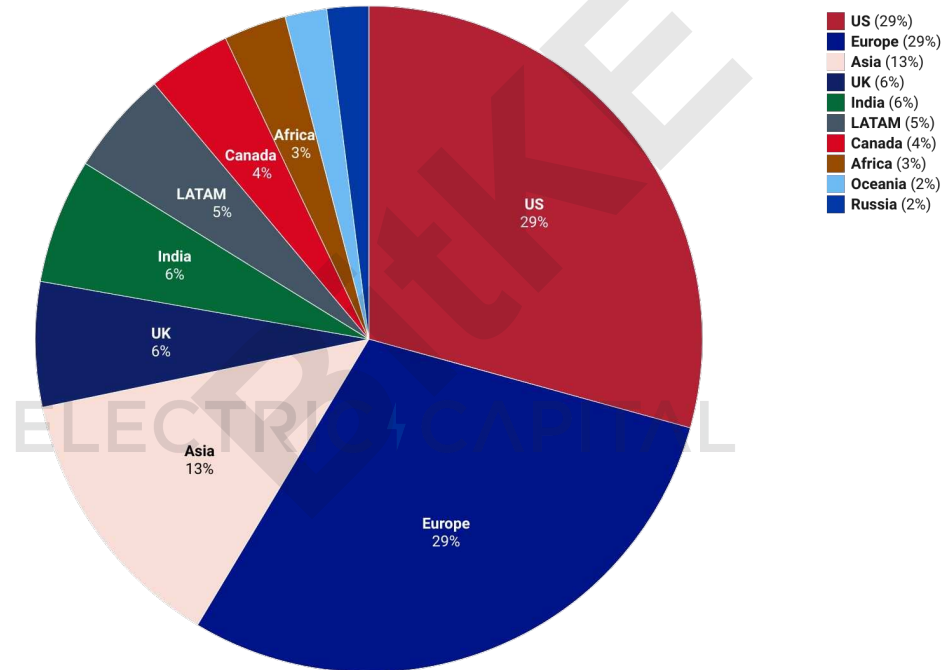
Sample size





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

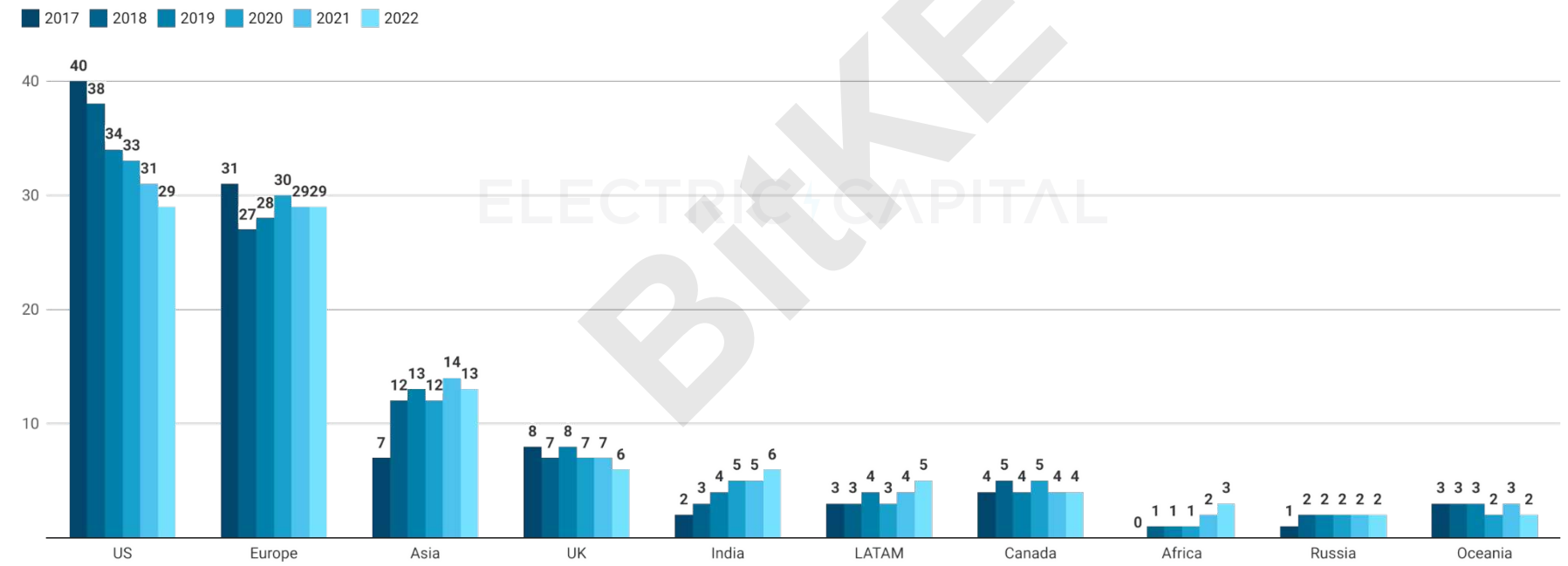
Share of blockchain developers by region in 2022





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

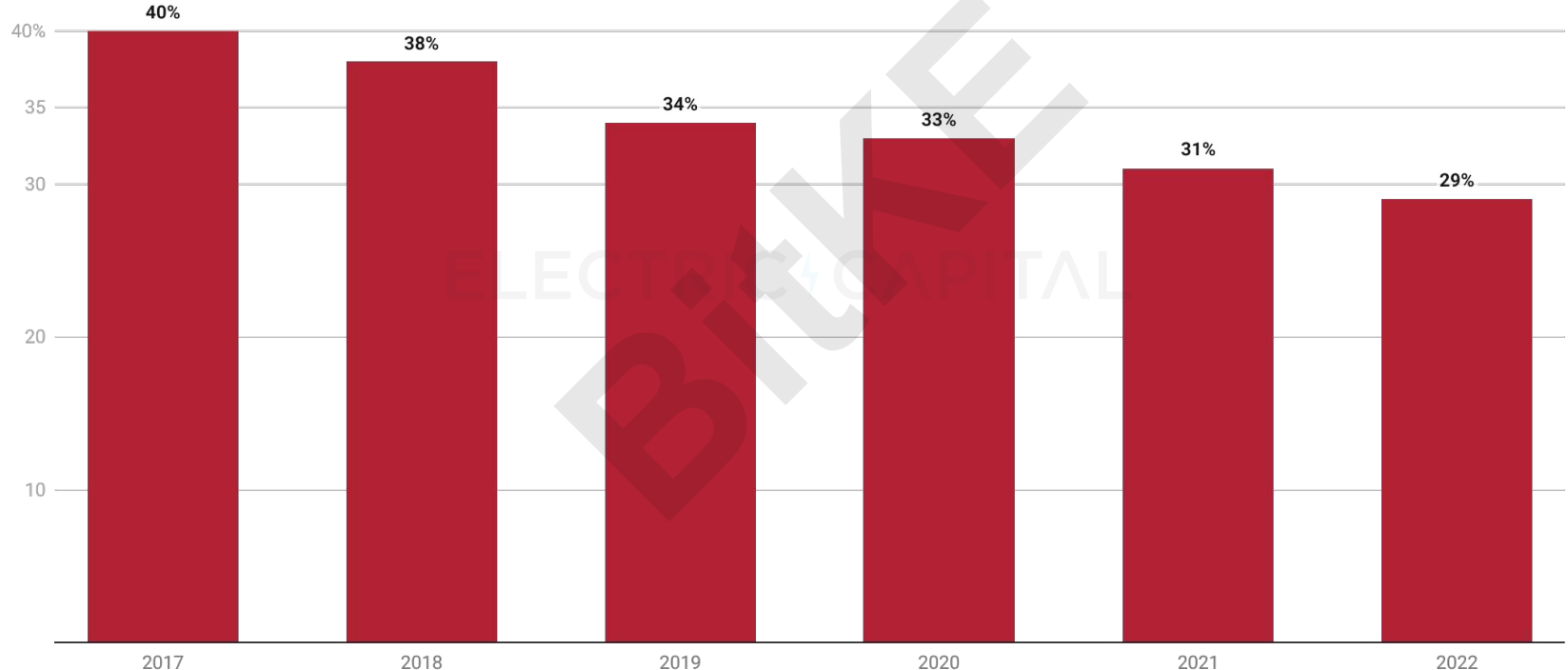
Share of blockchain developers by region over time





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

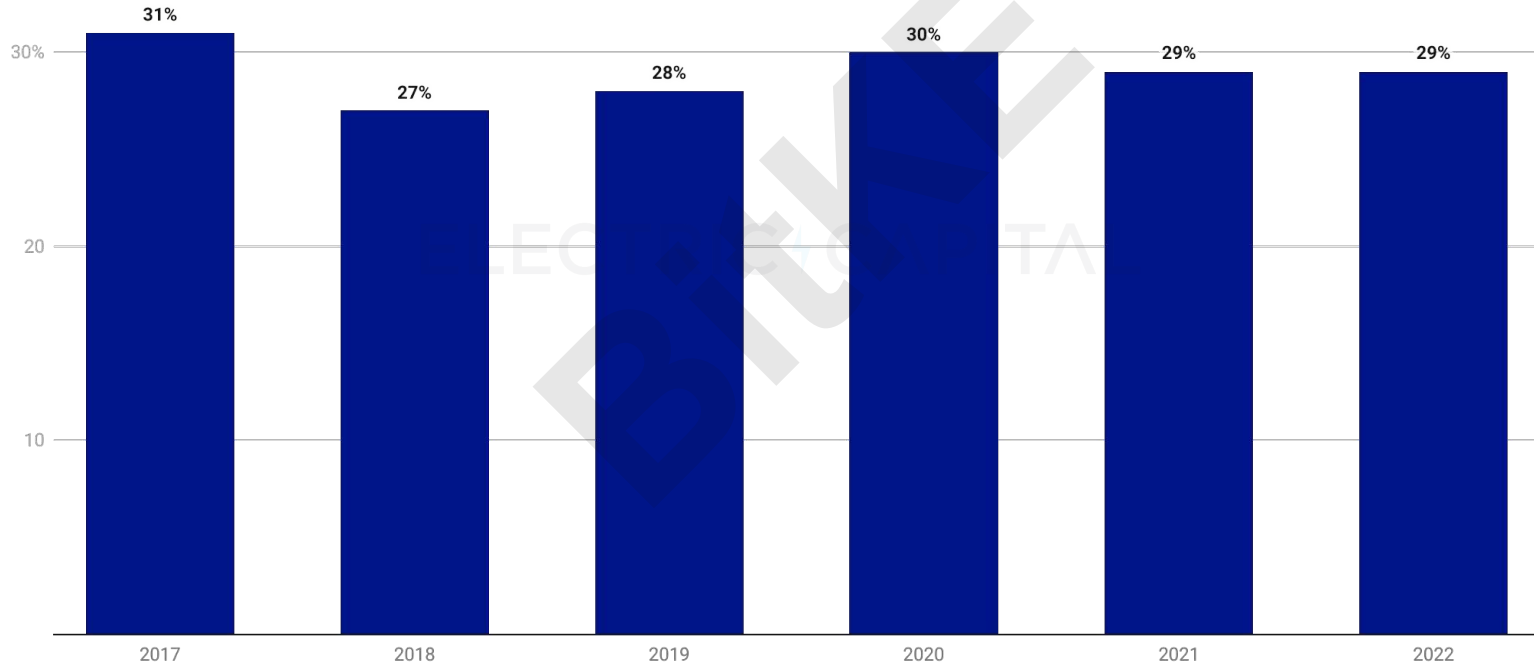
U.S.'s Share of blockchain developers





Comparatively, Europe (excl. U.K.) has been able to maintain a share of blockchain developers of 29%

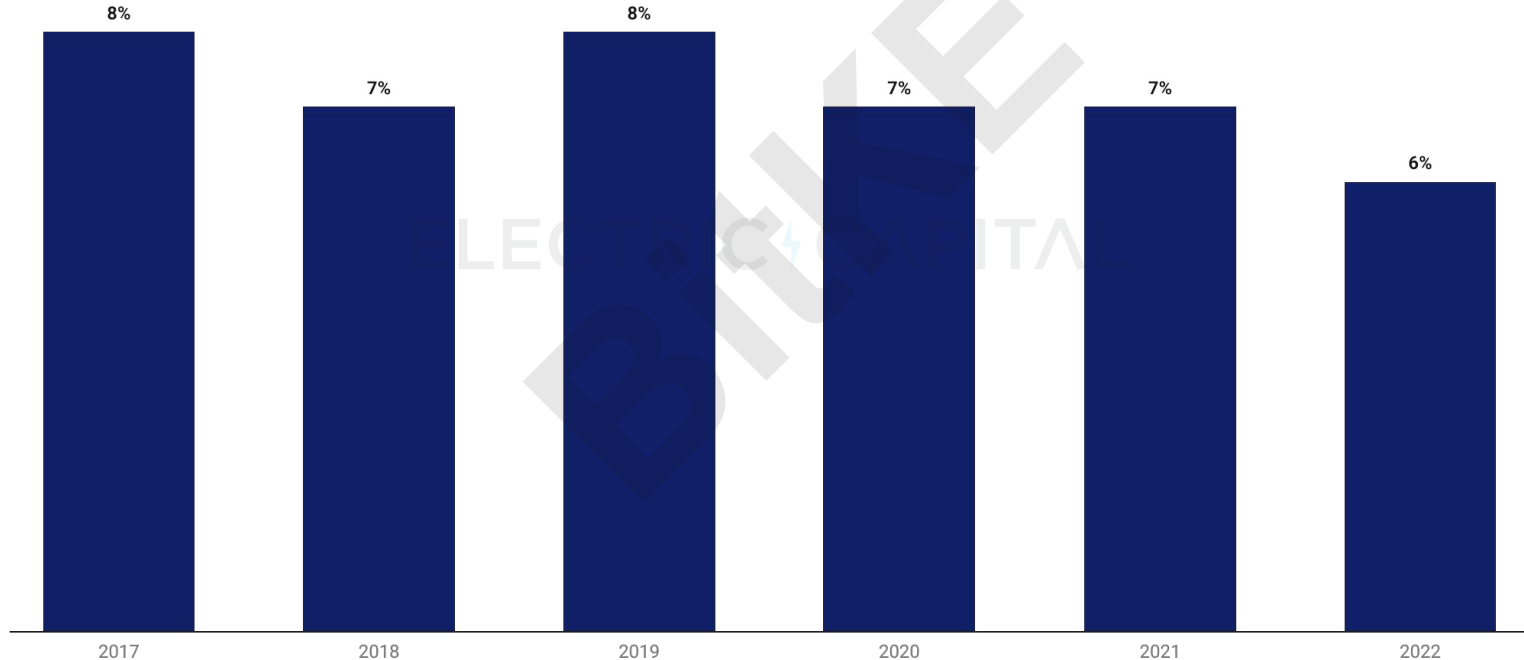
Share of blockchain developers in the E.U.





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

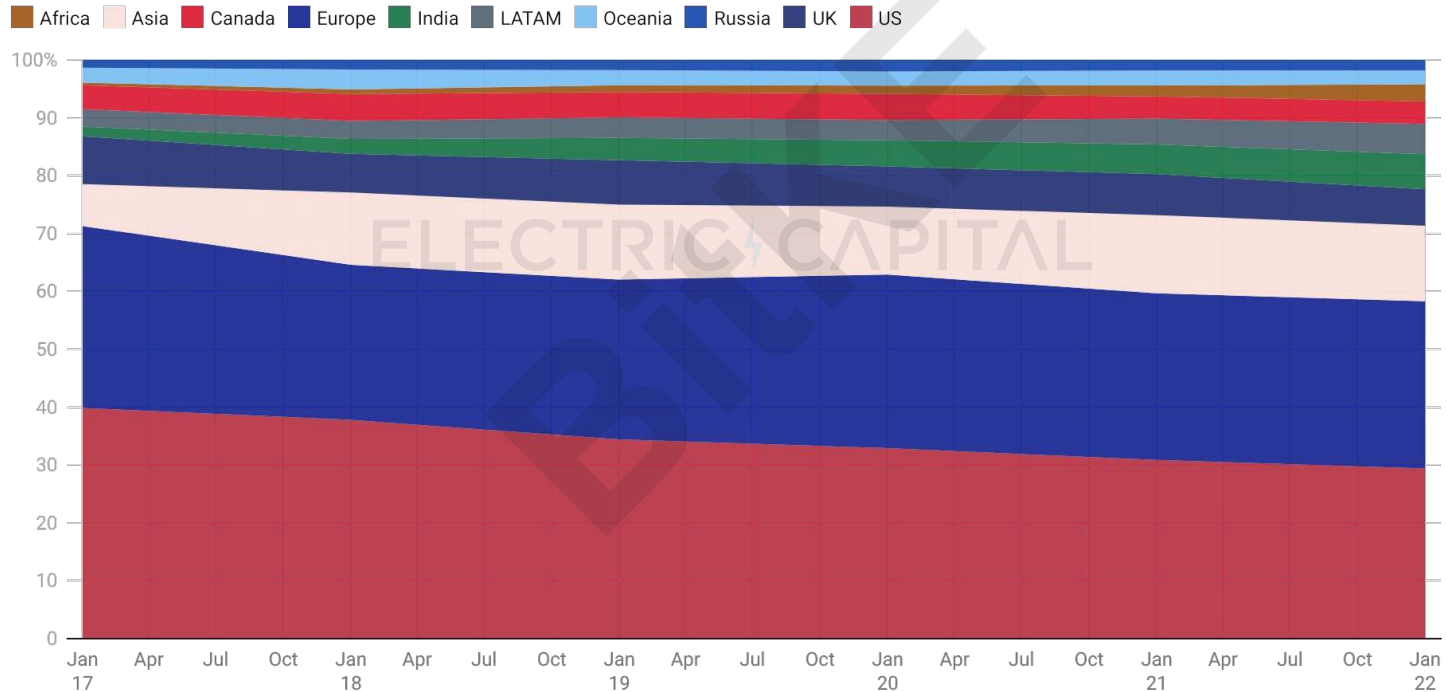
Share of blockchain developers in the U.K.





India, Africa, and LATAM are capturing blockchain dev share from the U.S.

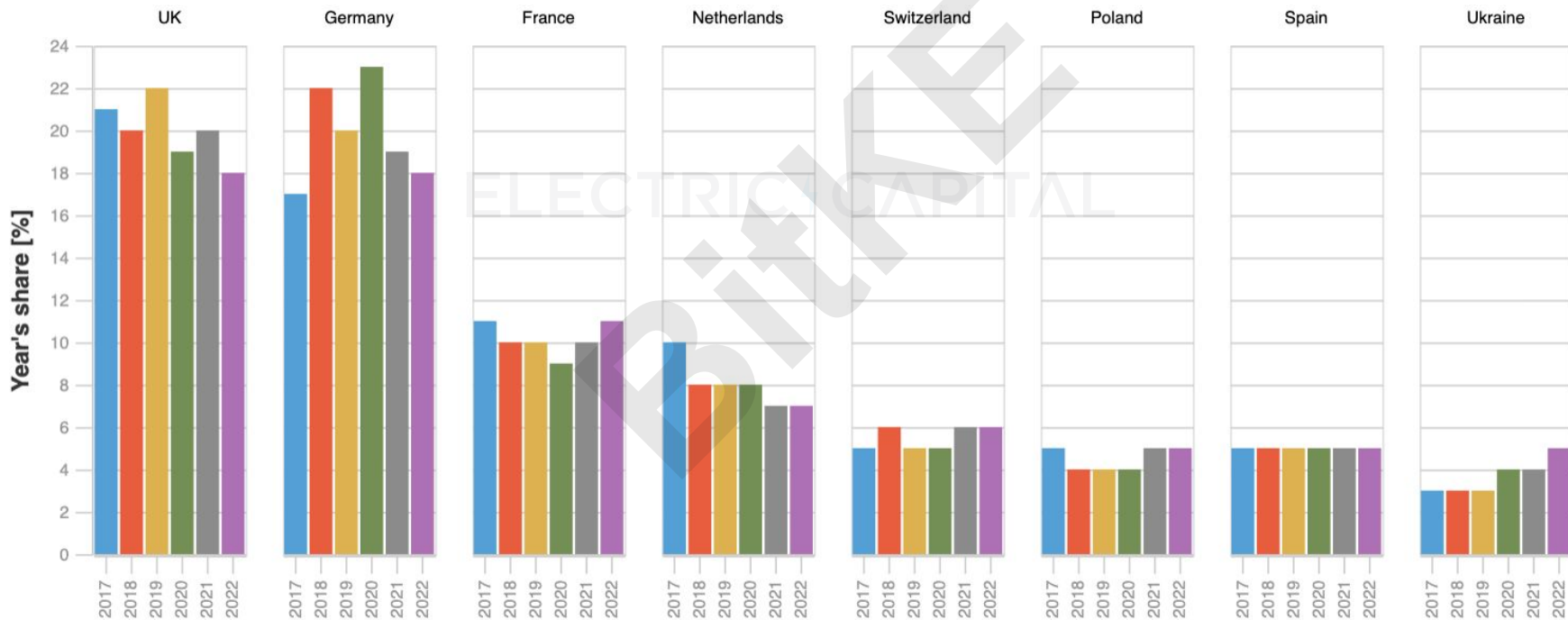
Normalized Share of blockchain developers by region over time





U.K. and Germany lead devs in Europe, but their share declined slightly; Ukraine's share grew 2% in 3 years

Share of blockchain 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 analyzes 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.

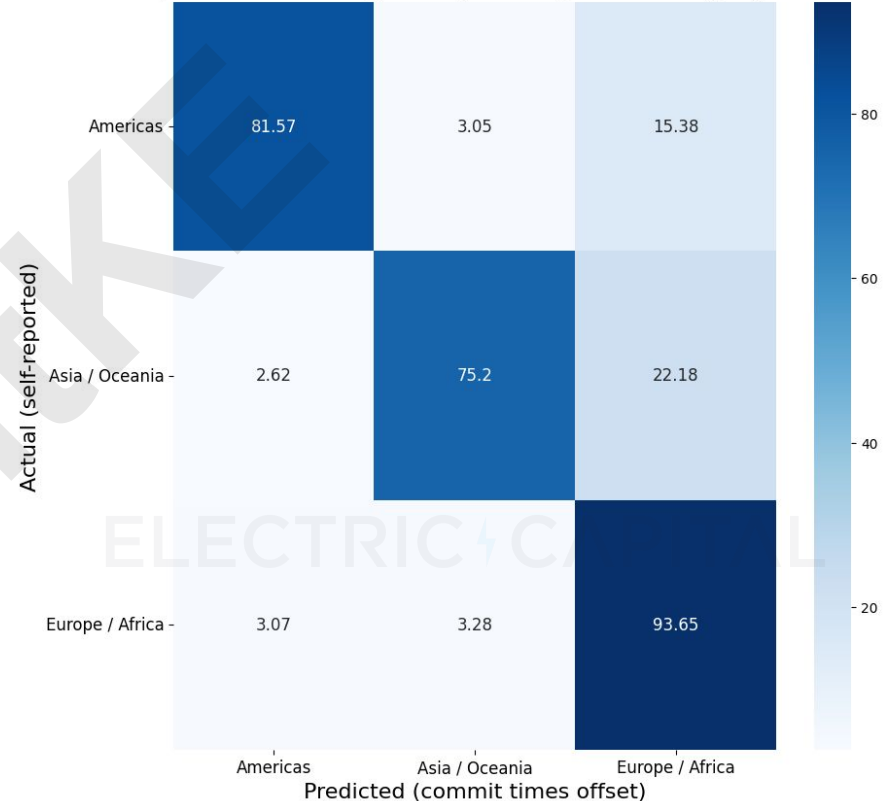
This method can provide a more complete picture of the global distribution of developers, even if they have not provided detailed location information on their social media profiles. Albeit being less precise than Method #1, the volume of data available with Method #2 is orders of magnitude larger than 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 time zone) 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 → 85%

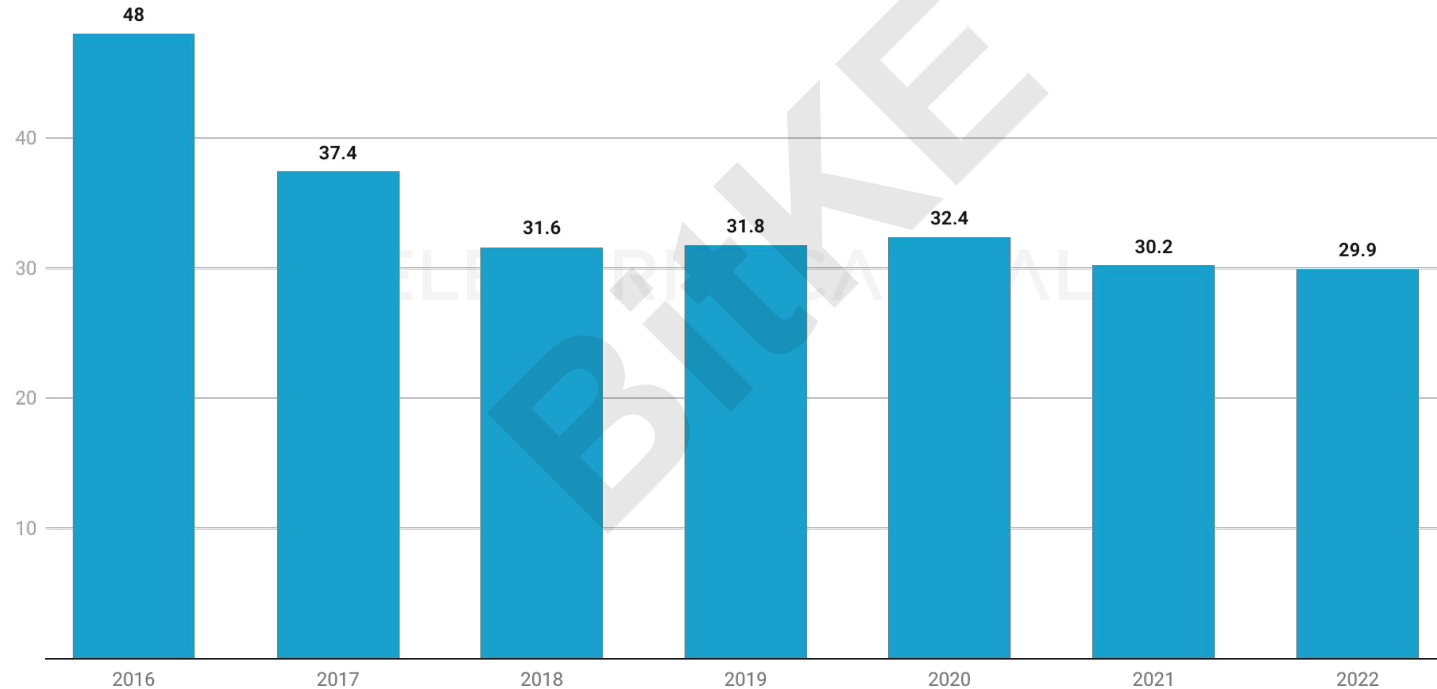
Accuracy of the Offset Methodology assuming the Self-Reported Methodology as ground truth





Dev share in the Americas is below 30% for the first time, even including LATAM

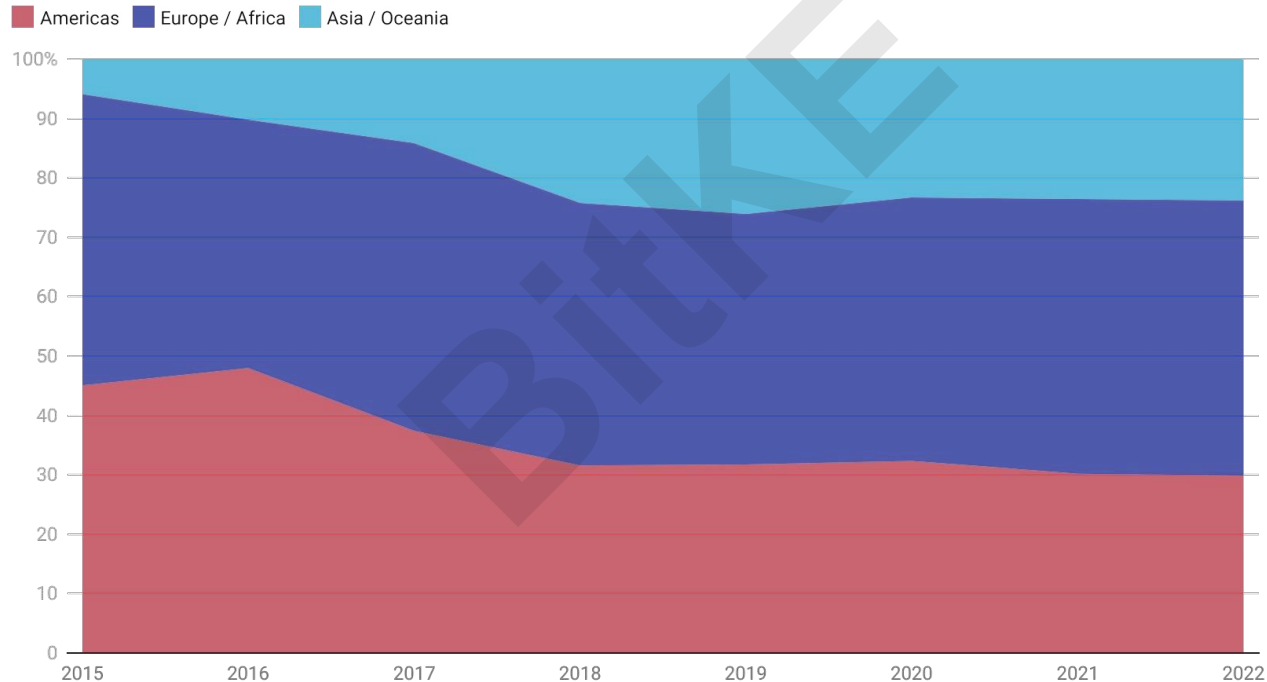
Share of blockchain developers in the Americas time zones





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

Share of blockchain developers by time zone wedge



Appendix

U.S. Specific Thoughts



Blockchain 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 blockchain 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.