Bitergia

RADAR REPORT

In collaboration with Exponential Science

The State of Hedera and the Open Source Crypto Ecosystems in 2024

February 2025

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This Radar Report delves into the following topics:

In this Bitergia Radar Report, we delve into the Hedera ecosystem and its relationship with other blockchain open source ecosystems, including key players and interdependencies, as well as challenges and opportunities within Hedera

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The analysis of the Hedera ecosystem and its relationship with other blockchain ecosystems shows two main ways of producing software and value for their respective communities. A more interconnected ecosystem where smaller projects are creating value on existing technologies by consuming and contributing back as the **Ethereum - Avalanche - Polygon - BNB Chain** group; and others as **Cardano**, **XRP**, or **Hedera,** where development takes place more independently.

This interconnection density allows those projects to produce value faster, as they incorporate existing technology, but at the same time this brings a **high dependency on** this base technology, in this case, **Ethereum**. This overlap across projects creates bridges and commonalities where the effort of more than 150 developers is directly consumed by the satellite projects to grow its core technology.

These commonalities do not exist between Hedera and the other analyzed ecosystems and this does not affect the development pace within the project. Company contributors are clearly focused on the core areas of the development as ***Consensus Node*** and ***Ledger*** versus the ***Tooling*** and ***Applications*** layers. The latter two areas are at the same time the ones attracting most of the new contributors which indicates new opportunities to grow the community.

The evolution of the community is positive, with hundreds of thousands of lines produced by several dozens of contributors not affiliated with Hashgraph, especially out of the core parts of the project. This is followed by a growth in the backlog which may require extra care from the main company to avoid burnout of those third parties contributing to the project.

The innovation flow in the open source crypto ecosystem

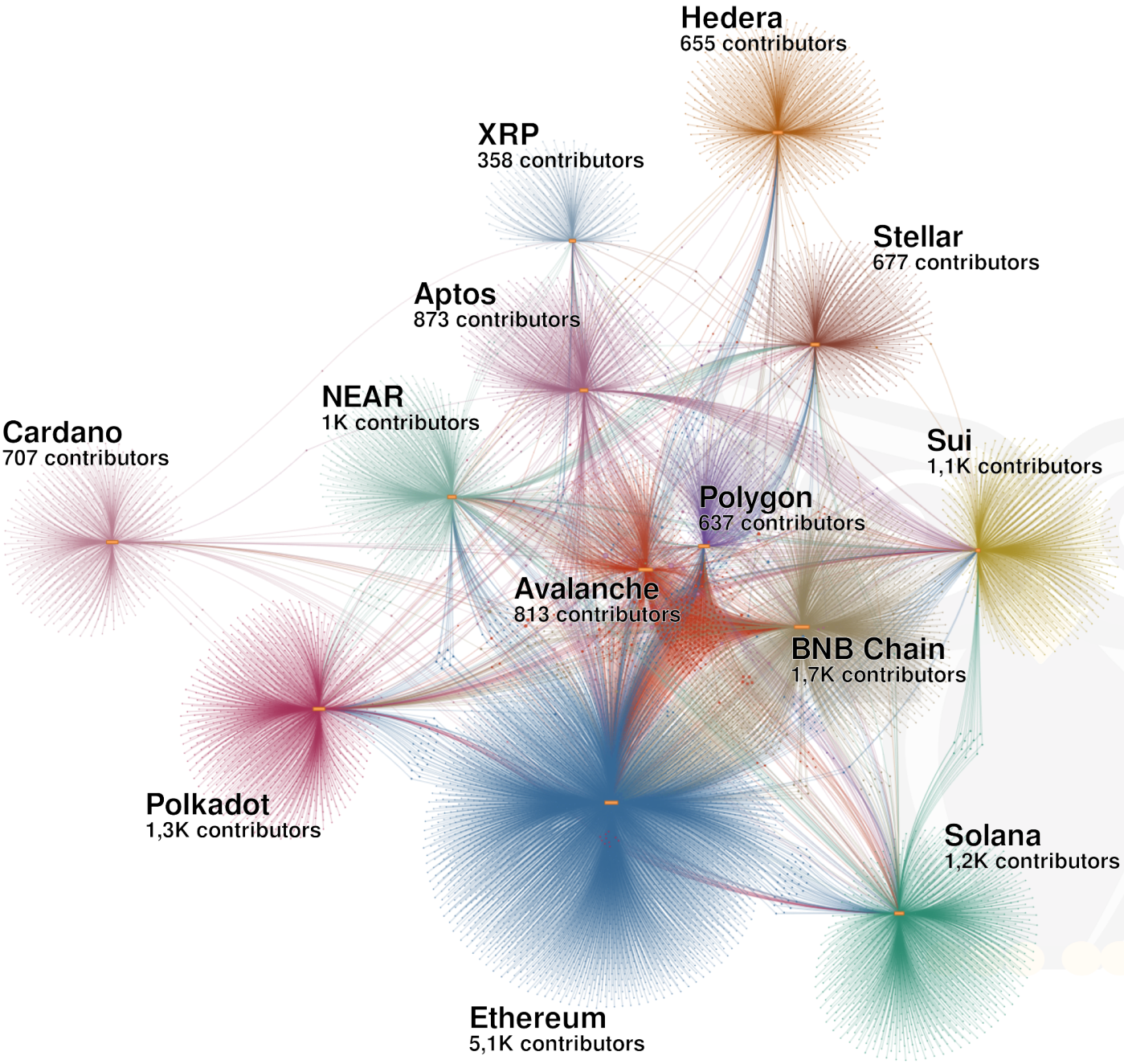
We begin by exploring the relationships within the cryptocurrency landscape, visualizing the connections between active contributors and the various ecosystems they engage with. The network chart below maps these relationships, providing a visual representation of the complex interactions that shape the crypto space.

Each colored node in this chart represents an instance of contributor activity in the GitHub repositories from these ecosystems during 2024. Contributor activity covers code submissions and proposals, issue creation, and commenting on issues and code reviews. For contributors who were active in more than one ecosystem, we assigned their node's color to match the ecosystem they contributed the most.

The chart revealed a three-layer ecosystem. The primary layer includes organizations with the most active contributors and the most connections to the other ecosystems. In this case, that primary layer is Ethereum. A second layer of connectedness is made up of ecosystems with medium activity. Finally, Hedera is in the outer layer with 655 contributors and fewer ecosystem connections.

The centrality of the innovation flow goes through the Avalanche, Polygon, and BNB Chain, as they are highly connected projects. Ethereum has its own gravity given its size, making it the fourth highly connected project. The interconnectedness of these four creates a virtuous cycle of knowledge sharing as the same developers are participating in one and the other.

On the other hand, Hedera, Cardano, and XRP are outliers in this ecosystem. Although they are not isolated, there is a consistent lack of connections to the core of the ecosystem. The middle layer consists of NEAR, Aptos, Stellar, Sui, Solana, and Polkadot. They are more densely connected, including higher levels of connection to the core. These connections include any type of contribution and role, from end-users of the technology to its core developers.



This chart displays contributors, represented by colored nodes, and the ecosystems to which they contributed in 2024. The number below each label represents the active contributors from that ecosystem during 2024.

Developers bridging crypto ecosystems

Despite the competition between the analyzed ecosystems, there is also collaboration and interoperability between some of them. In this analysis, we focused on the people acting as bridges between different communities to estimate how strong their collaboration is.

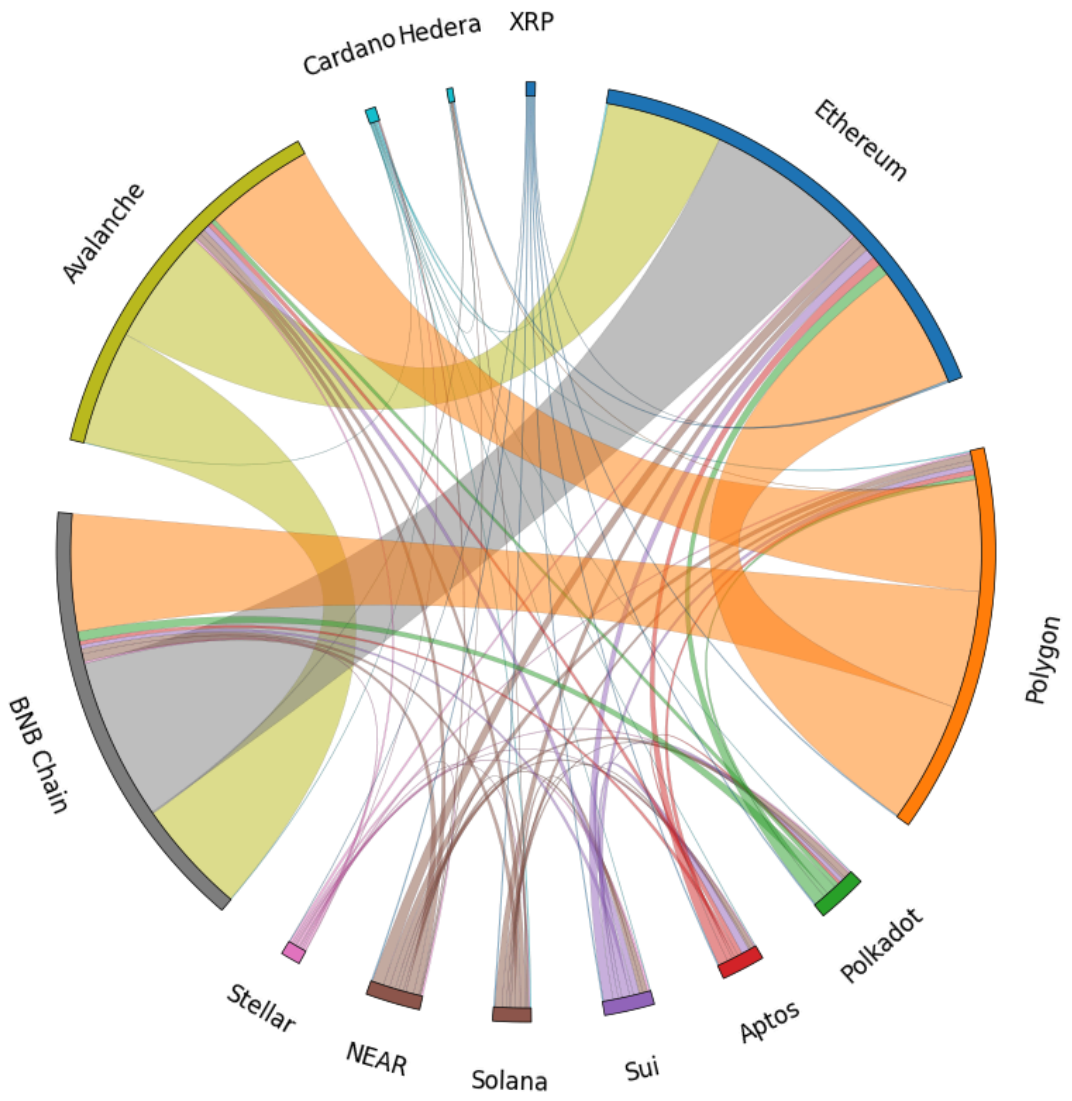
The first insight is that **BNB Chain, Avalanche, and Polygon have a strong dependency on the Ethereum ecosystem,** especially on the Ethereum client built in Go (aka *Geth*). Ethereum's code is being adopted by BNB Chain, Avalanche, and Polygon.

The figure on the next page shows strong connections between the four communities. A deeper analysis shows that all BNB Chain, Avalanche, and Polygon include a big portion of the contributions published in the Geth repository on GitHub *ethereum/go-ethereum*. Geth provides the core functionality for interacting with an Ethereum-based blockchain, including transaction processing, consensus mechanisms, and networking. Those adopted contributions from Geth were **produced by more than 150 developers in 2024**. The three ecosystems are reusing the work created by the Ethereum community and becoming more aligned with it. However, the collaboration between the four is not limited to reusing code produced by Ethereum. Some of the most active contributors in BNB Chain and Avalanche also make code contributions in the Ethereum repository, so **there is an active collaboration that is making these four ecosystems stronger**.

If we continue with the next level of interconnected ecosystems, we discover that Polkadot, Aptos, Sui, Solana, and Near are also connected with Ethereum. Both Polkadot and Near lead this group with 18 contributors in common with Ethereum. The connections between the ecosystems within this second group are weaker than the connections each has with Ethereum.

The third group is composed of ecosystems with limited connections to Ethereum. Those are Stellar, Cardano, Hedera, and XRP. Stellar is connected with 11 ecosystems with 9 common contributors, 4 of which are connected to Ethereum. XRP has the smallest team of contributors (83 active developers) and they are connected to 8 ecosystems through 6 common contributors. **Cardano and Hedera are the ecosystems with the smallest number**

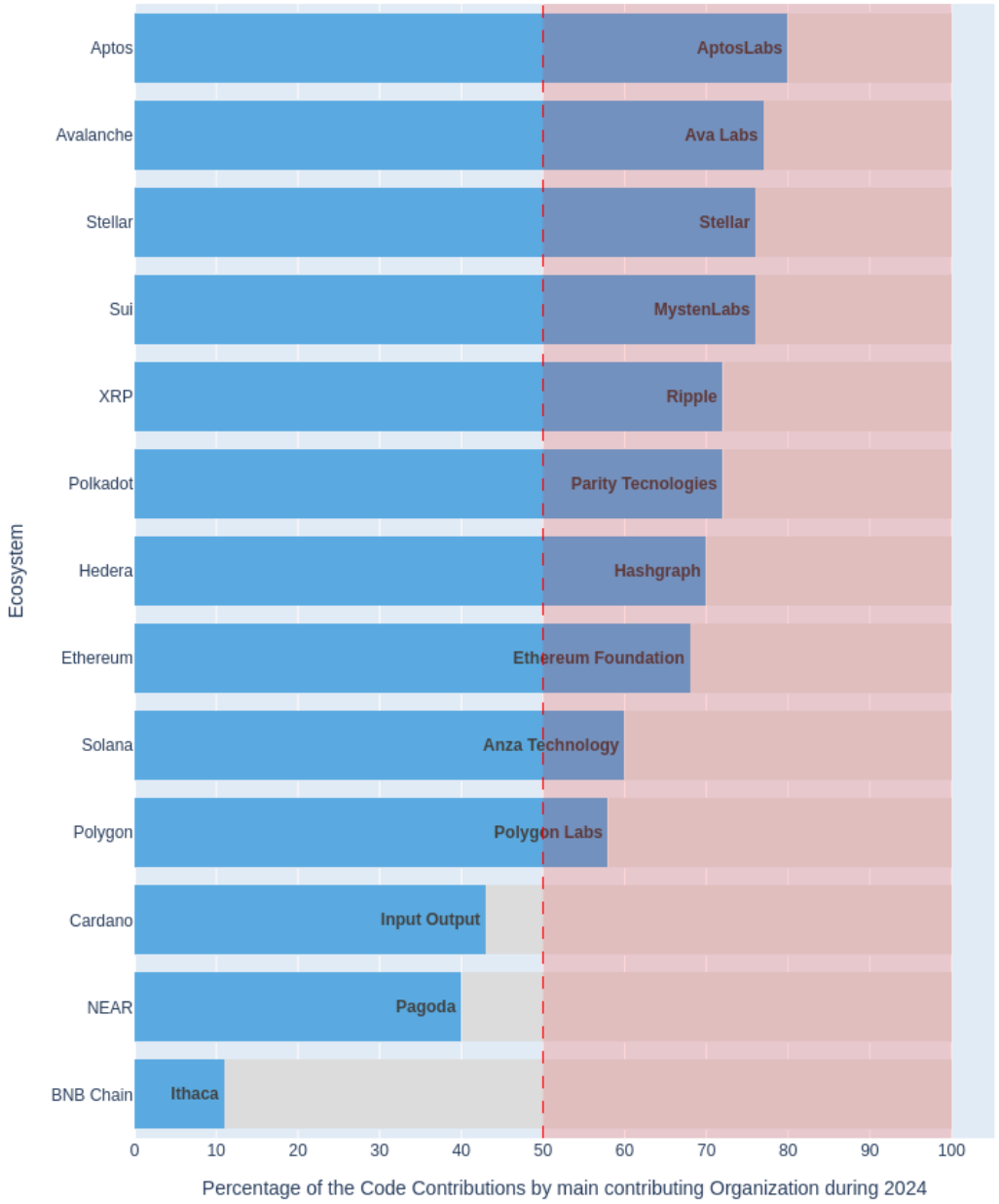
of developers bridging communities. Cardano has three common bridges while Hedera has four, both teams were close to 300 active contributors during 2024.



This chart illustrates the strength of collaboration between different ecosystems by identifying shared Git authors.

Key players in the open source crypto ecosystems

Generally, ecosystems with shared organizational leadership are more resilient to strategy changes by individual companies. From this point of view, **10 out of the 13 ecosystems are heavily controlled by a single organization**. This calculation involved grouping all Git contributions by company during 2024 for the analyzed ecosystems. This allowed for the identification of the leading contributors in each.



Concerning **Aptos**, the majority of development is undertaken by **Aptos Labs**, representing over 80% of contributions during 2024. The contributions from other organizations, including **Ripple**, are comparatively insignificant.

Avalanche development is primarily driven by **Ava Labs**, which represented 77% of code contributions during 2024. The next largest contributor is the **Ethereum Foundation** at 1%. The imported code from Ethereum serves to implement the Ethereum Virtual Machine.

Stellar is led by the **Stellar Development Foundation**, with close to 75% of the contributions. Companies like **Aha Labs** (5.5%) and **Apple** (2.2%) come next in the ranking.

Sui is led by **MystenLabs**, which has 75% of the contributions, and this number may be underestimated. The contributions of the second-largest contributor are minimal, suggesting that a significant percentage of unclassified contributions also originate from **MystenLabs** employees.

XRP development is primarily driven by **Ripple**, representing 73% of contributions. A significant difference exists between Ripple's contribution and that of the next major contributor, **Xaman**, at 1%.

Polkadot development is primarily driven by **Parity Technologies**, representing almost 73% of contributions. The next largest contributor, **Hashmatter**, contributes less than 3%.

The development of **Hedera** distinguishes itself from the preceding projects. While a single entity, **Hashgraph**, leads development with 70% of contributions, two additional organizations, **Limechain** (15%) and **Envision Blockchain Solutions** (7%), contribute a combined 22%.

Ethereum development is led by the **Ethereum Foundation** with 68% of the contributions, the second largest company found in the ranking contributed less than 1% of the contributions.

Polygon development is led by **Polygon Labs**, with 58% of the contributions during 2024. The second company in the ranking is the **Ethereum Foundation** with 10% of the activity. This activity can be attributed to Polygon's fork of the main Ethereum CLI client (known as *Geth*) and the integration of Ethereum's contributions on their repositories. **Aave Labs** is third with

2% of the code contributions.

Solana's development in 2024 was led by **Anza Technologies**, which contributed 57% of the code. The **Solana Foundation** contributed 8%, **Civic Technologies** 4%, and **Sona Labs** 3%.

Cardano development is led by **Input Output**, with more than 40% of the contributions. The second company in the ranking of contributions is **Tweag**.

NEAR platform development is led by **Pagoda**, which has 40% of the contributions. It is followed by **Near.org** with 17%. **Near DevHub**, **Near AI**, and **NearOne** add up to 5% of the contributions.

BNB Chain is a *rara avis* compared to the other 12 communities. The companies **Ithaca**, **NodeReal**, and **Paradigm** are the top three contributors, and they are making around 30% of the contributions. Identifying affiliations was very complex for this project, with a high percentage of unclassified contributors. We suspect that, in reality, the three companies likely have a larger contribution to the ecosystem.

The companies producing value in Hedera

This chapter focuses on the Hedera ecosystem and its community, analyzing the origin of the contributions.

43 organizations have contributed to the Hedera project on GitHub from January to December 2024.

The **first group** of companies is composed of Hashgraph, LimeChain, and Envision Blockchain Solutions. During the last 12 months, they made more than 80% of the Git contributions. It is worth mentioning Envision is contributing to the application level of the Guardian project, but not to the Core infrastructure level.

A **second group** of 27 organizations led by Hedera Hasgraph, ioBuilders, and Devlabs, is regularly involved in the project.

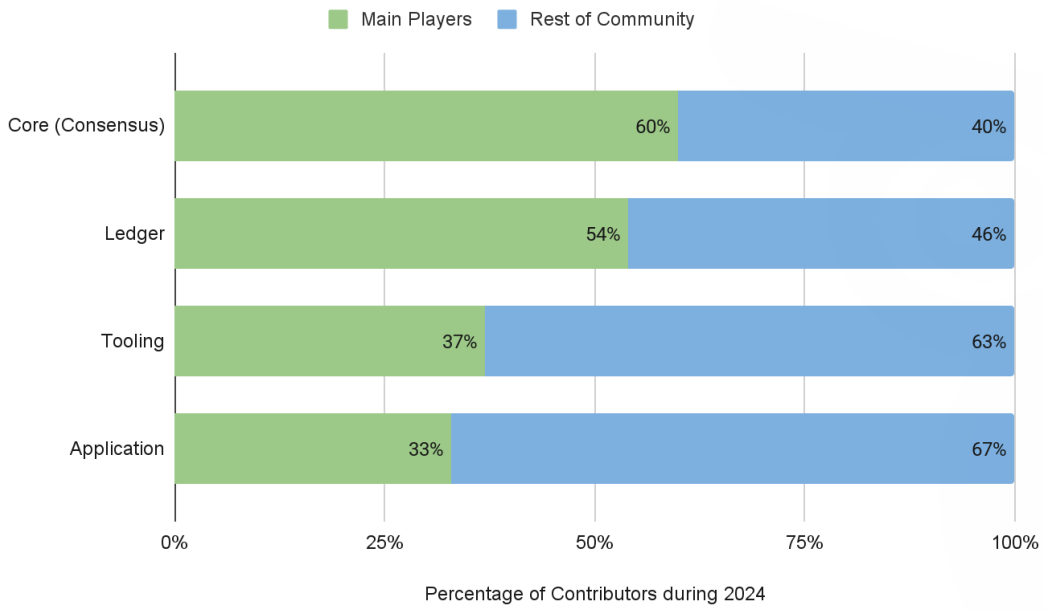
A **third group** of 12 organizations, including The Hasgraph Association, are informally active in the project, providing feedback and participating in discussions.

When comparing the activity of the contractors with the rest of the organizations, we see the contractors made 92% of the commits during the last 12 months, submitted 91% of the new GitHub Issues, and posted 82% of the comments in GitHub PRs and Issues.

Engaging developers in Hedera's community

Understanding the **balance between contributions from Hedera's main organizations** (those responsible for 80% of the code contributions), and the **contributions coming from the broader community** is crucial for assessing the project's long-term health and sustainability.

The bar chart shows the distribution of activity (commits, issues, pull requests, and comments) across Hedera projects during 2024, distinguishing those contributors coming from Hedera's main organizations and the contributors from the rest of the community.



The closer to the core technology (*Consensus Node* and *Ledger*) we come, the more developers we see involved from the main contributing organizations from Hedera. This represents a **significant, but not dominant, role for Hedera's organizations in these core components**.

In contrast, if we focus on the projects in the upper layers (*Tooling* and *Applications*) we observe a **clear dominance of contributions from the broader community**. This suggests that external developers are more engaged in building the tools and applications that interact with the Hedera network. This scenario would increase the popularity of the network, and that could lead to more potential contributors ending up working closer to the core.

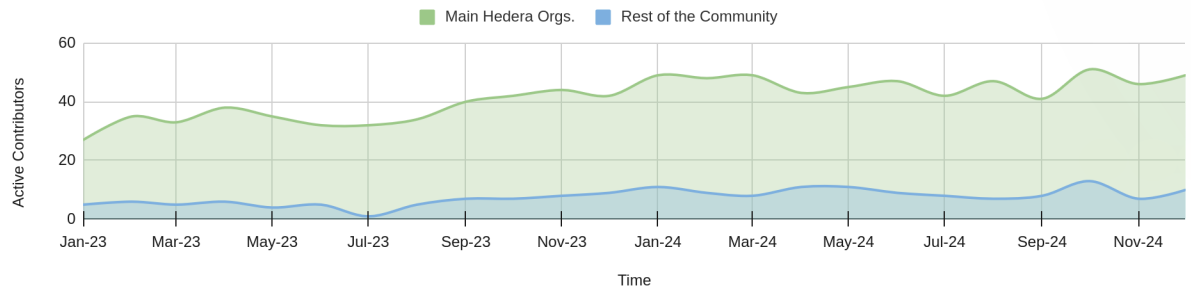
Who is developing Hedera's core technology?

Let's delve into the cohort responsible for building Hedera's core technology during 2024. We looked at the activity (commits, issues, and pull requests) from this group of contributors in the *Consensus Node* repository. The **2024 increase in total contributions and active developers** indicates active development and maintenance, even when the number of contributing organizations remained the same.

2024 vs. 2023 comparison	All Hedera projects	Core - Consensus Node
Total Contributions	49K (+7.5K)	16K (+3K)
Active People	610 (+170)	170 (+50)
Active Organizations	46 (-14)	12 (=)

Comparison of the activity from all Hedera projects with the activity in the Consensus Node.

Knowing where the development team is coming from also helps evaluate community involvement and influence in the *Consensus Node*'s evolution. **Most of the developers are affiliated with Hedera's main organizations**, mainly from Hashgraph and LimeChain. This group leads the development by far, as compared to other community contributors. Observing how the number of active contributors evolved since 2023, we see in both categories a **slightly increasing but stable trend**, with no major changes.



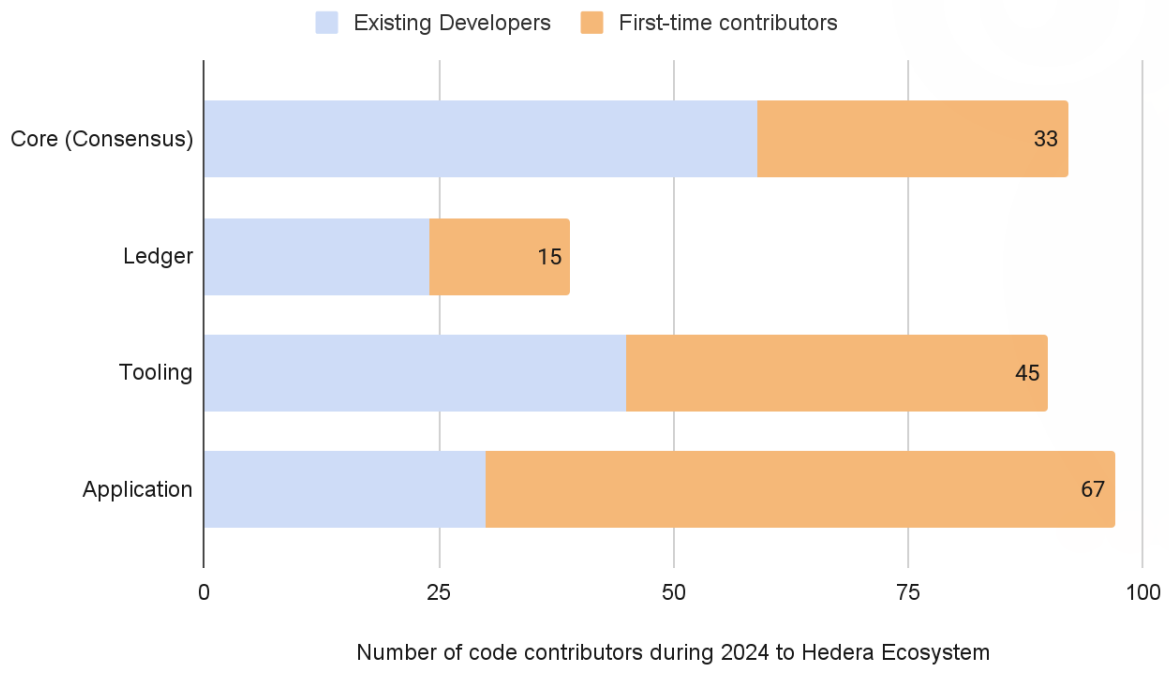
Evolution in the number of developers contributing to the Consensus Node in 2023 and 2024.

We then looked at the Pony Factor metric to see how much the ***Consensus Node*** depends on individual contributors. This value shows how many developers are responsible for half of the contributions during 2024, and the result was **ten contributors**. This is a **positive value** when compared to other mature, strong open source projects, and it suggests that the project is highly resilient and protected against changes in the main contributing team.

The challenges in attracting and nurturing Hedera's community

Contributor data reveals opportunities for growth across different areas of the Hedera ecosystem. While the *Applications* and the *Tooling* projects demonstrate a **stronger appeal to new developers**, the *Consensus Node* (the core technology) and the *Ledger* layer (Mirror Node), currently see **higher engagement from existing developers** rather than new contributors, reflecting their inherent technical complexity.

This fact suggests a need for specialized onboarding and resources for these critical components. Core development's technical depth, involving cryptography and distributed systems, naturally presents a steeper learning curve that developers might need to walk through as they enter the community.



Number of code contributors during 2024 to Hedera Ecosystem

Hedera's community keeps the backlog under control

Project Category	Last 12 months PR Backlog Growth	Last 12 months Issue Backlog Growth
Core (Consensus Node)	**<2%**	**-5%**
Ledger	**<1%**	**+6%**
Tooling	**<2%**	**+18%**
Applications	**<2%**	**+16%**

Backlog growth in 2024 for the different project categories.

The analysis of the growth of the backlog for pull requests (PRs) and issues measures the effectiveness of a team's backlog management process. This metric gives insight into whether the team can digest all the work created or if the number of items to work on (the backlog) is growing.

Hedera's community **successfully addressed a significant majority of pull requests** (PRs) during the last 12 months. Although a slight increase in the backlog has been observed across all project categories, it remains manageable. Importantly, the most critical component, the *Consensus Node* (Hedera's core technology) repository, is expected to have a flat or even negative growth in PRs. This small backlog growth requires ongoing attention to ensure continued progress.

While the backlog of PRs is critical and needs to be under control, in OSS projects the issues backlog grows faster. During the last 12 months the community was able to **reduce the backlog of issues in the most critical component**, the *Consensus Node*, although it is growing in the rest of the components.

The ROI of working in the open for Hedera

Analyzing the ROI of open source contributions to Hedera requires examining the engagement of developers beyond the major corporate players, recognizing their vital role in fostering innovation and community growth. The table below **focuses only on the organizations producing 20% of the total code contributions in 2024** (the second group from "The companies producing value in Hedera" section) **and excludes contributions from Hedera's main organizations**. We also analyzed the lines of code (LOC) added and removed during the mentioned period.

The data suggests **a positive ROI for open source contributions in Hedera**, particularly within the *Applications* and *Tooling* layers, where significant code modifications are occurring. To enhance ROI across all layers, Hedera could focus on reducing barriers to entry for the *Consensus Node* (Hedera's core technology) and *Ledger* development by providing more accessible documentation and educational resources.

Project Category	Code Contributions	Contributors	Lines added	Lines removed
Core (Consensus Node)	207	22	85K	97K
Ledger	26	8	3,5K	1,3K
Tooling	413	41	237K	106K
Applications	607	62	644K	870K

Activity summary from the regular contributing organizations in 2024 (Second group from "The companies producing value in Hedera" section).

The projects in the *Tooling* and *Applications* layer show the highest engagement. This engagement reflects that regular developers are actively developing and refining tools for the Hedera ecosystem. On the other hand, ***Consensus Node* and *Ledger* exhibit lower engagement in both contributions and contributors**. This result aligns with the results discussed in previous sections, reflecting the specialized knowledge required for these areas which hinders broader participation.

Appendix: List of repositories

This report shows data from code contributions (commits), issues, pull requests, general comments, and review comments extracted from the GitHub repositories in the project categories listed below, as provided by Hedera for their Bitergia Analytics instance.

The complete list of repositories is available at the following link.