Monthly Maturity Report: December 2024

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Organization:
Open Source Committee
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Cardano Ecosystem

Review Process	Approval
1st Pass: Tex M, OSO PM	✅**Approved**
2nd Pass: Christian T, Head of OSO	✅**Approved**

Summary

In **December 2024**, the Cardano open-source ecosystem sustained development momentum across core repositories despite a notable drop in surface-level contribution volume. While metrics such as pull requests and issues declined — reflecting end-of-year slowdowns — **code volume and repository coverage expanded**, suggesting that small, focused teams continued work on complex or foundational updates. Community participation remained steady, with new organizations and contributors submitting issues and expanding the contributor base. However, major contributors like **IOHK and Well-Typed showed drastic declines in logged contributions**, largely due to changes in reporting structure. Overall, the ecosystem demonstrated resilience and technical depth heading into 2025.

General Observations

Organizational Contributions:

- **IOHK** led again in absolute author count, but their commit and contribution counts dropped ~94%, likely due to reporting anomalies, not decreased activity.
- **Tweag** saw a 154% increase in commits and contributed over **681K lines**, indicating major delivery on infrastructure components.
- **Well-Typed and Cardano Foundation** recorded steep declines in commits and issues, though likely impacted by seasonal shifts and/or data changes.
- **Unaffiliated (Unknown)** contributors remained active, with increases in both commits and issues — reinforcing the value of decentralized community engagement.

Geographical Distribution of Commits:

- **UTC -7 (Pacific U.S.)** rose sharply (+60%), becoming the second most active zone.
- **UTC +1 and 0 (Europe)** dropped by over 30%, suggesting **a seasonal slowdown across European contributors**.

Project-Specific Insights:

- **cardano-node.git** commits nearly doubled (100 → 194), becoming the top repository — a sign of concentrated delivery in core infrastructure.
- **cardano-base.git** and **formal-ledger-specifications.git** saw triple-digit growth in modified files, reflecting renewed work on base libraries and validation layers.
- **plutus**, **cardano-ledger**, and **ouroboros-consensus** all saw declines in issue submissions and commit activity, pointing to **stabilization or end-of-cycle states**.

Repository & Issue Activity:

- Pull requests dropped by 31%, but repository coverage stayed constant — suggesting **slower, deeper work within the same project scope**.
- Issue submissions fell (−32.6%), but resolution time improved (−15%), with more projects receiving attention — a **positive signal for QA efficiency**.
- **Community and external engagement increased**, with organizations like **TUM and Tweag submitting issues after prior inactivity**.

Conclusion

The December 2024 maturity report reflects a period of **quiet but concentrated progress**. While high-level activity dipped, deeper repository and file-level data reveals ongoing technical work in core libraries and system layers. A reduced but steady contributor base — including growth from unaffiliated developers — carried forward the ecosystem's development. Looking into 2025, the priority should be to maintain this technical depth while re-activating broader contributor participation and sustaining efficient issue response cycles.

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1. Github Overview

This section provides a comprehensive overview of activities and dynamics within the Github platform. It encompasses various metrics and statistics concerning the usage, engagement, and performance of projects and contributors.

Summary:

December 2024 – 1,123 commits were made by 82 authors across 31 repositories.

This reflects a **broad resurgence in open-source activity**, with all three core metrics increasing — especially a **63.2% surge in active repositories**, marking the highest monthly repo count in the past quarter.

Metric	November 2024	December 2024	Change
Commits	1,082	1,123	+3.8%
Authors	69	82	+18.8%
Active Repositories	19	31	+63.2%

Observations:

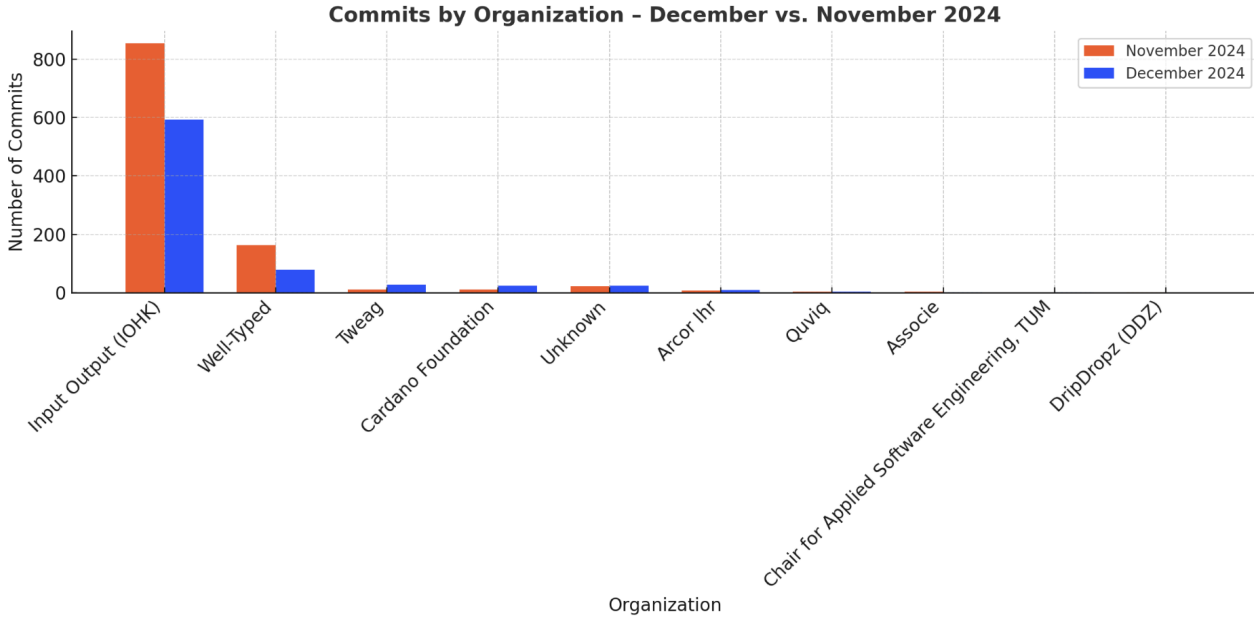
- **Commit volume increased** modestly, showing a stable delivery cadence.
- **Author count jumped 18.8%**, reflecting **broader engagement** from contributors across the ecosystem.
- The **rise in active repositories** (+63%) suggests **re-engagement with legacy or peripheral projects**, or the **onboarding of new repositories into active development**.
- This spike may reflect **post-Q4 ramp-up, milestone completions, or ecosystem expansion** heading into 2025.

1.a) Organization Activity

Here is the data for how different organizations within the Cardano ecosystem were contributing to open-source projects during the current timeframe. Complete data available here in Bitergia.

Top Organizations – December 2024

Organization	Commits (Dec)	Commits (Nov)	Change (%)	Authors	Touched Files	Added Lines	Removed Lines
Input Output (IOHK)	593	854	−30.6%	46	3,176	71,488	42,546
Well-Typed	78	163	−52.1%	6	357	6,902	5,842
Tweag	28	11	+154.5%	1	1,422	681,919	46,174
Cardano Foundation	24	11	+118.2%	2	41	793	324
Unknown	23	22	+4.5%	5	68	1,247	828



Observations:

1. **Input Output (IOHK)** remained the top contributor, though total commits dropped by 31%. Still, they led on team size and overall presence, with significant file-level activity and over 70K lines added.
2. **Well-Typed** saw a **sharp 52% drop in commits**, suggesting a pause or winding down of their November delivery phase.
3. **Tweag** showed the largest growth in both percentage and intensity — increasing commits 154% while adding **681K lines of code**, suggesting **a major delivery push from a single contributor**.
4. **Cardano Foundation** also more than doubled its contributions, marking a **renewed wave of**

engagement.

5. **Unknown contributors** stayed steady, representing continued **external or unaffiliated involvement**.

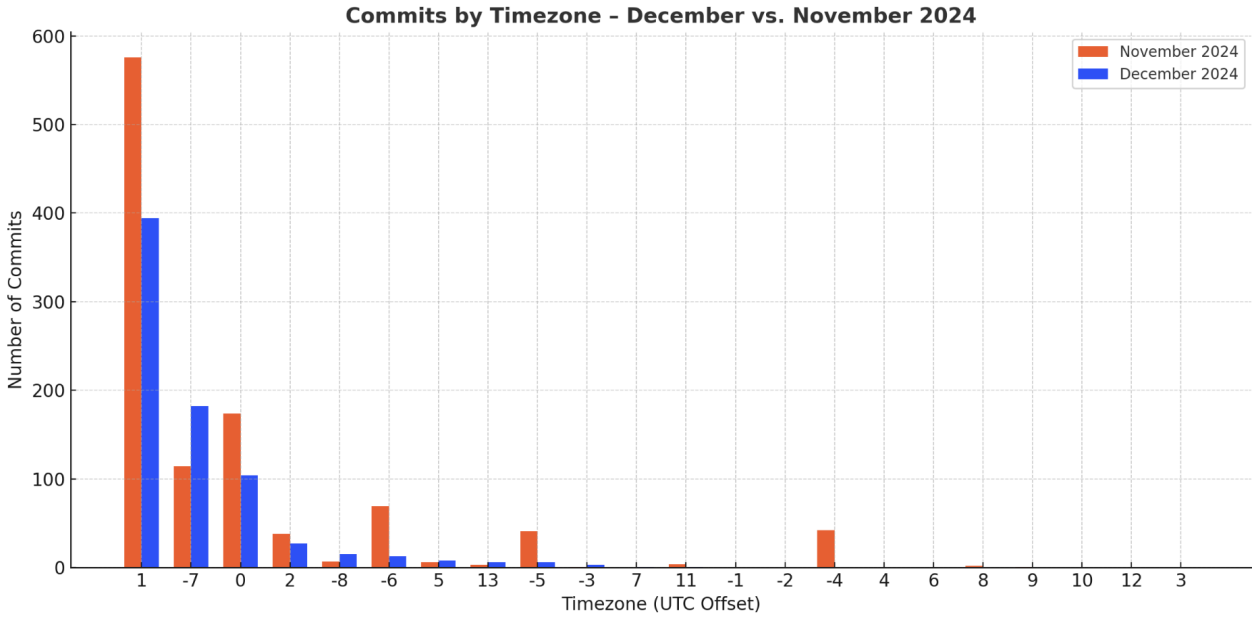
1.b) Commits by Timezone

Here is the data for commits per timezone. This view is important to understand how the contributors are spread geographically. Complete data available here in Bitergia.

In **December 2024**, commit activity shifted geographically, with notable growth in the Americas and a slowdown in European-based zones. The **Pacific Timezone (UTC -7)** posted the strongest gains (+59.6%), while historically dominant zones like **UTC +1** and **UTC 0** saw significant declines (−31.6% and −40.2%, respectively). This indicates a **regional handoff of development activity**, potentially due to holidays or shifting team workflows.

Top Timezones – December 2024

Timezone (UTC ±)	Commits (Nov)	Commits (Dec)	Change (%)
+1	576	394	−31.6%
−7	114	182	+59.6%
0	174	104	−40.2%
+2	38	27	−28.9%
−8	7	15	+114.3%



Observations:

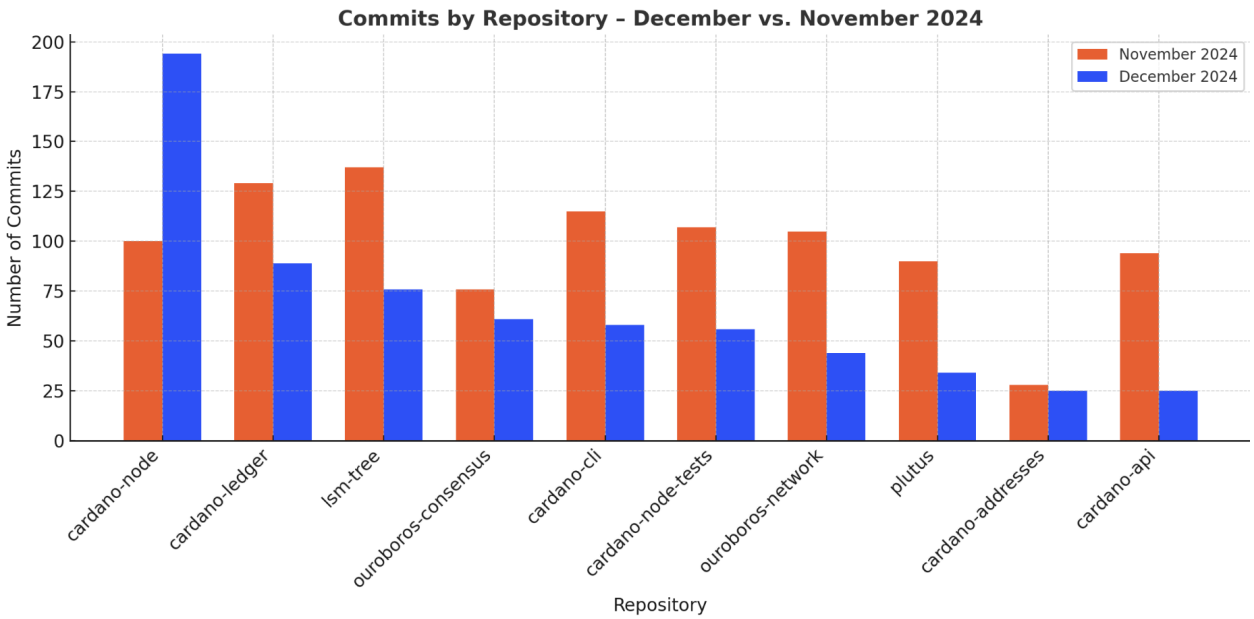
- **UTC +1 (Western Europe)** remained the most active zone, but commits dropped by 32%, indicating a **slowdown in European-based contributions**.
- **UTC -7 (Pacific North America)** surged nearly 60%, reflecting a **strong uptick in Western U.S. or Canadian activity**.
- **UTC 0 (Greenwich Mean Time)** dropped sharply (−40%), while **UTC -8 (likely California)** more than doubled, albeit from a small base — suggesting **re-emerging participation from previously quiet zones**.
- These shifts may reflect **team rotations, project handoffs**, or **seasonal regional variation**, including **holiday cycles**.

1.c) Per Repository Activity

This section shows activity for each repository in Cardano open-source. Complete data available here in Bitergia.

Top Repositories – December 2024

Repository	Commits (Dec)	Commits (Nov)	Change (%)
cardano-node.git	194	100	+94.0%
cardano-ledger.git	89	129	−31.0%
lsm-tree.git	76	137	−44.5%
ouroboros-consensus.git	61	76	−19.7%
cardano-cli.git	58	115	−49.6%



Observations:

1. **cardano-node.git** more than doubled its commits, becoming the top repository by volume. This suggests a **major delivery cycle**, likely involving final integration, testing, or deployment features.
2. **cardano-ledger.git**, **lsm-tree.git**, and **cardano-cli.git** all saw steep declines, possibly signaling the **completion of prior development phases** or shifting team focus.
3. Despite declines, **ouroboros-consensus.git** remained highly active, indicating ongoing protocol work or performance iteration.

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2. Areas of Code

This category outlines the diverse areas and aspects of code development and management within the Github environment.

Summary

December 2024 – 6,927 files were modified by 65 authors, with **777,819 lines of code added** and **109,658 lines removed**.

While overall contributor activity and modified file count dropped, the codebase experienced a **substantial increase in lines added** (+45.8%), reflecting **deep and possibly foundational development work**.

Metric	November 2024	December 2024	Change
Modified Files	9,396	6,927	−26.3%
Authors	69	65	−5.8%
Lines Added	533,499	777,819	+45.8%
Lines Removed	297,124	109,658	−63.1%

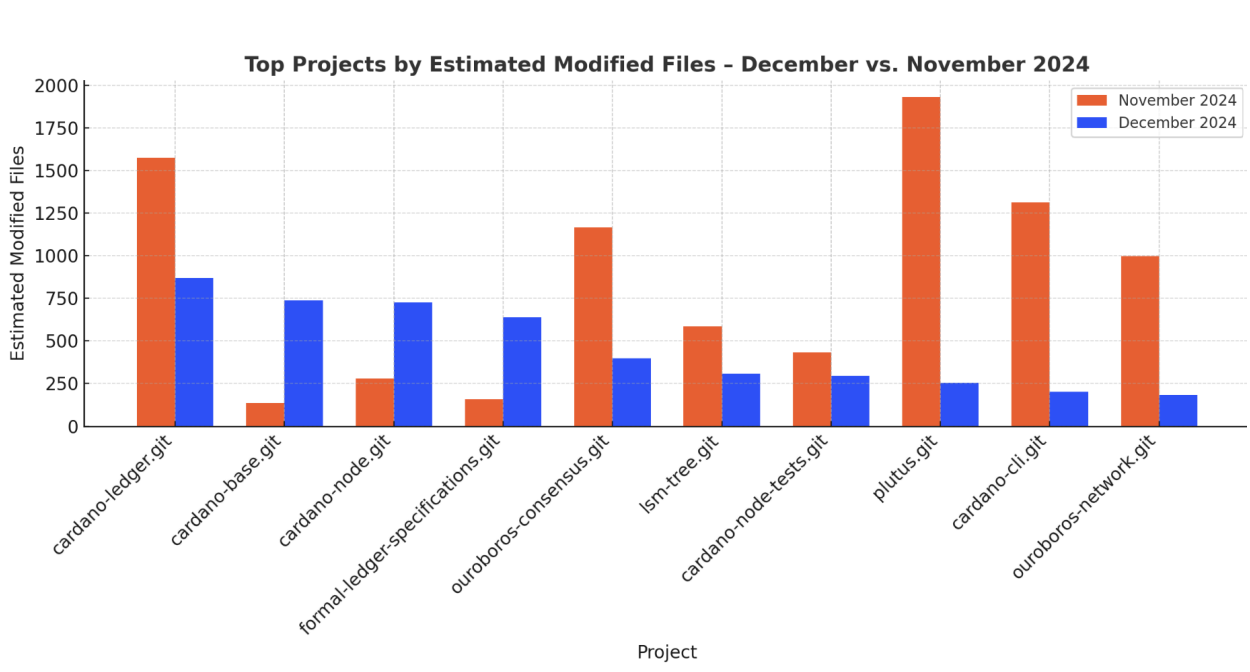
Observations:

- **Lines added surged**, suggesting **large-scale development or release preparation**, likely in core infrastructure.
- The steep drop in **lines removed** and modified files points to **less refactoring or cleanup**, and more **new feature implementation**.
- A small decline in authors (−5.8%) aligns with earlier indicators of a **tight core team driving delivery** in December.

2.a) Projects

Top Projects – December 2024 (Estimated Modified Files)

Project	Files (Dec)	Files (Nov)	Change (%)
cardano-ledger.git	869	1,574	−44.8%
cardano-base.git	738	136	+442.6%
cardano-node.git	725	279	+159.9%
formal-ledger-specifications.git	639	158	+304.4%
ouroboros-consensus.git	399	1,166	−65.8%



Observations:

1. **cardano-ledger.git** and **ouroboros-consensus.git** saw large decreases in modified files, signaling a **possible conclusion of major feature or refactor cycles**.
2. **cardano-base.git** led in percentage growth (+442%), while **formal-ledger-specifications.git** and **cardano-node.git** also surged — likely reflecting **new infrastructure or refactoring work**.
3. These shifts suggest a **redistribution of engineering focus** toward foundational components and ledger formalization.

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3. Issues

This segment revolves around the identification, tracking, and resolution of issues within Github projects. It encompasses discussions on problem-solving methodologies, issue management practices, and related metrics.

Summary

December 2024 – 58 issues were submitted by 36 unique contributors across 12 repositories, with an average time open of **43.0 days**.

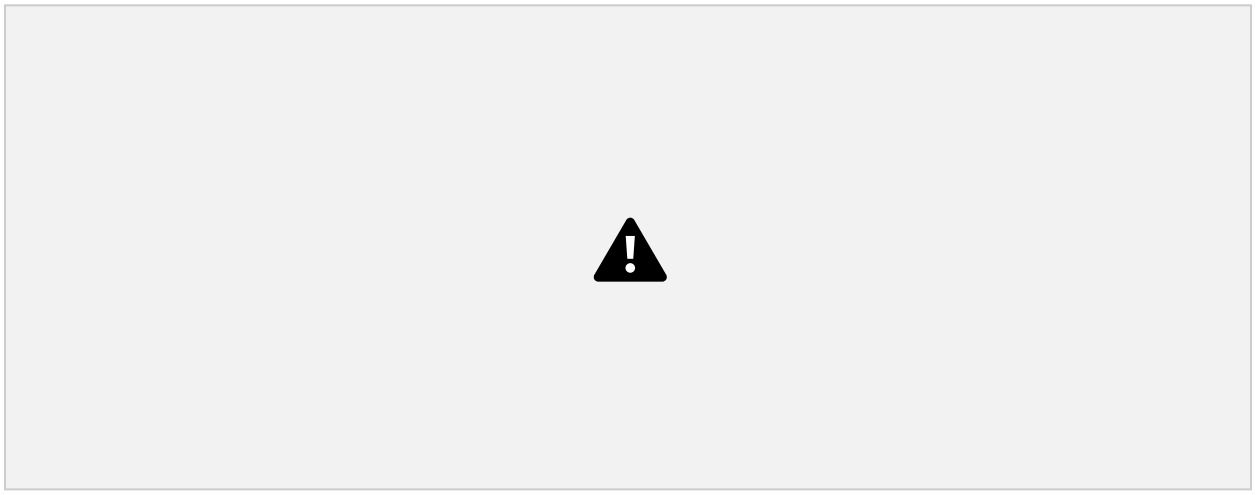
Compared to November, the volume of issues dropped by 32.6%, but the **number of submitters increased** and **issues were resolved faster**, suggesting streamlined operations and broader quality engagement.

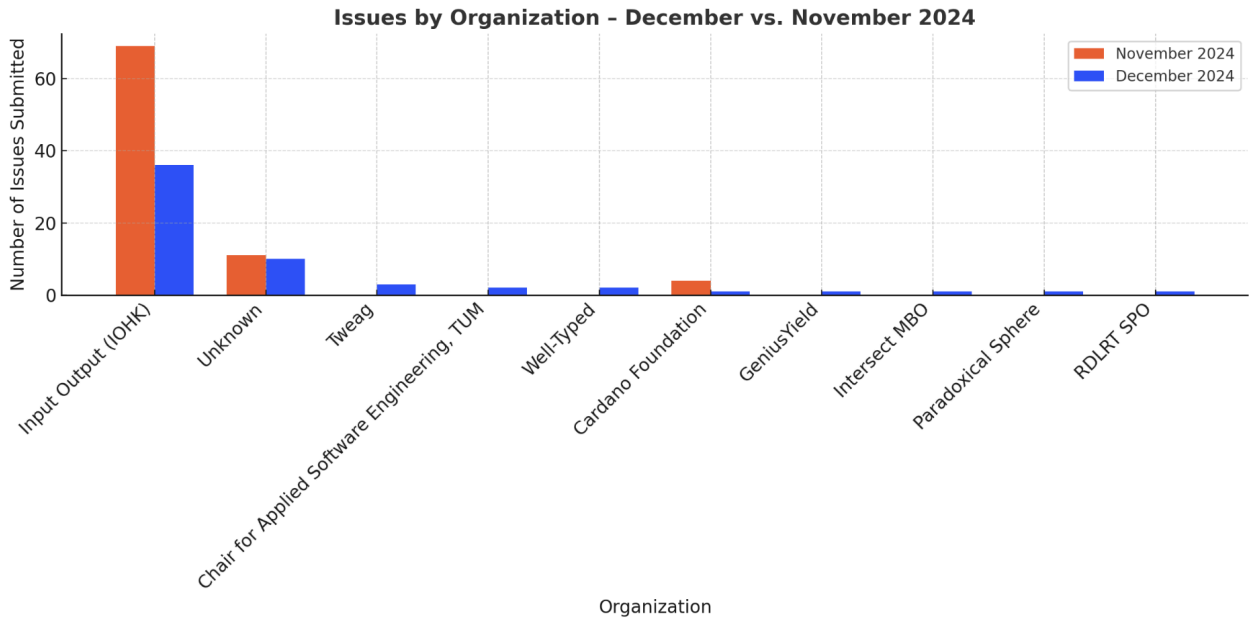
Metric	November 2024	December 2024	Change
Total Issues Submitted	86	58	−32.6%
Unique Submitters	33	36	+9.1%
Avg. Time Open (Days)	50.7	43.0	−15.2%
Distinct Projects	10	12	+20.0%

Observations:

- Fewer issues were opened in December, possibly reflecting **reduced testing cycles or fewer blockers** as year-end stabilization occurred.
- Despite fewer issues, the **submitter base expanded**, showing increased **breadth of community participation**.
- The **15% drop in average time open** points to **stronger triage and faster resolution velocity**.
- The rise in distinct projects (10 → 12) suggests that **broader ecosystem components are receiving attention**.

3.a) Organizations





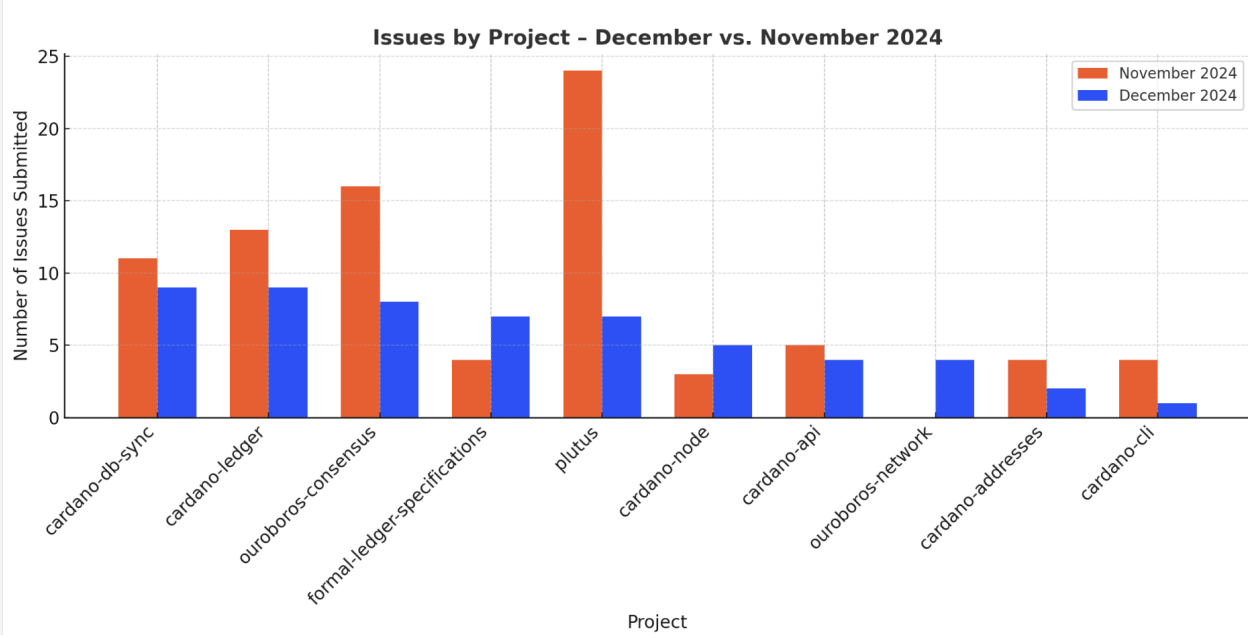
Observations:

1. **IOHK** remained the top reporter, though issue submissions dropped by nearly half. Their resolution time also improved by ~5 days, indicating **faster triage efficiency**.
2. **Unknown contributors** continued steady participation, likely external or unaffiliated developers, with a **shorter average open time** in December.
3. **Tweag, Well-Typed, and TUM** all submitted issues for the first time in this cycle — suggesting **renewed or expanded QA participation from academic and technical teams**.
4. Overall, the data reflects **fewer but more focused issue reporters**, with more organizations contributing in smaller quantities.

3.b) Projects

Top Projects – December 2024

Project	Issues (Dec)	Issues (Nov)	Change (%)	Median Open (Dec)	Median Open (Nov)
cardano-db-sync	9	11	−18.2%	32.9 days	50.7 days
cardano-ledger	9	13	−30.8%	35.6 days	35.0 days
ouroboros-consensus	8	16	−50.0%	50.1 days	63.4 days
formal-ledger-specifications	7	4	+75.0%	50.4 days	29.7 days
plutus	7	24	−70.8%	42.0 days	55.2 days



Observations:

1. **cardano-db-sync** and **cardano-ledger** led the month in issue volume, despite double-digit declines — indicating **ongoing QA cycles and production usage**.

2. **ouroboros-consensus** also dropped by 50%, though it remained highly active, with **median resolution time improving by 13 days**.

3. **formal-ledger-specifications** was the only top project to increase in issues (+75%), pointing to **renewed attention on ledger validation and spec auditing**.

4. **plutus** saw the largest decline in issues (−70.8%), alongside improved resolution times, suggesting **stabilization after a heavy November cycle**.

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4. Pull Requests

December 2024 – 264 pull requests were submitted by 58 contributors across 20 repositories.

This marks a **31.1% drop in PR volume**, though **repository coverage remained flat**, and contributor participation declined only slightly. The data suggests a **smaller set of developers continuing delivery in a stable project scope**, possibly working on larger or more complex tasks.

Metric	November 2024	December 2024	Change
Total Pull Requests	383	264	−31.1%
Unique Submitters	64	58	−9.4%
Repositories Touched	20	20	+0.0%

Observations:

1. The decline in PRs likely reflects **reduced delivery pressure during the holiday season** or a **shift toward larger, slower-moving feature branches**.
2. The contributor drop (−9.4%) is relatively modest, implying a **core team continuing active work**, even as overall throughput slowed.
3. Equal repository coverage shows the **development footprint remained broad**, even with fewer individual PR events.

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5. Analysis of Contributions by Organization

Top Organizations – December 2024

Organization	Contributions (Dec)	Contributions (Nov)	Change (%)	Authors (Dec)	Authors (Nov)
Input Output (IOHK)	54	854	−93.7%	54	51
Unknown	25	22	+13.6%	25	4
Well-Typed	6	163	−96.3%	6	5
Cardano Foundation	2	11	−81.8%	2	2
DripDropz (DDZ)	2	2	+0.0%	2	1

Observations:

1. **IOHK** showed a dramatic drop in contribution count (−93.7%) — likely due to **a missing or restructured reporting format** in December data (only authors were available), though team size remained consistent.
2. **Unknown contributors** expanded significantly in both submissions and team size, showing continued **strong unaffiliated engagement**.
3. **Well-Typed** also recorded far fewer contributions, mirroring the IOHK data anomaly — though their author count was stable.
4. **Cardano Foundation** and **DripDropz** maintained limited but consistent participation.

Glossary

Report Technical Definitions:

- **Repository(Repo):** In Git, a repository, often abbreviated as "repo," is a storage space where your project's files and their entire revision history are stored. It typically includes various files such as source code, documentation, images, and more. Repositories can be either local (on your computer) or remote (hosted on a server like GitHub, GitLab, Bitbucket, etc.).
- **Issue:** An issue is a feature request, bug report, task, or any other item that needs to be tracked within a project. In Git repositories hosted on platforms like GitHub or GitLab, issues are commonly used for discussing and tracking tasks or problems related to the project. They can include labels, assignees, comments, and other metadata to facilitate collaboration and organization.

- **Pull Request (PR):** A pull request is a proposed change that a user wants to merge into a target branch of a repository. It's commonly used in distributed version control systems like Git to facilitate code review and collaboration. When a developer completes a feature or fixes a bug in a separate branch of the repository, they can initiate a pull request to merge their changes into the main branch or another designated branch. Pull requests often include a summary of the changes, discussions, reviews, and automated checks.
- **Contributor:** A contributor is anyone who participates in a project by making contributions such as code changes, documentation improvements, bug fixes, feature enhancements, etc. Contributors can be individuals or organizations, and their contributions can take various forms, from writing code to providing feedback, reporting issues, or reviewing pull requests.
- **Git:** Git is an open-source distributed version control system designed to handle everything from small to very large projects with speed and efficiency. It allows multiple developers to work on the same project simultaneously, coordinating their work through branching, merging, and version tracking. Git is widely used in software development for managing source code revisions and collaborating on projects.
- **GitHub:** GitHub is a web-based platform that provides hosting for Git repositories and offers collaboration features such as issue tracking, pull requests, code review, and project management tools. It's one of the most popular platforms for hosting Git repositories and facilitating collaboration among developers and teams. GitHub also provides additional features like wikis, continuous integration, and deployment services.
- **Commit:** In Git, a commit is a snapshot of the changes made to the files in a repository at a specific point in time. It represents a single revision or change set and includes a unique identifier (SHA-1 hash), a commit message describing the changes, and a pointer to the previous commit(s). Commits are fundamental to version control in Git, as they allow developers to track changes, revert to previous states, and collaborate on code changes.
- **Organization:** In Git and GitHub, an organization refers to a group or entity that can own repositories, manage access permissions, and collaborate on projects. Organizations are often used by companies, open-source projects, or groups of developers to centralize their repositories and manage their collective work. Organizations on GitHub can have multiple members with varying levels of access, allowing for collaborative development within a structured environment.
- **Project:** A project in the context of Git and GitHub typically refers to a specific software development endeavor or initiative. It encompasses all the related tasks, code, documentation, issues, and resources needed to achieve a particular goal. Projects are often organized within repositories on GitHub, where developers can collaborate, track progress, manage tasks, and share code. A project may involve multiple contributors working together to develop and maintain software, with each contributor contributing to different aspects of the project.
- **Community:** In the Git and GitHub ecosystem, a community refers to the collective group of developers, users, contributors, and other stakeholders who are involved in a particular project, organization, or open-source initiative. Communities are essential for fostering collaboration, sharing knowledge, providing support, and driving the growth and sustainability of projects. They often gather around shared interests, goals, or values, and may interact through various channels such as forums, mailing lists, chat platforms, and social media. A strong and engaged community can contribute to the success and

longevity of a project by providing feedback, contributing code, reporting issues, and supporting fellow members.