Project Jupyter Community Building Report

Executive Summary

In late 2023, the Jupyter Community Building Working Group (JCB) launched a series of discussions with subproject representatives to better understand and support their community-building needs: a Jupyter Community Building Survey. The goals of the survey were to understand community-building needs and goals for each subproject, to gather information necessary to advise the Executive Council (EC) on where and what types of resources would be most impactful to meeting these needs and goals, and to identify and share community practices across Project Jupyter.

The JCB used a hybrid approach including a written survey followed by a 30 minute in-depth interview. The report includes our methodology and findings broken out by cross subproject topics and by subproject interviews. A copy of the interview questionnaire is in Appendix A.

This report will be publicly shared and sent to the EC to inspire or serve as a catalyst for strategic activities moving forward. If you have feedback, please contact us on Discourse.

Here is a brief summary of our recommendations (in no particular order). For more context on these recommendations, visit section 4.

1. Create a sustainable events program for subprojects

Project Jupyter should establish stable sources of funding, allocation procedures, and logistical support specifically for subprojects to conduct synchronous, in-person, collaborative meetings on an annual basis. The Project should also provide a way for associated events funded externally to label themselves as “affiliated” or “endorsed” by Project Jupyter.

2. Establish a mechanism for requesting resources

Project Jupyter should establish a procedure for accepting, reviewing, and funding proposals from subprojects. This could include support for external consulting services, infrastructure, or other items that have the potential to benefit the subproject itself and by extension the wider Jupyter ecosystem.

3. Increase Cross Project Coordination

Project Jupyter should create a regular program of Jupyter-wide meetings (virtual and in-person) and communication channels. These meetings should include opportunities to share news between subprojects, discuss best practices and lessons, and also provide opportunities for the wider user community to share information with contributors.

4. Improve onboarding processes for contributors

Project Jupyter should establish a dedicated effort to improve onboarding processes for contributors. This could be a working group, strategic initiative or paid staff and should focus on creating a more streamlined, consistent, and inclusive onboarding experience for all contributors. An approach that includes code and non-code contributors is important to success.

1 Introduction

In 2023, the Jupyter Community Building Working Group (JCB) launched a series of discussions with subproject representatives to better understand and support their community-building needs: a Jupyter Community Building Survey. The goal of the Survey was to understand community-building needs and goals for each subproject, to gather information necessary to advise the Executive Council (EC) on where and what types of resources would be most impactful to meeting these needs and goals, and to identify and share community practices across Project Jupyter.

This document is the result of this process. In Section 2, we outline the methodology used to gather input and feedback from participating Jupyter subprojects. Section 3 summarizes the main points from our interview with each subproject, and includes discussion of topics relevant across all subprojects. Recommendations arising from the findings outlined in Section 3 appear in Section 4. This report ends with acknowledgements, and two appendices containing reference material such as the survey interview template and example emails used to communicate with the subprojects.

2 Methodology

Initially, the JCB planned to create a Google form and distribute it to the subproject teams to be filled out asynchronously. But during the process of drafting this form, the JCB decided that the form structure was too restrictive, and that many of the most useful insights would come from free response questions. Given an expectation that these inputs would generate follow-up questions, the JCB decided on a hybrid approach including a written survey followed by a 30 minute in-depth interview. Using the template for gathering facts, data, and short answers allowed the interview session to focus on issues in a natural, conversational way. A copy of the interview questionnaire is included as Appendix A.

The JCB advertised the Community Survey to the SSC and invited representatives from each of the then 10 Jupyter subprojects with councils to select a date to meet with the JCB. A copy of the email to the SSC, sent September 21, 2023, is included in Appendix B. If the JCB received no response from SSC representatives, the JCB used direct emails, appearances at various subproject meetings, and personal communication to encourage participation. Interviews were conducted from October 2023 through February 2024 over Zoom, and the JCB was able to secure interviews with 9 of the 10 invited subprojects (Table 1).

Please note the list of subprojects when the interviews were being conducted differs from when this report was published in August 2024 (new subprojects have been created and existing subprojects merged). We are presenting these results from the list of subprojects as they were at the time of the survey dates.

Table 1: Jupyter Community Building Survey Interview Schedule

Subproject	Interview Date	Participants
Jupyter Accessibility	2023-10-26	Tony Fast
Jupyter Foundations & Standards	2024-02-01	Paul Ivanov
Jupyter Kernels	2024-01-25	Johan Mabille, Ian Thomas
Jupyter Notebook	2024-01-11	Andrii Ieroshenko, Rosio Reyes, Eric Gentry
Jupyter Security	2023-10-19	Rick Wagner, Matthias Bussonnier, David Qiu
Jupyter Server	2023-12-14	Zach Sailer, Piyush Jain, Afshin Darian
Jupyter Widgets	N/A	N/A
JupyterHub & Binder	2023-11-02	Min Ragan-Kelley, Sarah Gibson, Simon Li
JupyterLab	2023-11-09	Michał Krassowski, Frederic Collonval, Eric Gentry
Voilà	2023-12-07	Jeremy Tuloup, Sylvain Corlay, Duc Trung Le, Martin Renou

Prior to each interview, the JCB emailed the participants Zoom connection information and a link to the interview question document (included in Appendix B). Participants were invited to respond to the asynchronous questions ahead of the interview if they had time, and to peruse the synchronous questions in order to prepare. Google Calendar invites were sent to participants as well.

During the interview, one member of the JCB asked questions of the participants, while another JCB member served as official scribe. Everyone present was encouraged to add to or edit the notes for accuracy and clarity. While 30 minutes were allotted for each interview, the JCB strove to ensure that each subproject had ample time at the end of the session to ask any questions they may have. On occasion, the conversation extended past 30 minutes.

After each meeting, the JCB immediately convened to review the interview notes and make note of any high-level themes or issues highlighted during the session. A day or two later, the JCB sent a follow-up email (also included in Appendix B) to encourage participants to complete the asynchronous questions and supplement or clarify the notes taken in the document by the JCB.

3 Findings

In section 3, we highlight and summarize survey responses from each participating subproject. In section 3.1, we present information from the asynchronous questions posed to the subproject, followed by findings from the synchronous interview portion of the survey in section 3.2.

3.1 Cross-Subproject Topics

In the asynchronous questions, we surveyed the subprojects' communication channels. We asked separately about online written channels and “face-to-face” virtual video calls as they are qualitatively different interactions. Finally, we asked each subproject how it communicates its scope to the public.

Note that the Jupyter Foundations and Standards and the Jupyter Widgets subprojects did not submit responses to the asynchronous portion of the survey, so they are omitted from tables presented in this section.

3.1.1 Online Communication Channels

Jupyter subprojects use a variety of online written channels to communicate publicly and privately. For many subprojects, these are a central place where community conversations happen. While many subprojects share common channels, such as GitHub, some subprojects have also explored a variety of other forums to interact in their community.

Each subproject was asked to address the question “what online channels have you found useful for interacting with your community?” This asynchronous question included a list of prompts, categories, or examples of communication channels. Where applicable, subprojects were asked to provide a pointer to their online channel. For instance, if a subproject maintained a blog, they were asked to include its URL.The results are summarized in Table 2.

While all subprojects have a subproject mailing list, half of them indicated that they didn’t find the subproject mailing list to be a particularly useful communication channel.

A majority of subprojects indicated that they have a presence on the Gitter chat platform. No projects indicated that they maintain a Slack channel, public or otherwise.

All Jupyter subprojects that manage software have repositories on GitHub where they manage issues and pull requests. Most subprojects indicated that they considered issues and PRs to be a useful communication channel within their community. Two subprojects use GitHub

Discussions, a feature released in May 2020 that enables community members to ask and answer questions, share updates, have open-ended conversations, and follow a community.

A majority of subprojects referenced the Jupyter Discourse forum as a resource for online communication. One subproject also referenced engaging through Reddit as a forum.

Less than half of subprojects identified social media as a useful community communication channel, with half the subprojects citing Twitter. One subproject indicated decreasing interest in engaging through Twitter since its transition to “X” and another subproject actually referenced Jupyter’s official Twitter account. The other two subprojects indicated their engagement through Twitter went through individual subproject members’ Twitter accounts and not a subproject-maintained Twitter presence. One subproject, JupyterLab, indicated a more multi-pronged social media presence that included Stack Overflow, the decentralized Twitter alternative Mastodon, and Reddit. Finally, half the responding subprojects reported using a blog to connect with their communities, and all of those used Project Jupyter’s shared Medium blog.

All responding subprojects were able to provide a URL for a Team Compass or similar GitHub repo. A Team Compass repo is a requirement for all official Project Jupyter subprojects.

Table 2: Summary of responses to "what online channels have you found useful for interacting with your community?"

	Email List[1]	Chat	GitHub Issues & PRs	Other GitHub Features	Online Forums	Social Media	Blog[2]	Team Compass
Jupyter Accessibility						Twitter[3]	✔[11]	✔[4]
Jupyter Kernels	✔		✔[5]		Jupyter Discourse			✔
Jupyter Notebook	✔	Gitter[6]		Discussions	Reddit, Jupyter Discourse		✔	✔[7]
Jupyter Security[8]	✔[9]	rarely	✔	rarely	rarely	Twitter[3,10]	✔	✔[4]
Jupyter Server	✔	Gitter					✔	✔
JupyterHub & Binder	Internal only	Gitter, Matrix	✔		Jupyter Discourse		✔	✔
JupyterLab	✔	Gitter	✔		Jupyter Discourse	Stack Overflow, Twitter, Mastodon, Reddit	✔[11]	✔
Voilà		Gitter	✔	Discussions	Jupyter Discourse	Twitter[12]		✔

Notes:

1. Check mark indicates a Google Group mailing list.
2. Check mark indicates reference to Project Jupyter's shared Medium blog.
3. Twitter account belonging to an individual subproject member.
4. Not a team compass per se, but a GitHub repo filling a similar role.
5. Spread over several Jupyter repositories plus ipykernel.
6. "Not very active compared to [JupyterLab's Gitter] room."
7. "Seemingly less visible to those not already embedded in the Jupyter ecosystem."
8. Security identified additional channels including readthedocs and change logs (at least for IPython) for documenting CVEs and fixes. The project also expressed an interest in being able to leverage "official" communications channels more easily.
9. Security characterized their enthusiasm for using their mailing list as "ok ish."

10. Security remarked that Twitter engagement was reduced.

11. While the blog was not indicated in their answers, the JCB has seen posts from JupyterLab on the blog.

12. Voilà referenced Project Jupyter's Twitter account as its Twitter channel.

3.1.2 Public Meeting Practices

Most subprojects have regular synchronous public meetings through virtual video calls. These meetings provide a qualitatively different interaction than the online written channels, so we asked separately about them.

Table 3 summarizes responses to questions about how subprojects conduct public meetings, if they have them (Voilà reported that it ended public meetings in July of 2020, citing a lack of need). Empty cells indicate missing responses or "not applicable."

Subprojects were asked if they recorded their meetings digitally, and whether they activated closed captioning or subtitles during their meetings. Only the JupyterLab subproject reported that it records their meetings and posts them to YouTube. Only the JupyterHub & Binder subproject responded to the question about subtitles, stating that it used Jitsi's default settings. Interestingly, it appears all subprojects that run public meetings use the Zoom platform except for JupyterHub & Binder, which uses Jitsi. Since the answers to these questions about digital recordings and subtitles were mostly unanswered, "no," or "not applicable," these columns are omitted from the table for readability.

Subproject meetings are mostly weekly, two are biweekly, and one project only has monthly meetings. Most subproject meetings have fewer than 10 attendees on average, and subprojects with dwindling numbers have recently combined their meetings with other subprojects where scope overlap and objectives make that make sense — Jupyter Kernels has merged its meeting with Jupyter Server, and Jupyter Notebook has merged its meeting with JupyterLab. JupyterLab reported the largest average meeting size between 10 and 20 attendees.

Subproject meetings are primarily a way for contributors to get together to conduct subproject business. Most subprojects reported "drop-in" attendees or invited guests.

Records like meeting agendas, minutes or notes, or digital recordings were reported by all subprojects. HackMD is a widely used collaborative tool for markdown-style, collaborative note-taking. A common pattern is to create a HackMD document, use it to capture the agenda and meeting notes, and then submit the HackMD to the subproject Team Compass via pull request for archival purposes. Of all the subprojects, only JupyterLab reported recording its meetings and posting them to YouTube. The subproject stated that a meeting held just before their interview had 53 views.

The host for a subproject meeting varies from subproject to subproject. Jupyter Kernels/Server has a single person who mostly serves as host consistently. Some subprojects request that volunteers host the meeting, or otherwise attempt to rotate the responsibility, but some difficulty was expressed with making this work. Two of the subprojects spontaneously decide who is leading the meeting at the start of the meeting.

Some subprojects have standing agenda items to discuss like a backlog of issues, PRs, or enhancement proposals. Others report that they simply talk about whatever they find or add to their HackMD dynamically. Two subprojects reported using a template to formulate their agenda, with the actual agenda dynamically updated during the meeting.

Project Jupyter is a global project, with collaborators around the world. Most subproject meetings on the official Project Jupyter calendar are held in the morning hours of the Pacific time zone. This practice is convenient for attendees west of 30^{o} east longitude, since the Pacific time zone morning is still late afternoon or early evening in Europe. However, it is inconvenient for potential participants eastward toward the international date line, because the meetings are held overnight for them. Only JupyterHub & Binder alternated their monthly meeting times to try to account for this difficulty, accepting that half the time the Americas or Asia would have the more favorable schedule.

Table 3: Summary of responses to questions about public meetings

	Cadence	Size	Who	Records	Host	Agenda	Alt. TZ
Jupyter Accessibility	biweekly	5-12	regulars + invited	HackMD	rotates[1]		
Jupyter Kernels[2]	weekly	~10	regulars	Calendar, Team Compass	yes	PRs & JEPs	no
Jupyter Notebook[3]	weekly	3-5	regulars, some drop-ins	Calendar, HackMD, Team Compass	yes, volunteers	Issues, updates, questions	no
Jupyter Security	biweekly	4-6	regulars	Calendar, HackMD, GitHub	ad hoc	HackMD contents[4]	no
Jupyter Server	weekly	6-10	regulars, few drop-ins	Team Compass	yes	HackMD contents[4]	no
JupyterHub & Binder	monthly	6-8	regulars, 25-33% drop-ins	Team Compass	decided on day	HackMD, Collab. Cafe template	yes
JupyterLab	weekly	10-20	regulars, few drop-ins	HackMD, Team Compass, YouTube[5]	volunteer, standing backup	Technical issues, PRs, council business, release coordination, new features	no
Voilà	Not since 2020		regulars	Team Compass		Team Compass template	

Notes:

1. Accessibility subproject reported that it rotates the host, but in practice finds this difficult.
2. Historical, since Kernels meetings have recently merged with Server meetings.
3. Historical, since Notebook meetings have recently merged with JupyterLab meetings.

3.1.3 Subproject Scope

Finally, we asked how subprojects communicate the scope of their work, i.e., what is in the jurisdiction of the subproject and its council. We focused on three main areas: code repositories, released packages, and communication channels. Understanding the scope of each subproject enables a clear division of responsibilities between subprojects, which in turn enables autonomy within a subproject and more clear channels of collaboration between subprojects.

How do people know what repos are in your project?

Three subprojects (Jupyter Server, JupyterHub & Binder, and Voilà) indicated that they rely on people understanding GitHub's org/repo hierarchy to communicate which repos are managed by their subproject. JupyterHub & Binder have been discussing additional auxiliary orgs like a "contrib" org for projects related to JupyterHub & Binder but perhaps not directly maintained by members of the subproject.

However, there are subprojects that are not responsible for software packages derived directly from GitHub repos, like the Accessibility and Security subprojects. These subprojects cannot rely on GitHub's org/repo hierarchy, but these subprojects also have scope that cuts across all orgs and repos. These projects need to rely on their team compasses, documentation, or other mechanisms to communicate their areas of responsibility.

Members of the JupyterLab subproject noted that there is limited documentation about subprojects and their scope on jupyter.org. They pointed out that this could be communicated better with a more structured, systemic approach. The Jupyter Notebook subproject pointed out that since Notebook 7's release, responsibility has shifted toward JupyterLab, and this relationship may be somewhat unclear. In several instances, subprojects indicated simply that they could be doing a better job in this area.

How do people know what packages are maintained and released by your subproject?

Subprojects that indicated they rely on GitHub's org/repo hierarchy reiterated their previous answer: packages come from GitHub repo's under their org. The Security subproject indicated that it was concerned with not just packages, but also services managed by Jupyter subprojects and access control (GitHub, PyPI). JupyterLab reiterated that package responsibilities could be communicated better through a more structured, systemic approach.

How do people know the communication channels of the subproject?

Several subprojects indicated that this was an area where they could communicate more clearly. Responses indicated that subprojects attempt to advertise communication channels through

their Team Compasses, documentation, or contributor lists. The JupyterHub & Binder subproject uses a bot to try to direct support requests to Discourse from their GitHub issues. The Security team advertises its most consequential communication channel (an email address for reporting vulnerabilities) in a variety of places consistently, including the subproject home page, documentation, and meeting agendas.

3.2 Suproject Interviews

In this section, we summarize findings from the synchronous interviews with each subproject. **Bold** text in the subproject findings indicate areas or topics that the JCB felt warranted either action from the Project (specifically, the JCB or the EC), or at least further investigation.

3.2.1 Jupyter Accessibility

- The Accessibility subproject delivered a detailed outline of the issues, concerns, and frustrations they face coordinating and maintaining their community, let alone growing it. **Accessibility, while a concern that cuts across multiple Jupyter subprojects, is often an afterthought.**

- The subproject described an **overwhelming amount of work** just to get through all the issues and PRs, leading to burn out for developers and community members. Progress on advanced accessibility work is impossible because the community is too small. The Accessibility project relies on personal recruiting and outreach to bring people in.

- The subproject emphasized the **importance of a workshop or workshops to align everyone** working on accessibility, since the efforts were scattered, and described that they had a proposal in draft form waiting for an opportunity to request the needed resources (around $20-25K) from Project Jupyter.

- Members of the Accessibility subproject have historically also been the driving force behind the **Jupyter Community Meeting** and expressed a desire to see the meeting continue as an **“alive and vibrant”** communication channel for the entire Jupyter community — this responsibility further compounds the stress that members of the Accessibility subproject experience. Without the Community Meeting, they sense the Project has become disjointed and that Jupyter’s sense of community has disintegrated.

- Accessibility suggests that **funding for someone to work on community-building and maintenance** is crucial because without it the subprojects will continue to silo into separate groups. The Accessibility project emphasized that while the Community Survey process was a good step, they are counting on help from the JCB and the EC.

- More meetings in person would help to create a sense of community.

3.2.2 Jupyter Foundations and Standards

- This community exists with only **asynchronous communication**, primarily on Github and Discourse. This subproject has never had a regular call due to the smaller volume of discussion items.
- Email communication hasn't been an effective method of communicating in this subproject.
- **Communication has been key to keeping the community engaged** - both being a thorough communicator, and making it easy for community members to communicate.
- Having a more regular cadence of communication about what is going on in different subprojects would be helpful. This could be a blog post, mailing list, etc.

3.2.3 Jupyter Kernels

- Weekly meetings are shared with Jupyter server, and are the main source of engagement in the contributor community.
- Contributors are spread thin (10-20 maintaining 100s of repos), and require different skill sets (C++, Python, or a mixture of both).
- Contributors identified **inconsistent practices between subprojects for development process and documentation** as a barrier for contributors easily contributing to multiple subprojects.
- Community workshops have been effective at spurring design and development of subproject work.
- New contributors identified a **lack of clarity around how to gain the trust of the community** (e.g., commit rights or council membership) as a barrier to entry.
- New contributors identified areas of showing interest in people participating and having a good triage process and documentation as helps in growing the community.

3.2.4 Jupyter Notebook

- Notebook contributors are often **spread thin between several subprojects**. As of the writing of this report, the Notebook subproject has **merged with the JupyterLab subproject**, which may help with the focus of contributors.
- **Materials to provide ease of onboarding** would help fill a gap in communication, as these resources could significantly lower the barrier of entry for new contributors and users.
- The **complexity of the Jupyter stack** makes the user start-up experience more difficult. Simplifying this complexity or providing more robust guidance could significantly improve the experience of new users.

- The platforms typically used in Project Jupyter for discussion (Github, Discourse, Gitter) might not be familiar platforms to many users. It could help to cut down on red tape for people who are asking questions and looking for support by **meeting people where they are**, perhaps exploring more popular or accessible forums and social media platforms.

3.2.5 Jupyter Security

- The Security subproject strives to be welcoming and inclusive to members of the Jupyter and cybersecurity communities. Members advertise the subproject to developers and actively recruit at workshops, tutorials, and within other projects. Blog posts about the subproject's activities raise awareness that there is a dedicated security effort within Jupyter. **These efforts have driven increased attendance at the subproject's biweekly, public subproject meetings over time.**

- The subproject keeps its community engaged through activities like the Integriti bug bounty program, participating in the NumFocus Summit, and contributing tutorial content to the TrustedCI Cybersecurity Summit and other conferences and workshops. The subproject acknowledges **the delicate balance between community building and "process" (e.g. onboarding), and suggests that a bit more structured onboarding for new members of Project Jupyter generally might help people settle in.**

- While the project has a biweekly public meeting, certain Security subproject activities are coordinated in private, in particular vulnerability handling (private GitHub repo for CVEs and an email list). In addition the subproject uses private conversations to discuss privacy-preserving activities, finances, conflict resolution, etc. The team relies on established trust and references to decide who has access to these activities. Summarizing private discussions in public is ad hoc.

- The subproject identifies lack of time, funds, and personnel for key Security-related activities. While Jupyter security is recognized as fundamental, the actual work isn't the most glamorous and takes specific interest, skills, and attitude. **The subproject suggests that support for hackathons might bring in new participants who might otherwise not intersect with security.**

- The Security subproject frequently finds that it needs to track down developers from across the entire Jupyter project. Documentation and contact information is uneven in quality, may be out of date, or simply hard to find. **The proliferation of GitHub orgs and repos makes this task more difficult, and can lead to lost opportunities to remediate vulnerabilities efficiently.**

- The subproject also indicated that being able to **label events or workshops as official Jupyter activities** would be mutually beneficial to both to Project Jupyter and event organizers, even if Project Jupyter isn't providing funds for the event.

3.2.6 Jupyter Server

- The Jupyter Server project community interactions are largely driven by its weekly dev meeting with the Jupyter Kernels project. These meetings (usually 6-10 people) try to be welcoming to newcomers and conduct ad-hoc business as needed. **The effectiveness of meetings in developing community seems to depend on the effectiveness of the meeting leader** - training and collaboration across the project on how to host online meetings and create collaborative environments would be helpful.

- Contributors feel the Server struggles to get the attention of contributors because it is not as user-facing as other projects.

- A **contributing hour** has also been effective in helping small numbers of people become engaged over time.

3.2.7 JupyterHub and Binder

- **In March 2023, this subproject refactored its 1-hour monthly meeting into a 2-hour "Collaboration Café" — a virtual collaborative co-working space designed to be more accessible and inclusive to those just getting started in the community.** The group divides up into breakout rooms to work collaboratively on ideation and development. Breakouts include newcomer onboarding, maintenance tasks, quiet working space or topics du jour. Participants move between breakouts as they desire. The Café model is based on Turing Way Collaboration Cafés. These meetings are public; the subproject rarely uses private communications to conduct business, and mainly only for sensitive topics like security, countering cryptomining, and funding.

- The main challenge with the Collaboration Café model cited by the subproject is that the active JupyterHub developer community is actually rather small, so the subproject is considering how to scale the model down to fit its community. The subproject agreed that **expanding the Café model to the entire Jupyter project could be beneficial**, since it reserves mental space and time for prepared, collaborative work, instead of a model where decisions are made in a meeting, actions assigned to developers to "go away and do the work." The Café model entails some overhead in terms of preparation and logistics like managing a potentially large number of breakout rooms.

- Overall the subproject indicated that there is **no shortage of work, but there is a shortage of developers**. At the same time, efforts to streamline onboarding are a bit at the mercy of other subproject priorities. The subproject also maintains mybinder.org leveraging partnerships from the Binder Federation. The subproject suggested that **there's enough to do in the onboarding space across Project Jupyter that it could be a 100% full time position**, but acknowledged it would take a special combination of technical and community-building expertise.

- The subproject received a grant to help with community building but suggested that if that were done again they might use the funds to **hire in a more senior person with more community-building experience and perspective from other projects**. They

also highlighted a lack of expertise on front-end development, and a challenge in enticing new developers to work on existing architecture as well as new features. Another issue is new projects being brought into the JupyterHub org, handed over to the subproject, and the developer moves on, increasing maintenance burden on core developers.

- The subproject expressed a desire for **Project Jupyter to create a space for discussion of community building practices** that brings people from the various subprojects together. They pointed out that many of the problems that JupyterHub and Binder face, described above, aren't specific to the subproject. The advocated for open lines of communication across Project Jupyter including a virtual workspace (e.g. Slack or other messaging platform), and regular meetings where representatives of all subprojects can share community-building/maintenance best practices and lessons learned.

3.2.8 JupyterLab

- The JupyterLab subproject works to increase the size of its community by inviting people to its meetings, encouraging contributions from new participants during triage meetings (though in an ad hoc fashion), and proactively sending "shout-outs" to new contributors, leveraging the Jupyter Releaser tool. The subproject does not rely on social media. The subproject suggests they **could be more systematic about growing their community, though this takes resources.**

- To keep its existing community engaged, the JupyterLab subproject follows the general principles of openness and helpfulness. One member has experimented with using Reddit for outreach, answering questions about development or features, with a priority on answering development questions. Subproject members are also active in the more standard channels like GitHub and Discourse, but the subproject is **interested in proactively engaging its community "where the community spends its time."**

- Challenges the JupyterLab subproject is contending with include a lack of person-hours to work on the project, and the **complexity of the Jupyter stack itself as a barrier to bringing new people on board.** Fewer people have been available to run subproject meetings, and negative feedback can drive disengagement — the subproject considered whether separate meetings for different sets of concerns might help.

- The subproject suggested many ways the JCB and Project Jupyter could help it build and maintain community, including **a concerted, branded, project-wide mentoring program designed to onboard new developers who will continue working on Jupyter for the long term**; **secure resources for active outreach to users and developers where they are**; improving **overall accessibility** of the user/developer experience including better documentation, associated infrastructure, automation and maintenance tools; a contributing hour call dedicated to soliciting feedback; lowering barriers to new developers including those whose first language is not English; and

finally **leveraging resources (money, code, engineering time) from the industrial partners that depend on Jupyter itself.**

- The JupyterLab subproject considers itself to be a good citizen with respect to transparency, recording and posting their meetings on YouTube. Private communication is reserved for subproject business, voting, and security issues.

3.2.9 Voilà

- The Voilà subproject relies on social media to keep its community informed about developments. Somewhat unique among subprojects, Voilà development is centered within the same employer. Voilà has shifted away from regular meetings since all coordination within the project happens via GitHub or during in-person stand-ups. Communication with users happens mostly through Discourse or GitHub issues.

- Subproject participants identified a **lack of infrastructure for demonstrating** Voilà, as in a gallery of dashboard deployments, as a barrier to growth and user adoption. They also expressed a sense of being in competition with other dashboarding projects and suggest that this kind of infrastructure would help the subproject put its best foot forward.

- Voilà developers also explained that Voilà has a **high barrier to entry for new developers** who tend mostly to be only familiar with Python — to be an effective Voilà developer one needs additional skills. Voilà also depends on a number of external packages and other subprojects, so issues within those packages can cause issues like JupyterLab 4 migration delays.

- Because Voilà was created within a company and later adopted by Project Jupyter, many of Voilà's developers are employed at the same place. Due to this dynamic, the coordination of subproject activities often happens offline due to convenience. Explicitly private communication within the subproject is primarily related to subproject and project governance. Subproject members endeavor to surface decisions publicly on GitHub since the subproject recognizes the value of publicly archiving those decisions in that way.

- Finally, the Voilà developers mused whether the potentially unclear (to outsiders) relationship between Voilà and Jupyter was a **branding problem that needed consideration**.

4 Recommendations

Based on the findings presented in the previous section, the JCB has synthesized the following set of recommendations to Project Jupyter leadership that it believes will strengthen the Project's community of contributors. These recommendations address some of the most pressing, actionable, and recurring issues highlighted during our conversations with all the Jupyter subprojects we interviewed.

The JCB intentionally has refrained from editing these recommendations with possible budgetary constraints in mind. The details of how to fund activities arising from these recommendations is the purview of the EC. However, these recommendations should inform priorities in the context of a transparent, regular, comprehensive resource allocation process (i.e. budget and staffing), lead to the formation of new working groups to focus sustained effort on problems, and factor into strategic planning of project focus overall. Elements of these recommendations include scope that the JCB can directly address, and where applicable we have identified those situations and proposed next steps.

4.1 Create a sustainable events program for subprojects

As part of a comprehensive community-building budgetary process, Project Jupyter should establish stable sources of funding, allocation procedures, and logistical support specifically for subprojects to conduct synchronous, in-person, collaborative meetings on an annual basis. The Project should also provide a way for associated events funded externally to label themselves as "affiliated" or "endorsed" by Project Jupyter.

Multiple subprojects expressed the need to conduct synchronous, in-person events to align on goals, spur new design ideas, and kickstart development. Jupyter Community Workshops were cited as an effective activity supporting this kind of work in the past. Jupyter Community Workshops have also been used to promote the development of new projects and communities external to but affiliated with Project Jupyter, so they also serve a valuable purpose beyond subproject development.

As part of a comprehensive community-building budget process, Project Jupyter should develop procedures that enable subprojects to request support for standing (i.e. annual) in-person workshops for goal-setting, planning, and collaboration. Approval for subproject workshop proposals should be streamlined, but subprojects should provide basic justification for funds covering travel / housing grants, venue, and catering. In addition, Project Jupyter should establish a funded position for managing and coordinating these events and community workshops in general. If resources are limited, we recommend prioritizing subproject workshops designed to strengthen and facilitate the work of core developers over more general Jupyter Community Workshops designed to provide training or encourage new contributors to join.

Finally, certain subprojects have been able to leverage other sources of funding to conduct or host events involving their members and the broader community beyond Project Jupyter. For instance, the Security subproject has taken advantage of birds-of-a-feather meetings or workshops co-located with events like PEARC or the NSF Cybersecurity Summit. Enabling subprojects to label such events as “official” or at least “affiliated” with Project Jupyter will enhance their visibility and boost engagement, while furthering the overall goals of the Project at minimal or no cost. Project Jupyter should determine guidelines for such “associated” events, including requirements like the application of the Jupyter Code of Conduct procedures and deliverables to the Project.

Next step: JCB submits a proposal to the EC on subproject event management and governance

4.2 Establish a mechanism for requesting resources

Project Jupyter should establish a procedure for accepting, reviewing, and funding proposals from subprojects. This could include support for external consulting services, infrastructure or other items that have the potential to benefit not only the subproject itself but the wider Jupyter ecosystem. Subprojects should have additional funding to enable them to more adequately address issues within their scope that require specific skill-sets and affect nearly all other subprojects.

Project Jupyter would benefit from the creation of a clear and transparent budgeting process. Feedback was received for multiple subprojects including a request to create a clear and consistent mechanism for requesting funds or other resources. Regular calls for proposals should set expectations about the total amount available and the timeline for using funds/resources. This should include a procedure to audit and report back to the EC about funds used.

Implementation suggestions:

- Annual budget: EC should publish an annual budget report that includes an allocation for subproject needs.
- EC should establish a clear and consistent mechanism for requesting funds. This could include an annual call for proposals plus flexible alternative ways of requesting resources
- EC should provide guidance and support for subprojects spending funds. This can include clear instructions and account support

Next step: EC should establish an annual budget with allocations for subproject requests.

4.3 Improve Cross Project Collaboration

Project Jupyter should create a regular program of Jupyter-wide virtual and in-person meetings. These meetings should include opportunities to share news between subprojects, discuss best practices and lessons, and also provide opportunities for the wider user community to share information with subproject contributors. These gatherings may include a worldwide JupyterCon conference.

When Jupyter was a new open-source project, many Jupyter contributors were involved in multiple areas of the work, so sharing information and practices was very natural. As Jupyter has grown, subproject communities have become more distinct, leading to more isolated subproject practices. For example, survey and interview answers indicated that different subprojects had separately evolved similar practices, such as collaboration cafes in JupyterHub and contributing office hours in Jupyter Server. Several subproject representatives said that it would be helpful to share practices and training for common needs between subprojects, not only to improve each subproject, but also to establish common norms across subprojects. JupyterCon was one place where they felt they could connect with other subprojects and the wider community. We also heard feedback that the Jupyter Community Call, using a fairly free-form “show and tell” agenda with Jupyter users and contributors presenting, was an underutilized and under-resourced effort to communicate between subprojects and with the Jupyter user community as a whole.

Implementation suggestions:

- We recommend the JCB owns the strategy and structure for this program of meetings. We recommend that the JCB involves the community in hosting and implementing these meetings.
- Some topics for cross-subproject sharing and training might include:
    - How to run a meeting;
    - How to triage issues;
    - How to do testing;
    - How to automate releases.
- We recommend the JCB champion the creation of a sustainable model for JupyterCon, as a centerpiece event for the global Jupyter ecosystem.

Next steps: JCB is assigned to organize a program of meetings. JCB works with EC to evaluate holding JupyterCon again.

4.4 Improve onboarding processes at Jupyter

We recommend establishing a dedicated effort to improve the onboarding experience for contributors. This effort should focus on creating a more streamlined, consistent, and inclusive onboarding experience for all contributors. This effort could focus on contributions including coding, documentation, translation, or community activities.

Project Jupyter's onboarding processes are not well defined, and have historically been an area without significant focus or effort. Some subproject members noted that they were looking for more resources to support onboarding new contributors.

Establishing a dedicated effort to improve the processes around onboarding would likely involve forming a working group or strategic initiative to oversee the improvements in the onboarding process. This initiative should ideally include representatives from different Jupyter subprojects to ensure broad and diverse input.

Based on the feedback provided by various subprojects, we can suggest several areas of focus for improvement.

- **Consistency Across Subprojects**: Develop a standardized onboarding process with common features and terminology. This will facilitate easier transitions for contributors moving between different subprojects.
- **Trust and Leadership Mechanisms**: Implement consistent criteria for establishing trust and leadership within subprojects. For example, clearly define when a contributor is eligible for triage or maintainer permissions.
- **Inclusivity Beyond Code Contributions**: Ensure the onboarding process is inclusive of community contributors. This includes roles such as documentation writers, translators, and meeting leaders. Recognize and value their contributions equally alongside code contributors.

We recommend engaging with subprojects and groups that have expressed interest in improving the onboarding process. These include:

- Jupyter Notebook
- Jupyter Kernels
- Diversity, Equity, and Inclusion (DEI)
- Documentation (Docs)
- Accessibility

This initiative could result in outcomes like a role covering developer experience for the entire Project, a standardized template for new subproject contributor documentation based on a survey of existing such documents, or well-defined procedures for establishing trust in sensitive contexts.

Next Steps: JCB will engage the wider community to actively seek a champion for moving a new Working Group forward. The Executive Council should prioritize the creation of a new role at Jupyter for Developer Experience.

5 Acknowledgements

The members of the Jupyter Community Building Working Group—Rollin Thomas (Berkeley Lab NERSC), Martha Cryan (Plotly), Ana Ruvalcaba (Cal Poly San Luis Obispo), and Jason Grout (Databricks)—would like to thank all involved in this survey. We extend our gratitude to the subproject participants who found time in their busy schedules to respond to our survey questions and meet with us for interviews! We enjoyed learning more about the different subprojects and connecting with their contributors. This report represents a significant investment of time and we hope that its contents will help drive new strategic initiatives at Project Jupyter.

Appendix A: Community Survey Questions

We will be using these questions to guide the conversation during your visit to the Jupyter Community Building Working Group (JCB) meeting.

The questions we have prioritized for in-person discussion are at the top. Feel free to respond to the questions in writing ahead of time if you wish. During your meeting with the JCB we'll use this document to keep notes together. Thank you for your participation.

For the purposes of this survey, we are defining "community" as the group of contributors (code, documentation, maintainers, etc.) to your subproject.

Asynchronous Questions

1. What online channels have you found useful for interacting with your community? Find a list of prompts/examples below. Where applicable, please provide a pointer (for instance, if your subproject runs a blog, please include its URL):
    - Email list:
    - Chat clients or services:
    - Github issues and pull requests:
    - Other Github communication features:
    - Online forums:
    - Social media (provide any URLs):
    - Blog (provide URL):
    - Team compass repo (URL):
    - Other channels:
2. Questions about public meetings. For these, consider a meeting to be public if it has a public calendar entry, especially in the Jupyter Community Meeting Google calendar.
    - How often does your subproject convene a public meeting?
    - What is the average attendance?
    - Are attendees mostly the same people, or do you have drop-ins from the broader community?
    - How is meeting business shared with the community (agenda, notes, recordings) and where is it made available?

    - If you record meetings, do you have an idea of how often they are watched?
    - Do you enable subtitles and accessibility accommodations for meetings (whether they are recorded or not)?
    - Does the meeting have a moderator or leader, and if so how is the moderator or leader chosen?
    - What items are typically on the agenda, or do you use a template agenda?
    - Does your subproject alternate meeting times to accommodate people in different timezones?
3. Scope of subproject: How do you communicate the scope of your subproject work to the public? For example:
    - How do people know what repos are in your project?
    - How do people know what packages are maintained and released by your subproject?
    - How do people know the communication channels of the subproject?

For discussion during the meeting

1. What activities does your subproject undertake to increase the size of its community?
    a.
2. What activities does your subproject undertake to keep its existing community engaged?
    a.
3. What are the main challenges your subproject community faces in achieving its community-building and maintenance objectives? For example:
    a. Time:
    b. Money:
    c. People:
    d. Infrastructure:
    e. Other:
4. What efforts could the JCB and Project Jupyter introduce to help you build and maintain your community? How would you use new resources to build your community?
    a.

5. Transparency: Jupyter subprojects are responsible for conducting their “activities in a manner that is open, transparent, and inclusive.” However, we recognize that sometimes a project may still need to communicate privately for certain topics. How do you feel you are doing? For example:
    a. What communication channels in your subproject are private? For example, a council email list that does not have public archives is private.
    b. Other than official private channels, is there a significant amount of information that is discussed in informal private settings?
    c. Broadly speaking, what kinds of things/topics are discussed in private conversations?
    d. Are there mechanisms for summarizing private conversations in public channels?
    e. Overall, are subproject discussions mostly public, mostly private, or similar amounts public and private?
6. Do you have any questions for the JCB, or is there anything else you would like the JCB to know about?

If you have questions/ideas/feedback for JCB there are two ways to get in touch with us in the future:

- Email us: jupyter-community-building-working-group@googlegroups.com
- Post on discourse: https://discourse.jupyter.org/c/meta/community-building/49
- You can also feel free to add comments (don’t edit or delete) of things we didn’t capture in our notes above.

Appendix B: Email Correspondence

Initial Invitation to the SSC

Hello Jupyter Subproject Representatives,

The Jupyter Community Building Working Group (JCB) is launching a series of discussions with subproject representatives to better understand and support community-building needs.

Our Goals:

- Understand community-building needs and goals for each subproject.
- Advise the Executive Council on where and what type of resources will be most impactful.

- Identify and share successful community practices across Jupyter.

How It Works:

- We are inviting up to 3 representatives from each subproject to a 30-minute chat during JCB's regular 9am PT (local time) meetings. Our discussion will center on the questions in the interview doc linked in the scheduling spreadsheet. Please discuss these questions with your subproject ahead of time and feel free to start recording answers in your subproject's interview doc.

- We expect the interviews to take several months. After the interviews, we'll consolidate the feedback into a report for the EC and publish a blog post in early 2024.

Join Us: Sign up on this spreadsheet by choosing your preferred and alternate dates, and list your representatives. We'll confirm and send a calendar invite with a pre-meeting reminder.

Thank You!
Your participation in this survey will impact community-building activities within Project Jupyter. We look forward to hearing from you. If you have questions, comments, or feedback on this or any other community-building topic, feel free to reach out to us on our private mailing list: jupyter-community-building-working-group@googlegroups.com or on the public Discourse.

Warm regards, JCB Working Group

Martha Cryan, Jason Grout, Ana Ruvalcaba & Rollin Thomas
Jupyter Community Building Working Group
Email: jupyter-community-building-working-group@googlegroups.com

Interview Reminder Email

Hi <names>,

Thank you for taking time out of your schedule to participate in the Jupyter Community Survey.

Please take a look at the interview questions that we will use to guide the conversation, linked below. There are some questions there that can be answered ahead of time, in writing. If you could take a few minutes to answer those before we meet, that would allow us to focus on the more open-ended questions together.

Zoom connection information: (redacted)

Meeting Agenda: Complete survey

Survey Overview: Jupyter Community Survey 2023

We're looking forward to our conversation with you! As always, please don't hesitate to email the Jupyter Community Building (JCB) working group with any questions, feedback, or insights you may have on community building.

Warm regards, JCB Working Group

Martha Cryan, Jason Grout, Ana Ruvalcaba & Rollin Thomas
Jupyter Community Building Working Group
Email: jupyter-community-building-working-group@googlegroups.com

Interview Follow-up Email

Hi <names>,

Thank you for making time in your busy schedule to meet with us for the Jupyter Community Survey.

If you have any additional context to provide in the notes document we used during the interview, please feel free to add those directly. We do ask that if you do so, that you try to do it in the next few days while the conversation is still fresh in your mind.

We welcome hearing from you in the future! Please don't hesitate to email the Jupyter Community Building (JCB) working group with any questions, feedback, or ideas you may have about community building.

Warm regards, JCB Working Group

Martha Cryan, Jason Grout, Ana Ruvalcaba & Rollin Thomas
Jupyter Community Building Working Group
Email: jupyter-community-building-working-group@googlegroups.com