QuLab

Design Documentation

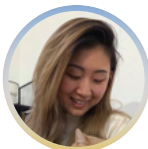**Members**   FAQ   Updates

Angela Xu
Designer

Juan C. Santos
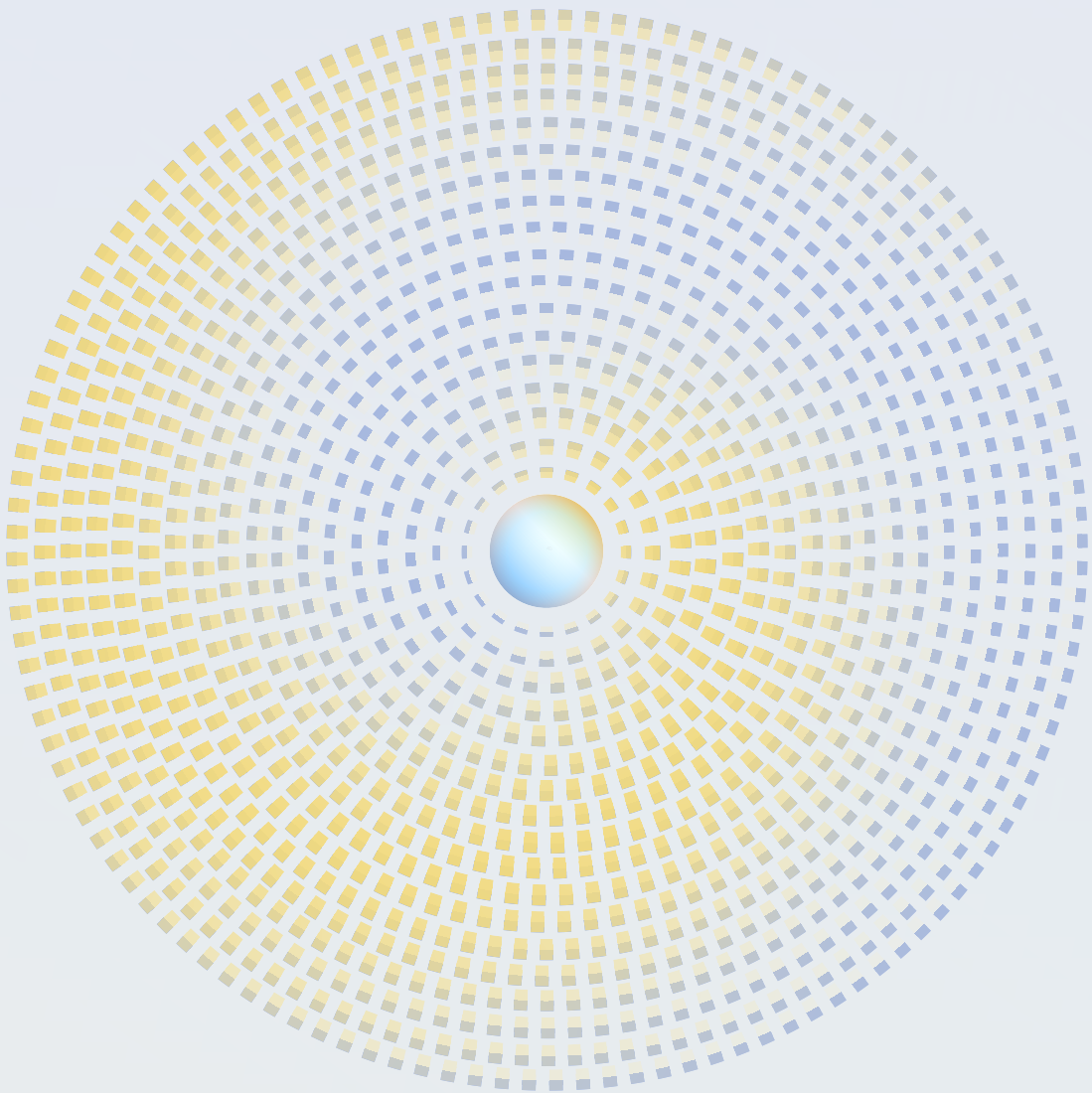Designer

Mary Li
Designer

Xiaotong Yang
Advisor

Table of contents

What is QuLab?

QuLab, an online platform that spotlights women, where women and allies can safely build a professional network. With an empasis on open source, which allows for a greater range of transparency and participation, users of the platform are able to discover, collaborate and discuss open source projects related to Quantum Computing.

Background

Quantum Computing is an emerging tech field centered around computers that use quantum mechanics to run calculations much faster than traditional computers. It has the potential to revolutionize many aspects of our lives—medicine, cybersecurity, and finance just to name a few.

However, much like many STEM disciplines, there is still a substantial lack of diversity of those working in the field, especially women. This is even more noticeable in higher positions with power, where there are even fewer women and abuse usually goes unpunished both in industry and academia.

This not only poses an obvious ethical problem, but creates homogeniety which can cause blind spots in researching problems and limits the innovative perspectives that diversity brings.

From our research and insights we, developed QuLab to help mitigate these issues in Quantum Computing.
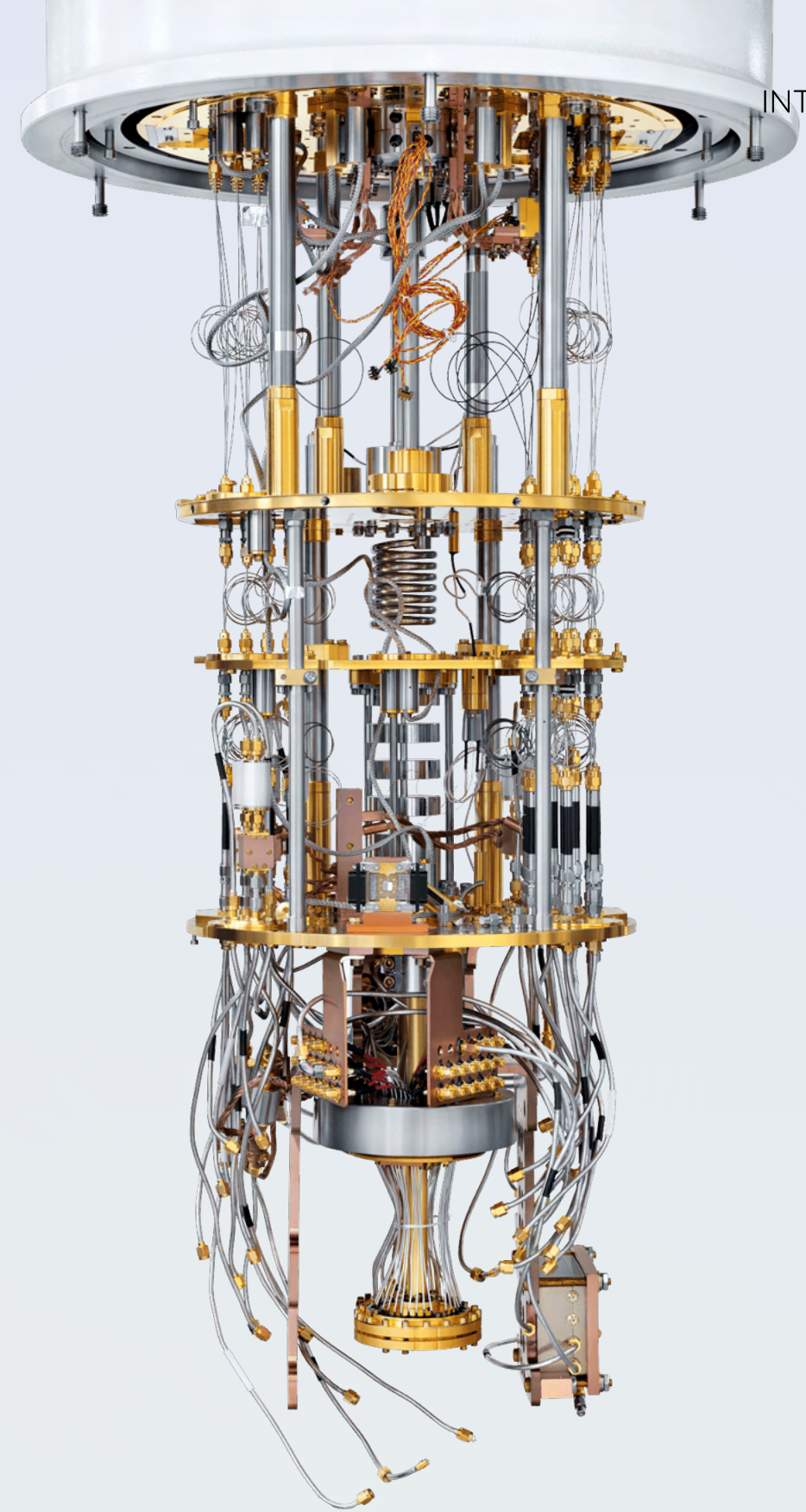
Insights

Synthesis

The development of QuLab relied heavily on multiple phases and research techniques which included interviewing Subject Matter Experts and creating a mapping activity to be done with research participants. The information gathered from this research process was analyzed and then clustered into different categories.

Using the data from themes, quotes, and mapping artifacts that we clustered, we identified four major insights that would inform and focus our design response.

Insight 01

Those who persevere through the judgement have all received positive peer support

"One of the reasons that I really enjoy mentoring, is because i've personally had a lot of really great mentors and so that's something that I[...] often talk about with my mentees as well is If you don't like your manager, if there's something wrong with like your relationship with your manager, address that early [or] figure out if you can have a different manager."

- P1

Insight 02

Educating others help women feel **control and ownership** over quantum computing

- P3

"Interacting with all students, I find rewarding[...] I like to give back in any way that I can, and I find that emotionally rewarding, so in that way you know it's emotionally supportive, [...] I just feel like i'm helping people."

- P3

Insight 03

Women are taking it upon **themselves** to address issues in the community through **different initiatives**

- P7

"I see the same few people gatekeep people out of the field, how much I see the same few prominent sexual harassers hurt people over and over again, you know. And the feeling that, if I can go make things easier to use, go make things more inclusive and more expansive, then maybe that gatekeeping doesn't have to be that way."

- P7

Insight 04

To achieve meaningful long term change, there needs to be diversity at the top.

- P1

"The people in the position to make decisions don't necessarily buy in like they'll say with words, yes, diversity is important to us, inclusion is important to us and then like nothing actually happens. So that's, I think the biggest problem we face right now is buy in. From a lot of people who don't fully grasp that this is an issue."

- P1

Values **+** Opportunities

Provide Shelter

A safe, inclusive, and non-judgemental space.

Normalize Experiences

Internal support structures that amplify women's voices.
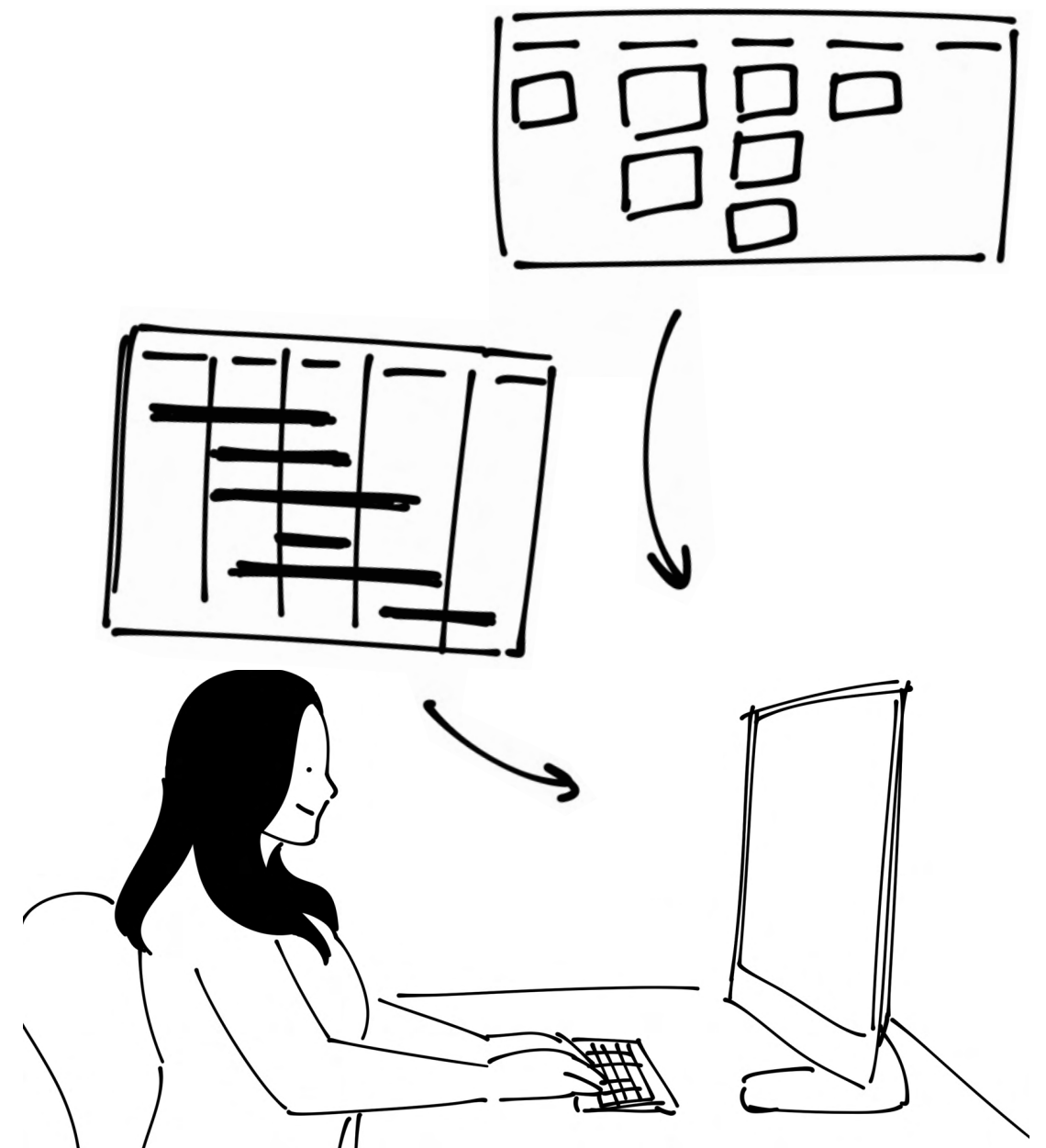
Showcase
Achievements

Opportunities for recognition that show and validate hard work.
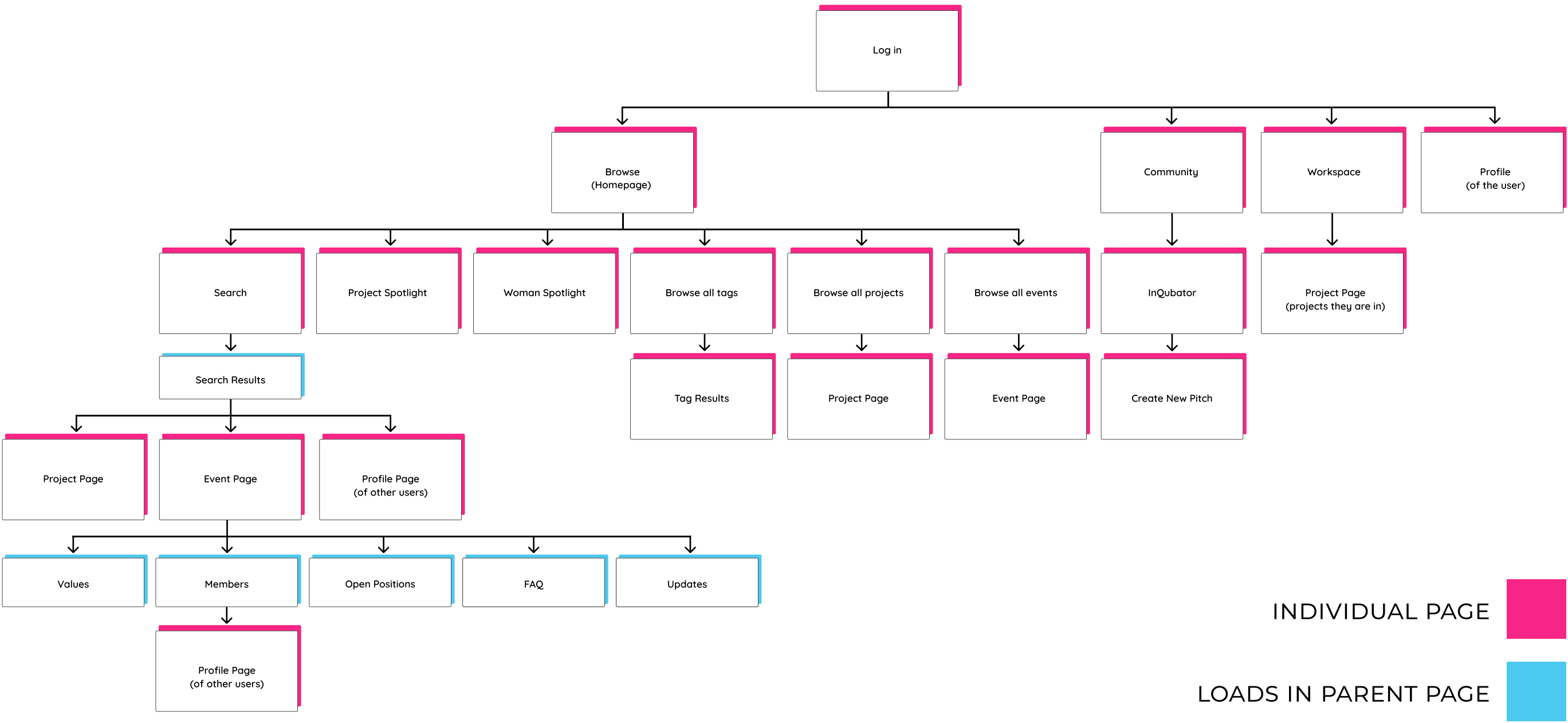
Highlight
Truth

Truthfulness by balancing expectations with scientific integrity.

Architecture and User Flow

Info Architecture

Log in

Browse
(Homepage)

Community

Workspace

Profile
(of the user)

Search

Project Spotlight

Woman Spotlight

Browse all tags

Browse all projects

Browse all events

InQubator

Project Page
(projects they are in)

Search Results

Tag Results

Project Page

Event Page

Create New Pitch

Project Page

Event Page

Profile Page
(of other users)

Values

Members

Open Positions

FAQ

Updates

Profile Page
(of other users)

INDIVIDUAL PAGE

LOADS IN PARENT PAGE

New User Flow

Sign Up Form   Successful Vetting   Profile Setup   Browsing   Search   Finding Project

Unsuccessful Vetting   Cannot Continue

Joining a project

Finding Project ⟶ **Open positions** ⟶ **Apply to position** ⟶ **Approval** ⟶ **Project Editor access**

Starting a new project

Create pitch on Incubator ⟶ **Community votes to approve** ⟶ **Approval** ⟶ **Recruit participants**

Key Path

Jam's Journey

Jam is a character we created to tell the story of a user going through the experience of using QuLab. Jam represents a woman who already works in quantum computing but feels discouraged and alone.

While QuLab would be able to service other types of users such as students and enthusiasts looking to enter the field, we focused on women already working in QC as our main audience.

Meet Jam. Jam is a software developer at a quantum computing startup. But she hasn't been feeling so great at work. She is disinterested in the type of work that she's doing and feels like her hard work always goes unrecognized. And as the only woman on her team and without any female role models to look up to, she feels isolated.

She feels like quitting quantum computing altogether...

That is, until, Jam learns about QuLab, an online platform built with women and diversity in mind. Where professionals and enthusiasts alike can find and collaborate on open source quantum computing projects together.

She finds a women-led project that fits her interests, skills, and values and applies to join as a developer.

Pages
- Homepage/Browse
- Search
- Project Page
  - (Values)
  - (Members)
  - (Open Positions)

Homepage/Browse
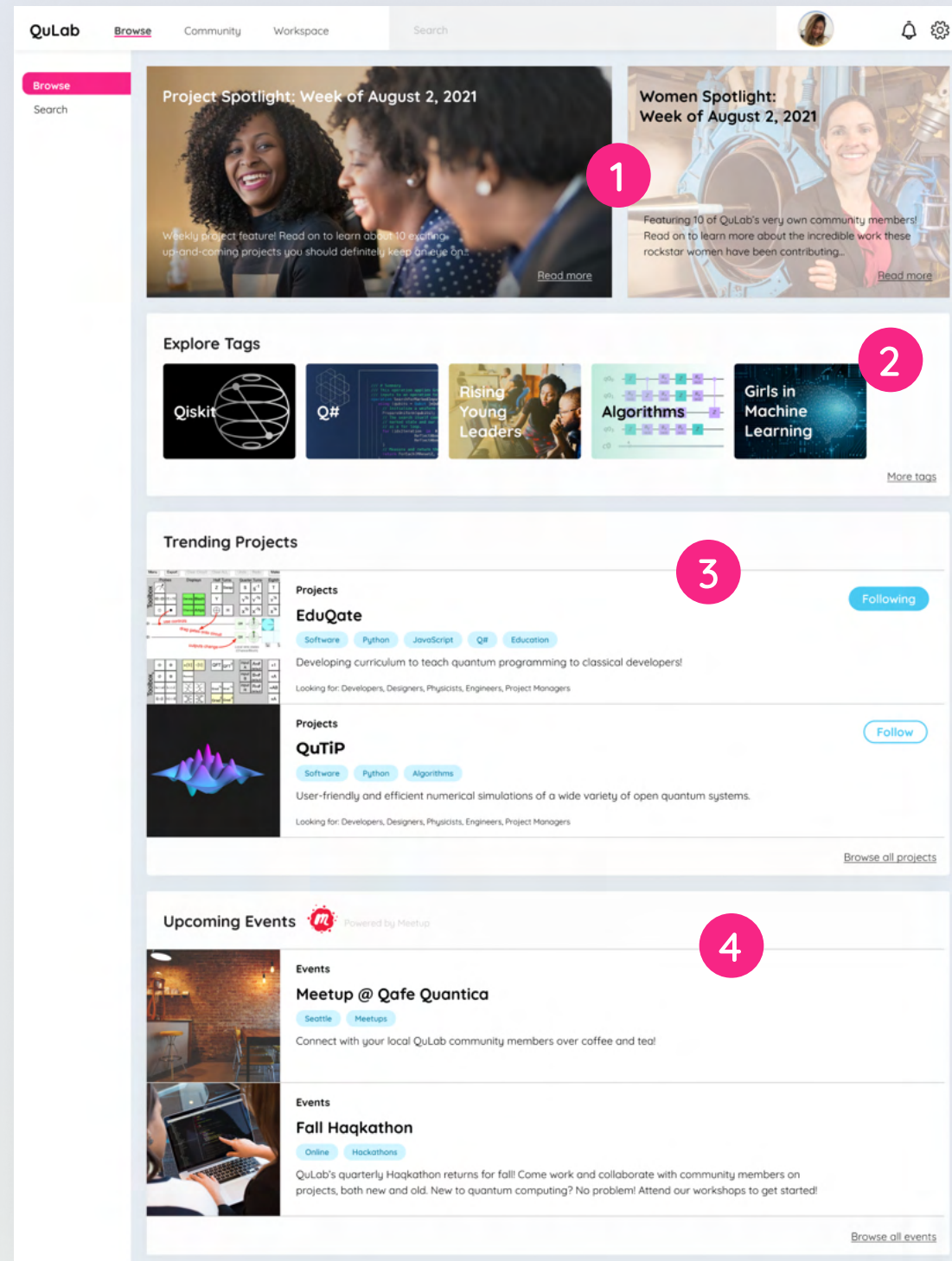
1 **Spotlights**

- Articles featuring projects and people, showcasing users' work and achievements.
- Helps users to discover new projects and people.

2 **Explore Tags**

- Clicking on a tag populates a search query for that tag
- Helps users discover projects by interests/technologies/other categories

3 **Trending Projects**

- List featuring projects that have been gaining popularity recently
- Follow button to quickly follow projects
- Shows users what projects other users have been interested in lately and what the community is currently excited about

4 **Upcoming Events**

- List showing local and online events and networking opportunities
- Integration with other platforms (e.g. Meetup)

Search
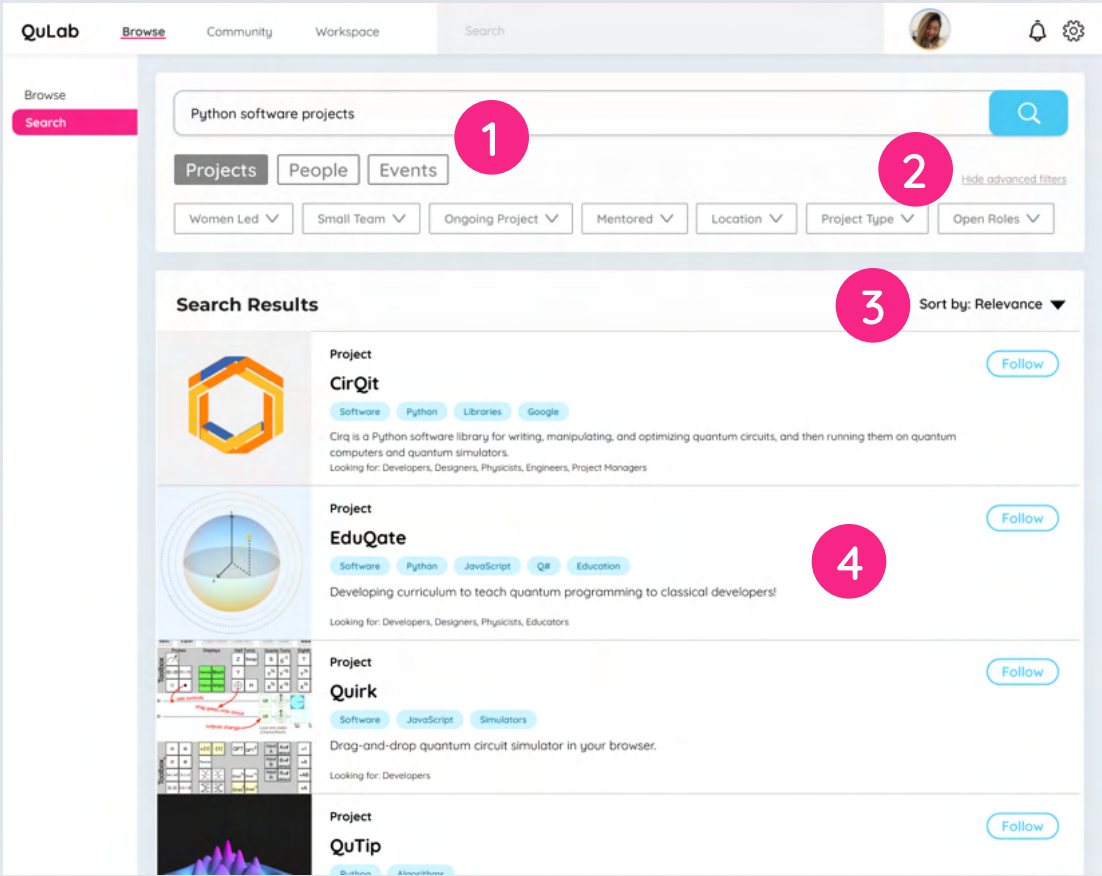
1 Search

- Type search queries into the search box
- Filter by Projects, People, or Events

2 Advanced Filters

- Show/hide advanced filters by clicking the button
- Shows various options to narrow down search results (e.g. women-led projects, team size, project status, mentorship opportunities, location, project type, open roles, etc.)

## 3 Sort

- Sort search results
- Default sorting by relevance
- Other sorting options include newest, popularity, alphabetical, etc.

4 Search Result

- Short description of project
- Tags give a quick look at what the project is for, what technologies it uses, company hosting, etc.
- Quick summary of roles that the project is currently looking for
- Follow button to quickly follow projects

Project (Values)
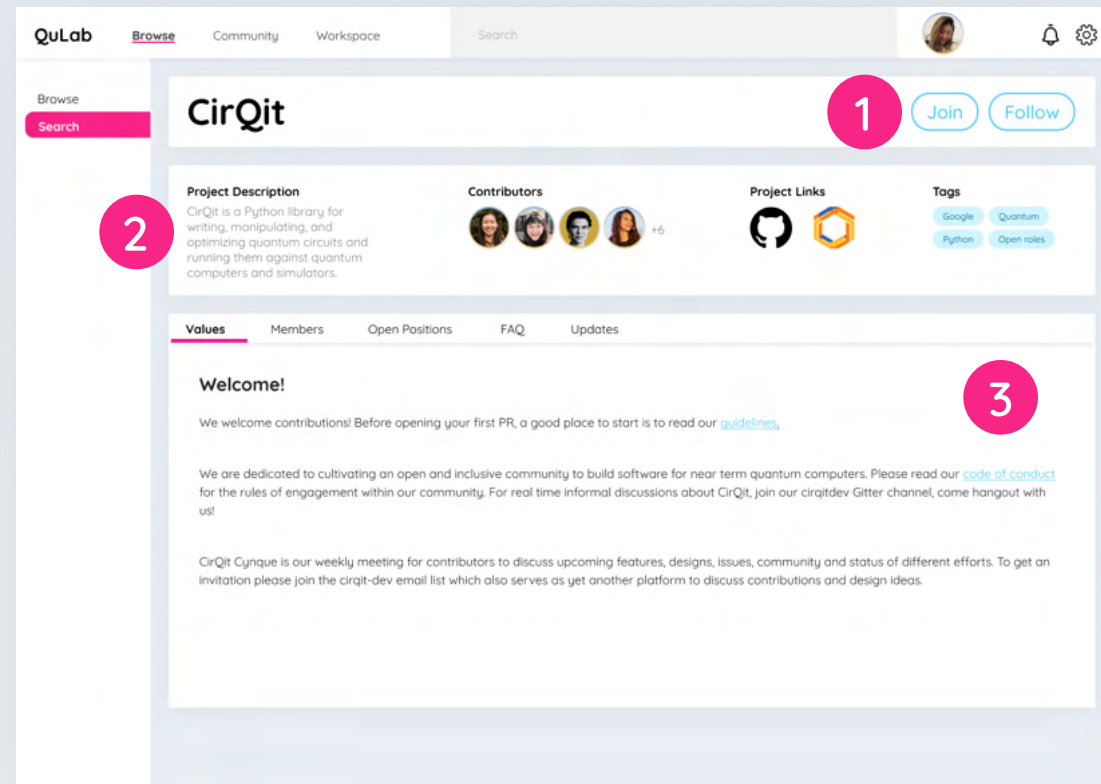
1 Join/Follow

- Clicking the join button leads to the Open Positions section where the user can view what roles the project is currently recruiting for
- Clicking the follow button allows user to follow the project, which allows them to get this project's updates in their community feed.

2 Header Information

- Short description of project
- Preview of contributors; clicking leads to Members section for full list of contributors
- Quick access to relevant links to project source code, assets, etc.
- Tags provide quick summary of project, what it's for, technologies, if it's hosted by a company, etc.

3 Values

- Speaks more to what the team is like rather than the project itself
- Team values, code of conduct, work style, etc.
- Helps users determine if they would work well with the team

Project (Members)
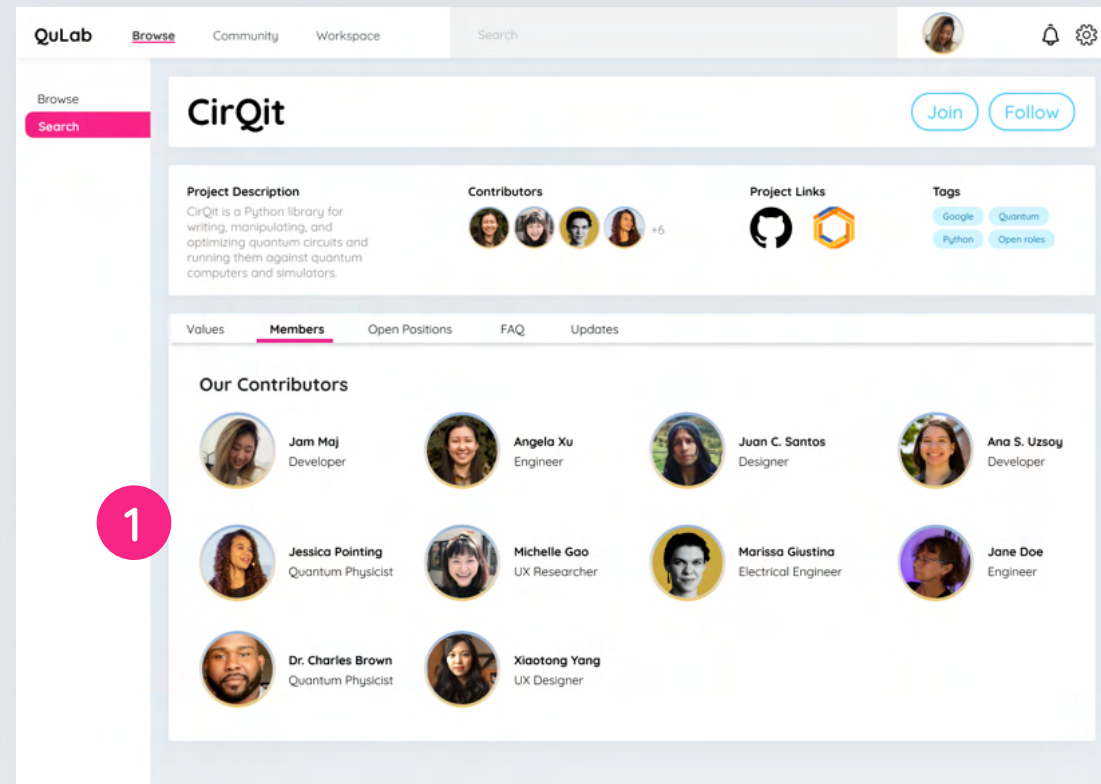
① Members

- Shows all contributors on a project and their roles on the project
- Clicking on their icons leads to their profile pages

Project (Open Positions)
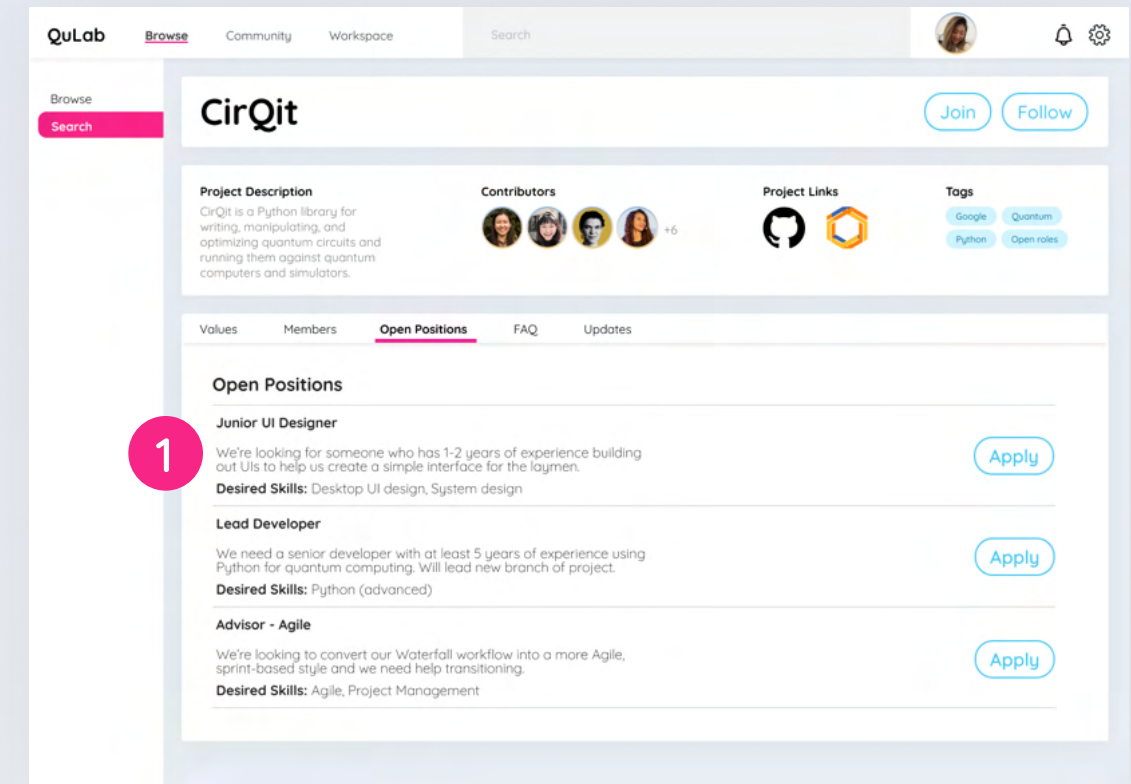
① Open Positions

- Shows the types of roles that the project is currently recruiting for
- Description and desired skills for each role
- Clicking Apply leads to a contact form to be sent to the project team; user interested in the role attaches a message and any additional materials (e.g. website, portfolio, research, etc.)

Jam joins the project and meets up with members of the project team. Jam is excited to use her skills toward this project that she's really interested in. She is also happy to finally have female peers to connect with and relate to.

As she works on the project with her new teammates, she gains a sense of belonging.

The team's shared values creates a welcoming environment and Jam finally feels a sense of belonging in the quantum computing community.

As the project progresses, Jam posts updates about her team's project on their project page to share their progress to QuLab's whole community.

She loves seeing quantum computing professionals from all over the world giving helpful feedback and having engaging discussions in the comments.

Pages

- **Project Page (Updates)**

Another QuLab user, who has been following this project for some time, notices Jam's update and looks at her profile to learn more about Jam.

Pages

- **Project Page (Updates)**
- **Profile Page**

Project (Updates)
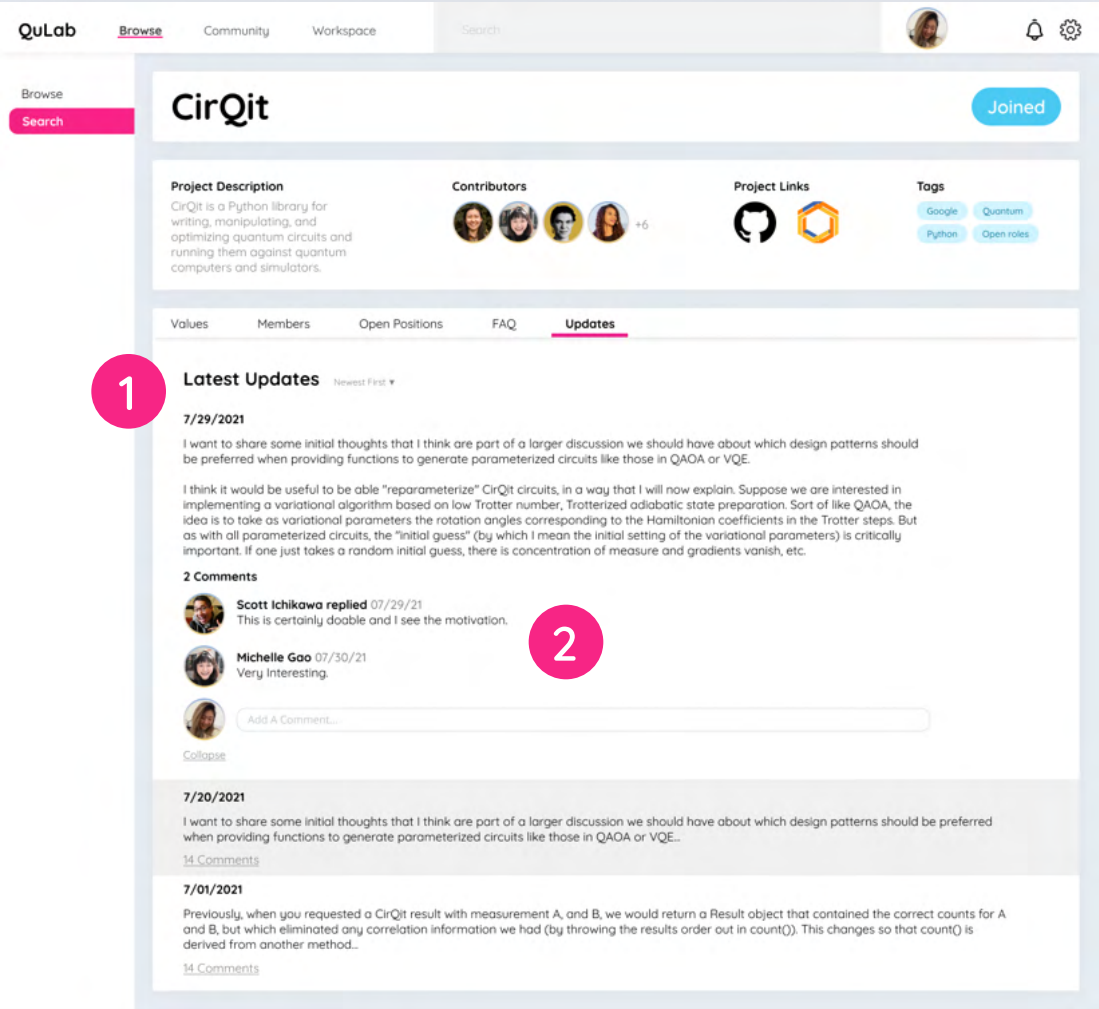
1 **Updates**

- Project status updates let the rest of the community know about their progress, what they've accomplished, any issues they've run into, etc.
- Adds more transparency and authenticity to help mitigate the secrecy that leads to competition and overhype within the field

2 **Comments**

- Updates facilitate discussion
- Users can comment on updates and provide feedback or help

Profile Page

1 Follow/Contact

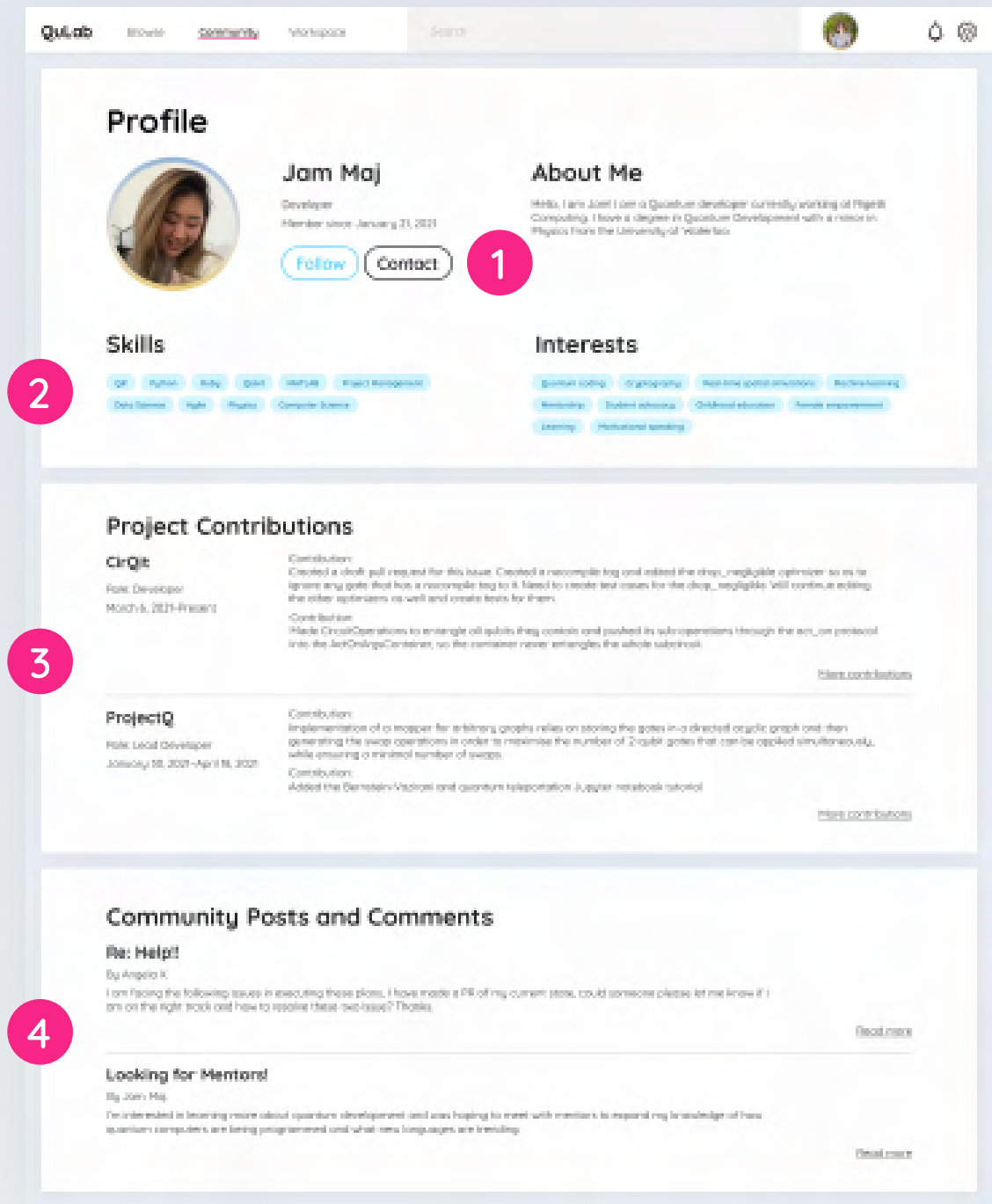- Follow button allows users to get this person's updates in their community feed
- Contact button pops up a modal with user's contact information, social media, website, portfolio, research, etc.

2 Skills/Interests

- Skills and interests displayed in tag form, provides a quick summary of who this user is, what they are capable of, and what they are interested in

3 Project Contributions

- Like a resume, a list of projects this user has worked on and how they contributed to them
- Data is pulled from QuLab projects as well as the user's linked social media accounts such as LinkedIn and Github to automatically populate this information, reduces the burden on the user to manually fill in

4 Community Posts and Comments

- A list of the user's community contributions (community posts and comments)
- Shows how they have helped others and demonstrates their thinking

Impressed by Jam's skills and contributions, she feels like Jam would be a great fit for her company and reaches out to offer a job opportunity.

Jam is much happier at her new company. Her new team respects Jam for her capabilities and she feels heard and valued. Instead of wanting to quit, she now wants to help QC thrive by giving back to the community. She uses QuLab's Project Incubator to propose a new project of her own.

Through this new project, she wants to give students and people with less experience an opportunity to grow their skills. Lots of QuLab users express interest in her project and it is quickly greenlit.

Pages

- **Project Incubator**
- **Create New Pitch**

Project Incubator
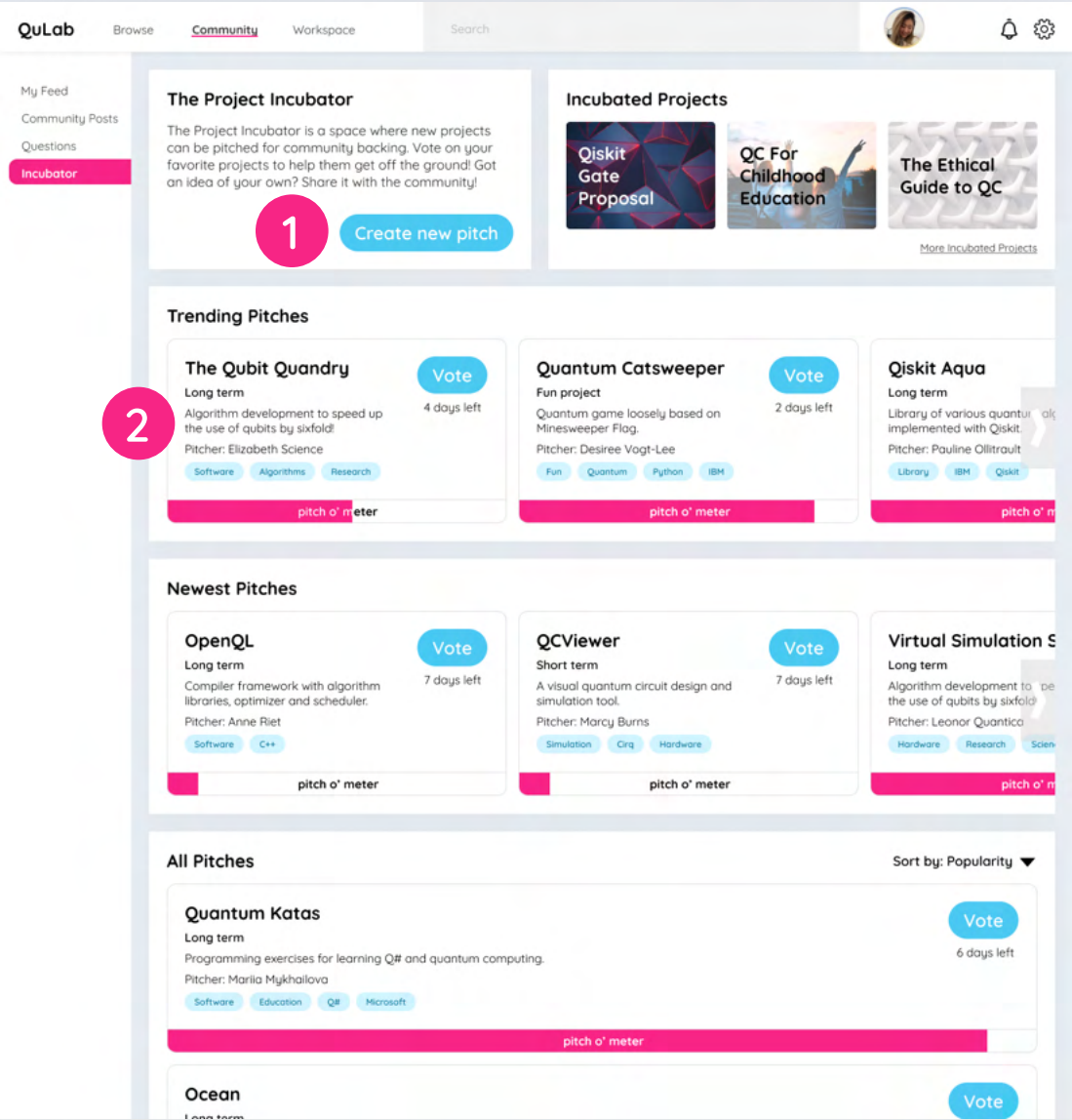
1 Project Incubator

- Users can pitch ideas for projects through the Project Incubator
- Helps gauge community interest in ideas and mitigates unrealistic projects
- Pitches are vetted by the community through a voting system
- Pitches that garner enough votes can move forward to become full projects on the platform
- Button leads to Create New Pitch button

2 Pitch

- Name of pitch, short description of idea, and the user pitching the idea
- Type of project (e.g. long term, short term, fun project, etc.)
- Tags providing quick information about the project, technology, company hosting, etc.
- Pitch o' Meter shows pitch's progress toward being greenlit
- Click the vote button to support the pitch
- Shows how many days are left to vote for this project
- Clicking on the pitch card leads to a page with full details about the pitch and a comments sections to leave suggestions and feedback to improve the idea

Create New Pitch

1 Project Assist

- A tool that helps users build a project by providing recommendations and templates
- Learns what to suggest based on what the user had filled out in certain fields as well as by pulling from previous project pitches

2 Sponsored Project

- Users pitching a project as part of their company can indicate that the company is hosting the project

3 Roles

- Users indicate the roles the project would need starting out
- Project Assist suggests roles that the project might need based on the project description, project type, and other previous fields

Young developers and QC enthusiasts sign up for her project and Jam provides them with guidance as they work. She feels fulfilled by helping nurture the next generation of the quantum computing workforce and the impact she has made on these people.

Visual Systems

Design

QuLab is a vibrant and inviting community that thrives on diversity and inclusion. However, it is still mainly a professional and interest oriented space. As such, we wanted to design an interface that embodies its communities.

Components

The UI library for QuLab is a custom designed library that appears welcoming but clean. We decided to create this UI library to help us quickly build out screens that are modular but readable.

Global UI

Main Nav

QuLab Browse Community Workspace Search

Community Sidebar

- My Feed
- Community Posts
- Questions
- Incubator

Browse Sidebar

- Browse
- Search

Buttons

Main Button Secondary Button Tertiary Button Inactive Button Warning action

Follow Following Follow

Tags (clickable)

Tag name

Filteration

Sort by: Relevance

Selected Filter Non Selected Filter
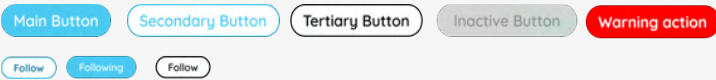
Dropdown menu

Dropdown Menu

Input field

Textbox Text

Cirq is a Python software library for writing, manipulating, and optimizing quantum circuits, and then running them on quantum computers and quantum simulators.
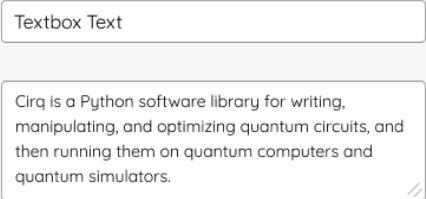
Profile

Name
Title
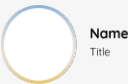
Font

When selecting a typeface for QuLab, a key consideration was to make sure that it was not overly aggresive and masculine that might feel uninviting for women.

QuLab uses Quicksand, a versitile sans-serif font that features soft rounded edges which evoke a neutral yet modern and inviting aesthetic.

Quicksand

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVXYZ
0123456789

Sub Text/Tag Font:
Quicksand Regular 8

Body Font:
Quicksand Regular 16

Secondary Header:
Quicksand Bold 24

Primary Header:
Quicksand Bold 32

Color Palette

We chose a mix of bright and playful colors to create a sense of inviting vitality that is not overly intimidating.

Elements

Background

#FFFFFF (100%)

Status

Button
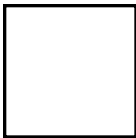
#06D6A0 (100%)

Warning

#FF0000 (100%)

Text

Body

#000000 (100%)

Active Highlight

#3D3D3D (100%)

Inactive

#D3D3D3 (100%)

Links

#78D7F3 (100%)

Page

Background
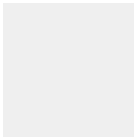
#E8EDF2 (100%)

Tags

Tag Body
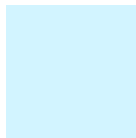
#D2F4FF (100%)

Misc.

Gradient border

#0085FF (70%)
#C5FFFF (25%)
#FFC700 (100%)

Search Bar

Body

#F2F2F2 (100%)

Tag Text

#53A3BC (100%)

Drop Shadow
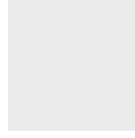
#D7D7D7 (60%)
Blur 30px

System Grid
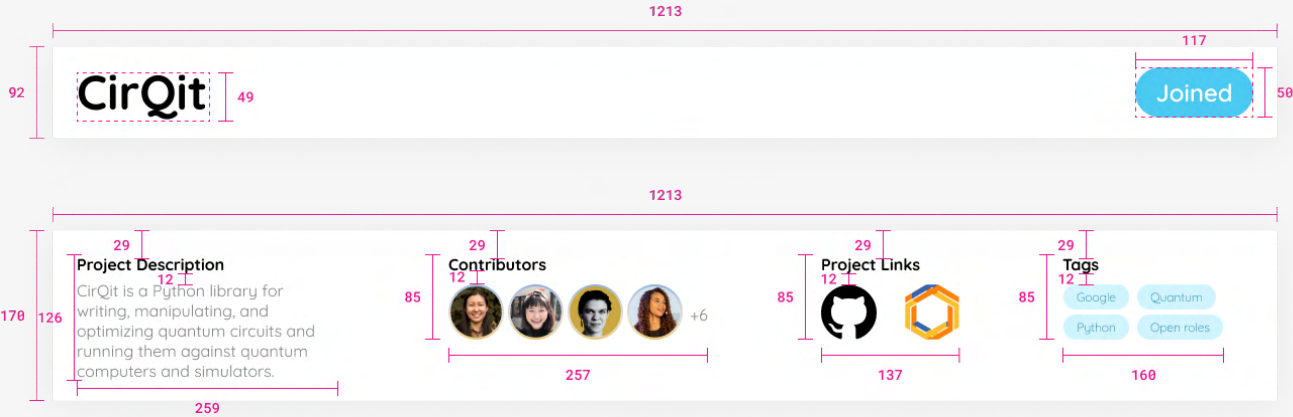
Project Pages - Values

Project Pages - Members

Project Pages - Open Positions

Project Pages - Updates

QuLab Browse   Community   Workspace   Search

Browse
Search

CirQit

Joined

Project Description
CirQit is a Python library for writing, manipulating, and optimizing quantum circuits and running them against quantum computers and simulators.

Contributors
+6

Project Links

Tags
Google Quantum
Python Open roles

Values   Members   Open Positions   FAQ   Updates

Latest Updates   Newest First ▾

7/29/2021
I want to share some initial thoughts that I think are part of a larger discussion we should have about which design patterns should be preferred when providing functions to generate parameterized circuits like those in QAOA or VQE.

I think it would be useful to be able "reparameterize" CirQit circuits, in a way that I will now explain. Suppose we are interested in implementing a variational algorithm based on low Trotter number, Trotterized adiabatic state preparation. Sort of like QAOA, the idea is to take as variational parameters the rotation angles corresponding to the Hamiltonian coefficients in the Trotter steps. But as with all parameterized circuits, the "initial guess" (by which I mean the initial setting of the variational parameters) is critically important. If one just takes a random initial guess, there is concentration of measure and gradients vanish, etc.

2 Comments

Scott Ichikawa replied 07/29/21
This is certainly doable and I see the motivation.

Michelle Gao 07/30/21
Very Interesting.

Add A Comment...

Collapse

7/20/2021
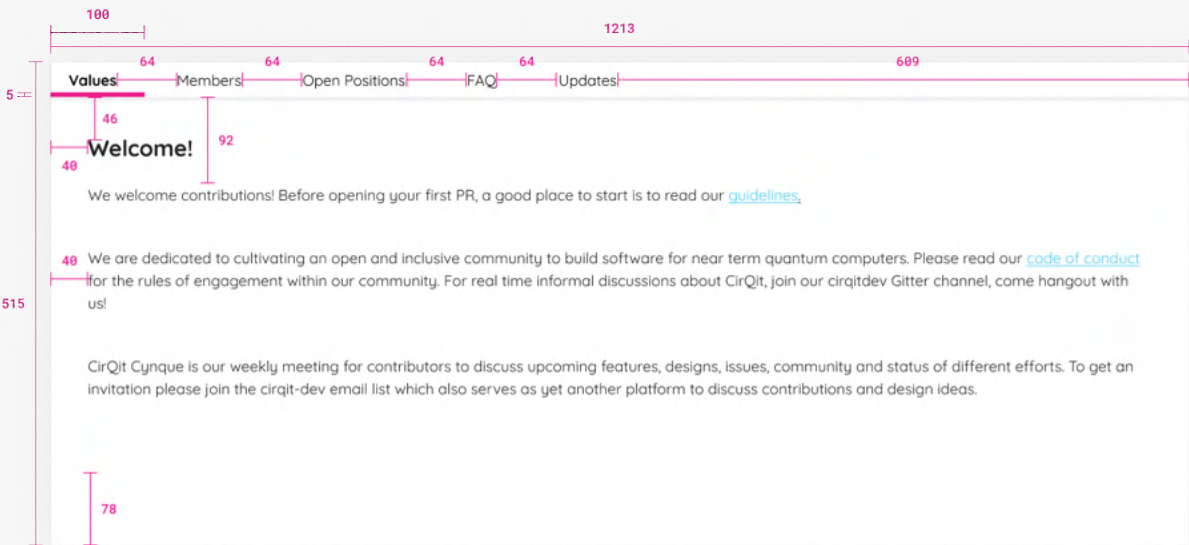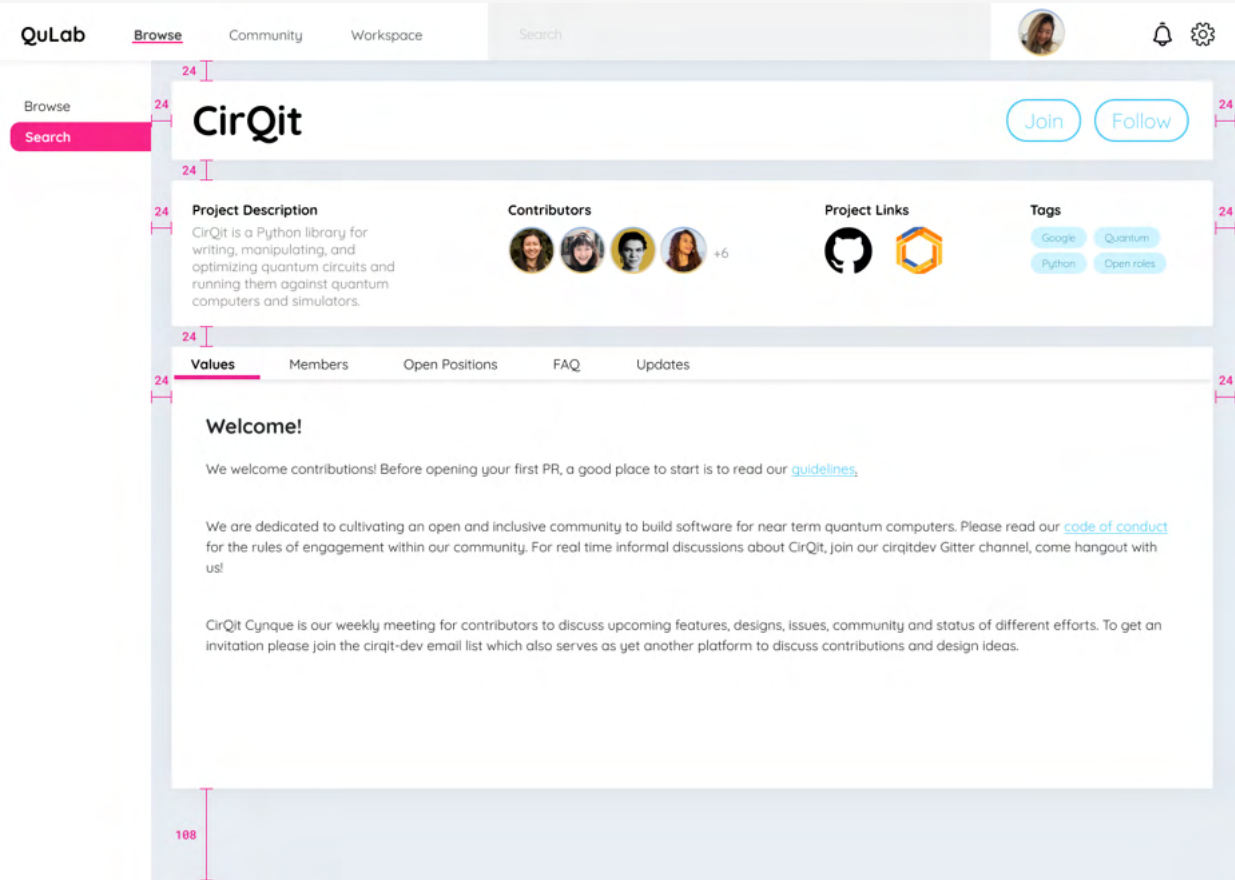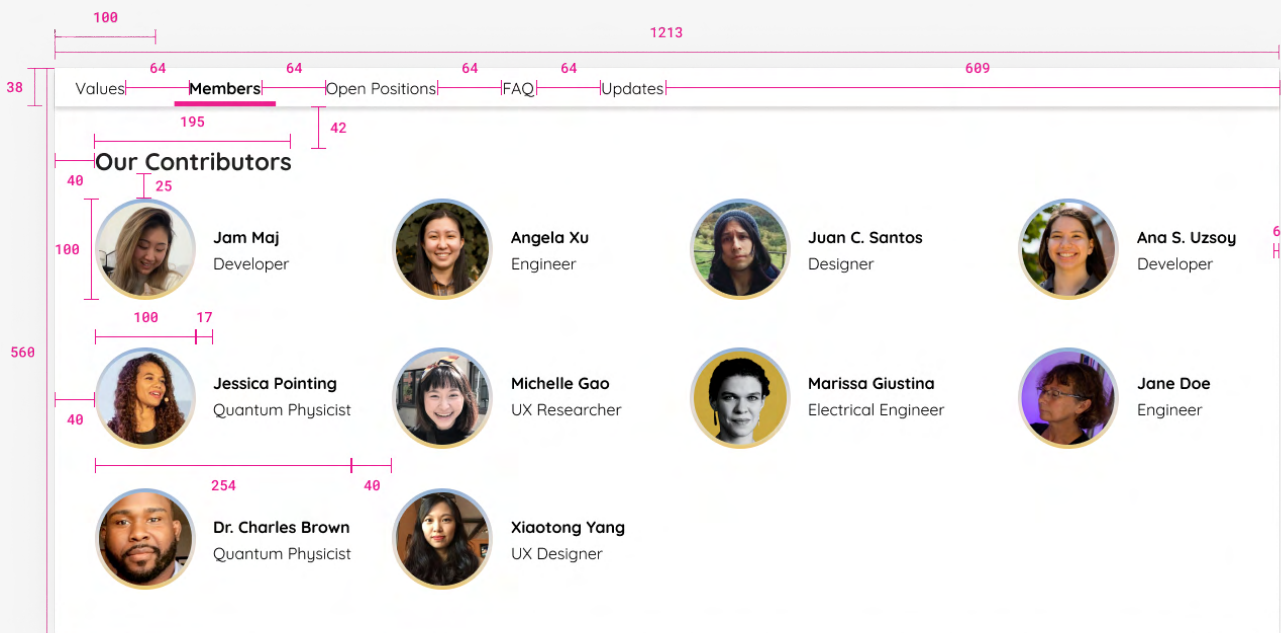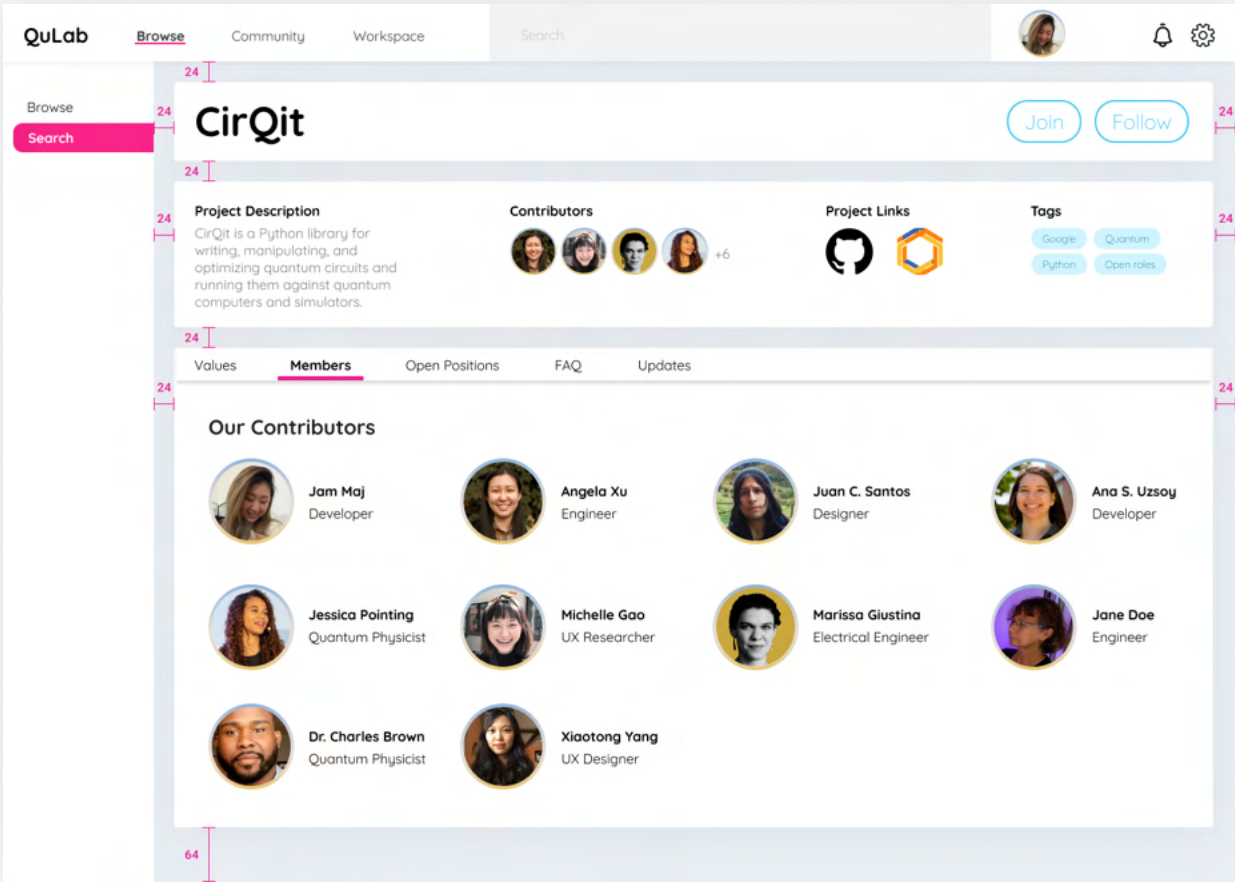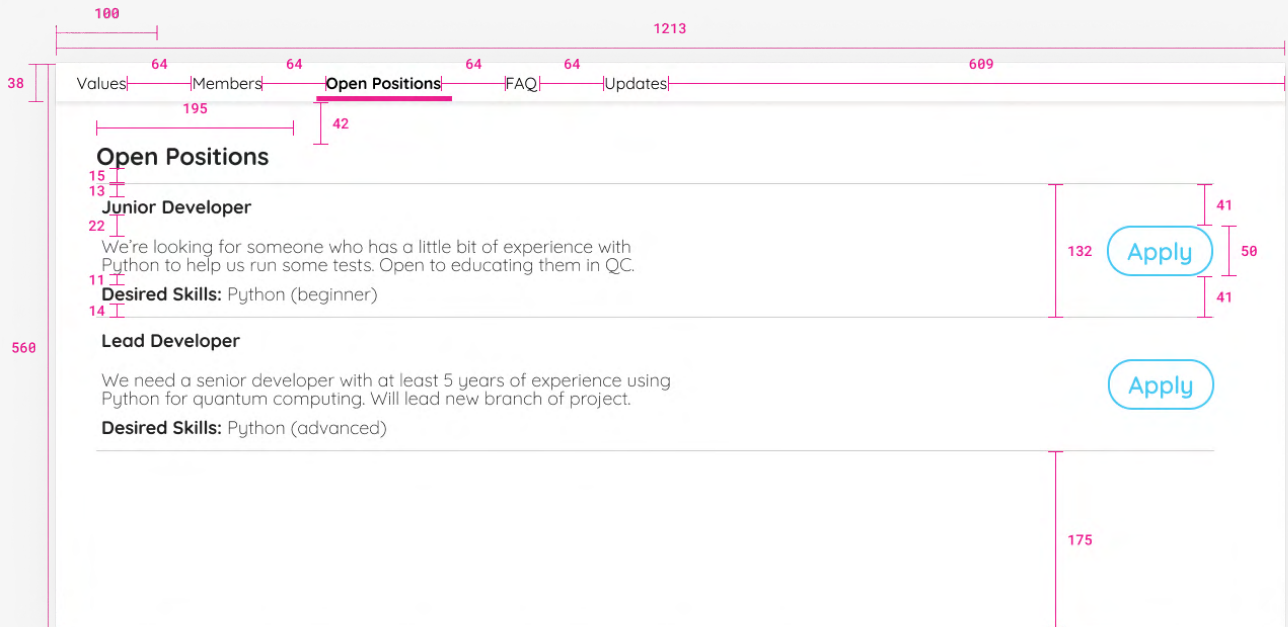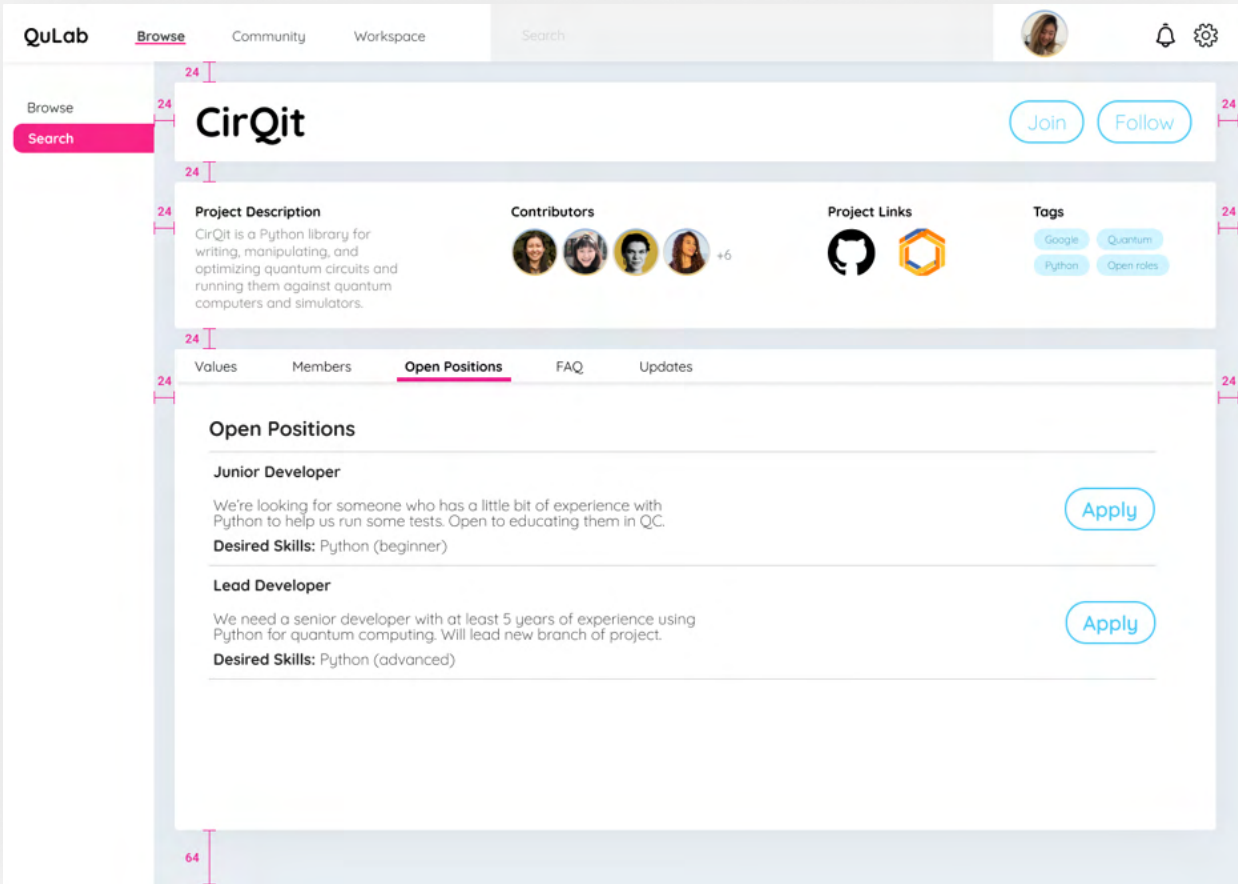I want to share some initial thoughts that I think are part of a larger discussion we should have about which design patterns should be preferred when providing functions to generate parameterized circuits like those in QAOA or VQE...
14 Comments

7/01/2021
Previously, when you requested a CirQit result with measurement A, and B, we would return a Result object that contained the correct counts for A and B, but which eliminated any correlation information we had (by throwing the results order out in count()). This changes so that count() is derived from another method...
14 Comments

Values   Members   Open Positions   FAQ   Updates

Latest Updates   Newest First ▾

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7/01/2021
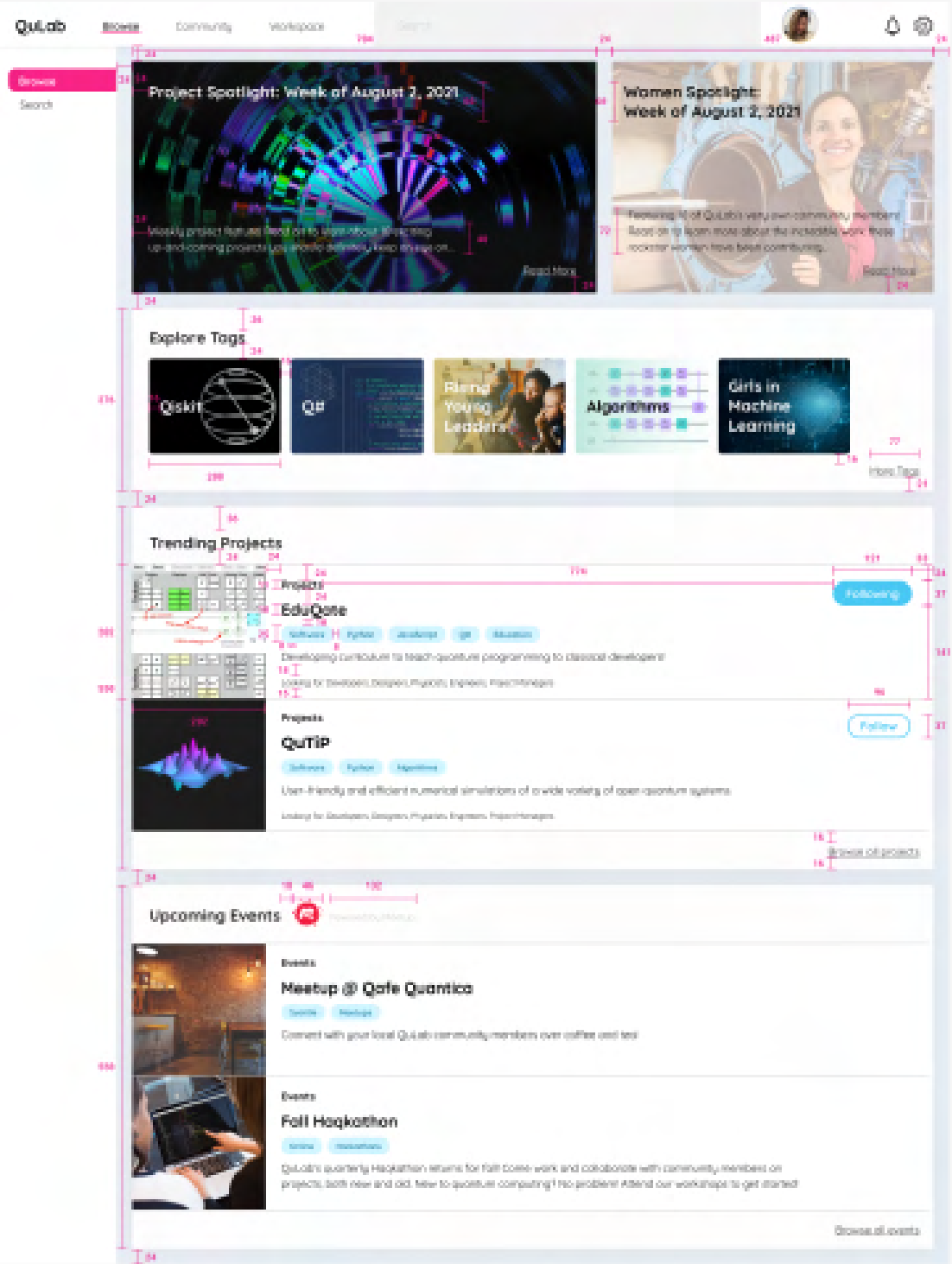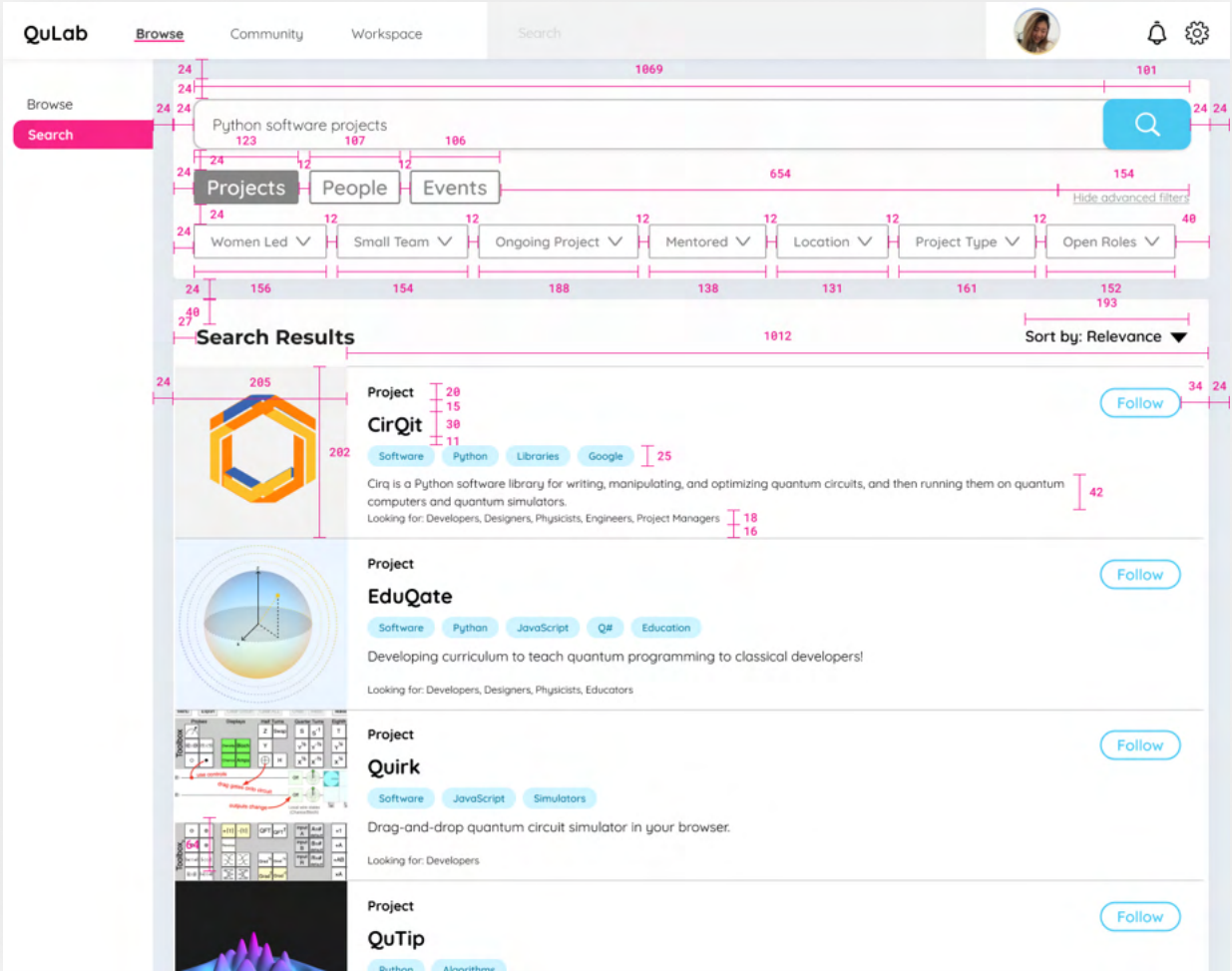Previously, when you requested a CirQit result with measurement A, and B, we would return a Result object that contained the correct counts for A and B, but which eliminated any correlation information we had (by throwing the results order out in count()). This changes so that count() is derived from another method...
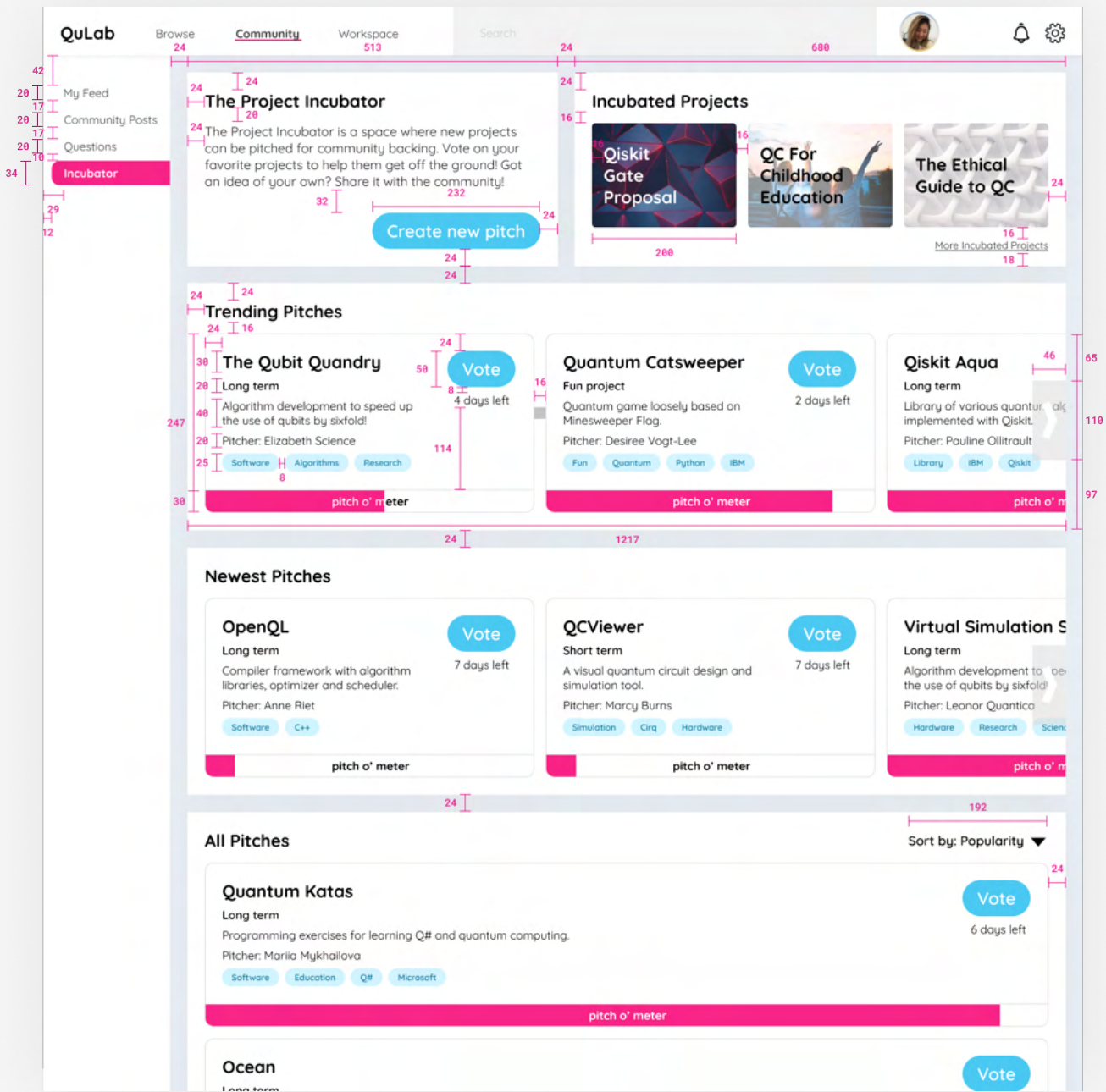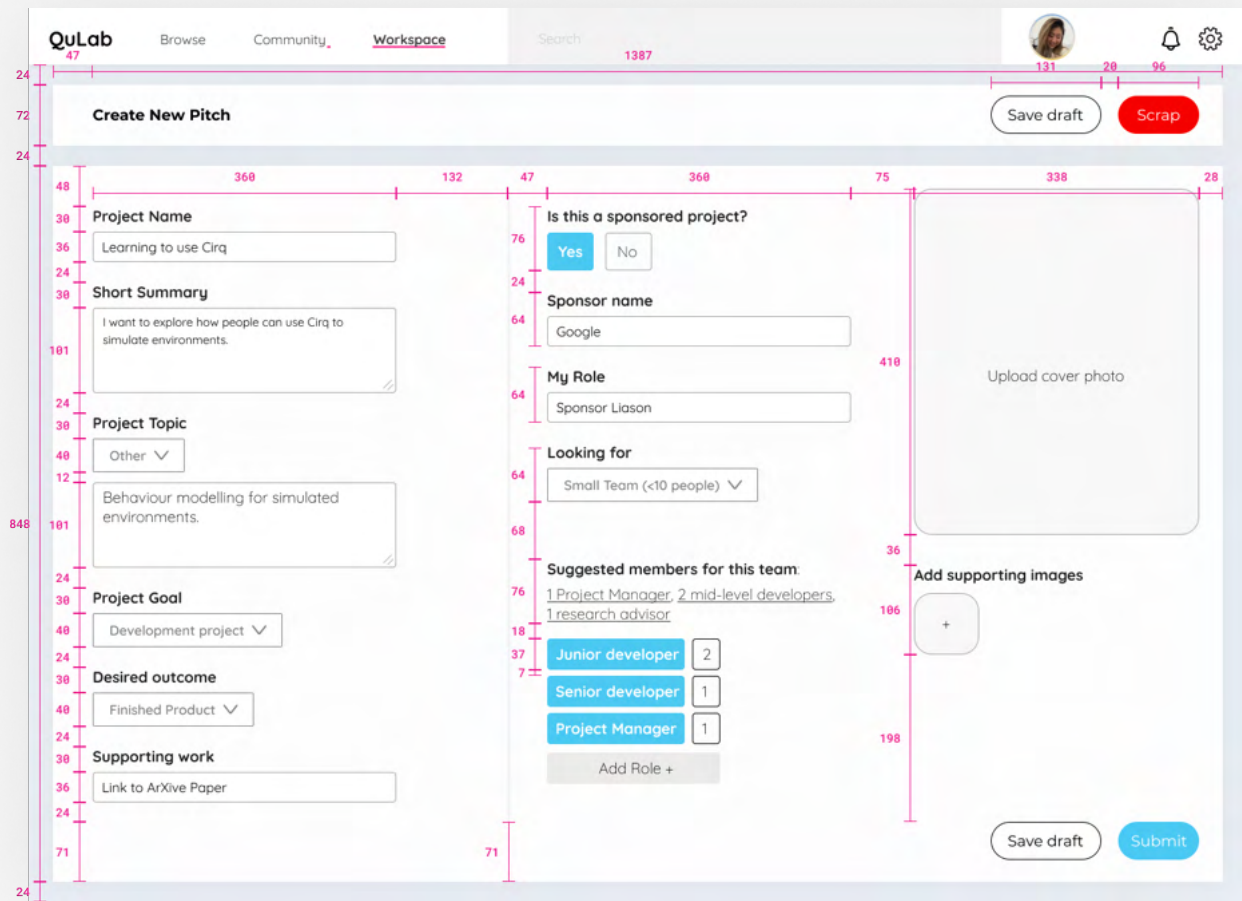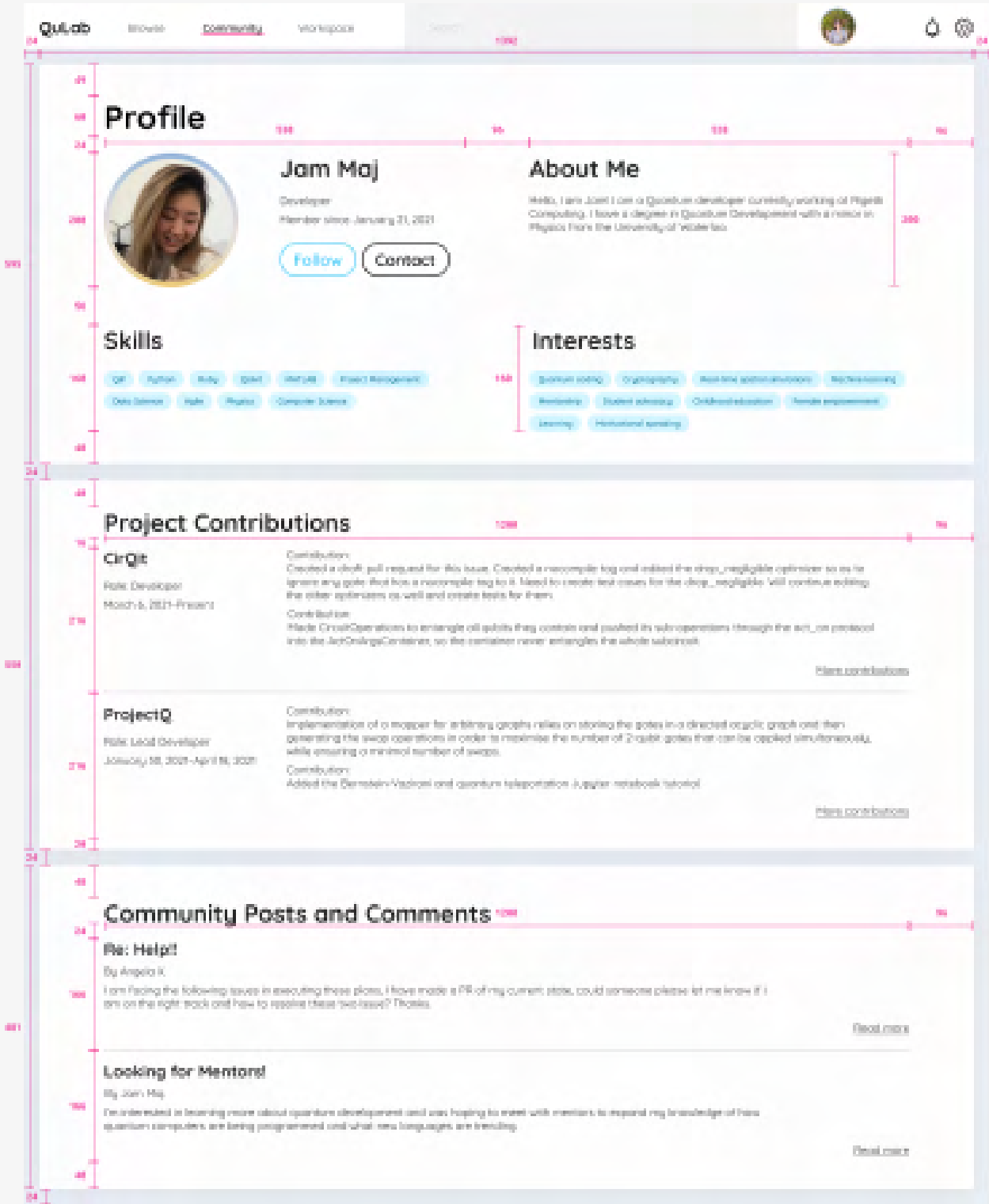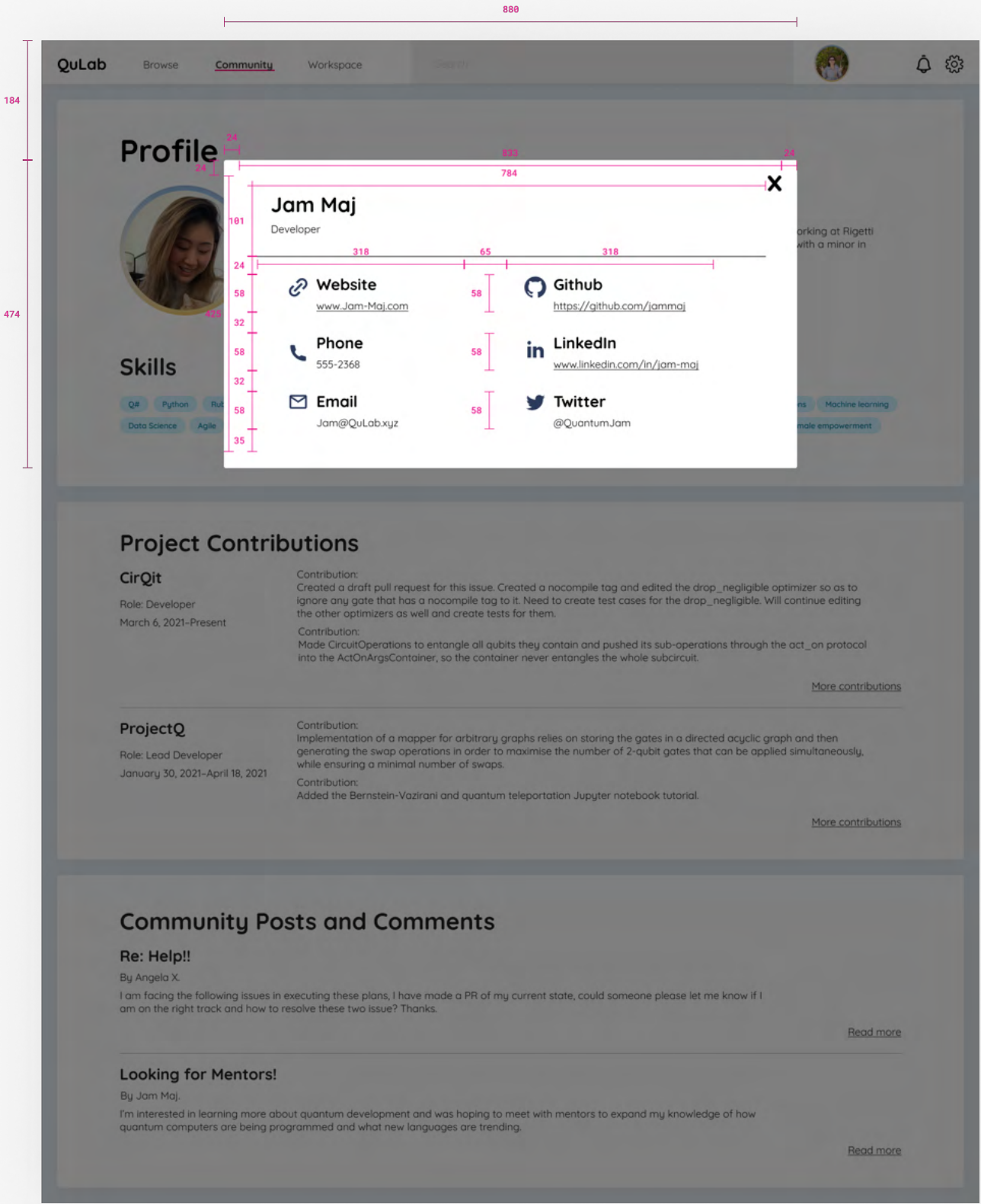14 Comments

Browse

Search

Incubator

New Project Maker

Profile

Search

Profile

Jam Maj
Developer
Member since January 31, 2021

Follow   Contact

About Me

Hello, I am Jam! I am a Quantum developer currently working at Rigetti Computing. I have a degree in Quantum Development with a minor in Physics from the University of Waterloo.

Skills

Q# | Python | Ruby | Qiskit | MATLAB | Project Management
Data Science | Agile | Physics | Computer Science

Interests

Quantum scaling | Cryptography | Real-time spatio-simulation | Machine learning
Mentoring | Student advocacy | Childhood education | Female empowerment
Learning | Motivational speaking

Project Contributions

CirQit
Role: Developer
March 6, 2021-Present

Contributions:
Created a draft pull request for this issue. Created a nocompile tag and edited the drop_negligible optimizer so as to ignore any gate that has a nocompile tag to it. Need to create test cases for the drop_negligible. Will continue editing the other optimizers as well and create tests for them.

Contribution:
Made CircuitOperations to entangle all qubits they contain and pushed its sub-operations through the act_on protocol into the ActOnArgsContainer, so the container never entangles the whole subcircuit.

More contributions

ProjectQ
Role: Lead Developer
January 30, 2021-April 18, 2021

Contributions:
Implementation of a mapper for arbitrary graphs relies on storing the gates in a directed acyclic graph and then generating the swap operations in order to maximise the number of 2-qubit gates that can be applied simultaneously, while ensuring a minimal number of swaps.

Contribution:
Added the Bernstein-Vazirani and quantum teleportation Jupyter notebook tutorial.

More contributions

Community Posts and Comments

Re: Help!!
By Angela X.
I am facing the following issues in executing these plans, I have made a PR of my current state, could someone please let me know if I am on the right track and how to resolve these two issue? Thanks.

Read more

Looking for Mentors!
By Jam Maj.
I'm interested in learning more about quantum development and was hoping to meet with mentors to expand my knowledge of how quantum computers are being programmed and what new languages are trending.

Read more

QuLab | Browse | Community | Workspace

Profile

Jam Maj
Developer

🔗 **Website**
www.Jam-Maj.com

📞 **Phone**
555-2368

✉ **Email**
Jam@QuLab.xyz

Github
https://github.com/jammaj

LinkedIn
www.linkedin.com/in/jam-maj

Twitter
@QuantumJam

Project Contributions

CirQit
Role: Developer
March 6, 2021-Present

Contribution:
Created a draft pull request for this issue. Created a nocompile tag and edited the drop_negligible optimizer so as to ignore any gate that has a nocompile tag to it. Need to create test cases for the drop_negligible. Will continue editing the other optimizers as well and create tests for them.

Contribution:
Made CircuitOperations to entangle all qubits they contain and pushed its sub-operations through the act_on protocol into the ActOnArgsContainer, so the container never entangles the whole subcircuit.

More contributions

ProjectQ
Role: Lead Developer
January 30, 2021-April 18, 2021

Contribution:
Implementation of a mapper for arbitrary graphs relies on storing the gates in a directed acyclic graph and then generating the swap operations in order to maximise the number of 2-qubit gates that can be applied simultaneously, while ensuring a minimal number of swaps.

Contribution:
Added the Bernstein-Vazirani and quantum teleportation Jupyter notebook tutorial.

More contributions

Community Posts and Comments

Re: Help!!
By Angela X.
I am facing the following issues in executing these plans, I have made a PR of my current state, could someone please let me know if I am on the right track and how to resolve these two issue? Thanks.

Read more

Looking for Mentors!
By Jam Maj.
I'm interested in learning more about quantum development and was hoping to meet with mentors to expand my knowledge of how quantum computers are being programmed and what new languages are trending.
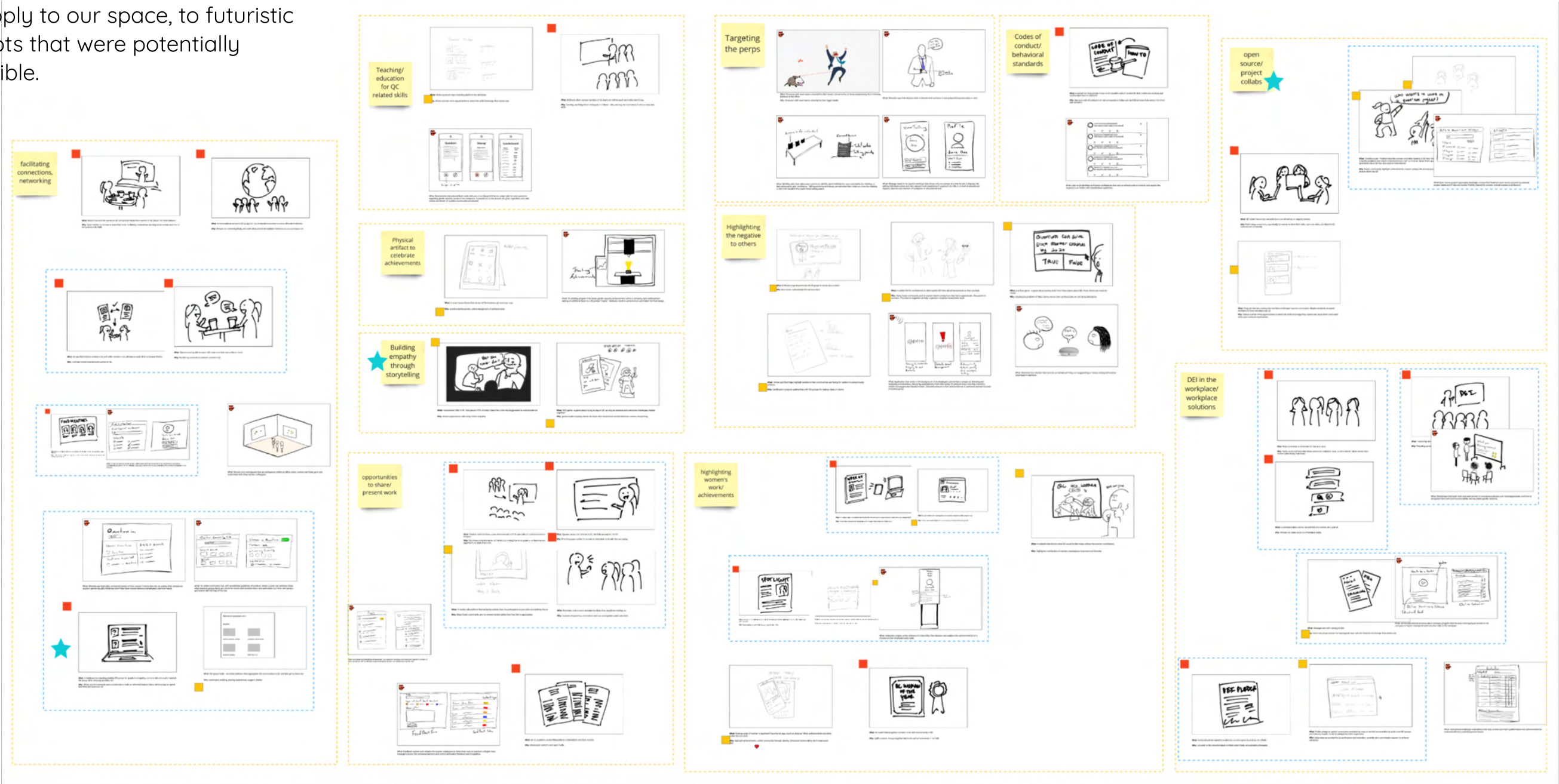
Read more

Process Documentation

Ideation

From our research and values we generated approximately 60 potential ideas ranging from grounded and existing solutions we could leverage and apply to our space, to futuristic concepts that were potentially unfeasible.

Downselection

From these initial ideas we grouped similar or complementing concepts into larger themes to facilitate a process of down selection. Through a simple voting process we ultimately selected 1 concept to storyboard.
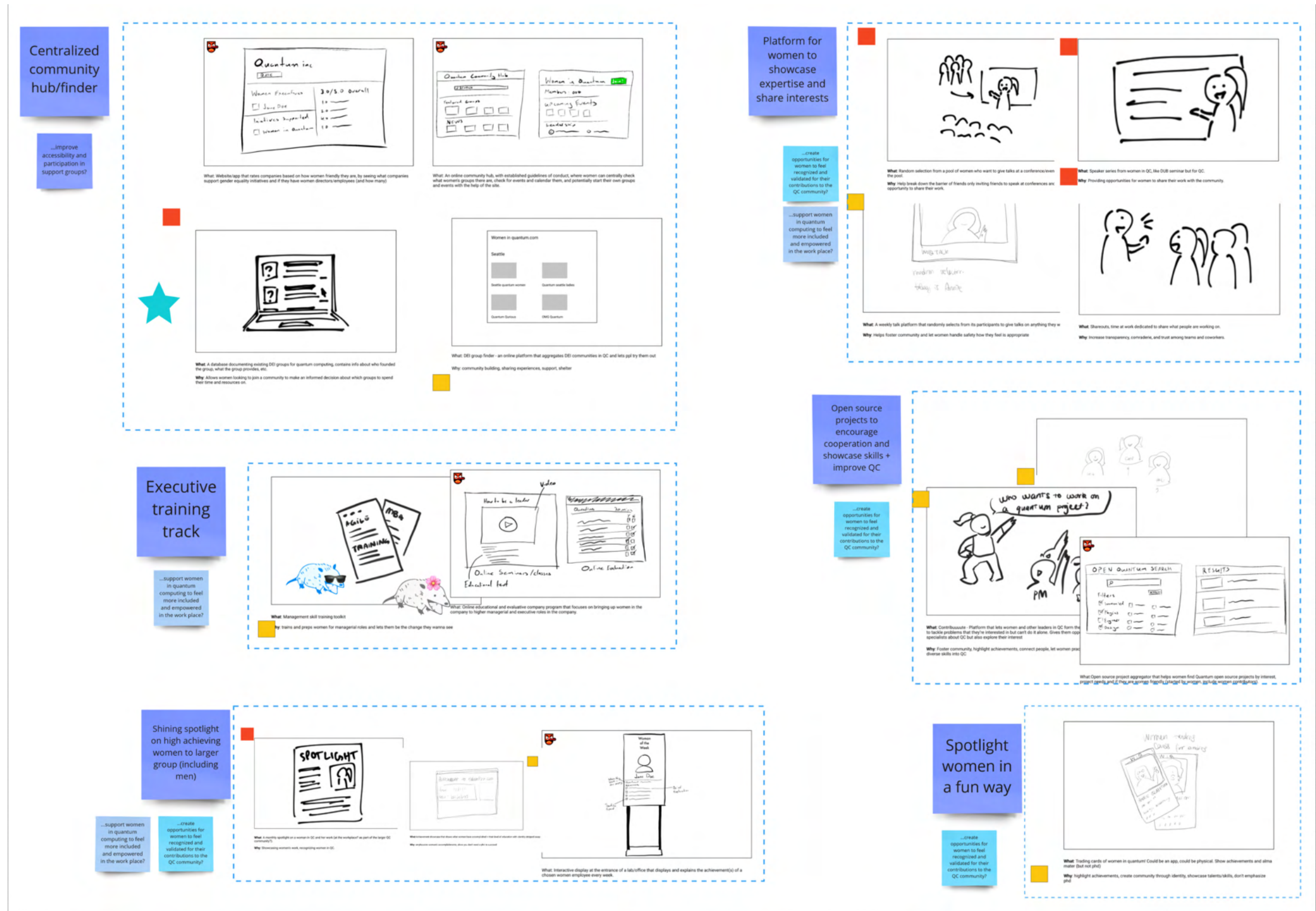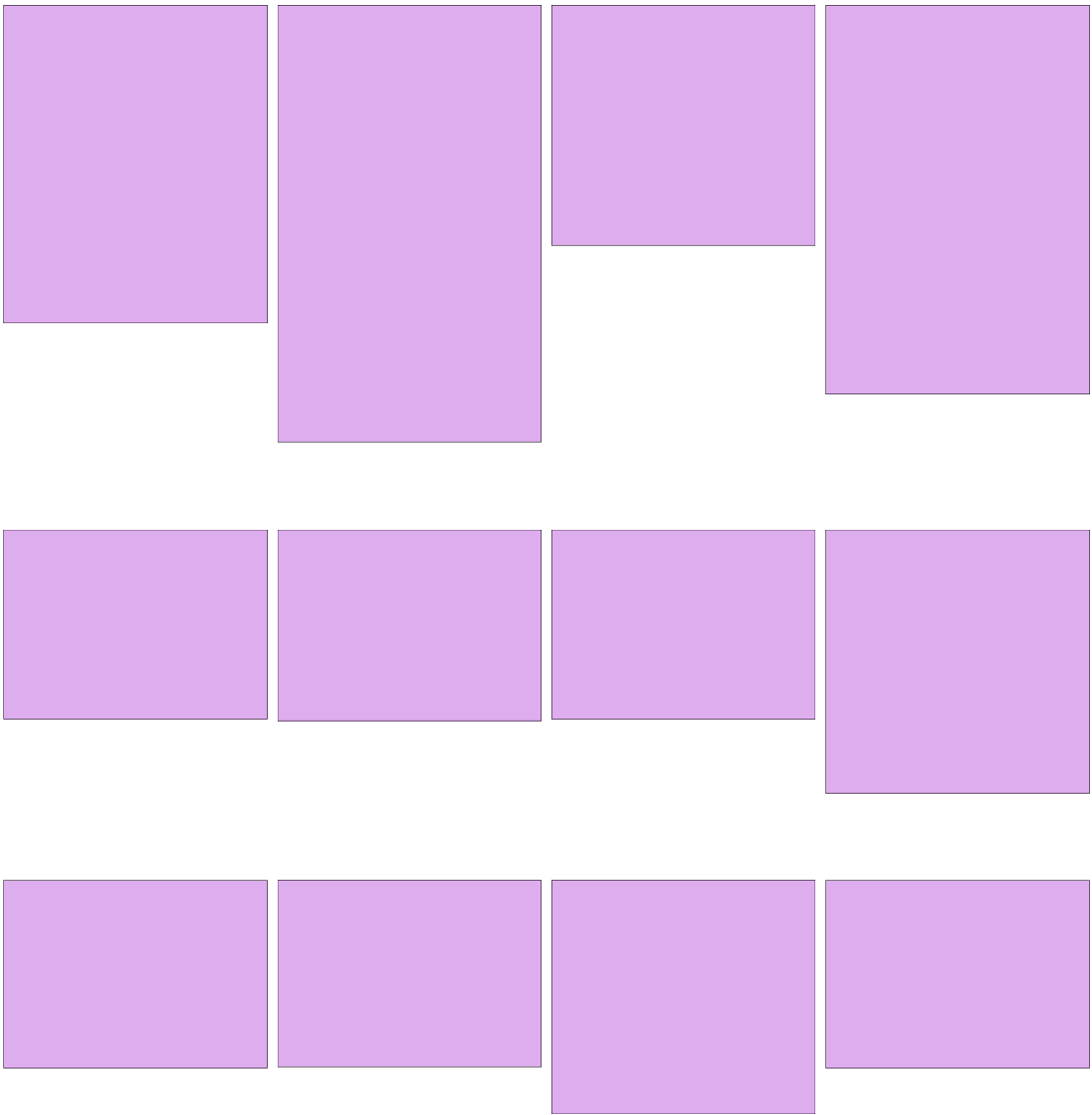
Storyboard

Having selected a concept we wanted to go with, we developed hybrid storyboard to demonstrate how our concept would work to benefit women in Quantum Computing, and to function as a user flow of how it could be used.

Jam feels unfulfilled and unrecognized at her current job.

Jam vents to a friend who is also in QC.

Her friend invites Jam to ArQ.

Jam signs up and finds a project that fits her interests.

Jam meets with the project team to see if it's a fit for her.

Her team works together and asks the community for help when needed.

Jam updates Project X's ArQ page and helps others in the forums.

Jam is selected to speak about Project X at ArQ's online conference.

A recruiter sees her talk and is impressed by her skill.

Jam is recruited to join a new company that fits her interests.

Jam starts a new project, aiming to help juniors and students.

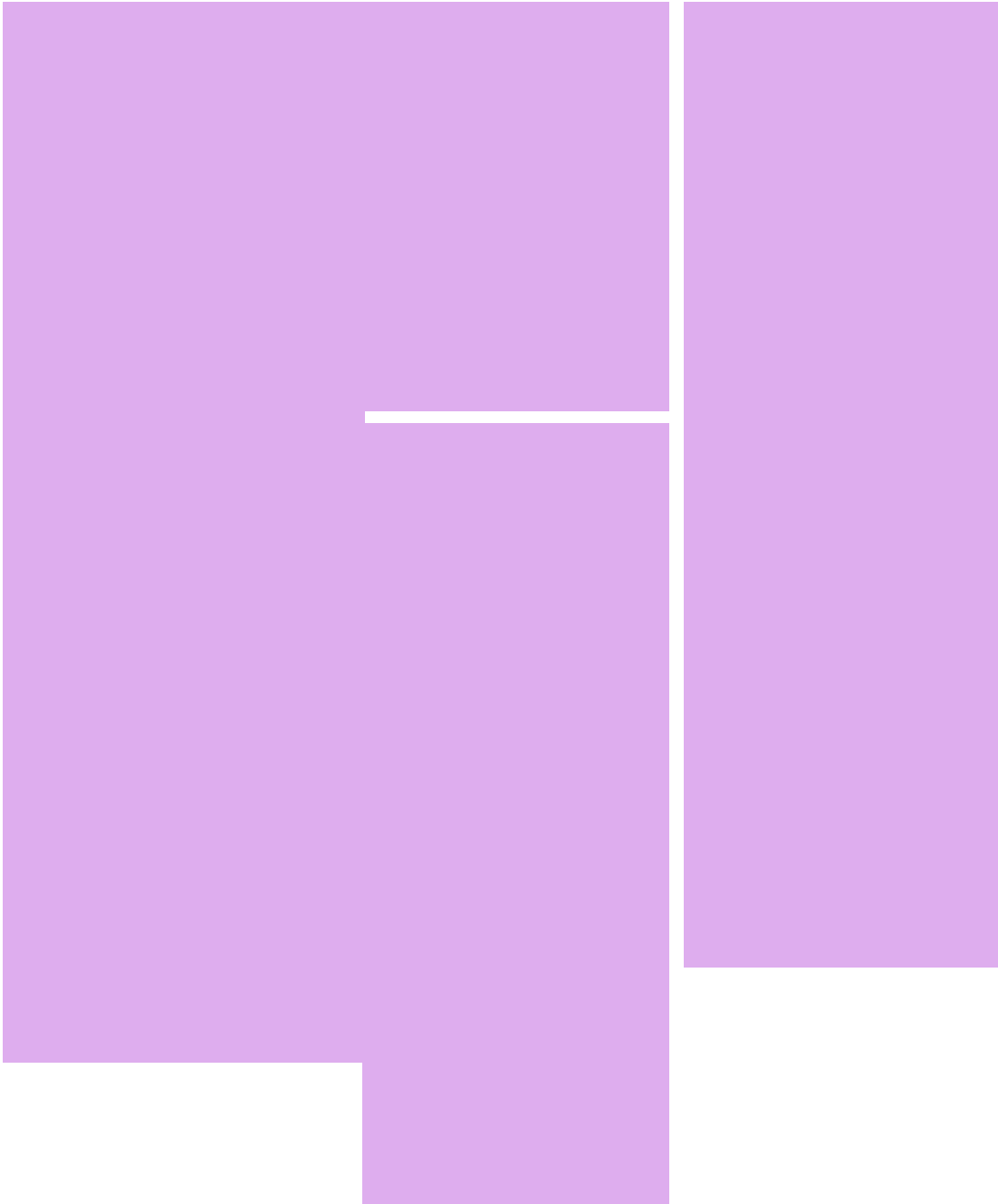Jam mentors junior devs in her new project.
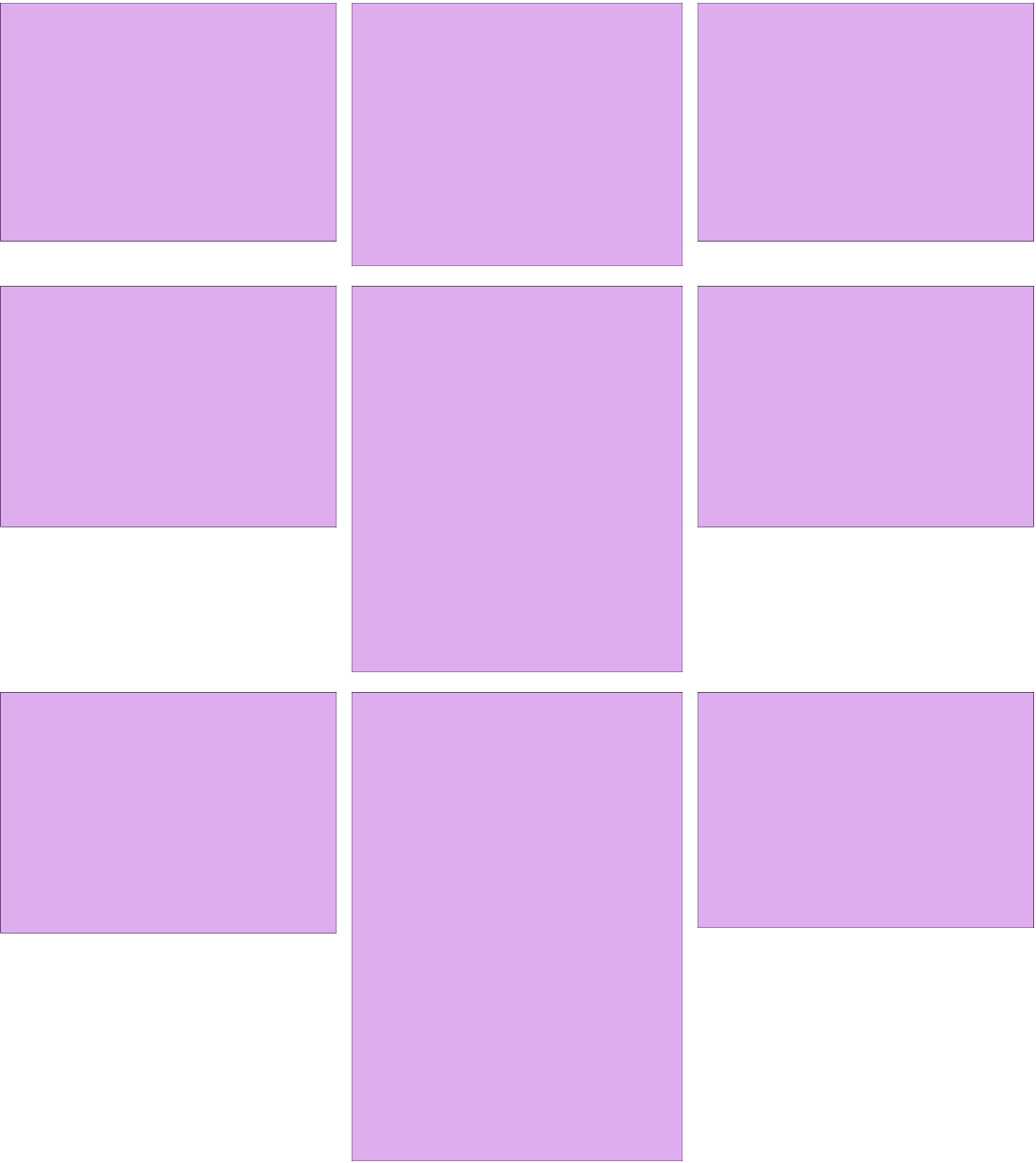
Generating Wireframes

Using the storyboard we identified the core screens we needed and began to develop wireframe variations of how the information and design of each screen would be laid out.

Wireframe Selection

Initial Visual Design

Once we decided on a wireframe layout we began to experiment with the visual design we wanted. We focused on using bright colors as accents to provide a clean look that was fun and inviting, but not overbearing.

Video Storyboard

THE END