

# IBM Schematics Case Study

---

Kathy Wang

# The Process

Introduction

User Research

Prototyping

Testing

Prototyping Round 2

# Introduction

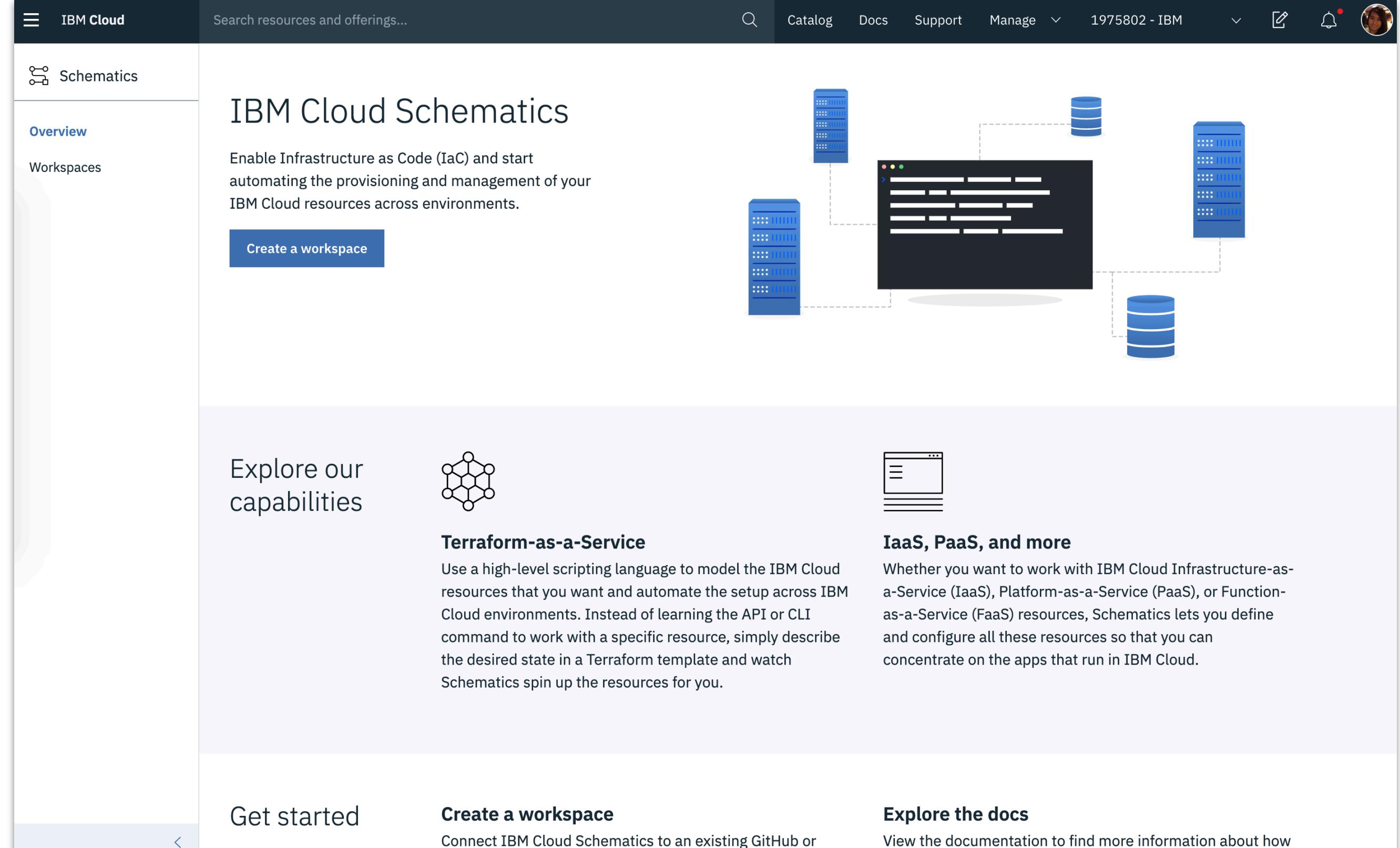


## Introduction

# The Product

Before, you had to manually deploy resources. Now, you can deploy resources via code.

Schematics is an infrastructure as code product, enabling a DevOps engineer to deploy several resources (i.e. a Kubernetes cluster).

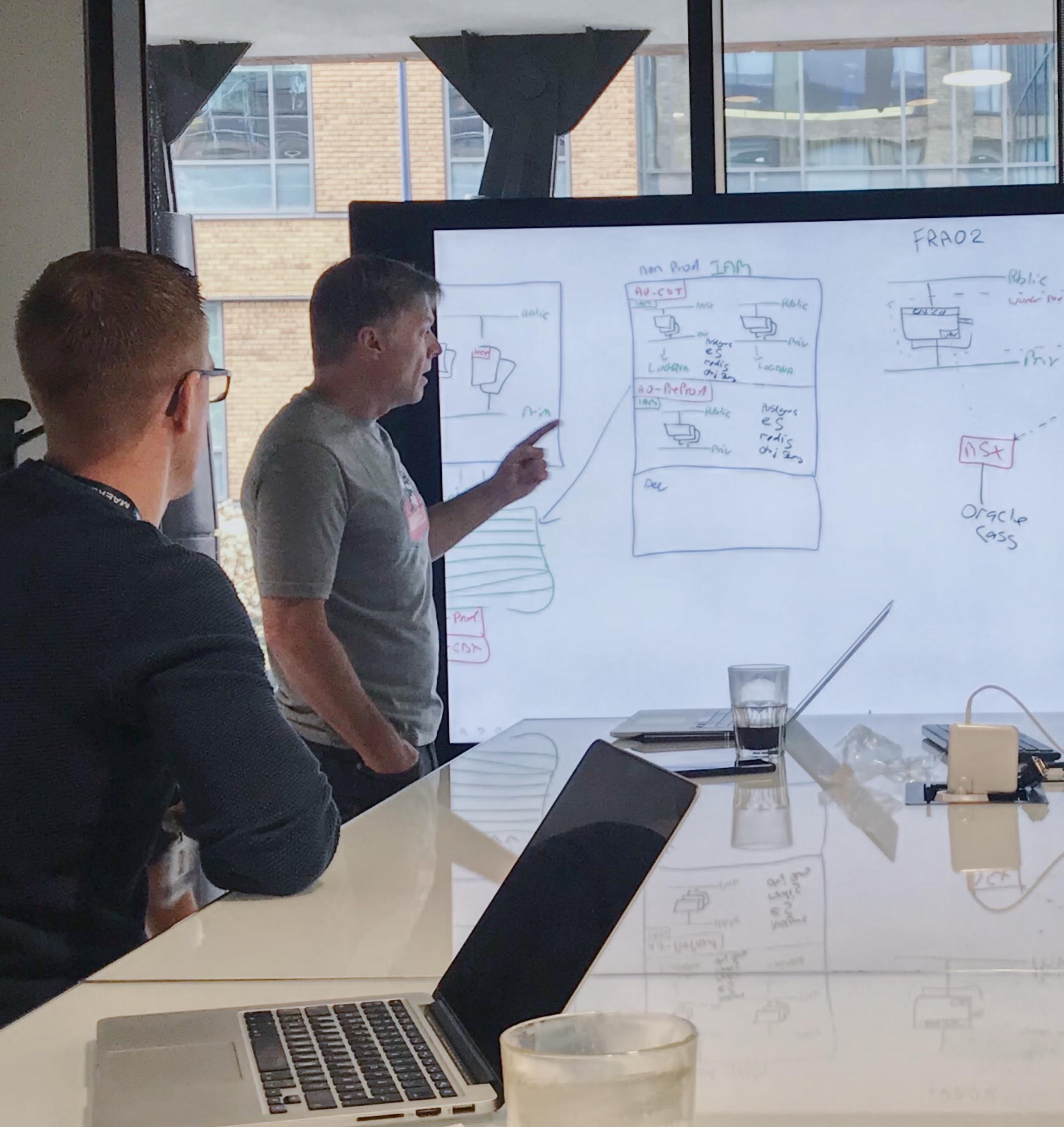


The screenshot shows the IBM Cloud Schematics interface. At the top, there's a navigation bar with 'IBM Cloud' and a search bar. Below it, a sidebar on the left lists 'Schematics', 'Overview', and 'Workspaces'. The main content area is titled 'IBM Cloud Schematics' and describes enabling Infrastructure as Code (IaC) to automate provisioning and management of resources. It features a large diagram of a central workspace connected to multiple server and database icons. Below this, there are sections for 'Explore our capabilities' (with a Terraform icon), 'Terraform-as-a-Service' (describing its use for automating resource setup), 'IaaS, PaaS, and more' (describing its use for other cloud services), and 'Get started' (with a 'Create a workspace' button). At the bottom, there are links for 'Create a workspace' (connecting to GitHub or GitLab), 'Explore the docs' (viewing documentation), and 'View the documentation to find more information about how'.

## Introduction

# Persona

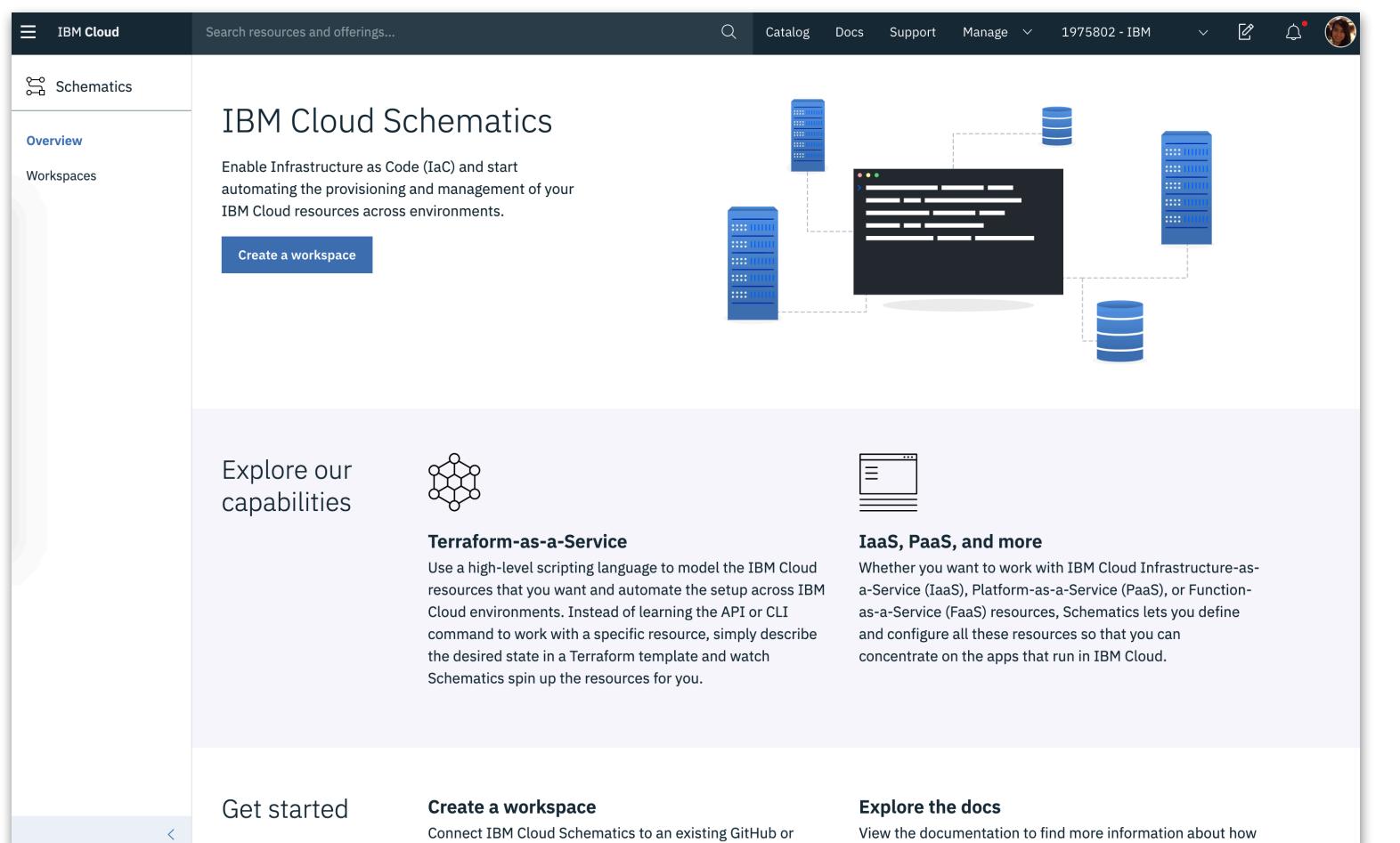
“RJ is an operations engineer with a holistic view of the network, infrastructure, applications, and services. He is responsible for the 24/7 operation of the environment including deployments, monitoring, automation, and troubleshooting. He often receives and responds to alerts in order to reduce and prevent disruptions in service.”



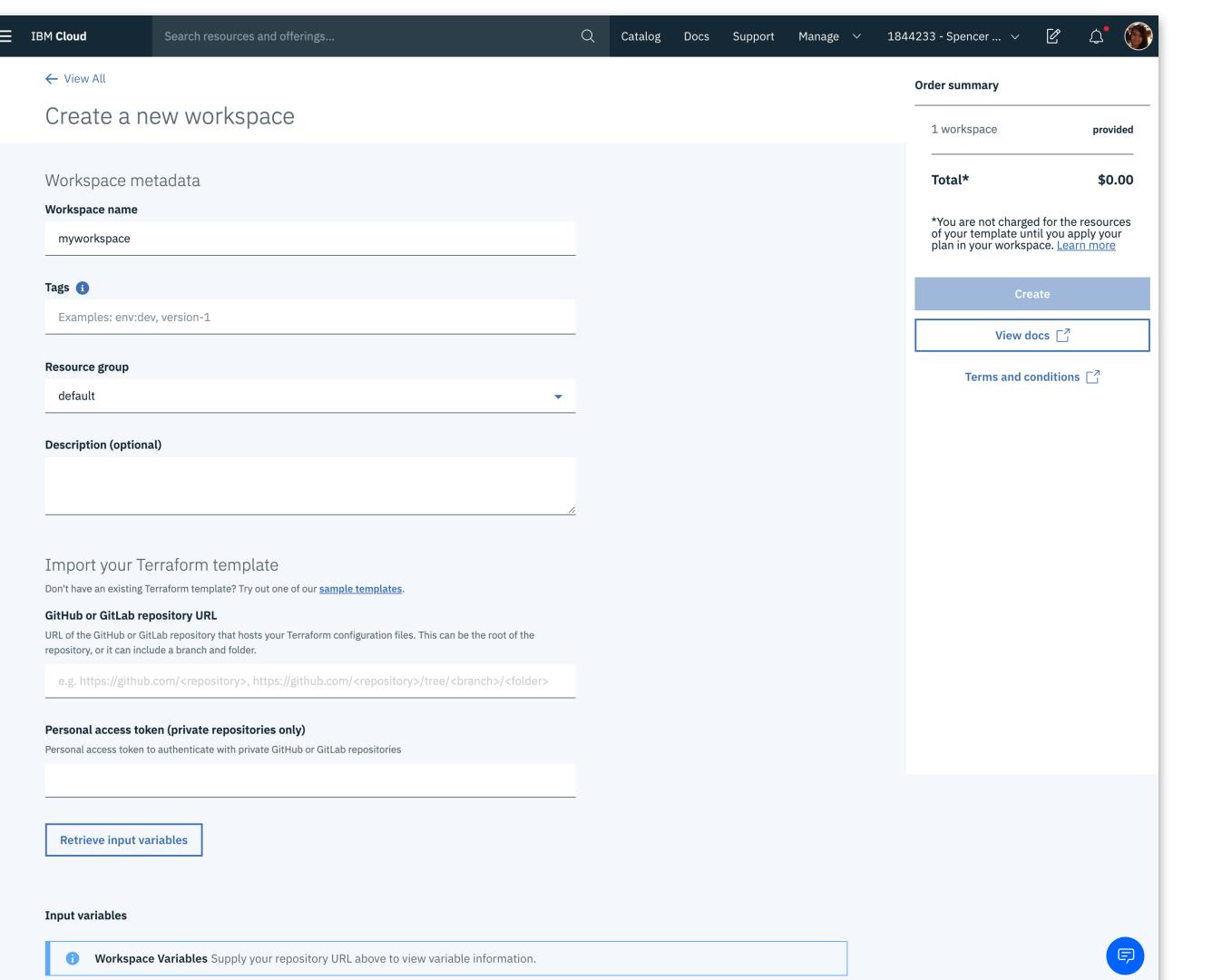
IBM

# As-is

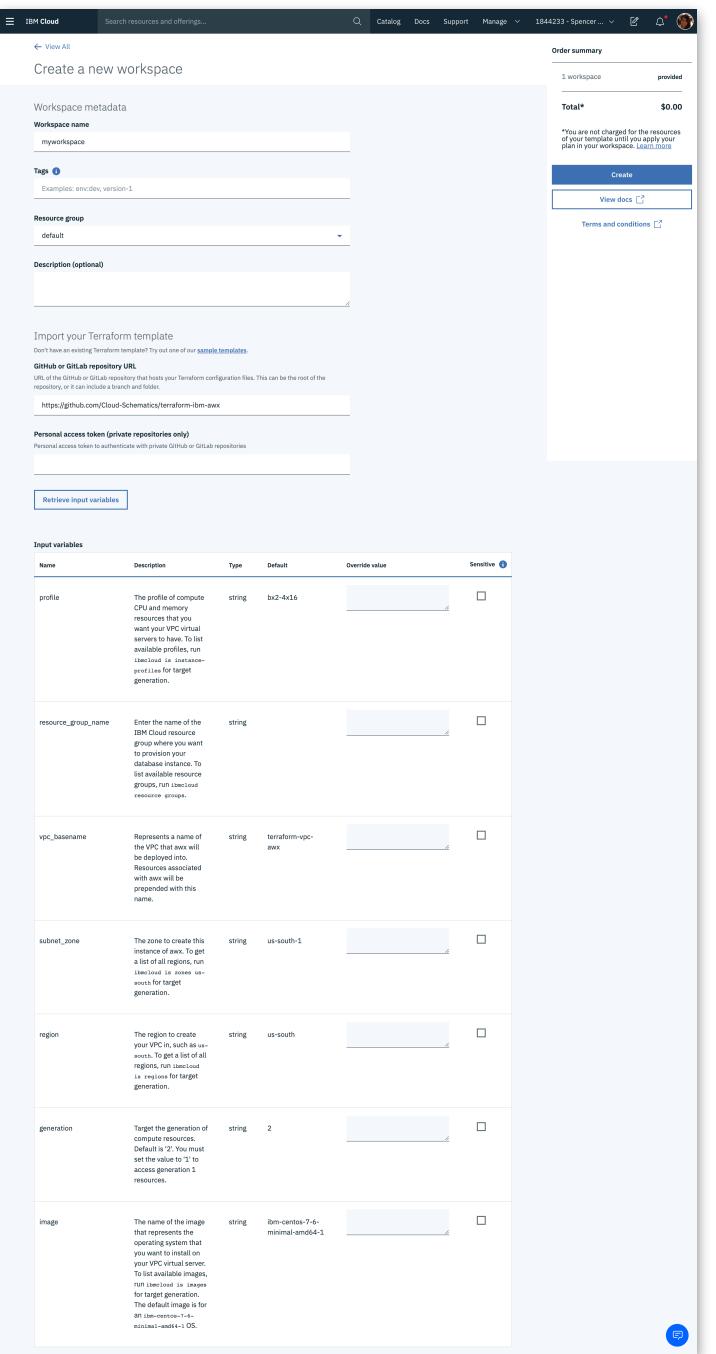
This is the current flow.



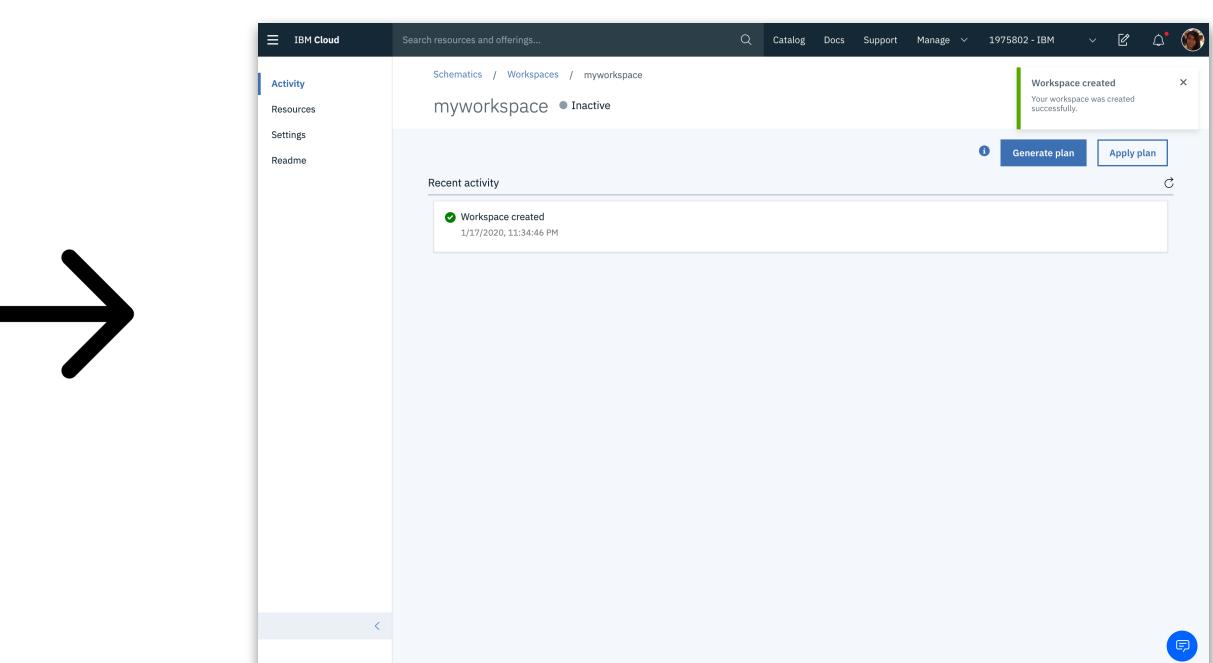
The screenshot shows the IBM Cloud Schematics interface. At the top, there's a navigation bar with 'IBM Cloud', 'Search resources and offerings...', 'Catalog', 'Docs', 'Support', 'Manage', and a user profile. Below the navigation is a section titled 'IBM Cloud Schematics' with a sub-section 'Overview'. A large blue button labeled 'Create a workspace' is prominently displayed. To the right of this button is a diagram illustrating the infrastructure-as-code concept, showing a central computer monitor connected to various cloud services like databases and storage. Below the diagram, there are sections for 'Explore our capabilities' (Terraform-as-a-Service, IaaS, PaaS, and more) and 'Get started' (Create a workspace, Connect IBM Cloud Schematics to an existing GitHub or GitLab repository, Explore the docs). A large black arrow points from this screen to the next one.



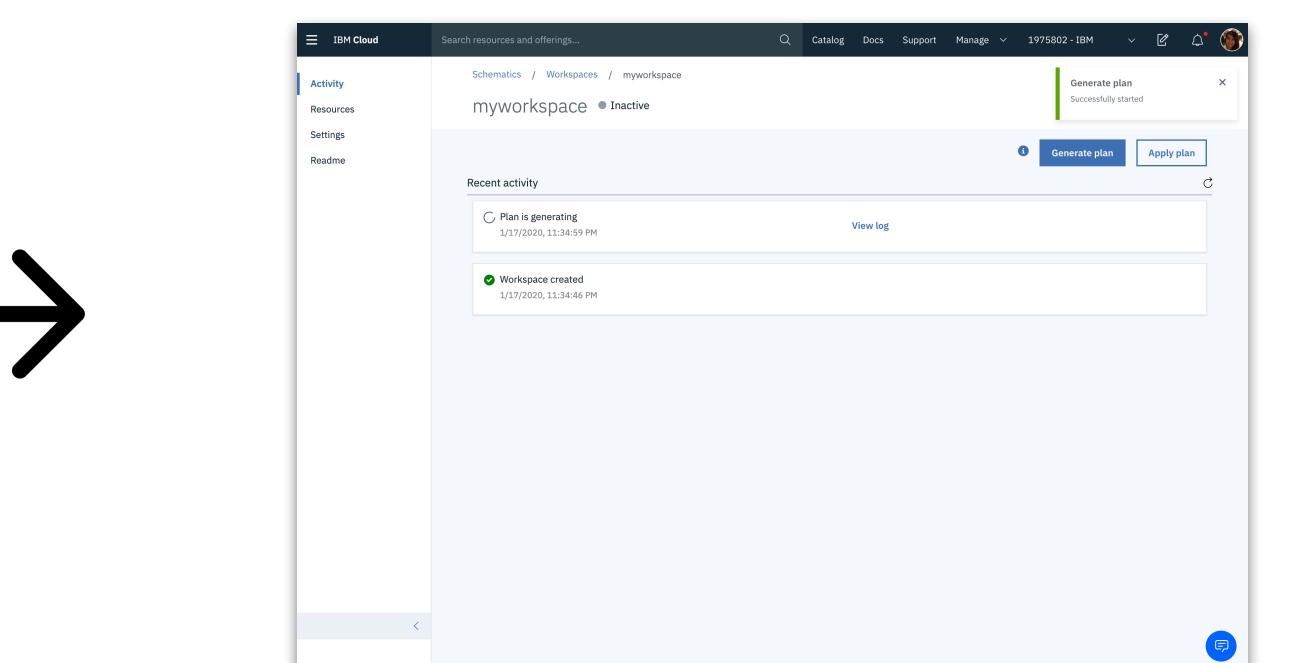
The screenshot shows the 'Create a new workspace' form. It includes fields for 'Workspace name' (set to 'myworkspace'), 'Tags' (examples: env:dev, version-1), 'Resource group' (set to 'default'), and a 'Description (optional)' field. On the right, there's a 'Create' button and a 'View docs' link. Below the main form is a 'Import your Terraform template' section with fields for 'GitHub or GitLab repository URL' (example: https://github.com/ibm-schematics/ibm-schematics.git) and 'Personal access token (private repositories only)'. At the bottom, there's a 'Retrieve input variables' button and a 'Input variables' section with a note about workspace variables. A large black arrow points from this screen to the next one.



The screenshot shows the 'Order summary' page for creating a workspace. It displays a single workspace entry with a total cost of '\$0.00'. The workspace name is 'myworkspace'. There are links for 'View All', 'Catalog', 'Docs', 'Support', 'Manage', and a user profile. A large black arrow points from this screen to the next one.



The screenshot shows a confirmation message: 'Workspace created' with the note 'Your workspace was created successfully.' Below this, there are buttons for 'Generate plan' and 'Apply plan'. A recent activity log shows the workspace creation event. A large black arrow points from this screen to the next one.



The screenshot shows the workspace status as 'myworkspace • Inactive'. It indicates that a plan is generating ('Plan is generating 1/17/2020, 11:34:59 PM') and provides a 'View log' link. A recent activity log shows the workspace creation event. A large black arrow points from this screen to the next one.

Introduction

# Team

Role: Design lead

Team: 3 designers, 1 researcher

Contribution: User research, low-fidelity wireframes, high-fidelity prototypes, interactive prototyping

Project duration: 4 months

Tools: Sketch, InVision, Mural

A photograph of a person sitting at a desk, viewed from the side. They are wearing a grey hoodie and are looking down at a laptop screen. Their right hand holds a silver pen over an open notebook, and their left hand rests on the laptop's trackpad. A white mug sits on the desk to the left, and a small potted plant is visible in the bottom left corner.

# User Research

## User Research

# Interviews

## 4 usability sessions

1. DevOps Engineer, Toyota Connected
2. SRE, brightwheel
3. STSM, IBM
4. Executive IT Specialist, IBM

### Interviewee Background

LinkedIn

#### Intro (5 min)

How's it going? We're with the IBM Cloud team here in Austin, TX. We have a new feature that we're hoping to do some usability testing.

Before we begin, do you mind if we record?

1. What's your role? And can you tell us a little bit about what you do?
2. I see that you have been working as a \_\_\_ for X time. Is that correct?
3. I see that you listed Terraform as a tool that you use, how are you using it today?

#### Tasks (20 min)

We're going to give you a task related to Terraform. As you are doing it, tell us what you are thinking out loud. There is no right or wrong answer here and we are not testing you on your skills but we are more looking to smooth out the feature before it goes to Generally Availability. If you have a question, like if something is not clear, definitely voice it in the moment and we will come back to it at the end.

1. Task #1: Here's some TerraForm starters. Deploy one of these to IBM Cloud.
  - a. [Starter link](#)
  - b. Things to Validate (Observe and Probe):
    - i. Time (?)
    - ii. Task completion rate
2. Dig into workspace creation, generate plan, apply plan. What if we generated on create workspace?

### Notes

#### Post-Assessment (5 min)

1. Satisfaction rating
2. Was there anything you found particularly enjoyable about your experience?
3. Was there anything you found particularly challenging?
4. Is there anything you would change?

## User Research

# Synthesis

We took the important data points, and then gathered them into one document.

We found out that users were really annoyed with the fact that variables were not retrieved for them.

### Participants

2 external (DevOps Engineer at Toyota Connected, SRE at [brightwheel](#))

2 internal (STSM, Executive IT Specialist)

### Satisfaction

- 3 initially bc confused at prompt; actual task solid 4, only issue is logs and feedback
- 4, close to 5 but 5 is perfect so he said 4, it's simple, it works, it might be missing some things
- 3.6, it's ok, it's not terrible, i would want to see how hard it is to pull my terraform into this, modules, output variables

### Task completion (follow up)

- no, got stuck at GitHub URL and second time at input variables
- partial, plan generate started but no input variables
- partial, plan generate started but no input variables
- yes

### Issues to open

1. Input Variable Defaults: i'm logged into my account, why haven't you retrieved those variables for me? api key, username
  - a. external
  - b. (internal)
  - c. (internal)
  - d. - external
2. GitHub Repo URL: difficulty getting the right formatting for [github](#) URL, 3+ tries, 2+ minutes (Note: may be an easy change to the readme: deploy to [ibm](#) cloud vs deploy locally)
  - a. - external
  - b. - external
3. Log Navigation: difficulty viewing most recent logs and navigating around in general, wished for floating buttons to make this easier
  - a. (external)
  - b. (internal)
4. Rename Workspace: would like option to rename a workspace
  - a. (internal)
5. ReadMe Appearance: readme looks broken
  - a. (internal)

### Issues already in progress

1. Workspace Create Feedback: to show system is processing / in progress (spinner or logs), to show whether activity was success or failure
  - a. (external)
  - b. (internal)
  - c. (internal)
2. Terminology confusion: confused if frozen/frozen and locked/unlocked are referring to the same thing
  - a. (internal)
3. Terraform actions: clicking buttons lead to error while workspace is creating

### Feature requests

- Output variables (2 / 3)
- Download Pure Terraform: ability to download pure terraform. google lets you generate terraform state from pure infrastructure, they create template and state file for you (1 / 3)

### Content review

- Inconsistent Wording: he clicked on sample templates in UI but the [github](#) repo says examples.
- Template Wording: passed over app sample template bc he says it implies he needs an app ready to go -
- Sample Naming: didn't match expectations -
- GitHub Repo URL: difficulty getting the right formatting for [github](#) URL, 3+ tries, 2+ minutes (Note: may be an easy change to the readme: deploy to [ibm](#) cloud vs deploy locally)

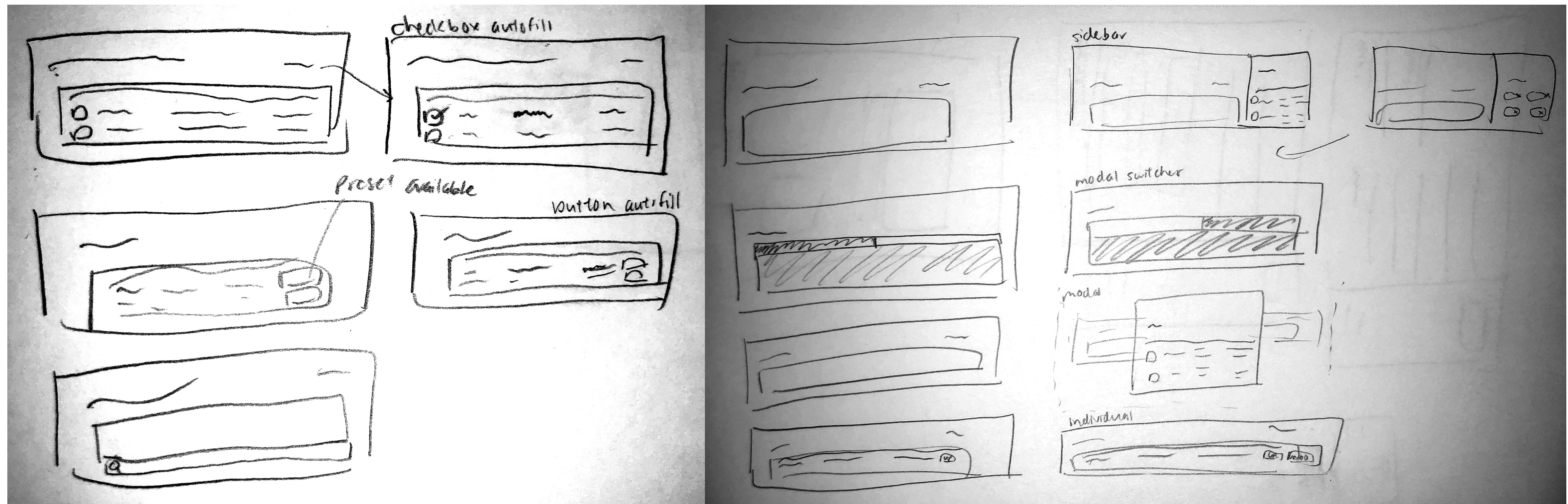
# Define

Schematics users want to fill out the values for variables so that they can generate and apply plan, but they get annoyed having to fill out the values.

# Prototyping

Prototyping

# Low-Fidelity Explorations

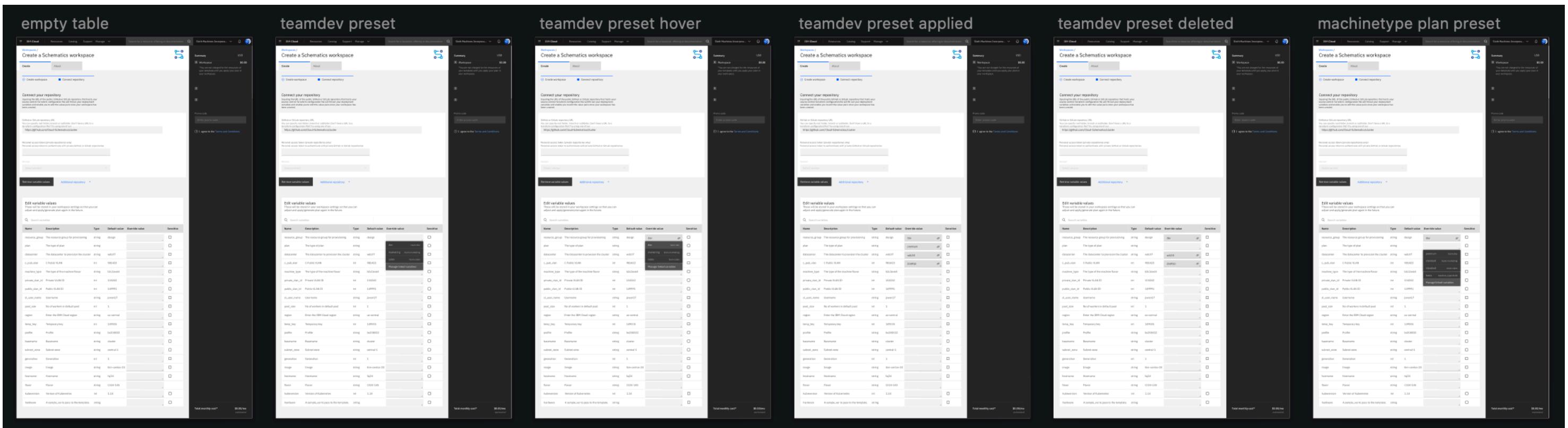


## Prototyping

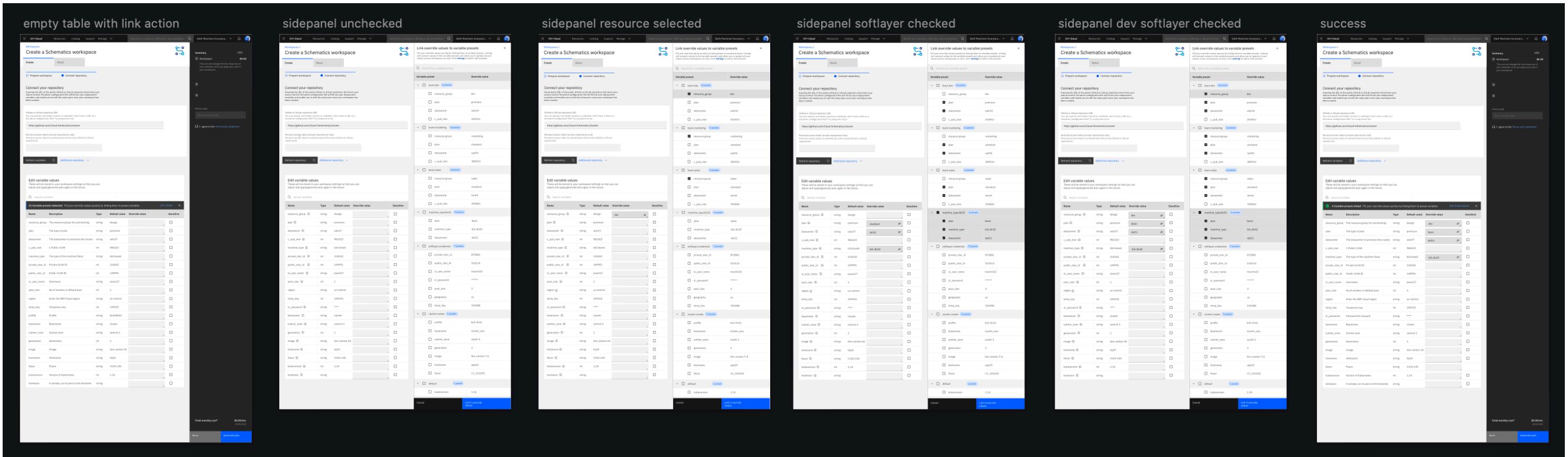
# High-Fidelity Prototyping

We ended up with two concepts: autofill and side panel.

## Autofill



## Side panel



# Discussion Point: Reveal System vs. Provide Convenience

The advantages of the autofill were discoverability and convenience, while the advantages of the side panel were visibility and understanding. The question here was, do we need to reveal the system in order for it to be useful (similar to Google Chrome's autofill feature)? We decided to test this out.

The image displays two screenshots side-by-side. On the left is a screenshot of a travel booking form on Google Flights. It shows a 'Who's traveling?' section where 'Kathy' is entered in the 'First name' field. A dropdown menu shows suggestions: 'Kathy', 'Kathy T Wang', and 'Kathy Wang'. Below this is a date input field for 'Date of birth' with dropdown menus for 'Month', 'DD', and 'YYYY'. At the bottom of the form, there is a 'CONTACT DETAILS' section with an email input field containing 'kw496@cornell.edu' and a note below it stating 'Your booking confirmation will be sent here'.

On the right is a screenshot of the Google Chrome Settings page, specifically the 'Passwords' section. It shows a list of saved passwords from various websites, each with a website icon, username, and password (represented by dots). The list includes entries for dl.acm.org, login.activebuilding.com, ...ing.activebuilding.com, a1.services.adobe.com, aetna.com, aetna.com, amazon.com, passport.amazon.work, passport.amazon.work, and americanexpress.com. Each entry has a 'View' button and a three-dot menu icon.

# User Testing

## Testing

# Research plan

We created a research plan, ensuring that we captured our existing assumptions, so that we could test them.

### Motivation

When creating a workspace, users of schematics are shown an option to fill in [a certain area of tags/metadata]. Past testing has shown that people do not want to and sometimes will not fill in these tags. However, filling this is could be very useful for them in the long run. (why) We want to make this understandable for users and easy for them to complete.

### General research goal

The goal of the research is to decide between two design options.

The options aim to solve the problem that users *are annoyed about filling out a specific section of Schematics*.

We want to know which design solves that problem better and helps them to complete this stage of the flow.

In scope: We don't know if users understand these presets and can use them in a way that makes sense.

Out of scope: exploration into other ways in journey to avoid filling this section out.

### Research Questions:

1. Which design leads to less experience of annoyance?
2. With which design do we see more of the intended behavior (what user was "supposed" to do)?
  - a. Which design leads to a greater fill-in rate of adding variable values?
  - b. Are they filling in the "correct" variable values? -- *what's correct*
3. Do users feel confident in what they're doing?
  - a. With which design do we see more confidence?

### Methods:

#### In person user testing

- Usability test of two designs (half start with design A, half start with design B)
  - Task completion (binary), count of tags added
    - Answers question #2.
  - Self-reported measures
    - SEQ, Simple/Cumbersome to answer question #1
    - Confidence on task completion to answer question #3

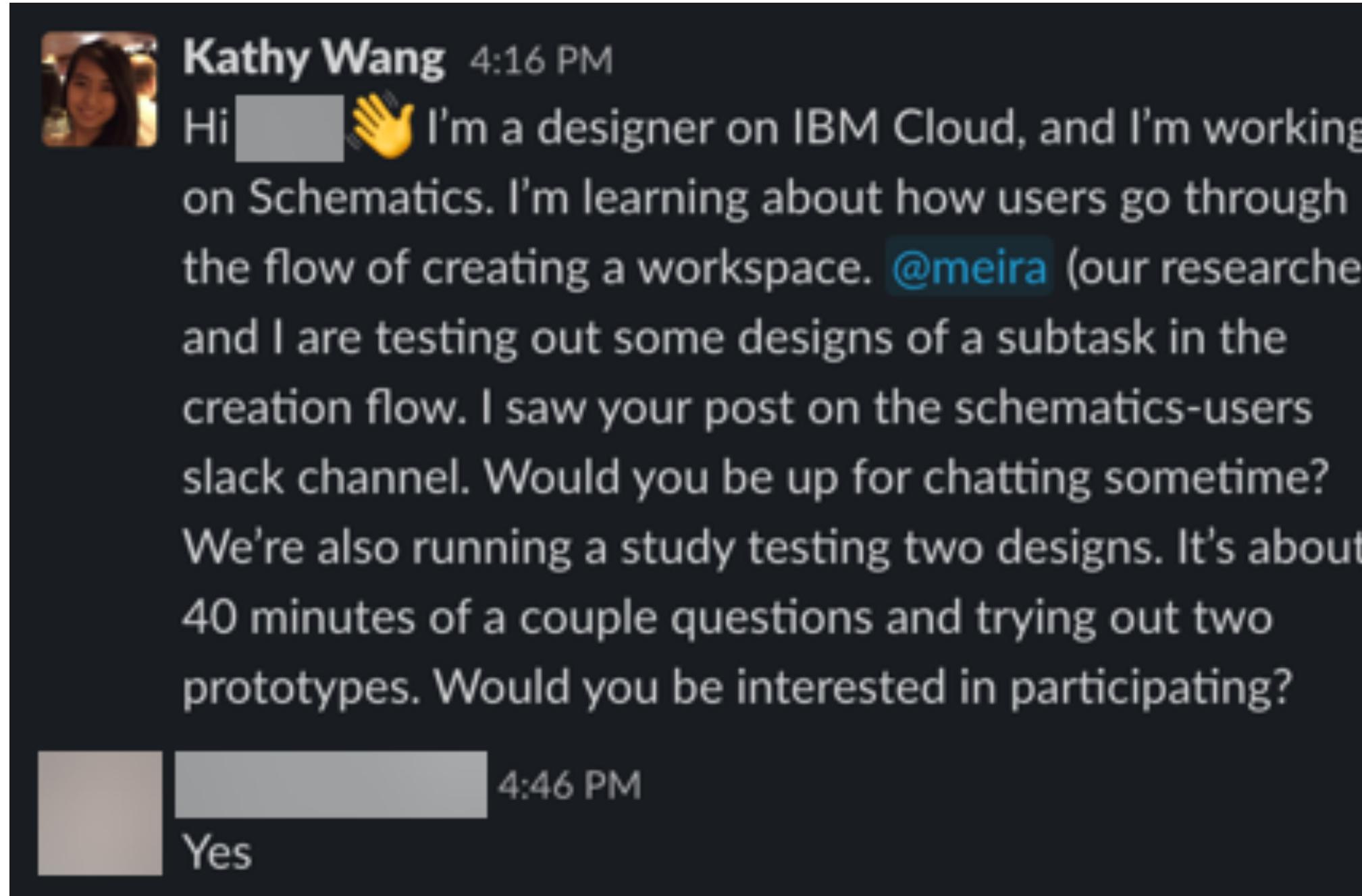
#### Post-test user interviews on context of text

- Gather type of employee (sales, marketing, dev, design)
- Need to gather any other details that may impact how they populate variable values
- Ask additional questions to answer above research questions

Testing

# Recruit participants

We recruited participants via Slack, and I kept track of this through a spreadsheet.



Order	Name	Slack	Profile	Location	Contacted	Follow up	Scheduled	First test	Interview Notes	Recording	Roles
1	[REDACTED]	[REDACTED]	Bluepages LinkedIn	Durham, NC	<input checked="" type="checkbox"/>	N/A	1/27 Monday 10:15-11am	A	<a href="#">Link</a>	<a href="#">Recording</a> Password: DvUe7wJU	Facilitator: Meira Notetaker: Kathy Other(s): Spencer
2	[REDACTED]	We know him	Bluepages LinkedIn	Austin, TX	<input checked="" type="checkbox"/>	N/A	1/27 Monday 11:15am-12pm	A	<a href="#">Link</a>	<a href="#">Recording</a> Password: tR5A9Sx3	Facilitator: Meira Notetaker: Kathy Other(s): Spencer
3	[REDACTED]	[REDACTED]	Bluepages LinkedIn	Austin, TX	<input checked="" type="checkbox"/>	N/A	1/27 Monday 1:15-2pm	B	<a href="#">Link</a>	<a href="#">Recording</a> Password: AdWZ5vQ3	Facilitator: Meira Notetaker: Kathy Other(s): Spencer
4	[REDACTED]	[REDACTED]	Bluepages LinkedIn	Durham, NC	<input checked="" type="checkbox"/>	Followed up 1/27	1/29 Wednesday 12-12:45pm	B	<a href="#">Link</a>	<a href="#">Recording</a> Password: 8zPWdwKf	Facilitator: Meira Notetaker: Kathy Other(s): Spencer
5	[REDACTED]	[REDACTED]	Bluepages LinkedIn	Cambridge, MA	<input checked="" type="checkbox"/>	N/A	1/29 Wednesday 1:15-2pm	A	<a href="#">Link</a>	<a href="#">Recording</a> Password: gRE5FAM4	Facilitator: Spencer Notetaker: Kathy Other(s): N/A
6	[REDACTED]	[REDACTED]	Bluepages LinkedIn	Portland, Oregon	<input checked="" type="checkbox"/>	N/A	1/29 Wednesday 4-4:45pm	B	<a href="#">Link</a>	<a href="#">Recording</a> Password: JrtV3YFp	Facilitator: Meira Notetaker: Kathy Other(s): Spencer
7	[REDACTED]	[REDACTED]	Bluepages LinkedIn	Arlington, VA	<input checked="" type="checkbox"/>	N/A	1/29 Thursday 1-1:45pm	A	<a href="#">Link</a>	<a href="#">Recording</a> Password: wGkwjPb3	Facilitator: Spencer Notetaker: Kathy Other(s): N/A
8	[REDACTED]	[REDACTED]	Bluepages LinkedIn	Austin, TX Building 45	<input checked="" type="checkbox"/>	N/A	2/1 Friday 3:30-4:15pm	B	<a href="#">Link</a>	<a href="#">Recording</a> Password: rXAdu3fJ	Facilitator: Spencer Notetaker: Kathy Other(s): N/A

## Testing

# Facilitating user sessions

We then went on to facilitate eight user testing sessions.

### Introduction (5 min)

- How's it going? We're with the IBM Cloud team here in Austin, TX [Introduce each person on the call]. We have a new feature with which we're hoping to do some usability testing.
- Before we begin, do you mind if we record?
- How long have you used terraform or infrastructure as code?
- After creating a workspace, what are the major tasks you have to do?
- For stuff that you're doing in prod, what's a normal number of variables in a workspace?
- And are you mostly filling those out manually?

### Prototype A (15min)

#### Set up scenario

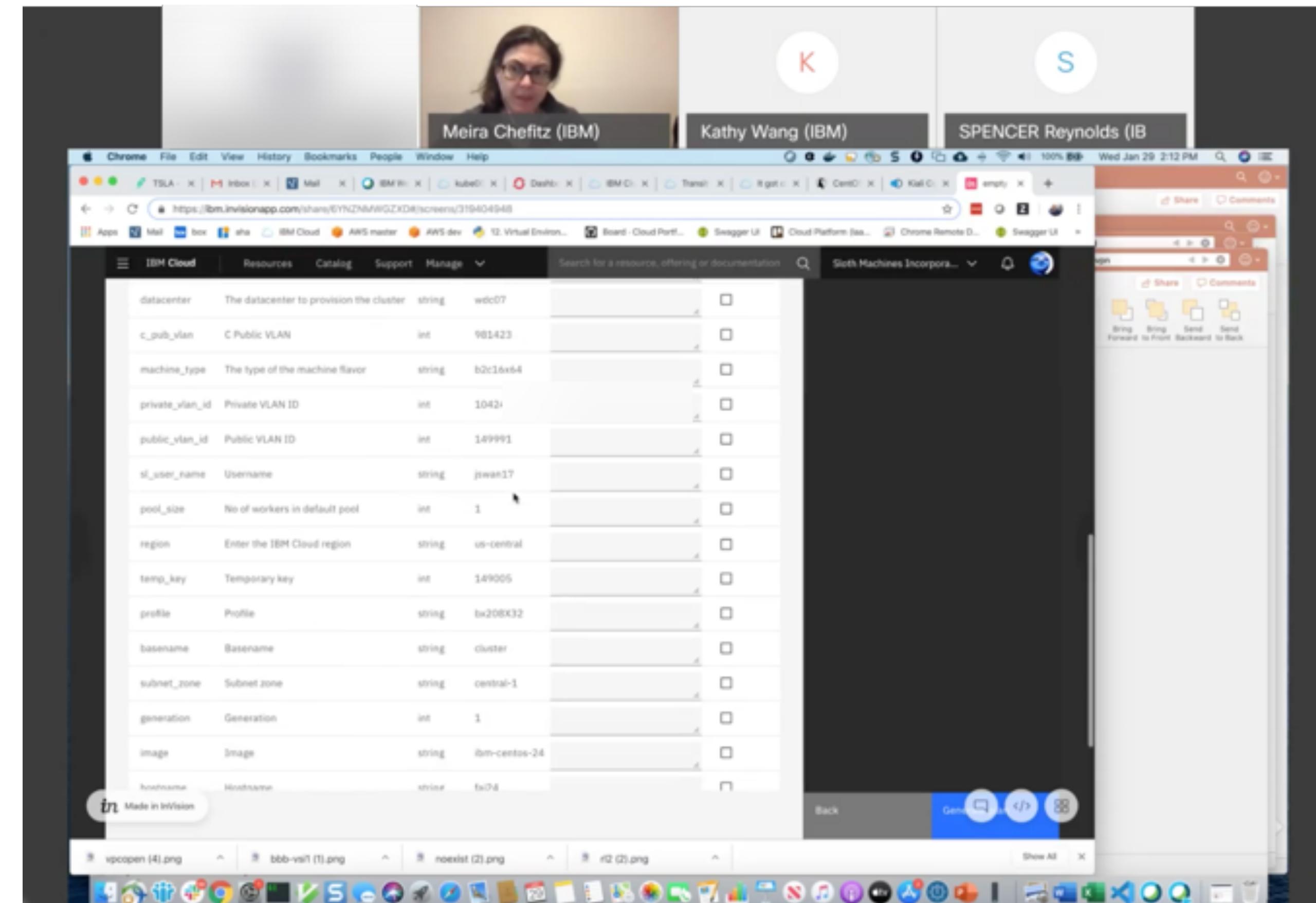
- Send link to autofill prototype.
  - [https://ibm.invisionapp.com/share/NDNZNISTR3W#/319401610\\_schematics\\_Prepares\\_Workspace](https://ibm.invisionapp.com/share/NDNZNISTR3W#/319401610_schematics_Prepares_Workspace)
- Could you share your screen?
- Read out message, and Slack it.
  - You're using Schematics to deploy your infrastructure as code for a **dev environment**, and your manager is telling you to use the override values he put in the Schematics tool.
  - It needs an **8x32 machine type** (32 gigabyte of ram machine type),
  - the **datacenter is in Dallas**, and
  - it's on a **basic plan**
- Based on your understanding of this task and service, on a scale for 1 to 7, with 1 being extremely difficult and 7 being extremely easy, how difficult or easy do you expect this task to be?

#### Complete task

- 

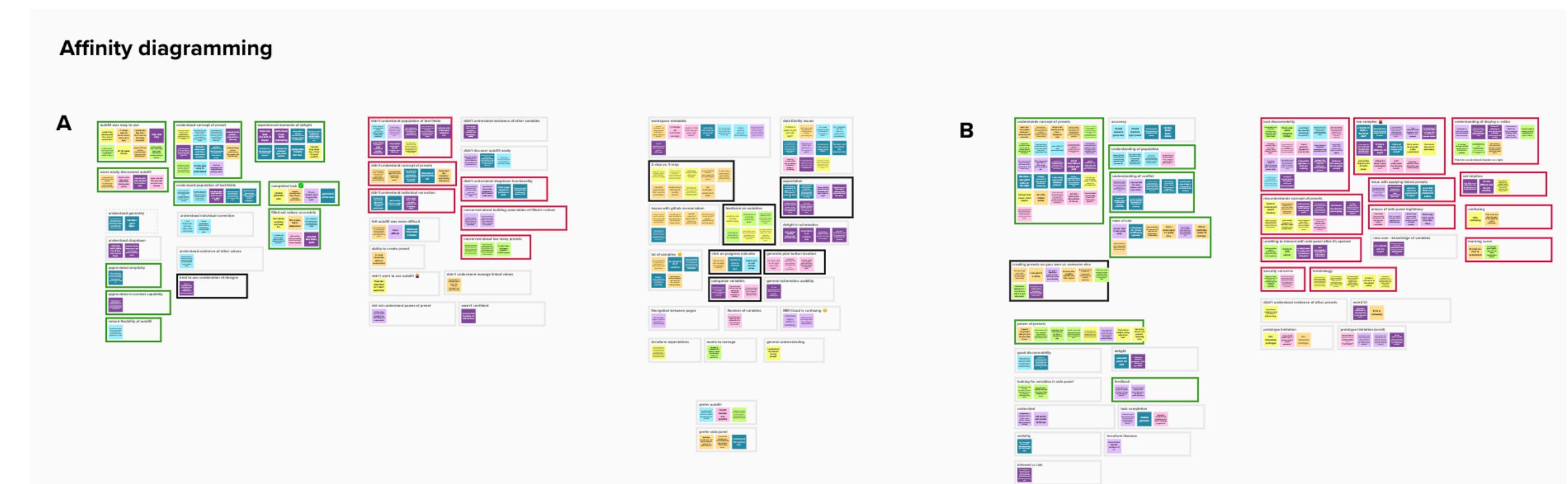
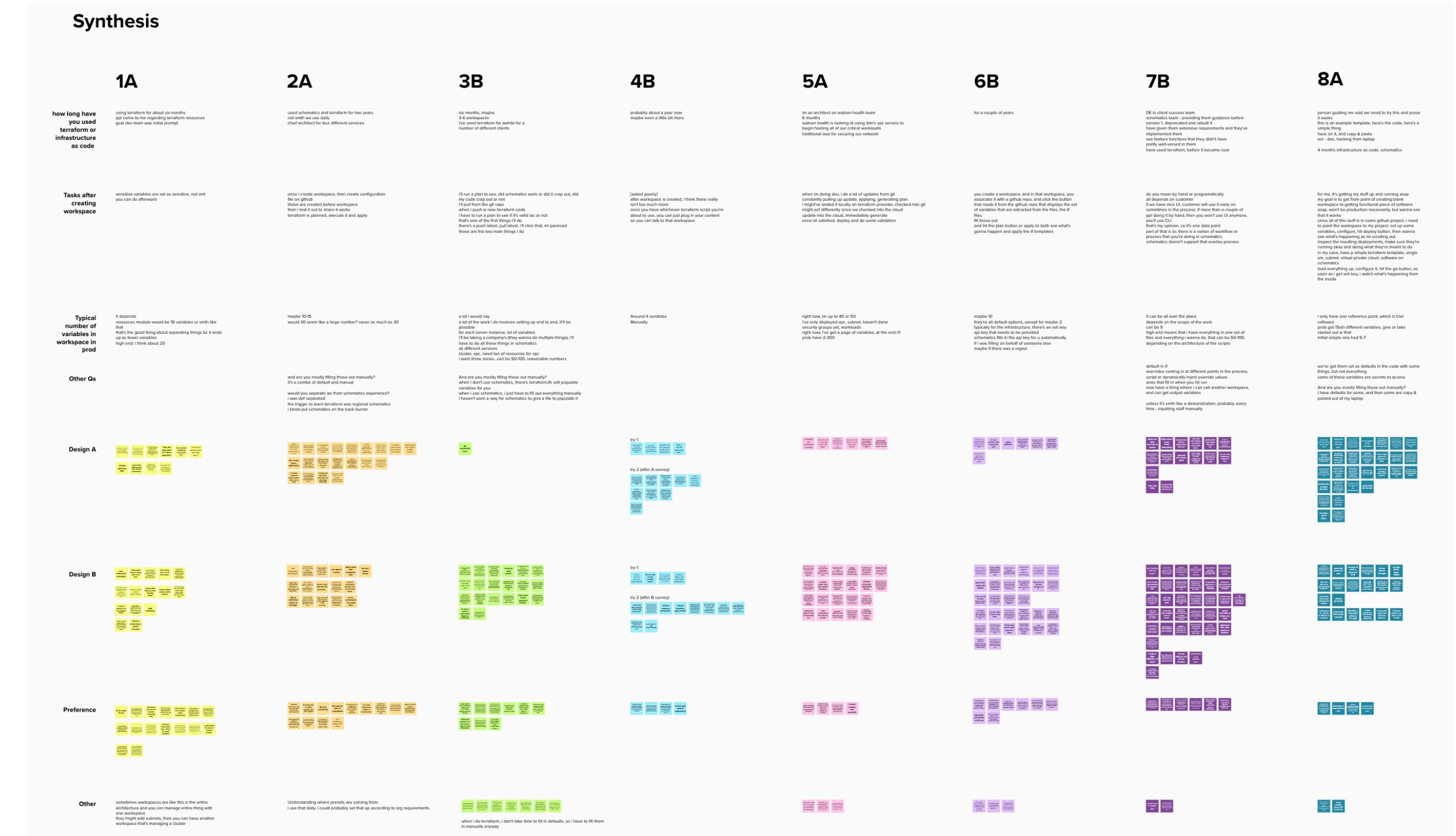
#### Reflect

- Based on that experience, on a scale of 1 to 7 with 1 being extremely difficulty and 7 being extremely easy, how difficult or easy was that task?
  - Why do you say that?
- Send link to survey
  - <https://www.surveygizmo.com/s/5424974/Schematics-Test-Design-A>



# Testing Synthesis

I compiled all of the interview notes into a Mural, where I could synthesize them.



## Testing

# Findings

From the synthesis, we found the following pros and cons.

## Autofill

### Pros

1. High discoverability: users easily discovered autofill
  2. High ease: autofill was easy to use
  3. High accuracy: users filled out values accurately
- Note: someone tried to use combination of designs

### Cons

1. Low understanding: didn't understand the concept of presets
2. Low understanding: didn't expect or understand the population of other text fields
3. Low Understanding: didn't understand individual correction

## Side panel

### Pros

1. High understanding: understood concept of presets
  2. High understanding: understood conflict scenario
  3. High ease: felt it was easy to use - once they understood it / got past learning curve
- Note: people assumed you could create presets on your own, didn't assume someone else created them

### Cons

1. Low discoverability: users never knew to click on the inline notification
  2. High complexity: users thought it was too complex (not intuitive, confusing, learning curve)- some didn't even want to interact with it even after it was opened
  3. Low trust: security concerns - unsure of side panel legitimacy
- Note: display v. editor

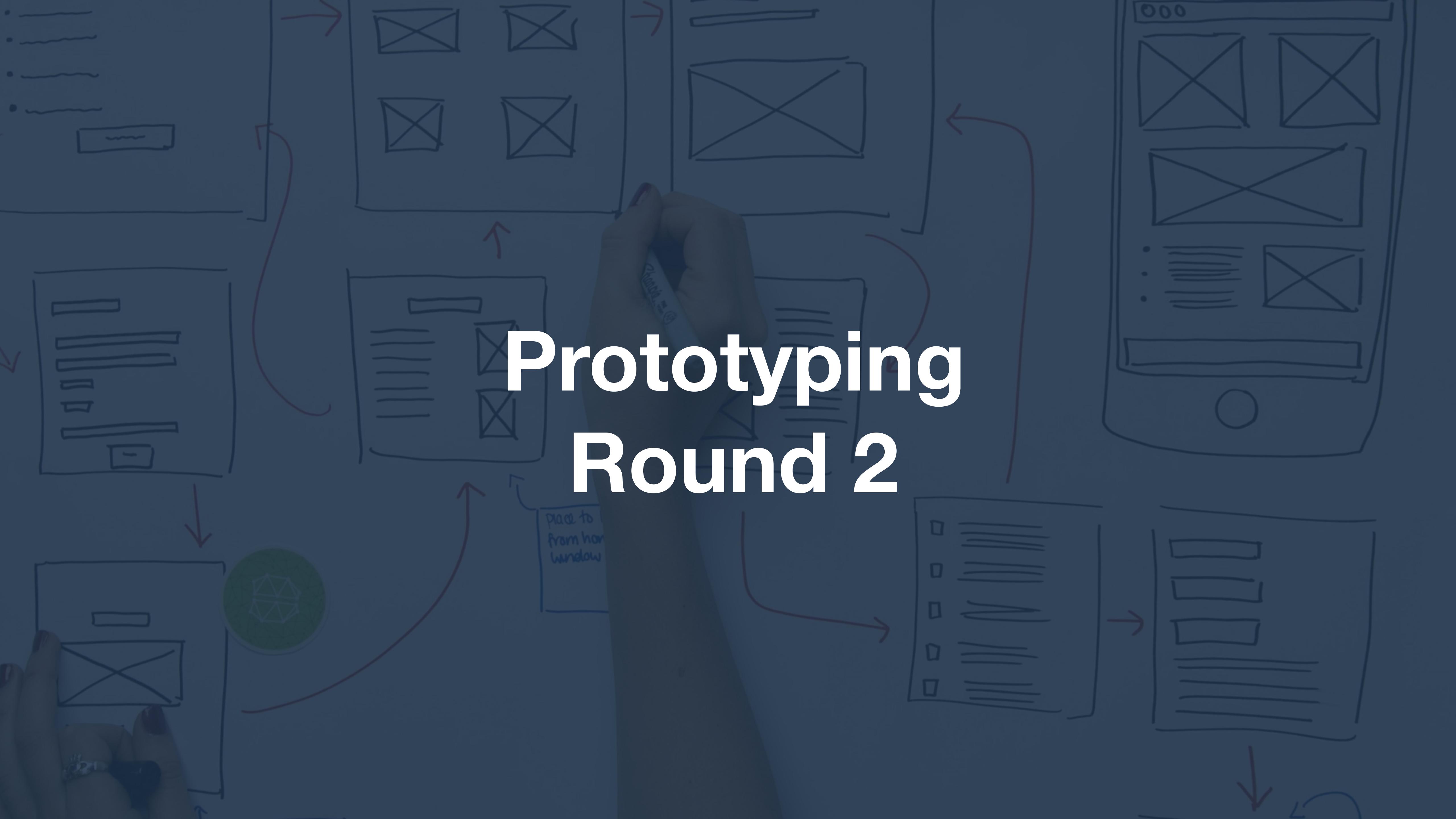
# Findings

We found that the side panel is high in understanding and low in discoverability and ease of use. In contrast, autofill is high in discoverability and ease of use, but low in understanding.

Thus, there seems to be a trade-off between understanding and discoverability / ease of use.

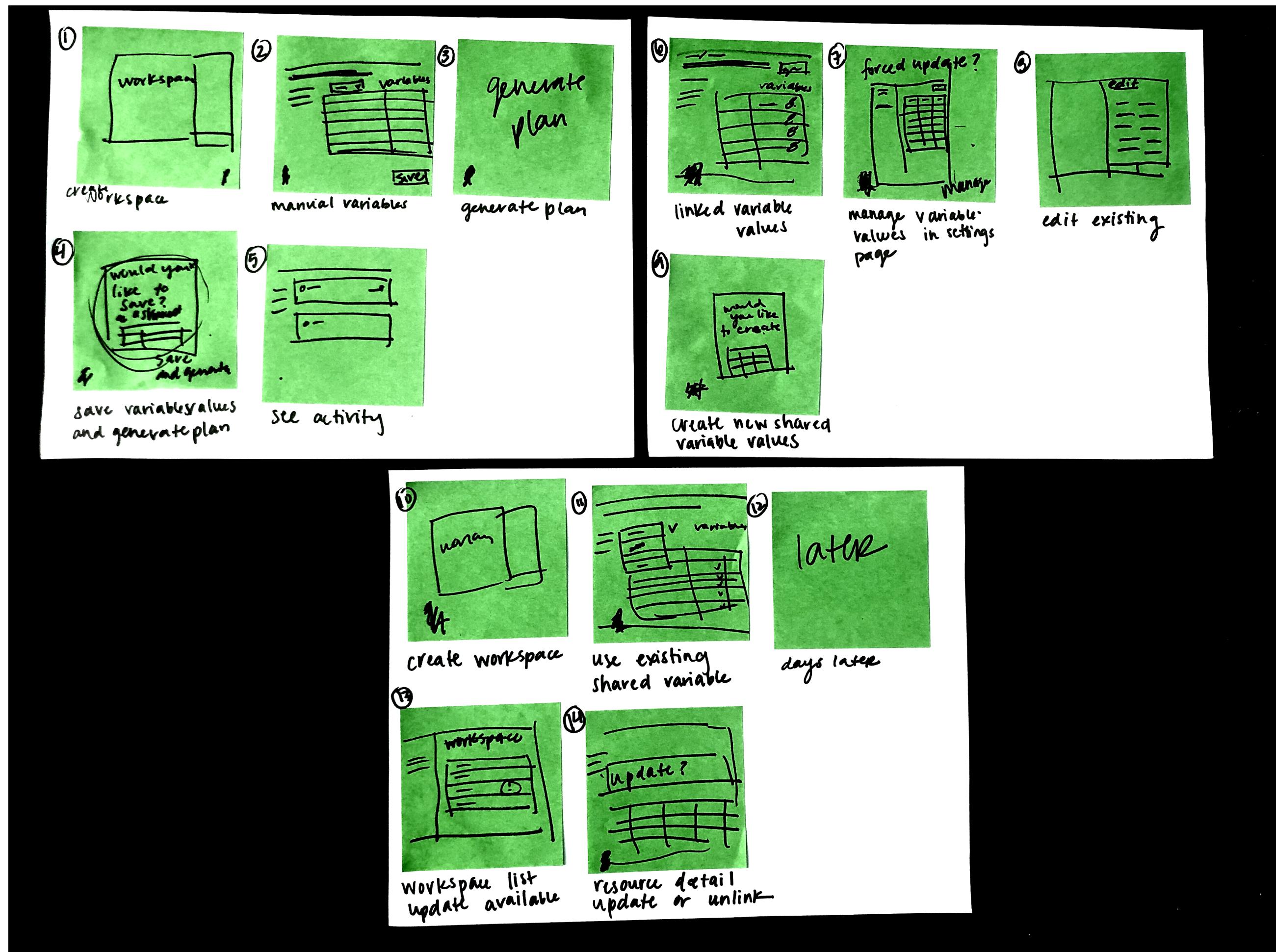
How might we design for both understanding and discoverability / ease of use?  
Or do we value one over the other?

# Prototyping Round 2



## Prototyping

# Low-Fidelity Explorations



# Prototyping

# Create Group

The screenshots illustrate the process of creating a variable group in an IBM Cloud workspace.

**Screenshot 1:** The workspace details page shows basic information like Workspace ID (myworkspace), Created by (elraymond@us.ibm.com), and Version (v0.11.14). It also displays a repository URL (<https://github.com/Cloud-Schematics/Cloud-Foundry-App>) and a "Pull latest" button.

**Screenshot 2:** The workspace details page remains largely the same, but the "Variable values" section is highlighted. It shows a table of variables with their descriptions, types, and current values. A modal window titled "Save as a group" is open, asking if you want to save these four values as a group. It lists the variables: kubeversion, resource\_group, plan, and datacenter.

**Screenshot 3:** The workspace details page now includes a "Save and generate" button in the "Variable values" section. The "Save as a group" modal is still open, showing the selected variables and a "Group name" input field containing "myworkspace-cloudfoundryapp".

Name	Description	Type	Value	Sensitive
kubeversion	Version of Kubernetes	int	1.15	<input type="checkbox"/>
resource_group	The resource group for provisioning	string	dev	<input type="checkbox"/>
plan	The type of plan	string	premium	<input type="checkbox"/>
datacenter	The datacenter to provision the cluster	string	wdc07	<input type="checkbox"/>
c_pub_vlan	C Public VLAN	int	981423	<input type="checkbox"/>
machine_type	The type of the machine flavor	string	b2c16x64	<input type="checkbox"/>
private_vlan_id	Private VLAN ID	int	104242	<input type="checkbox"/>
public_vlan_id	Public VLAN ID	int	149991	<input type="checkbox"/>
sl_user_name	Username	string	iswan17	<input type="checkbox"/>
pool_size	No of workers in default pool	int	1	<input type="checkbox"/>
region	Enter the IBM Cloud region	string	us-central	<input type="checkbox"/>
temp_key	Temporary key	int	149005	<input type="checkbox"/>
profile	Profile	string	bx208x32	<input type="checkbox"/>
basename	Basename	string	cluster	<input type="checkbox"/>
subnet_zone	Subnet zone	string	central-1	<input type="checkbox"/>

# Prototyping Apply Group

**Left Screenshot (Initial State):**

Name	Description	Type	Value	Sensitive
kubeversion	Version of Kubernetes	int		<input type="checkbox"/>
resource_group	The resource group for provisioning	string		<input type="checkbox"/>
plan	The type of plan	string		<input type="checkbox"/>
datacenter	The datacenter to provision the cluster	string		<input type="checkbox"/>
c_pub_vlan	C Public VLAN	int	981423	<input type="checkbox"/>
machine_type	The type of the machine flavor	string	b2c16x64	<input type="checkbox"/>
private_vlan_id	Private VLAN ID	int	104242	<input type="checkbox"/>
public_vlan_id	Public VLAN ID	int	149991	<input type="checkbox"/>
sl_user_name	Username	string	iswan17	<input type="checkbox"/>
pool_size	No of workers in default pool	int	1	<input type="checkbox"/>
region	Enter the IBM Cloud region	string	us-central	<input type="checkbox"/>
temp_key	Temporary key	int	149005	<input type="checkbox"/>
profile	Profile	string	bx208x32	<input type="checkbox"/>
basename	Basename	string	cluster	<input type="checkbox"/>
subnet_zone	Subnet zone	string	central-1	<input type="checkbox"/>

**Right Screenshot (After Applying Group):**

Name	Description	Type	Value	Sensitive
kubeversion	Version of Kubernetes	int	1.15	<input type="checkbox"/>
resource_group	The resource group for provisioning	string	dev	<input type="checkbox"/>
plan	The type of plan	string	premium	<input type="checkbox"/>
datacenter	The datacenter to provision the cluster	string	lon04	<input type="checkbox"/>
c_pub_vlan	C Public VLAN	int	981423	<input type="checkbox"/>
machine_type	The type of the machine flavor	string	b2c16x64	<input type="checkbox"/>
private_vlan_id	Private VLAN ID	int	104242	<input type="checkbox"/>
public_vlan_id	Public VLAN ID	int	149991	<input type="checkbox"/>
sl_user_name	Username	string	iswan17	<input type="checkbox"/>
pool_size	No of workers in default pool	int	1	<input type="checkbox"/>
region	Enter the IBM Cloud region	string	us-central	<input type="checkbox"/>
temp_key	Temporary key	int	149005	<input type="checkbox"/>
profile	Profile	string	bx208x32	<input type="checkbox"/>
basename	Basename	string	cluster	<input type="checkbox"/>
subnet_zone	Subnet zone	string	central-1	<input type="checkbox"/>

## Prototyping

# Designing for understanding

Including the ability to save the variables as a group upon generation of the plan facilitated user understanding of the group concept.

The screenshots illustrate the evolution of a workspace configuration interface:

- Screenshot 1:** Shows the workspace overview with basic details like Workspace ID (myworkspace), Resource group (Default), and Activity (Frozen). It also displays a repository URL (<https://github.com/Cloud-Schematics/Cloud-Foundry-App>) and a variable values table.
- Screenshot 2:** Similar to the first, but the variable values table has been populated with sample data.
- Screenshot 3:** A modal dialog titled "Save as a group" is displayed over the workspace details. It asks if you want to save the four values as a group. It includes a "Variable group management settings" link and two buttons: "No, just generate" and "Save and generate".

**Variable values table (Visible in all screenshots):**

Name	Description	Type	Value	Sensitive
kubeversion	Version of Kubernetes	int	1.15	<input type="checkbox"/>
resource_group	The resource group for provisioning	string	dev	<input type="checkbox"/>
plan	The type of plan	string	premium	<input type="checkbox"/>
datacenter	The datacenter to provision the cluster	string	wdc07	<input type="checkbox"/>
c_pub_vlan	C Public VLAN	int	981423	<input type="checkbox"/>
machine_type	The type of the machine flavor	string	b2c16x64	<input type="checkbox"/>
private_vlan_id	Private VLAN ID	int	104242	<input type="checkbox"/>
public_vlan_id	Public VLAN ID	int	149991	<input type="checkbox"/>
sl_user_name	Username	string	iswan17	<input type="checkbox"/>
pool_size	No of workers in default pool	int	1	<input type="checkbox"/>
region	Enter the IBM Cloud region	string	us-central	<input type="checkbox"/>
temp_key	Temporary key	int	149005	<input type="checkbox"/>
profile	Profile	string	bx208x32	<input type="checkbox"/>
basename	Basename	string	cluster	<input type="checkbox"/>
subnet_zone	Subnet zone	string	central-1	<input type="checkbox"/>

## Prototyping

# Designing for discoverability

Users also quickly discovered the dropdown.

The image displays two side-by-side screenshots of the IBM Cloud Workspaces interface, specifically the 'Variables' section of a workspace named 'myworkspace2'. Both screenshots show a table of variables with columns for Name, Description, Type, Value, and Sensitive status. In the second screenshot, a dropdown menu is open under the 'Group' column, showing options like 'Choose an option', 'myworkspace-cloudfound...', and 'prod'. The 'prod' option is selected.

Name	Description	Type	Value	Sensitive
kubeversion	Version of Kubernetes	int	1.15	<input checked="" type="checkbox"/>
resource_group	The resource group for provisioning	string	dev	<input checked="" type="checkbox"/>
plan	The type of plan	string	premium	<input checked="" type="checkbox"/>
datacenter	The datacenter to provision the cluster	string	lon04	<input checked="" type="checkbox"/>
c_pub_vlan	C Public VLAN	int	981423	<input checked="" type="checkbox"/>
machine_type	The type of the machine flavor	string	b2c16x64	<input checked="" type="checkbox"/>
private_vlan_id	Private VLAN ID	int	104242	<input checked="" type="checkbox"/>
public_vlan_id	Public VLAN ID	int	149991	<input checked="" type="checkbox"/>
sl_user_name	Username	string	jswan17	<input checked="" type="checkbox"/>
pool_size	No of workers in default pool	int	1	<input checked="" type="checkbox"/>
region	Enter the IBM Cloud region	string	us-central	<input checked="" type="checkbox"/>
temp_key	Temporary key	int	149005	<input checked="" type="checkbox"/>
profile	Profile	string	bx208x32	<input checked="" type="checkbox"/>
basename	Basename	string	cluster	<input checked="" type="checkbox"/>
subnet_zone	Subnet zone	string	central-1	<input checked="" type="checkbox"/>

## Prototyping

# Designing for ease of use

Users also easily grasped the concept of groups through the dropdown.

The image displays two side-by-side screenshots of the IBM Cloud Workspaces interface, illustrating the concept of variable grouping.

**Screenshot 1 (Left):** Shows the 'myworkspace2' workspace settings. In the 'Variable values' section, there is a 'Group' dropdown menu labeled 'Choose an option'. A search bar below it shows 'myworkspace-cloudfound...'. The table lists various variables with their descriptions, types, and values. For example, 'kubeversion' is set to '1.15' and 'resource\_group' is set to 'dev'.

Name	Description	Type	Value	Sensitive
kubeversion	Version of Kubernetes	int	1.15	<input checked="" type="checkbox"/>
resource_group	The resource group for provisioning	string	dev	<input checked="" type="checkbox"/>
plan	The type of plan	string	premium	<input checked="" type="checkbox"/>
datacenter	The datacenter to provision the cluster	string	lon04	<input checked="" type="checkbox"/>
c_pub_vlan	C Public VLAN	int	981423	<input checked="" type="checkbox"/>
machine_type	The type of the machine flavor	string	b2c16x64	<input checked="" type="checkbox"/>
private_vlan_id	Private VLAN ID	int	104242	<input checked="" type="checkbox"/>
public_vlan_id	Public VLAN ID	int	149991	<input checked="" type="checkbox"/>
sl_user_name	Username	string	jswan17	<input checked="" type="checkbox"/>
pool_size	No of workers in default pool	int	1	<input checked="" type="checkbox"/>
region	Enter the IBM Cloud region	string	us-central	<input checked="" type="checkbox"/>
temp_key	Temporary key	int	149005	<input checked="" type="checkbox"/>
profile	Profile	string	bx208x32	<input checked="" type="checkbox"/>
basename	Basename	string	cluster	<input checked="" type="checkbox"/>
subnet_zone	Subnet zone	string	central-1	<input checked="" type="checkbox"/>

**Screenshot 2 (Right):** Shows the same workspace settings with a different grouping. The 'Group' dropdown now shows 'prod'. The variable values remain the same as in Screenshot 1.

Name	Description	Type	Value	Sensitive
kubeversion	Version of Kubernetes	int	1.15	<input checked="" type="checkbox"/>
resource_group	The resource group for provisioning	string	dev	<input checked="" type="checkbox"/>
plan	The type of plan	string	premium	<input checked="" type="checkbox"/>
datacenter	The datacenter to provision the cluster	string	lon04	<input checked="" type="checkbox"/>
c_pub_vlan	C Public VLAN	int	981423	<input checked="" type="checkbox"/>
machine_type	The type of the machine flavor	string	b2c16x64	<input checked="" type="checkbox"/>
private_vlan_id	Private VLAN ID	int	104242	<input checked="" type="checkbox"/>
public_vlan_id	Public VLAN ID	int	149991	<input checked="" type="checkbox"/>
sl_user_name	Username	string	jswan17	<input checked="" type="checkbox"/>
pool_size	No of workers in default pool	int	1	<input checked="" type="checkbox"/>
region	Enter the IBM Cloud region	string	us-central	<input checked="" type="checkbox"/>
temp_key	Temporary key	int	149005	<input checked="" type="checkbox"/>
profile	Profile	string	bx208x32	<input checked="" type="checkbox"/>
basename	Basename	string	cluster	<input checked="" type="checkbox"/>
subnet_zone	Subnet zone	string	central-1	<input checked="" type="checkbox"/>



**Thank You!**