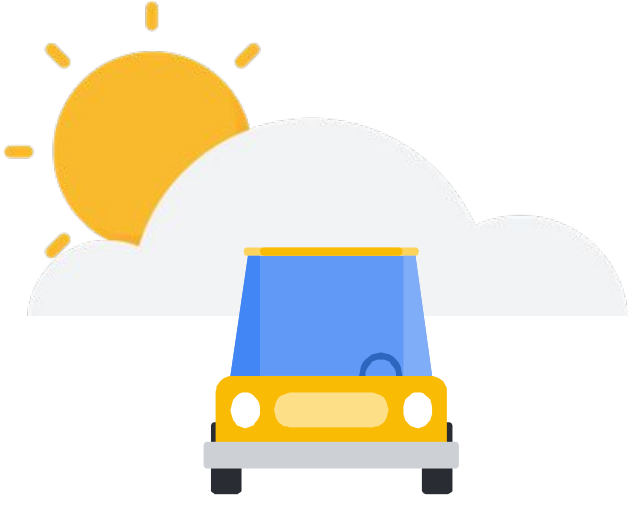
The following work is all under NDA

Carolyn Huynh
care0hlyn.github.com

Carolyn Huynh | Google Cloud Security

Self Driving Cloud

IAM Role Recommender



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Carolyn Huynh | Google Cloud Security

Lead UX Designer

Role

I was the first designer to join this team and ever since, I've been the Lead UX Designer and thought leader behind the suite of self driving cloud/policy intelligence tools for three years now.

I've lead every product within SDC/PI from inception to launch cycles. Since I was the first to join the team, I've been the go-to designer for all x-functional teams within the Self Driving Cloud ecosystem.

I've also been responsible for leading the initial vision work concepts as well.

Carolyn Huynh | Google Cloud Security

Applying Machine Learning Intelligence and Analytics to security products

What are we building?

IAM Role Recommender is the first product launch within the Self Driving Cloud suite of products. Role Recommender is built on top of IAM (Identity & Access Management) policy.

At the time, no other competitors (AWS, Azure) had this tooling available and we were moving at lightning speed to ship this product out tomorrow.

Who are we building it for?

Security teams for our existing enterprise customers that are on Google Cloud Platform. Companies such as Spotify, Target and Snapchat were some of the big names we worked with on this feature.

Also for security consultants (PWC etc) and 3rd party products that might want to take advantage of this functionality.

I need help adhering to the principle of least privilege.

Nicole
Security Engineer at {Tech Company}

The Problem Statement:

Least Privilege is hard to measure.
It's also hard to get right.

More constraints

Constraints stacked on constraints stacked on constraints

Understanding least privilege

There is no easy way to understand how well customers are doing in maintaining least privilege.

Tracking least privilege

No easy way to track all the resources being created in an organization and who has access to them in the company.

Revealing when it's over privileged

There is no easy way to see what permissions an individual is using

When to timebox access?

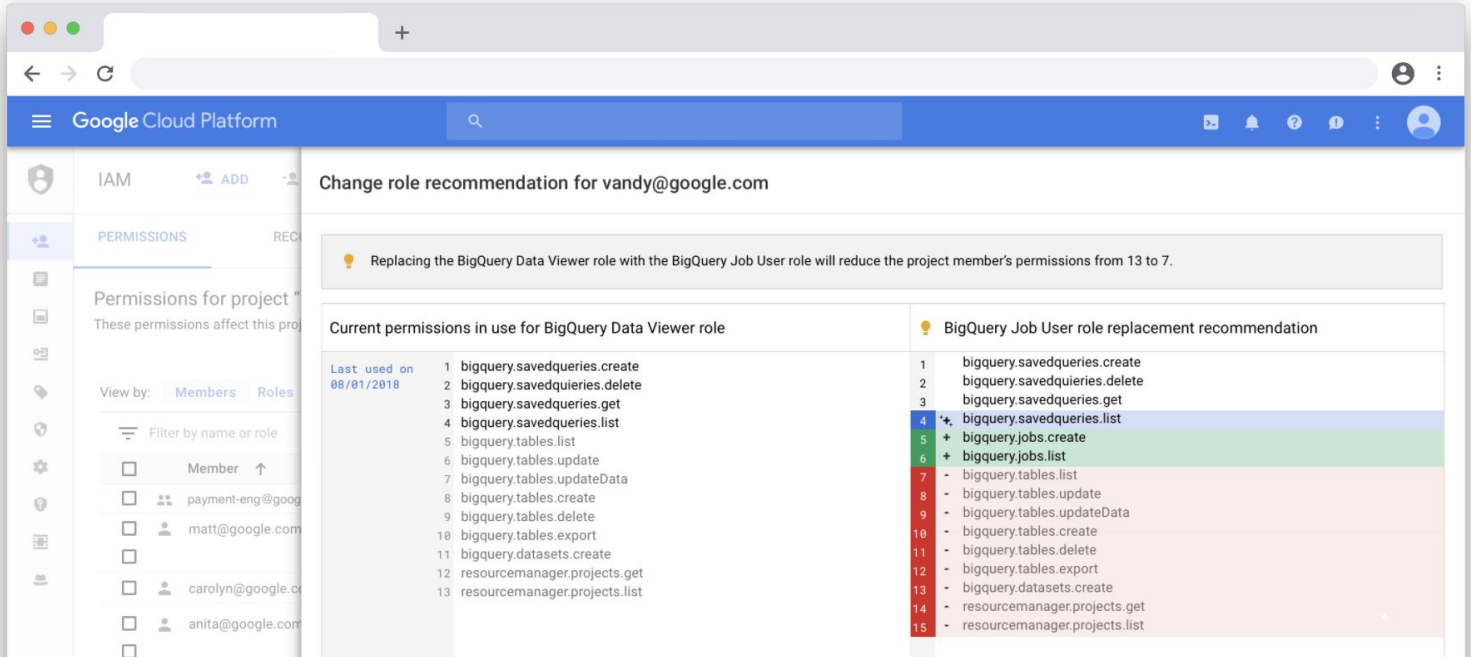
Most access tends to be indefinite

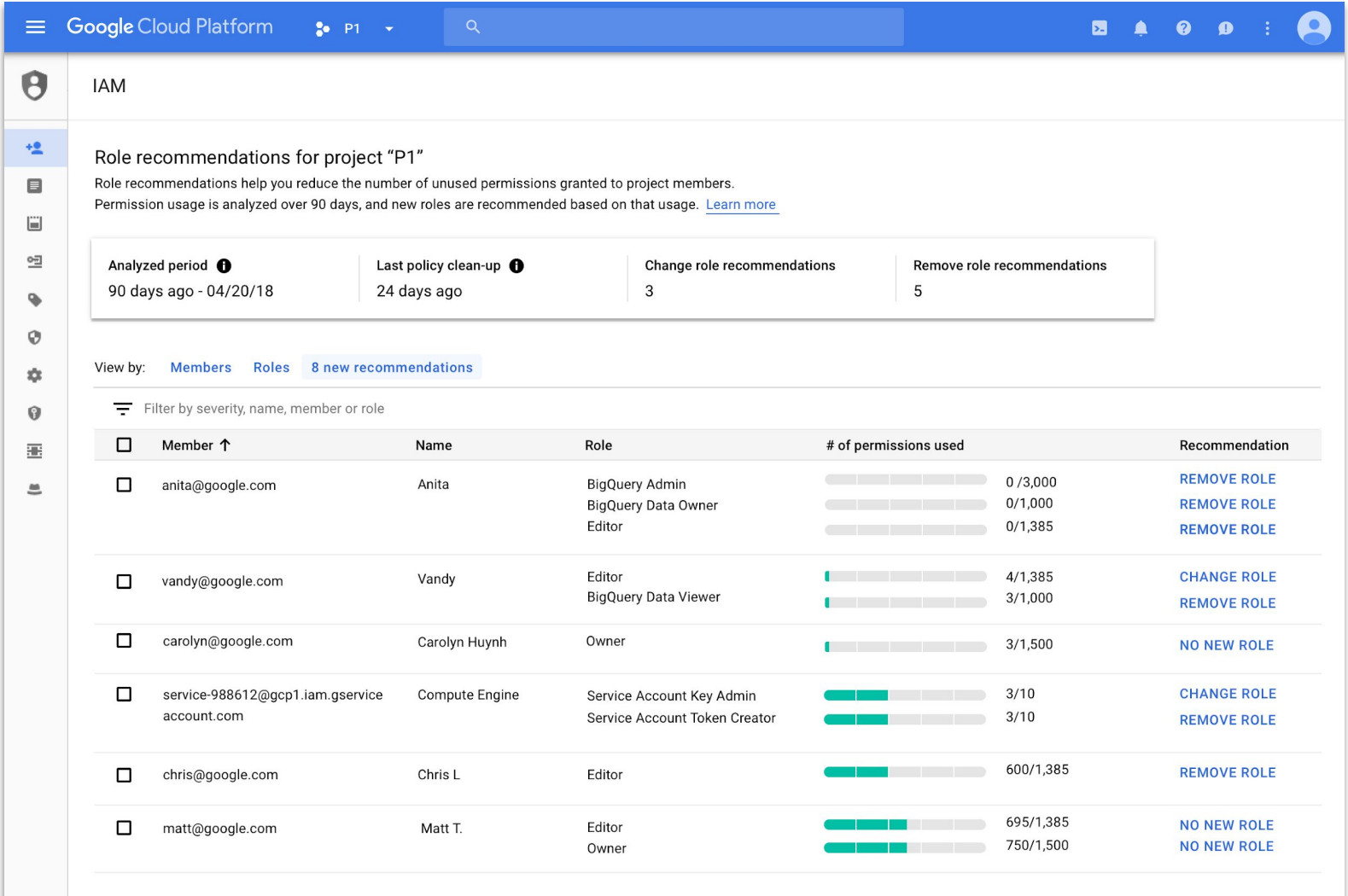
The Big UX ask:

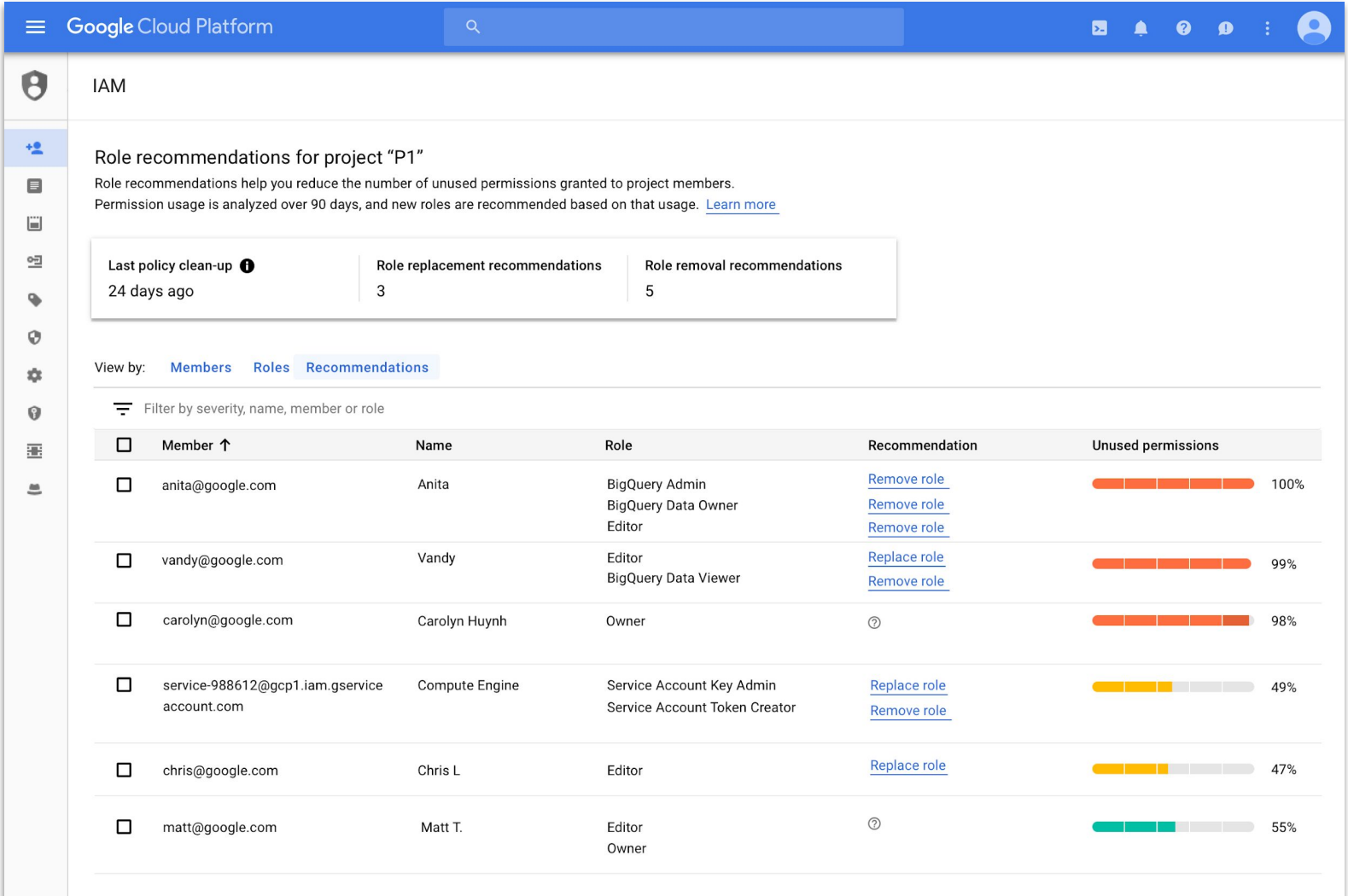
How does one visualize surfacing machine learning recommendations while also building confidence in users so that they apply them?

Early Design Explorations

60+ iterations




Google Cloud Platform
P1
IAM
Role recommendations for project “P1”
Role recommendations help you reduce the number of unused permissions granted to project members.
Permission usage is analyzed over 90 days, and new roles are recommended based on that usage. Learn more
Analyzed period
90 days ago - 04/20/18
Last policy clean-up
24 days ago
Change role recommendations
3
Remove role recommendations
5
View by: Members Roles 8 new recommendations
Filter by severity, name, member or role
Member
Name
Role
# of permissions used
Recommendation
anita@google.com
Anita
BigQuery Admin
0 /3,000
REMOVE ROLE
BigQuery Data Owner
0/1,000
REMOVE ROLE
Editor
0/1,385
REMOVE ROLE
vandy@google.com
Vandy
Editor
4/1,385
CHANGE ROLE
BigQuery Data Viewer
3/1,000
REMOVE ROLE
carolyn@google.com
Carolyn Huynh
Owner
3/1,500
NO NEW ROLE
service-988612@gcp1.iam.gserviceaccount.com
Compute Engine
Service Account Key Admin
3/10
CHANGE ROLE
Service Account Token Creator
3/10
REMOVE ROLE
chris@google.com
Chris L
Editor
600/1,385
REMOVE ROLE
matt@google.com
Matt T.
Editor
695/1,385
NO NEW ROLE
Owner
750/1,500
NO NEW ROLE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3
Role removal recommendations
5
View by: Members Roles Recommendations
Filter by severity, name, member or role
Member
Name
Role
Recommendation
Unused permissions
anita@google.com
Anita
BigQuery Admin
BigQuery Data Owner
Editor
Remove role
Remove role
Remove role
100%
vandy@google.com
Vandy
Editor
BigQuery Data Viewer
Replace role
Remove role
99%
carolyn@google.com
Carolyn Huynh
Owner
98%
service-988612@gcp1.iam.gserviceaccount.com
Compute Engine
Service Account Key Admin
Service Account Token Creator
Replace role
Remove role
49%
chris@google.com
Chris L
Editor
Replace role
47%
matt@google.com
Matt T.
Editor
Owner
55%

Something was not right.

We weren’t visualizing
machine learning intelligence
in a more powerful way.

¿ML?

1

Back to the drawing board

We needed more research

2

Ran customer research sessions

A lot of qualitative chats

3

Customer whiteboarding sessions

...mixed with hands on brainstorming

4

Designing on the spot in front of customers

A quick and dirty yes? no?

The Light Bulb Moment

I was designing with roles. But customers wanted to go as granular as the permissions *within* the roles, which are hidden in the UI and only exposed via the API.

Research taught us that when it came to changing permissions, we had to be as *explicit* as possible

We talked to a lot of customers. A lot.

Based off foundational research, customer whiteboarding sessions, and several low-low fi concepts, my UX researcher and I were able to discern that in order for us to gain trust from our customers to apply Google recommendations, we needed to be as granular as possible.

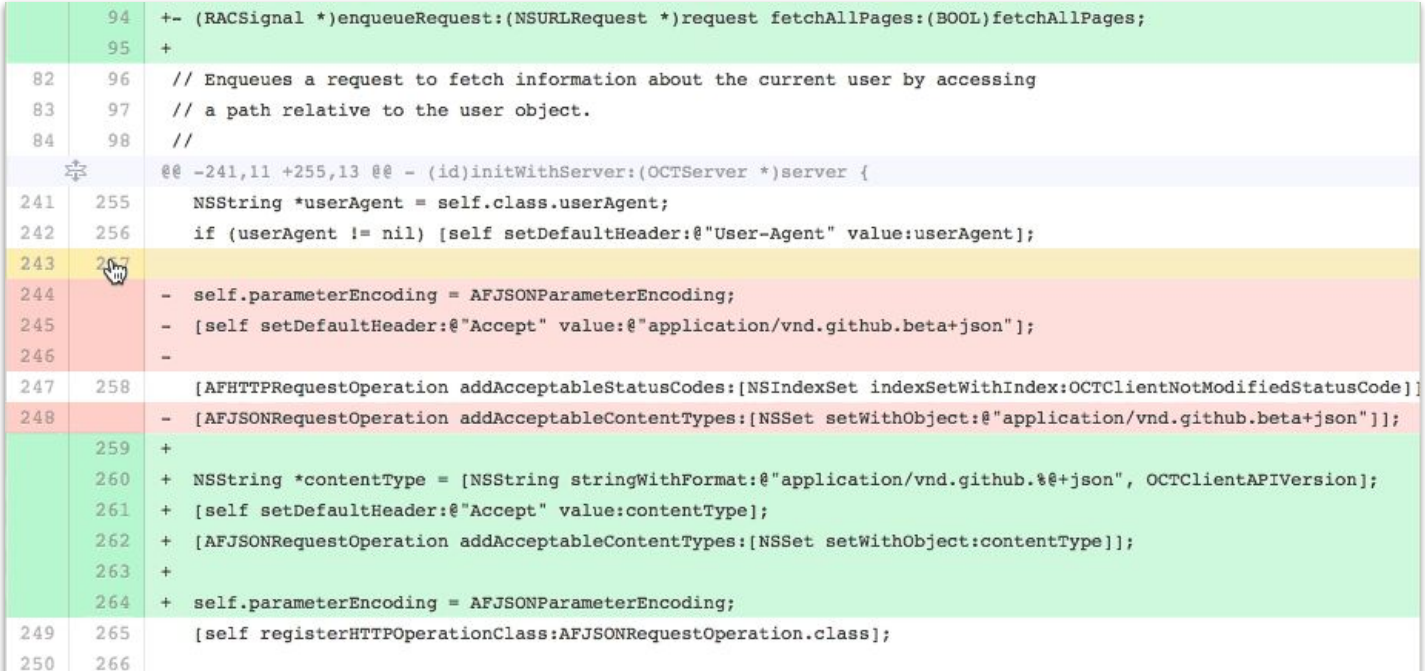
After combing through all the qualitative data, I couldn't get my mind off off of the granularity when it comes to *displaying* trust.

Especially in the security space.

So, I decided to bring back the trusty code diff and give it a makeover.

What a standard code diff looks like

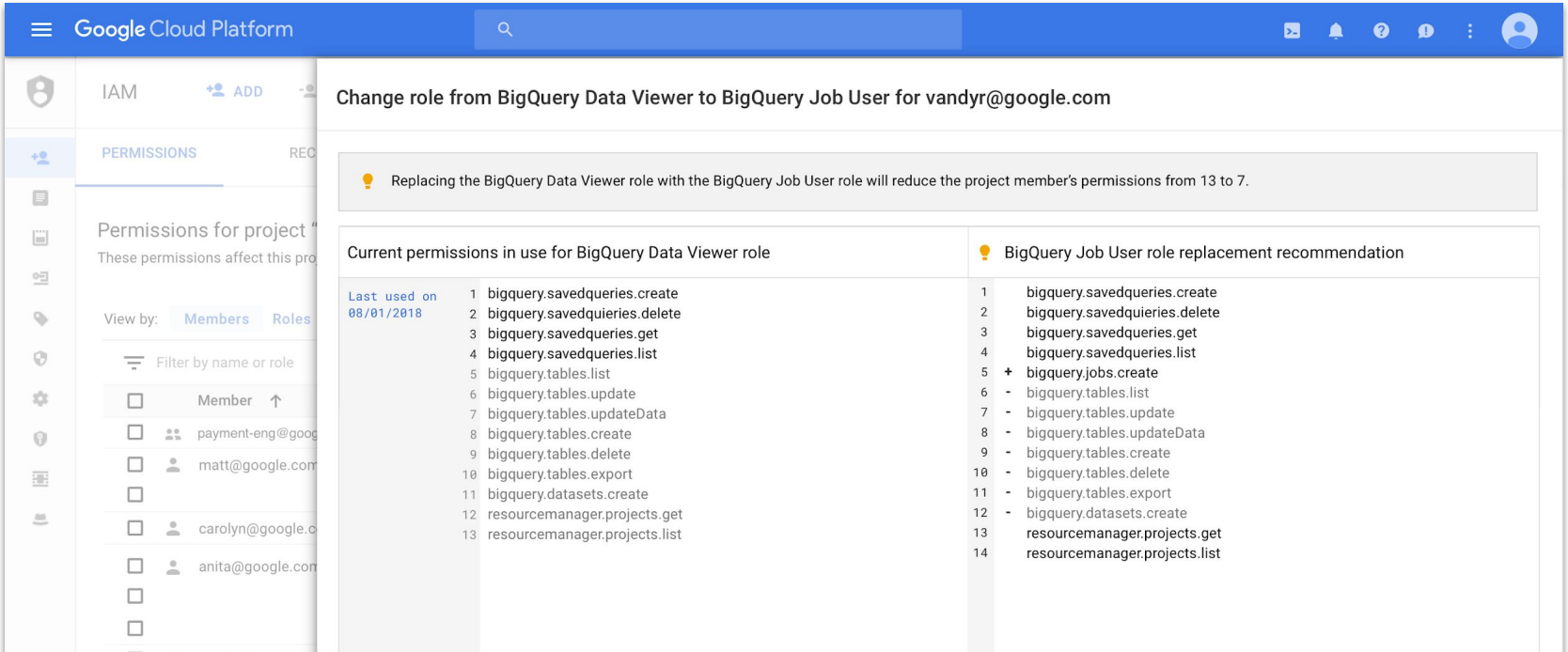
the -/+ pattern is key here



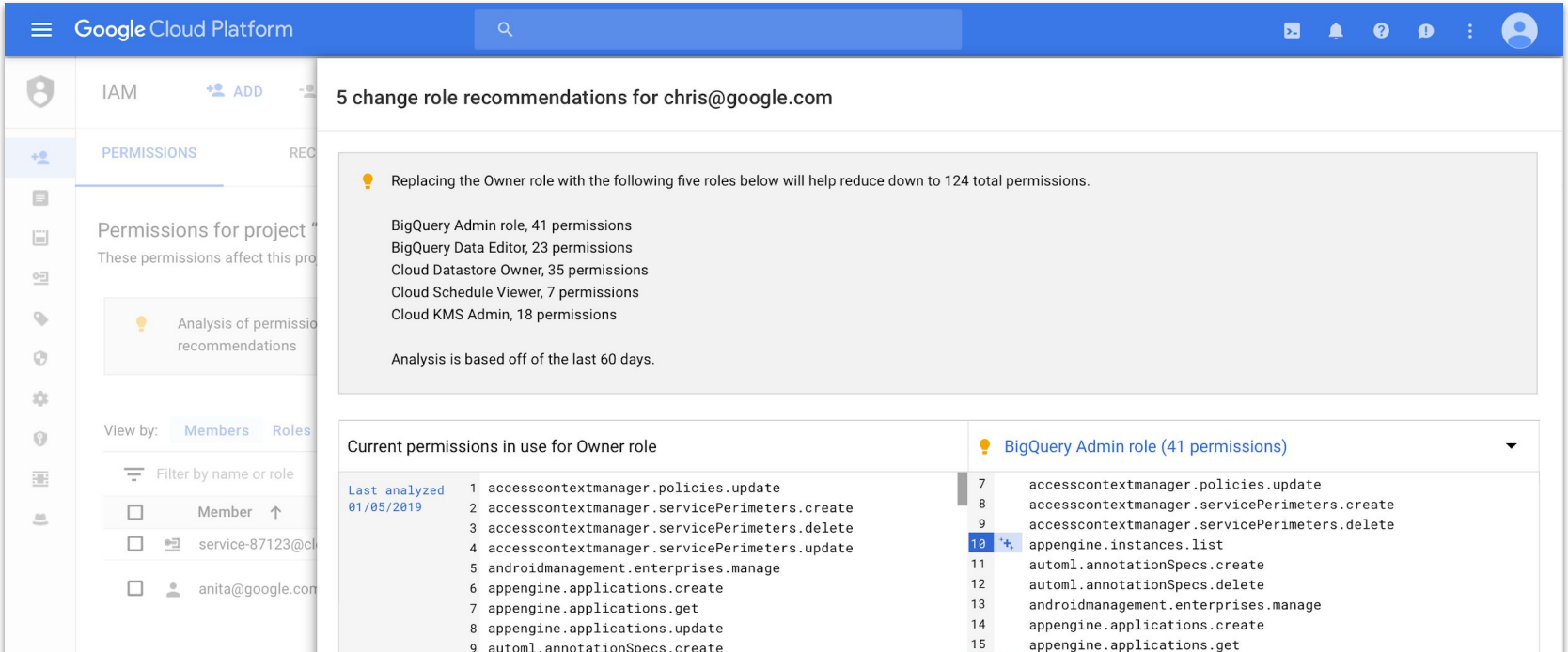
```
+- (RACSignal *)enqueueRequest:(NSURLRequest *)request fetchAllPages:(BOOL)fetchAllPages;
+
 // Enqueues a request to fetch information about the current user by accessing
 // a path relative to the user object.
 //
@@ -241,11 +255,13 @@ - (id)initWithServer:(OCTServer *)server {
    NSString *userAgent = self.class.userAgent;
    if (userAgent != nil) [self setDefaultHeader:@"User-Agent" value:userAgent];

-  self.parameterEncoding = AFJSONParameterEncoding;
-  [self setDefaultHeader:@"Accept" value:@"application/vnd.github.beta+json"];
-
    [AFHTTPRequestOperation addAcceptableStatusCodes:[NSIndexSet indexSetWithIndex:OCTClientNotModifiedStatusCode]];
-  [AFJSONRequestOperation addAcceptableContentTypes:[NSSet setWithObject:@"application/vnd.github.beta+json"]];
+
+  NSString *contentType = [NSString stringWithFormat:@"application/vnd.github.%@+json", OCTClientAPIVersion];
+  [self setDefaultHeader:@"Accept" value:contentType];
+  [AFJSONRequestOperation addAcceptableContentTypes:[NSSet setWithObject:contentType]];
+
+  self.parameterEncoding = AFJSONParameterEncoding;
    [self registerHTTPOperationClass:AFJSONRequestOperation.class];
```

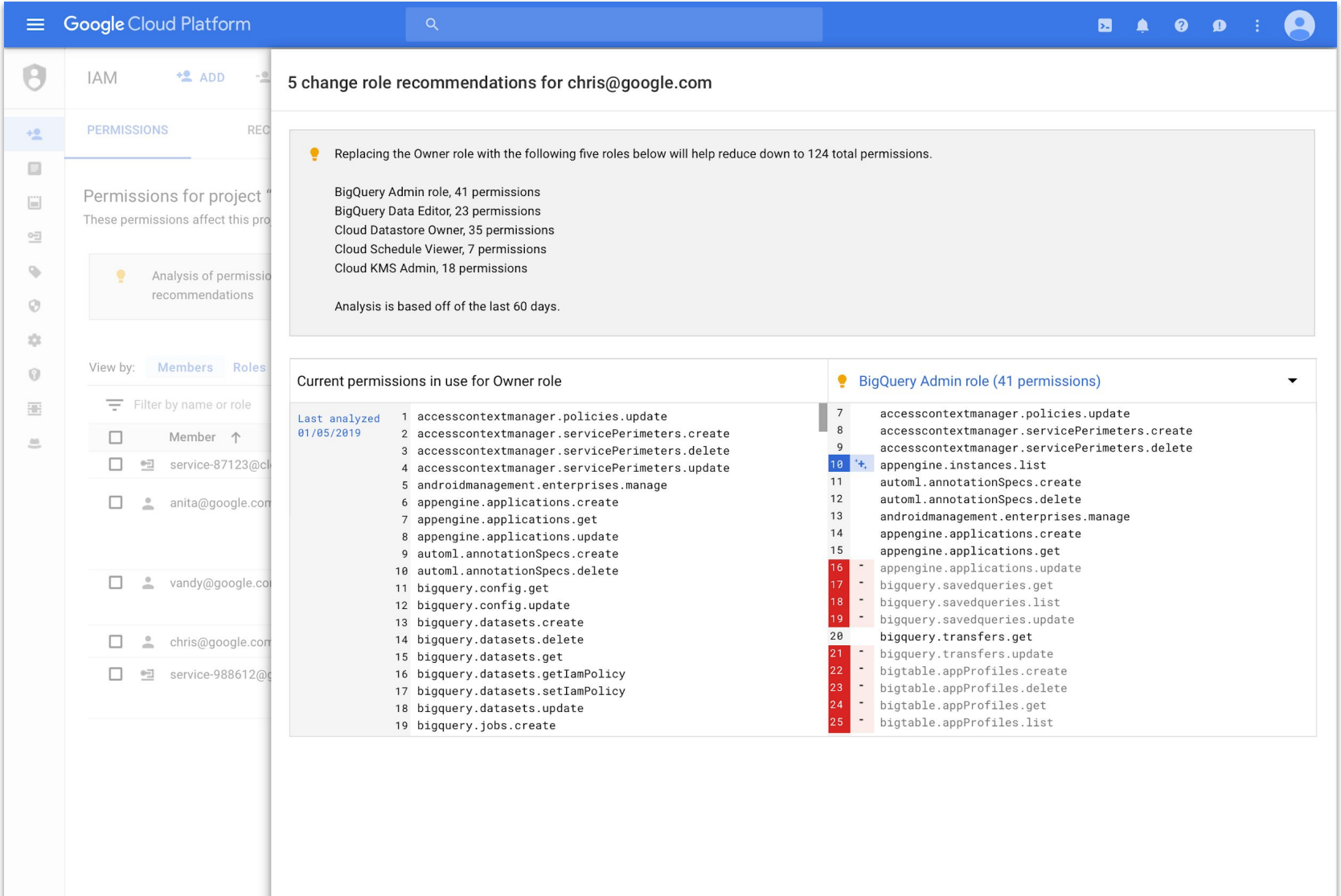
Wait. We're still missing the ML part.

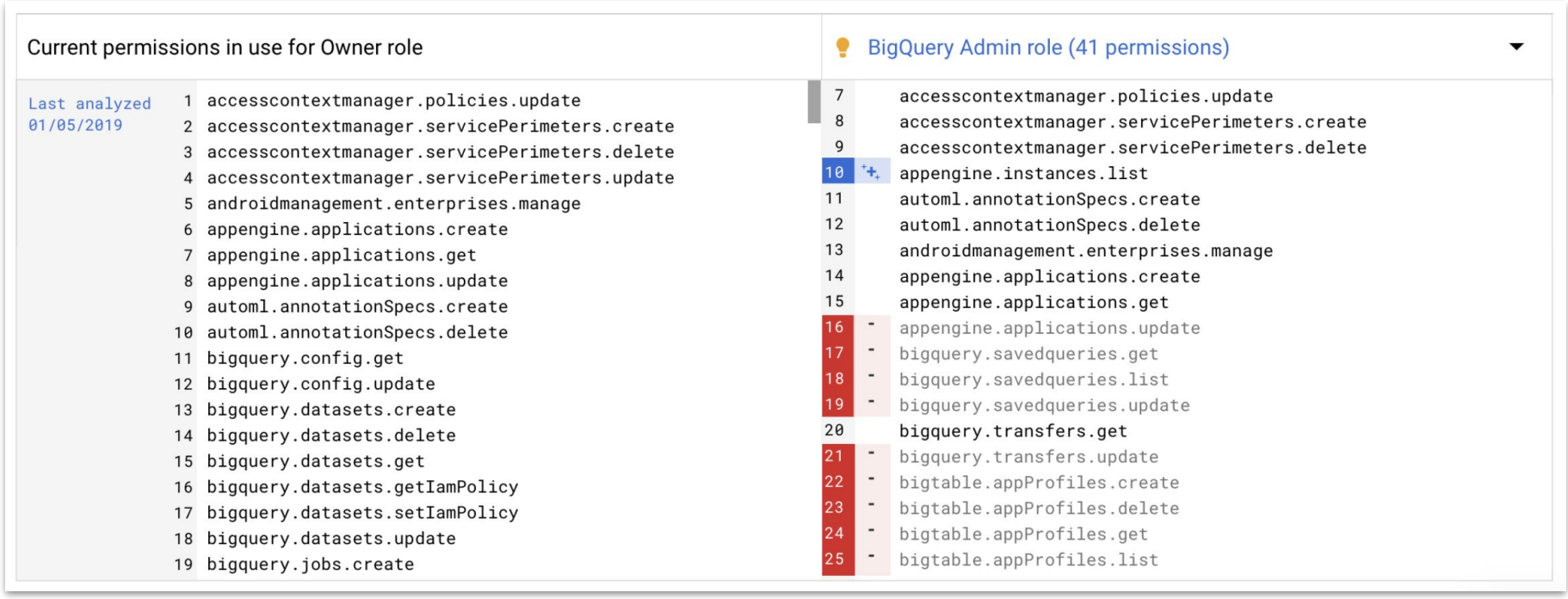
Stay with me. The -/+ pattern is still key here.



...what if we added ML into the traditional -/+ pattern?




Google Cloud Platform
IAM
ADD
PERMISSIONS
Permissions for project "
These permissions affect this pro
Analysis of permissio
recommendations
View by:
Members
Roles
Filter by name or role
Member
service-87123@cl
anita@google.com
vandy@google.co
chris@google.com
service-988612@g
5 change role recommendations for chris@google.com
Replacing the Owner role with the following five roles below will help reduce down to 124 total permissions.
BigQuery Admin role, 41 permissions
BigQuery Data Editor, 23 permissions
Cloud Datastore Owner, 35 permissions
Cloud Schedule Viewer, 7 permissions
Cloud KMS Admin, 18 permissions
Analysis is based off of the last 60 days.
Current permissions in use for Owner role
Last analyzed 01/05/2019
1 accesscontextmanager.policies.update
2 accesscontextmanager.servicePerimeters.create
3 accesscontextmanager.servicePerimeters.delete
4 accesscontextmanager.servicePerimeters.update
5 androidmanagement.enterprises.manage
6 appengine.applications.create
7 appengine.applications.get
8 appengine.applications.update
9 automl.annotationSpecs.create
10 automl.annotationSpecs.delete
11 bigquery.config.get
12 bigquery.config.update
13 bigquery.datasets.create
14 bigquery.datasets.delete
15 bigquery.datasets.get
16 bigquery.datasets.getIamPolicy
17 bigquery.datasets.setIamPolicy
18 bigquery.datasets.update
19 bigquery.jobs.create
BigQuery Admin role (41 permissions)
7 accesscontextmanager.policies.update
8 accesscontextmanager.servicePerimeters.create
9 accesscontextmanager.servicePerimeters.delete
10 + appengine.instances.list
11 automl.annotationSpecs.create
12 automl.annotationSpecs.delete
13 androidmanagement.enterprises.manage
14 appengine.applications.create
15 appengine.applications.get
16 - appengine.applications.update
17 - bigquery.savedqueries.get
18 - bigquery.savedqueries.list
19 - bigquery.savedqueries.update
20 bigquery.transfers.get
21 - bigquery.transfers.update
22 - bigtable.appProfiles.create
23 - bigtable.appProfiles.delete
24 - bigtable.appProfiles.get
25 - bigtable.appProfiles.list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1 accesscontextmanager.policies.update
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3 accesscontextmanager.servicePerimeters.delete
4 accesscontextmanager.servicePerimeters.update
5 androidmanagement.enterprises.manage
6 appengine.applications.create
7 appengine.applications.get
8 appengine.applications.update
9 automl.annotationSpecs.create
10 automl.annotationSpecs.delete
11 bigquery.config.get
12 bigquery.config.update
13 bigquery.datasets.create
14 bigquery.datasets.delete
15 bigquery.datasets.get
16 bigquery.datasets.getIamPolicy
17 bigquery.datasets.setIamPolicy
18 bigquery.datasets.update
19 bigquery.jobs.create
7 accesscontextmanager.policies.update
8 accesscontextmanager.servicePerimeters.create
9 accesscontextmanager.servicePerimeters.delete
10 + appengine.instances.list
11 automl.annotationSpecs.create
12 automl.annotationSpecs.delete
13 androidmanagement.enterprises.manage
14 appengine.applications.create
15 appengine.applications.get
16 - appengine.applications.update
17 - bigquery.savedqueries.get
18 - bigquery.savedqueries.list
19 - bigquery.savedqueries.update
20 bigquery.transfers.get
21 - bigquery.transfers.update
22 - bigtable.appProfiles.create
23 - bigtable.appProfiles.delete
24 - bigtable.appProfiles.get
25 - bigtable.appProfiles.list


10
appengine.instances.list

Meet the ML sparkles

Design Patent filed GP-300272-00-US-DP on 09/16/2019

For surfacing machine learning recommendation in a code diff.

No design challenge is too small or too big to take on.

Key Takeaways & Reflections

As the first team to ship a ML product within self driving cloud...

1

Start with the user/customer first

A PM's idea is good and all, but early collaboration from the beginning can not just shape the API but the UI as well.

The whiteboarding/brainstorming session with our customers in the iteration phase garnered some of the best data.

2

UX the API. ...as *much* as possible.

Un-engineer the API as much as possible. UX the hell out of it.

Language in the API desperately needs a UX writer, and features that are API first without any UX consultation only creates more tech debt in the future.

3

Anything can be patented.

Yes, even icons in a pattern.

The UI is so easy, my mom could use it!

Customer on GCP
Name and Company redacted

(I swear they said this).

Debuted as the keynote product at Google Cloud NEXT last year.

Many of our top customers (Snapchat, Uber, Spotify, etc) use it frequently.

Thank You