Federated Credential Management

TPAC 2021

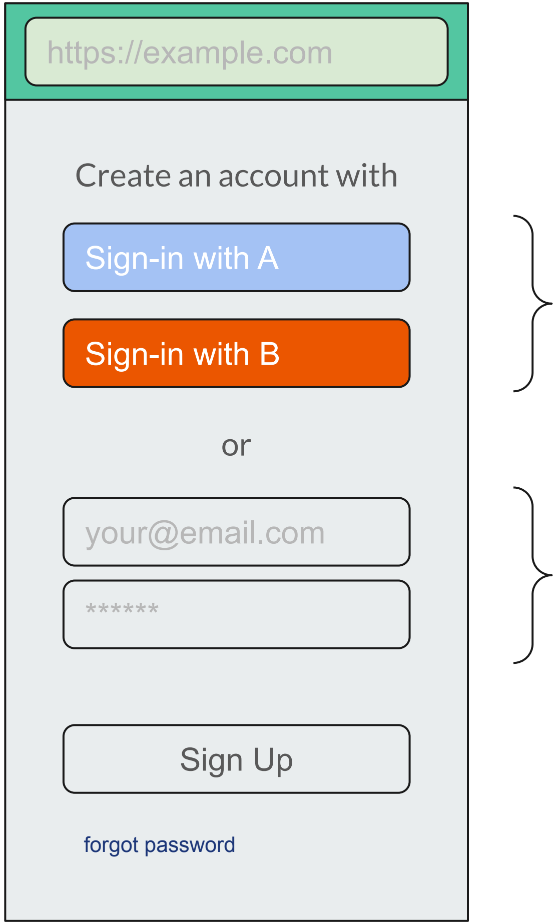
https://github.com/WICG/FedCM

Agenda

- The Problem
  - Premise: federation is good, we want to preserve it.
  - How federation works
  - User activity tracking on the web
  - Scope of this project
- Solution Framework
  - Directed identifiers
  - High-level approaches for an identity API
- Moving Forward
  - Challenges
  - Community engagement

The Problem

Federation is Safer Than Usernames/Passwords



Two factor authentication,
password-less single sign-on

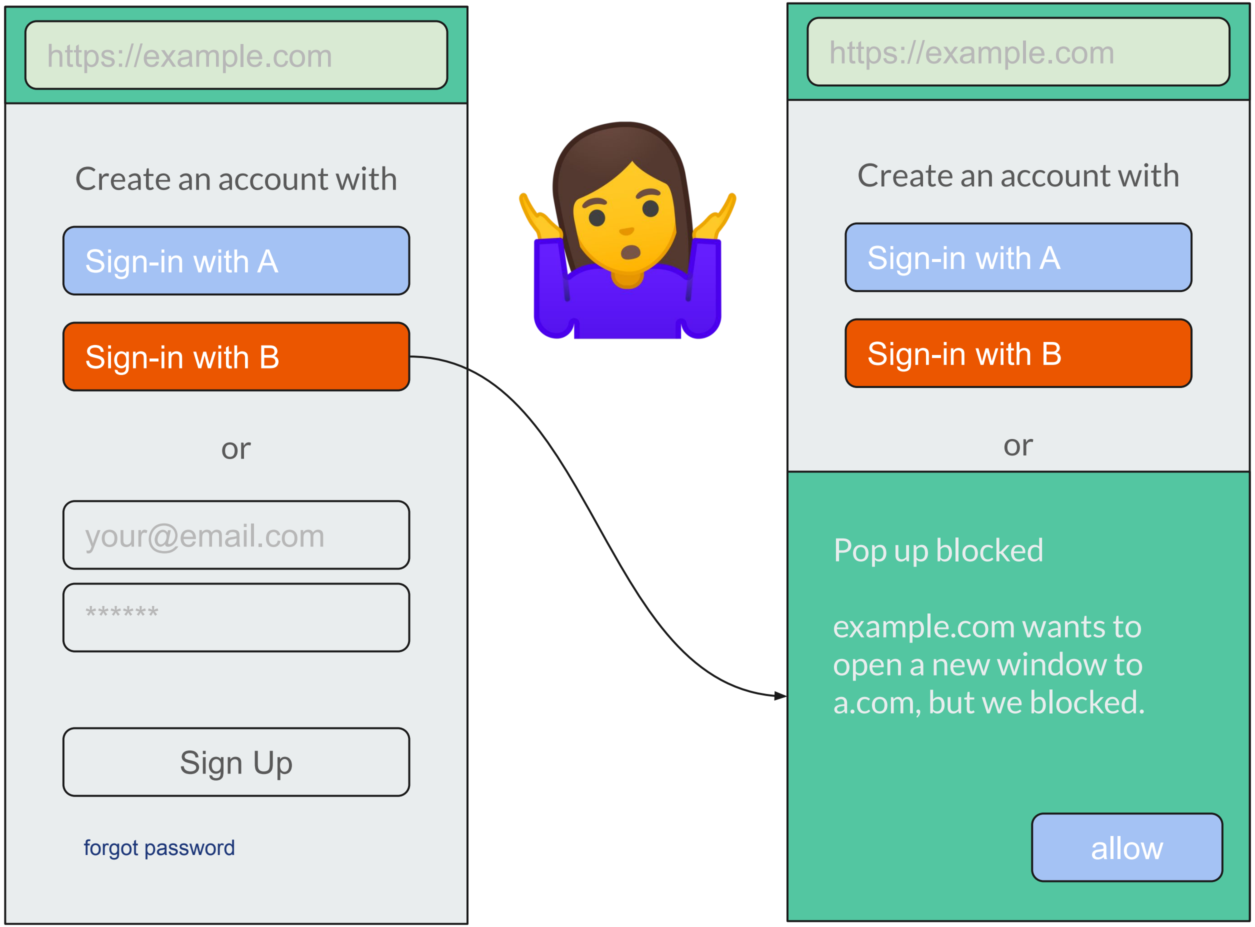
phishing, credential stuffing,
password reuse

🟩 Browser

⬜ RP

🟦 IDP

Reliance on General-purpose Web Primitives



Pop up blocked

example.com wants to open a new window to a.com, but we blocked.

🟩 Browser

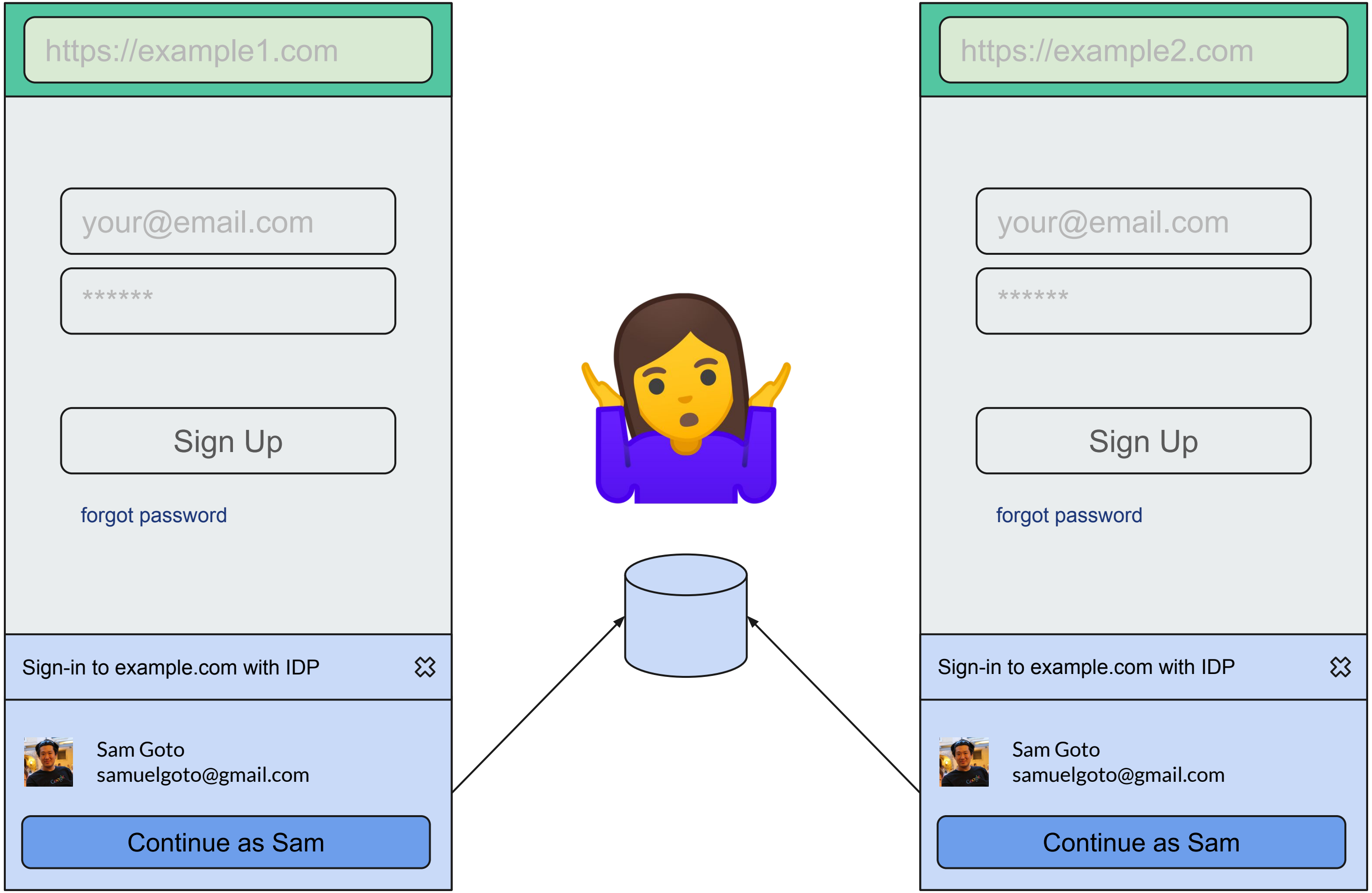
⬜ RP

🟦 IDP

Other low level primitives:

- Iframes
- Cookies
- Redirects
- Pop-ups
- URL Parameters

Third-Party Cookie Access

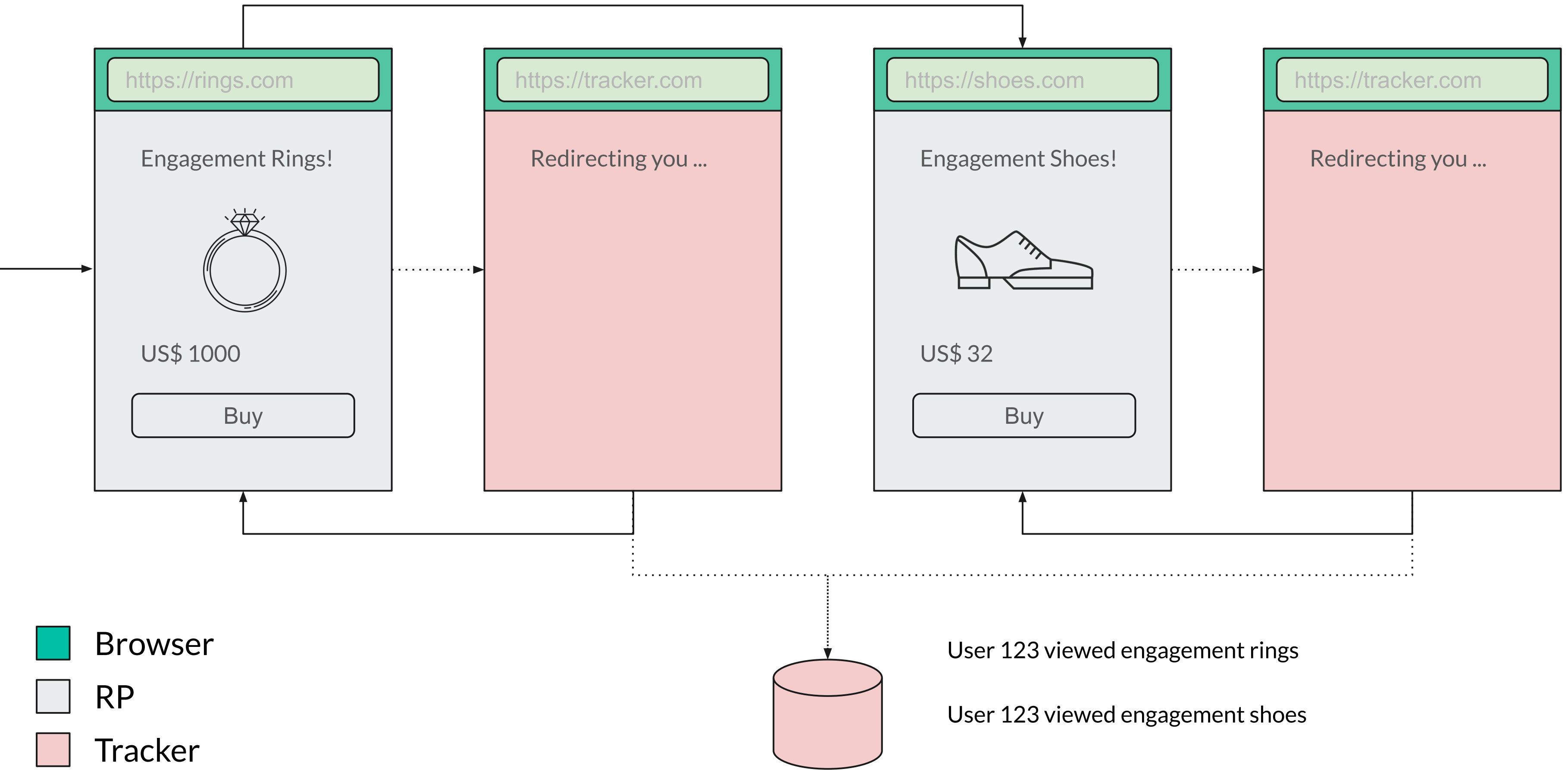


🟩 Browser

□ RP

🟦 IDP

Navigational/Bounce Tracking and Link Decoration



🟩 Browser

⬜ RP

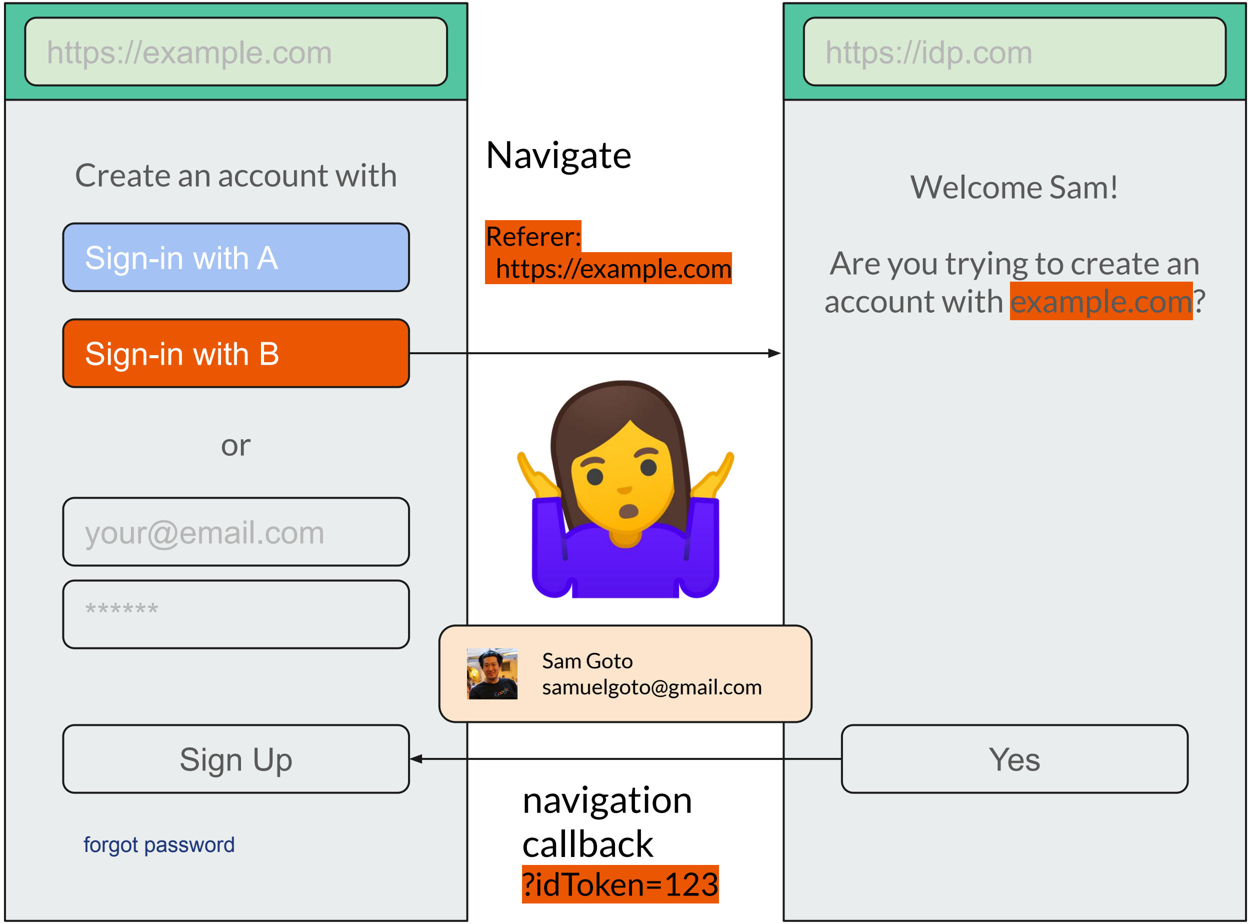
🟥 Tracker

User 123 viewed engagement rings

User 123 viewed engagement shoes

....

The Classification Problem



https://example.com

Create an account with

Sign-in with A

Sign-in with B

or

your@email.com

******

Sign Up

forgot password

Navigate

Referer: https://example.com

Sam Goto
samuelgoto@gmail.com

navigation callback ?idToken=123

https://idp.com

Welcome Sam!

Are you trying to create an account with example.com?

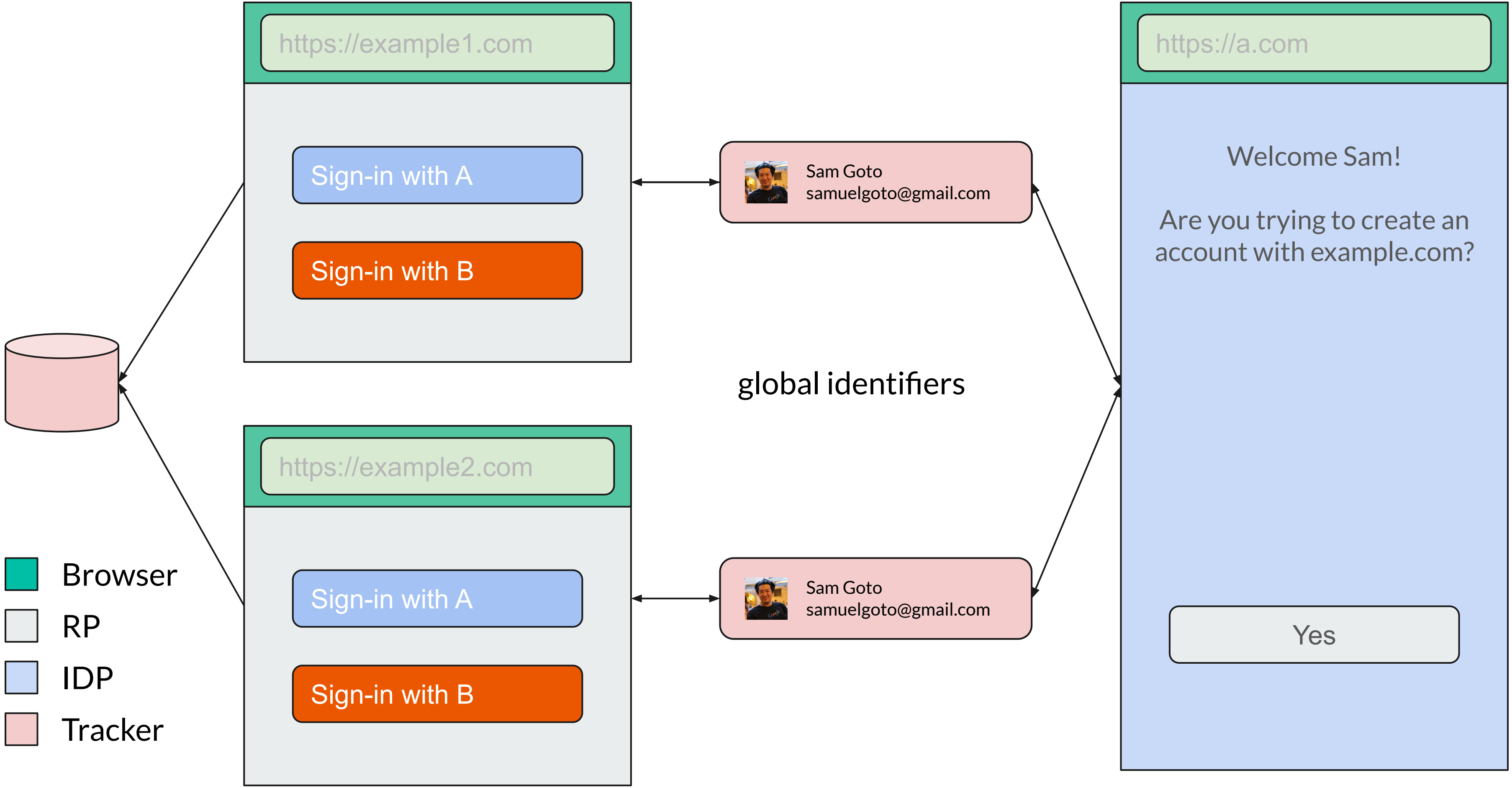
Yes

🟩 Browser

⬜ RP

🟦 IDP

RP Consequences of Web Identity



https://example1.com

Sign-in with A

Sign-in with B

https://example2.com

Sign-in with A

Sign-in with B

Sam Goto
samuelgoto@gmail.com

Sam Goto
samuelgoto@gmail.com

global identifiers

https://a.com

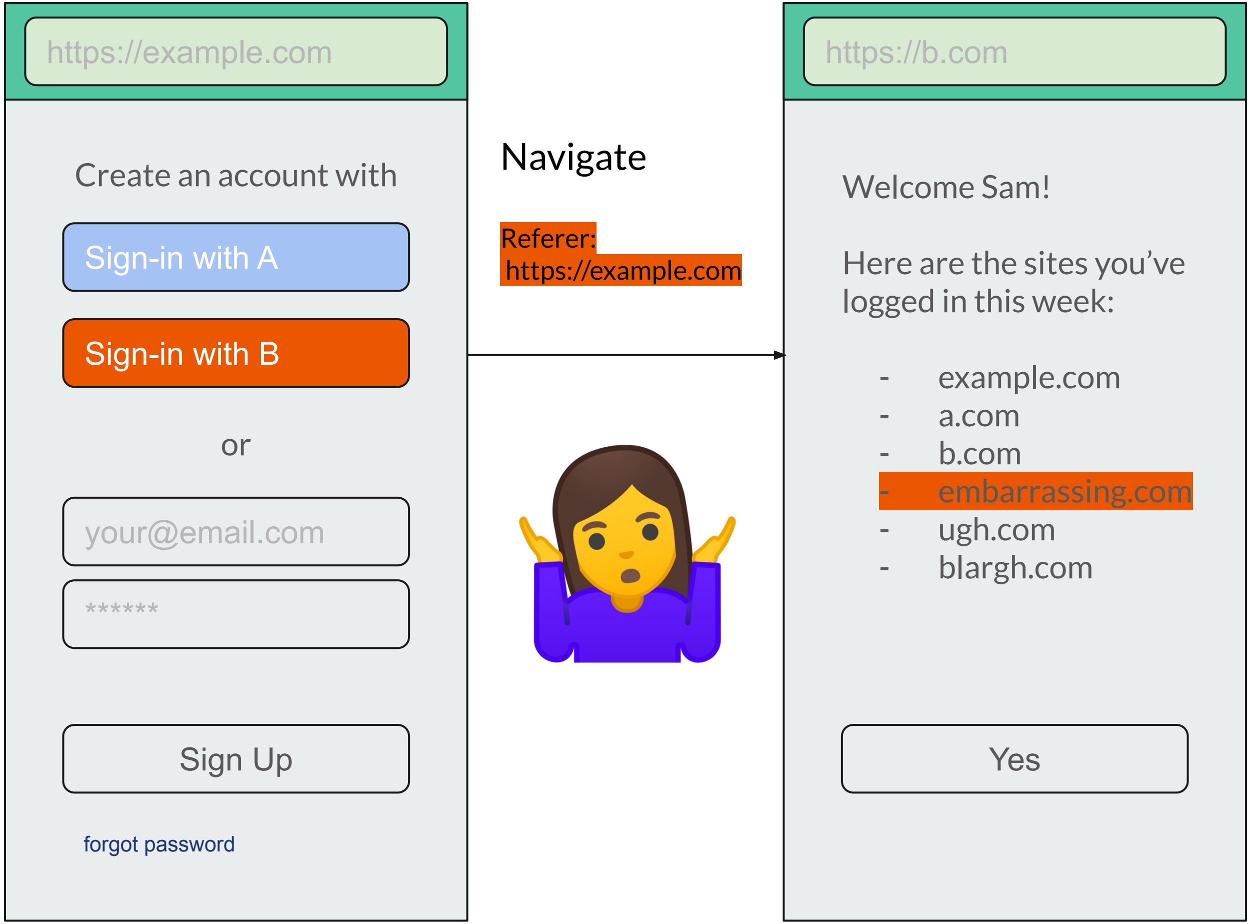
Welcome Sam!

Are you trying to create an account with example.com?

Yes

🟩 Browser
⬜ RP
🟦 IDP
🟥 Tracker

IDP Consequences of Federated Sign-in



https://example.com

Create an account with

Sign-in with A

Sign-in with B

or

your@email.com

******

Sign Up

forgot password

Navigate

Referer: https://example.com

https://b.com

Welcome Sam!

Here are the sites you've logged in this week:

- example.com
- a.com
- b.com
- embarrassing.com
- ugh.com
- blargh.com

Yes

🟩 Browser

⬜ RP

🟦 IDP

Scope and Limitations

Currently out of scope

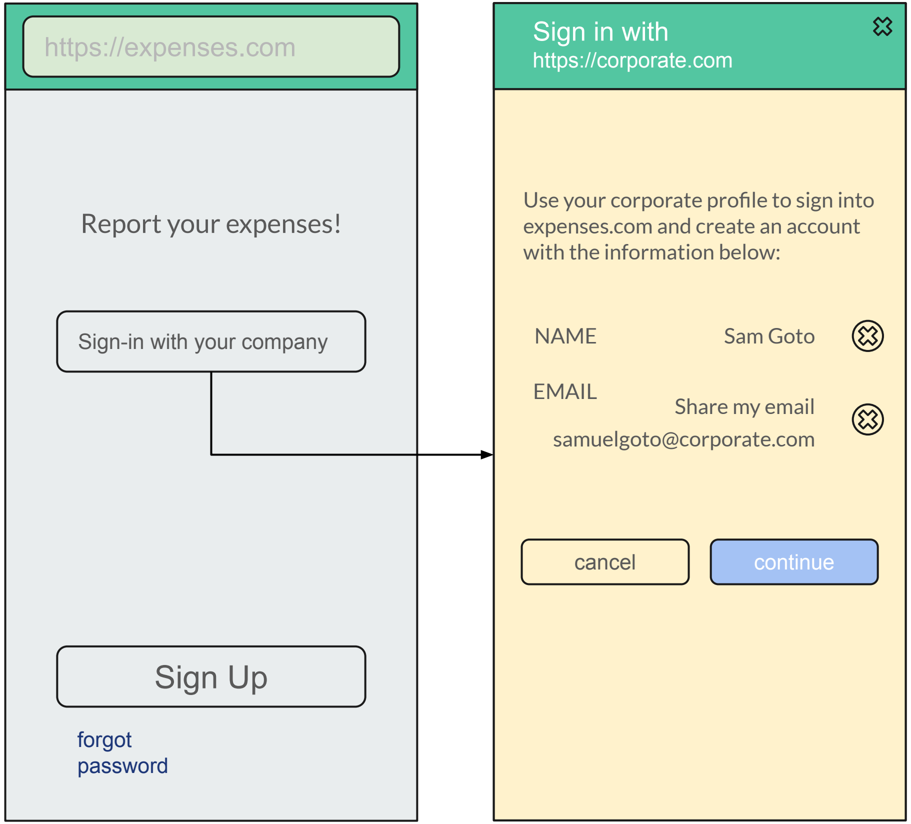
- IDP Impersonation
- Cross-device sign-in state
- The “NASCAR flag” problem

Enterprise Use Cases

🟩 UA

🟨 IDP

⬜ RP



https://expenses.com

Report your expenses!

Sign in with
https://corporate.com

Use your corporate profile to sign into expenses.com and create an account with the information below:

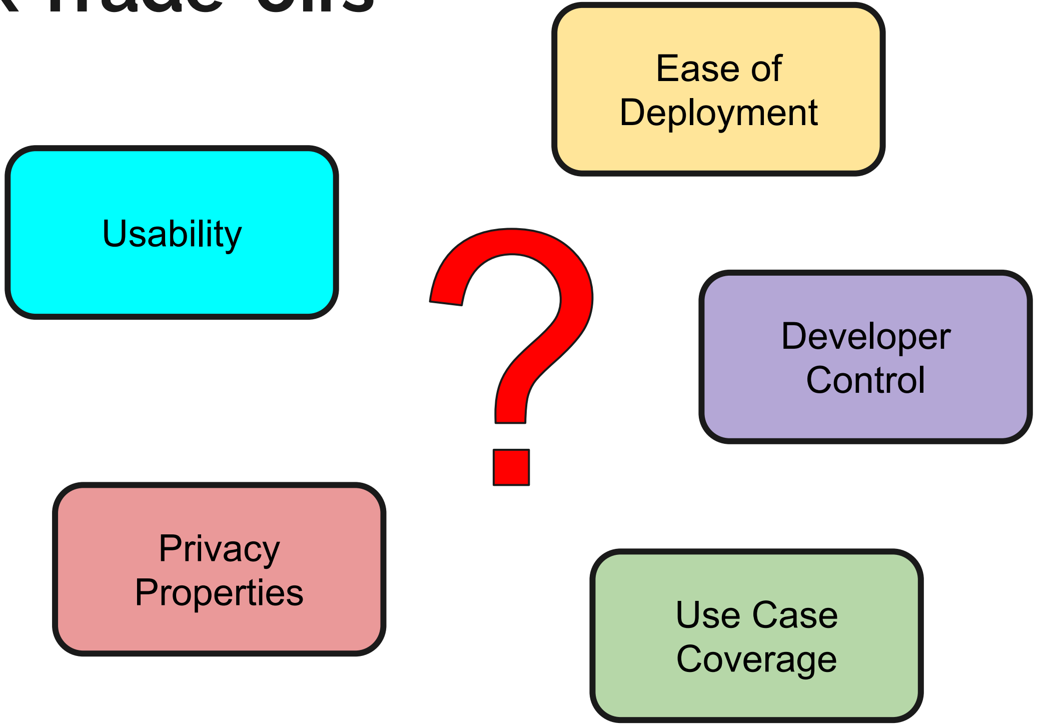
NAME	Sam Goto
EMAIL	Share my email samuelgoto@corporate.com

WebID Proposals for Sign-In / Sign-Up

Important caveat

This project is in very early stages and everything below is still considered exploratory.

Complex Trade-offs



Ease of Deployment

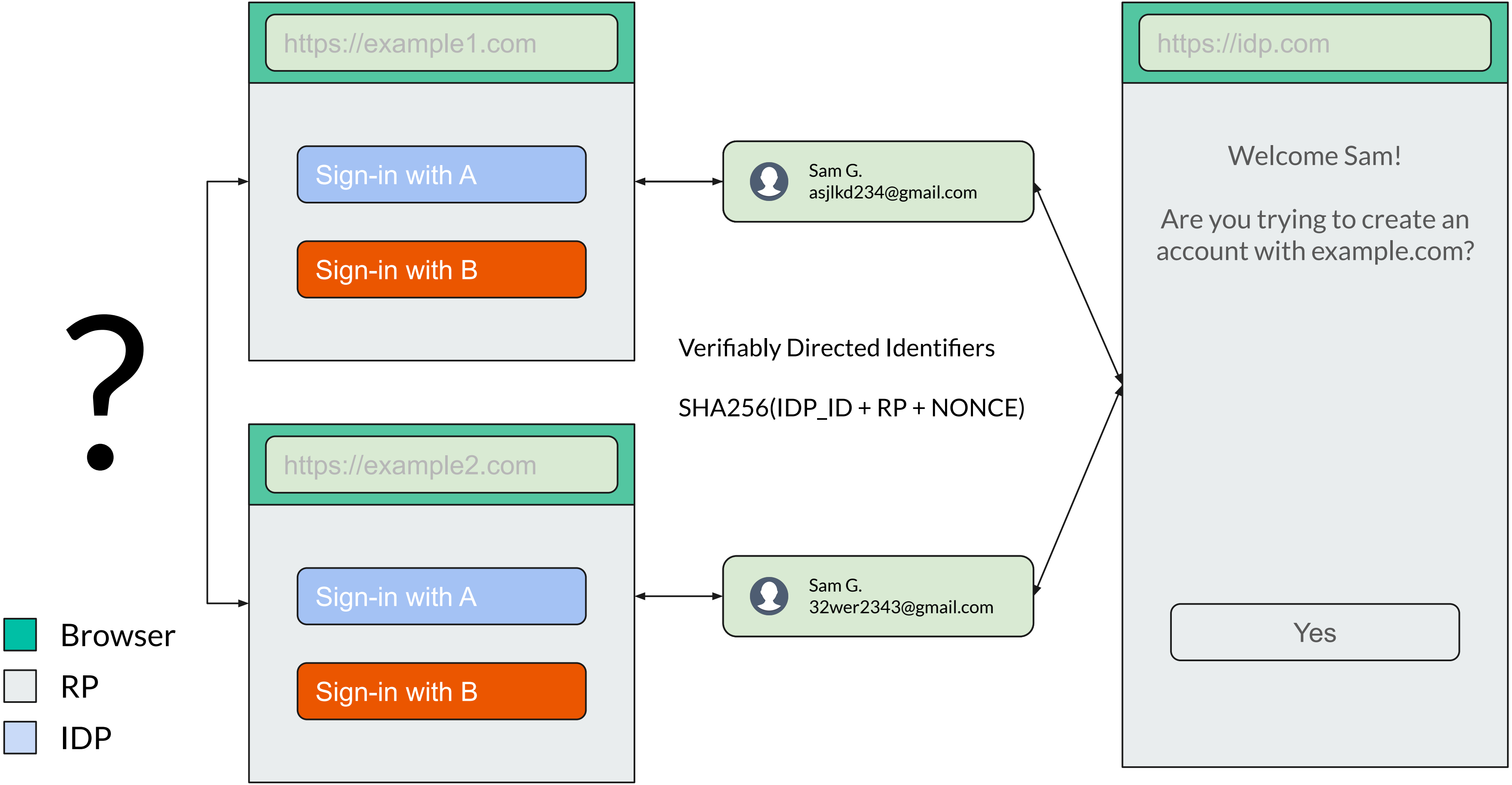
Usability

Developer Control

Privacy Properties

Use Case Coverage

Directed Identifiers



Verifiably Directed Identifiers

SHA256(IDP_ID + RP + NONCE)

🟩 Browser

⬜ RP

🟦 IDP

Alternatives under consideration

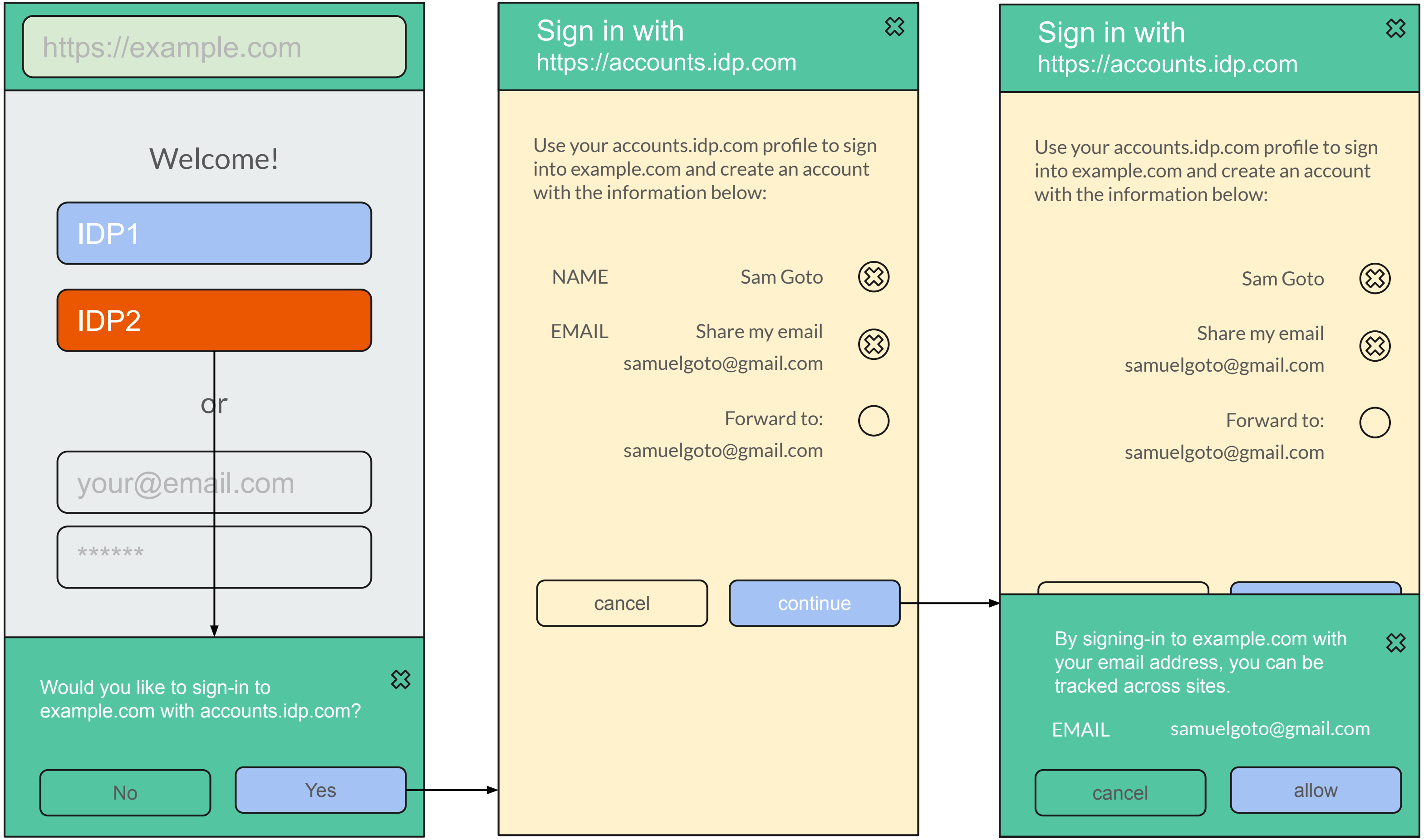
- Approaches for designing a new API fall into three general buckets:
    - The *Permission-oriented* Variation
    - The *Mediation-oriented* Variation
    - The *Delegation-oriented* Variation

#1 The Permission-oriented Variation

🟩 UA

🟨 IDP

⬜ RP



https://example.com

Welcome!

IDP1

IDP2

or

your@email.com

******

Would you like to sign-in to example.com with accounts.idp.com?

No

Yes

Sign in with https://accounts.idp.com

Use your accounts.idp.com profile to sign into example.com and create an account with the information below:

NAME	Sam Goto	☒
EMAIL	Share my email samuelgoto@gmail.com	☒
	Forward to: samuelgoto@gmail.com	○

cancel

continue

Sign in with https://accounts.idp.com

Use your accounts.idp.com profile to sign into example.com and create an account with the information below:

Sam Goto	☒
Share my email samuelgoto@gmail.com	☒
Forward to: samuelgoto@gmail.com	○

By signing-in to example.com with your email address, you can be tracked across sites.

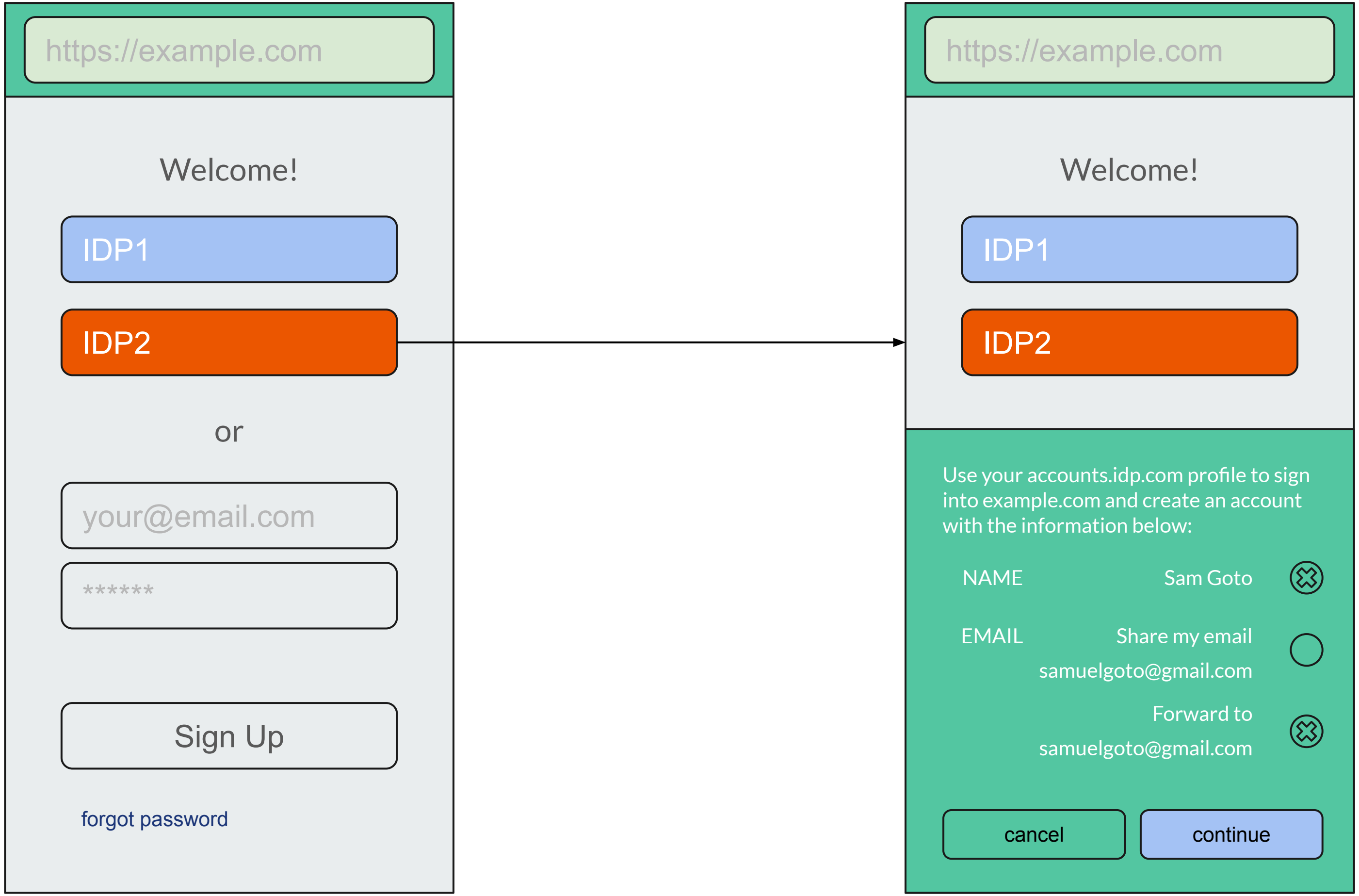
EMAIL samuelgoto@gmail.com

cancel

allow

🟩 User Agent ⬜ Relying Party

#2 The Mediation-oriented Variation



Use your accounts.idp.com profile to sign into example.com and create an account with the information below:

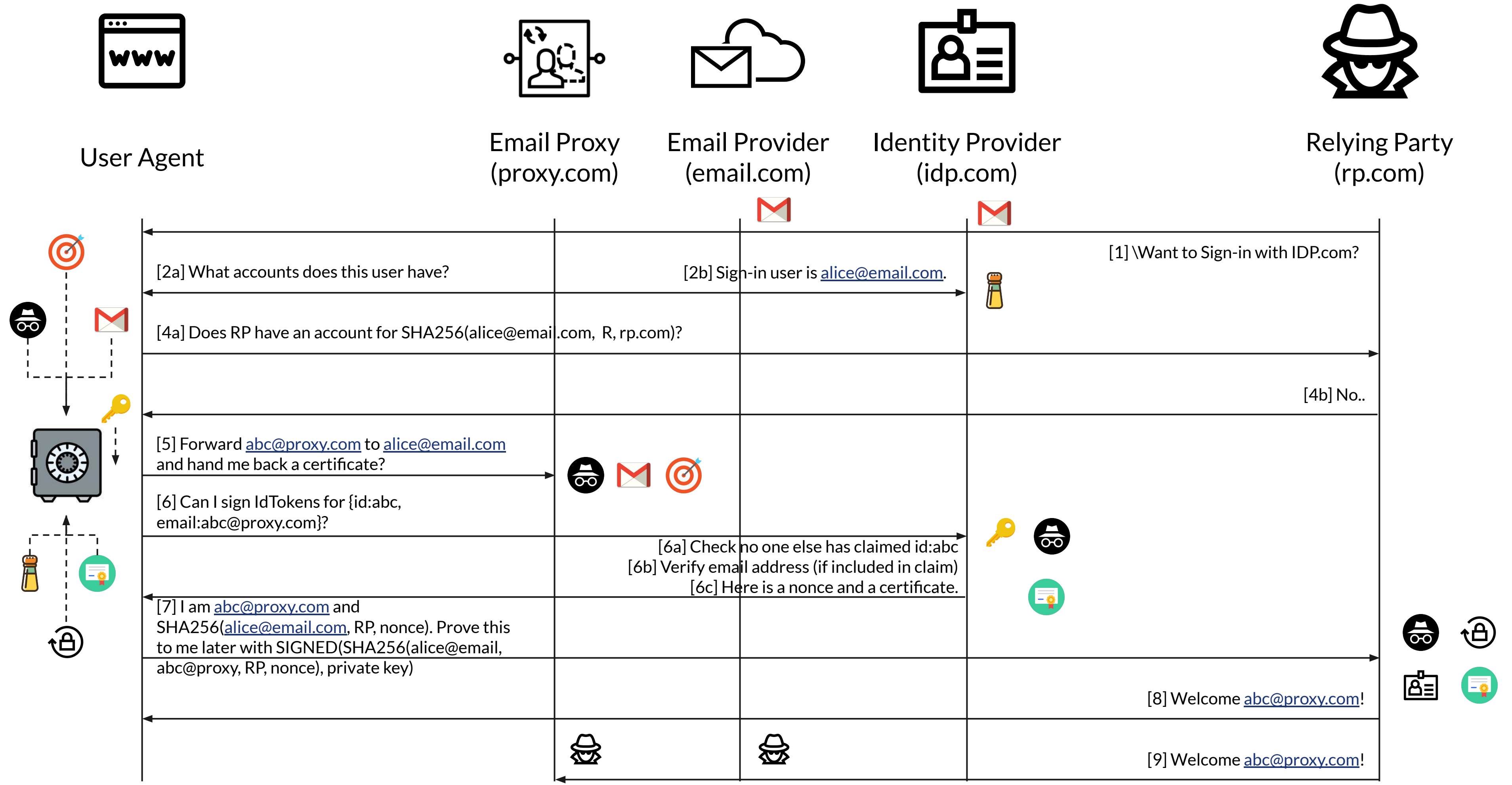
NAME Sam Goto ⊗

EMAIL Share my email samuelgoto@gmail.com ○

Forward to samuelgoto@gmail.com ⊗

IDP Tracking

- Neither the permission-based nor mediation-based approach limits the ability of the IDP to know where the user has signed in using the IDP credentials.
- Delegation-based approach redefines the role of an IDP to address that.



User Agent

Email Proxy (proxy.com)

Email Provider (email.com)

Identity Provider (idp.com)

Relying Party (rp.com)

[1] \Want to Sign-in with IDP.com?

[2a] What accounts does this user have?

[2b] Sign-in user is alice@email.com.

[4a] Does RP have an account for SHA256(alice@email.com, R, rp.com)?

[4b] No..

[5] Forward abc@proxy.com to alice@email.com and hand me back a certificate?

[6] Can I sign IdTokens for {id:abc, email:abc@proxy.com}?

[6a] Check no one else has claimed id:abc
[6b] Verify email address (if included in claim)
[6c] Here is a nonce and a certificate.

[7] I am abc@proxy.com and SHA256(alice@email.com, RP, nonce). Prove this to me later with SIGNED(SHA256(alice@email, abc@proxy, RP, nonce), private key)

[8] Welcome abc@proxy.com!

[9] Welcome abc@proxy.com!

#3 The Delegation-oriented Variation

global email

directed email

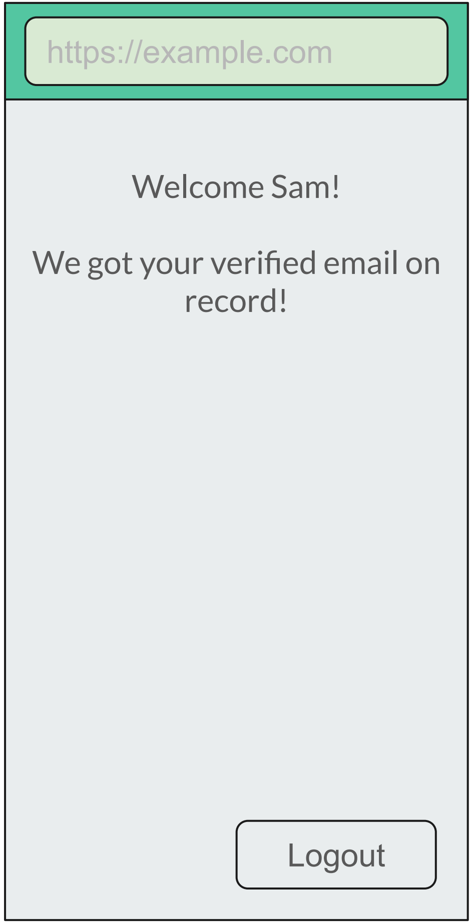
keypair

certificate

nonce

recovery token

Server-Side Relying Party Backwards Compatibility



Welcome Sam!

We got your verified email on record!

If the user grants access, the id token is passed back to the application:

```
{
  "alg": "HS256",
  "typ": "JWT"
}
{
 "iss": "https://accounts.a.com",
 "sub": "110169484474386276334",
 "aud": "https://example.com",
 "name": "Sam",
 "given_name": "Sam",
 "family_name": "G.",
 "email": "242423asf390@email.example",
 "email_verified": "true",
}
HMACSHA256(
  base64UrlEncode(header) + "." +
  base64UrlEncode(payload),
  SECRET
)
```

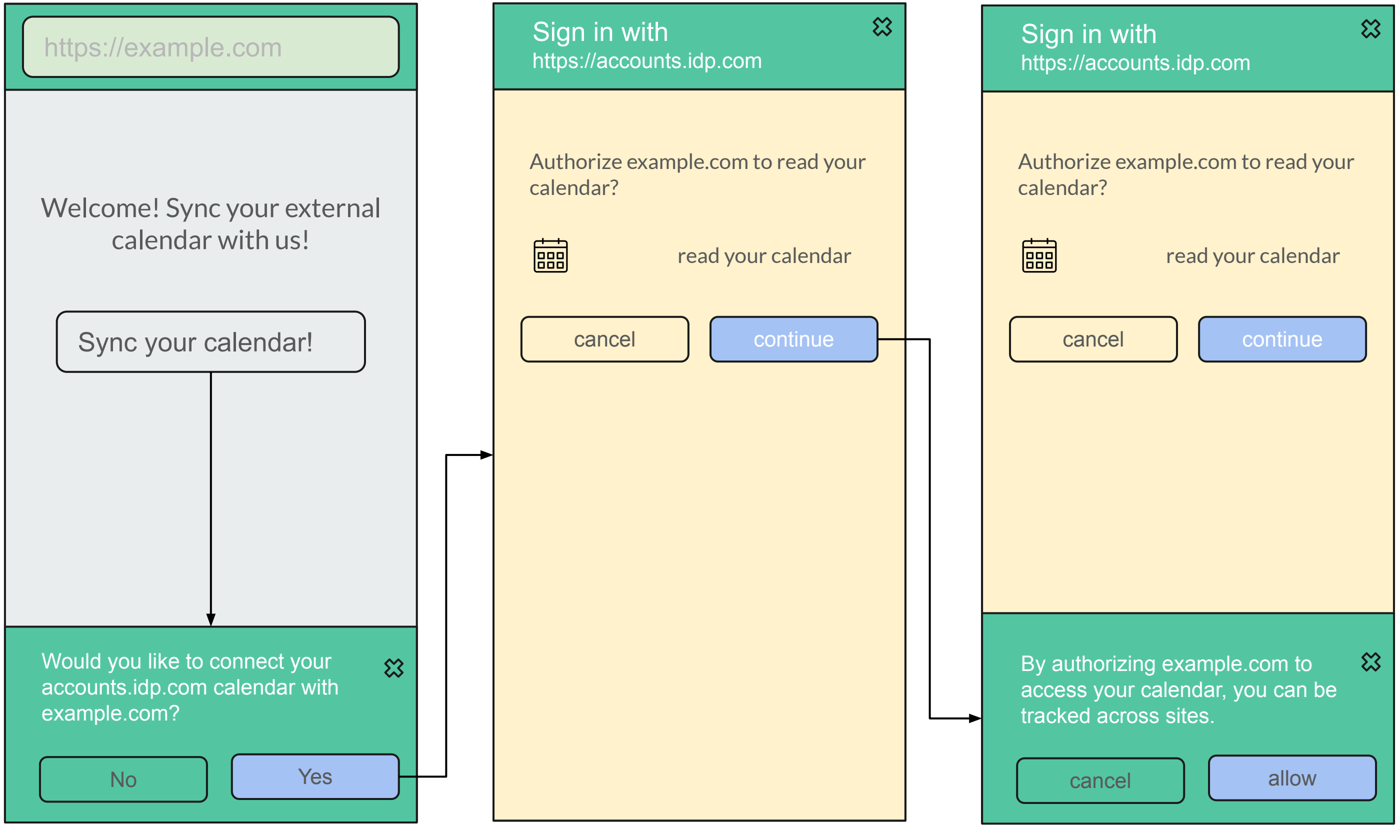
🟩 Browser

⬜ RP

🟦 IDP

Aside: Authorization

🟩 UA   🟨 IDP   ⬜ RP



Welcome! Sync your external calendar with us!

Would you like to connect your accounts.idp.com calendar with example.com?

Sign in with https://accounts.idp.com

Authorize example.com to read your calendar?

Sign in with https://accounts.idp.com

Authorize example.com to read your calendar?

By authorizing example.com to access your calendar, you can be tracked across sites.

Looking Forward

Challenges

- Ecosystem design
  - Can RPs do their job well enough with directed identifiers? Customer support classic example.

- Technical questions
  - To what extent can we programmatically enforce directed identifiers?
  - How valuable are technical enforcement measures over policy requirements for IDP behaviour?
  - What about server-to-server communication that is in common use today?

- Accommodating other use cases
  - Should enterprise policies play a role in setting a different privacy bar for enterprise SSO? How would we handle “bring your own device” scenarios?

Engagement

- Many stakeholders:
  - RPs
  - IDPs
  - Browsers
  - Other identity ecosystem participants

- Feedback is welcome on https://github.com/WICG/WebID

This deck is shared publicly.