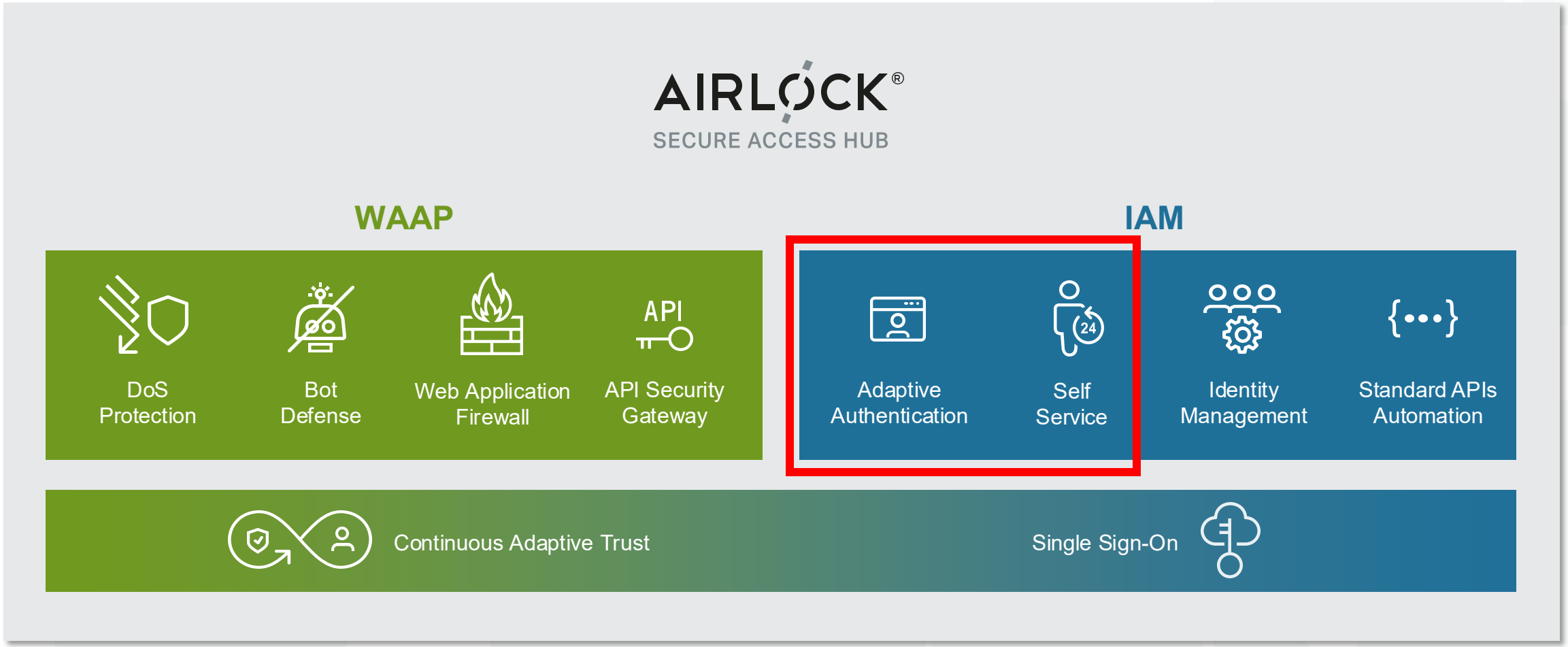
AIRLOCK®

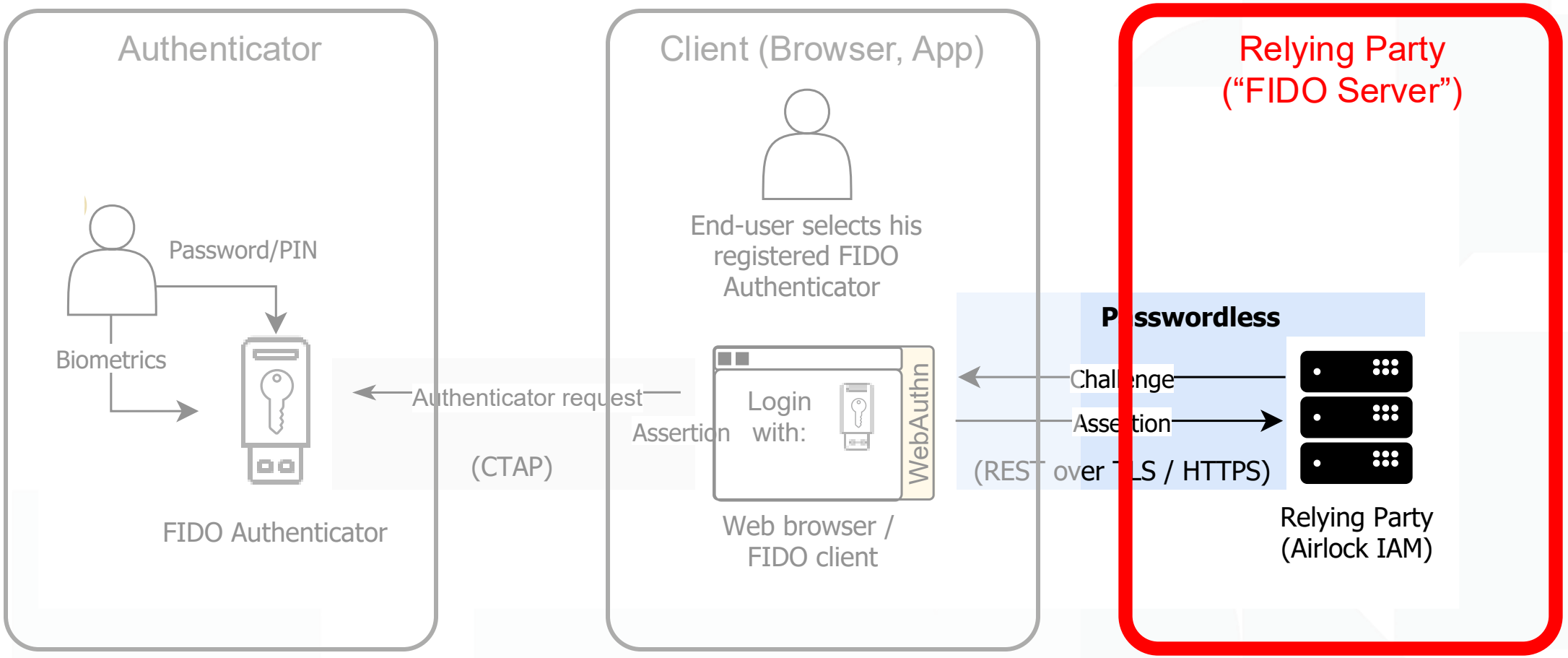
FIDO2 Relying Party

cnlab Herbsttagung 2025

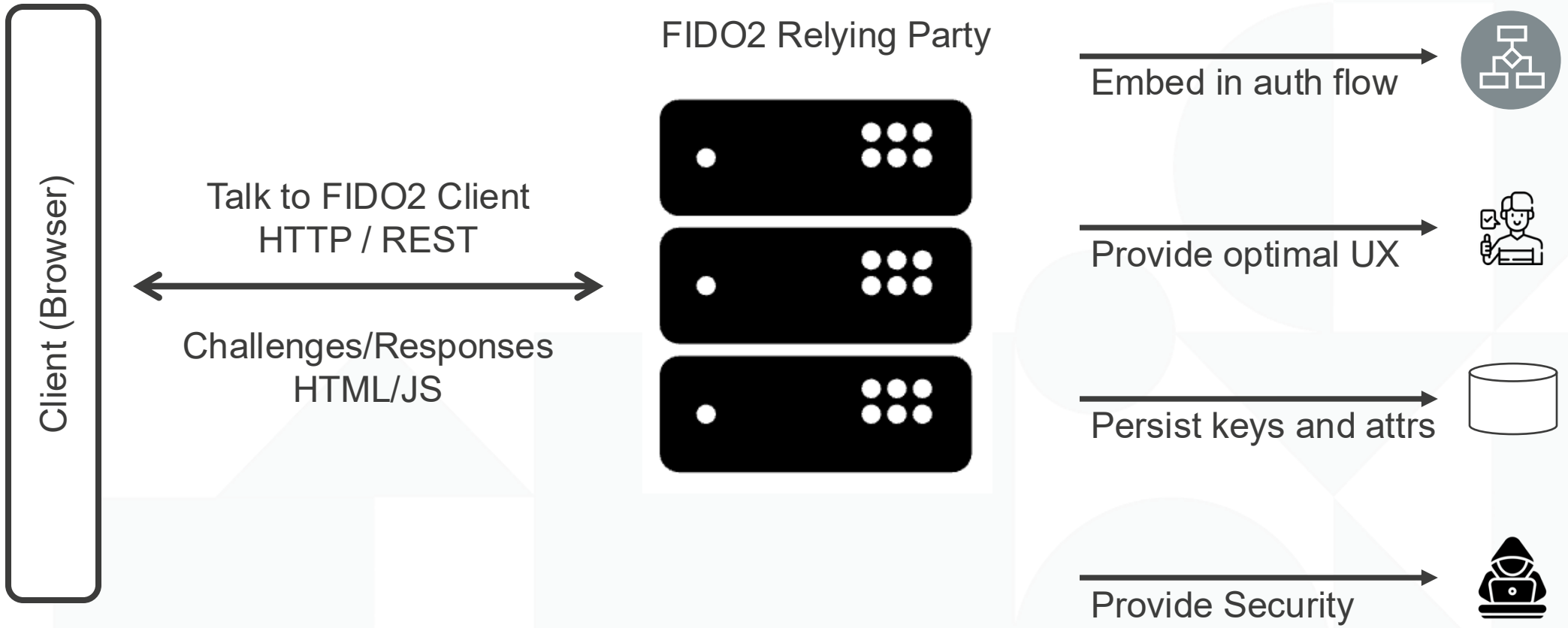
Marc Bütikofer
Head of Innovation
Security Solutions Airlock


AIRLOCK®
SECURE ACCESS HUB
WAAP
IAM
DoS Protection
Bot Defense
Web Application Firewall
API
API Security Gateway
Adaptive Authentication
24
Self Service
Identity Management
Standard APIs Automation
Continuous Adaptive Trust
Single Sign-On

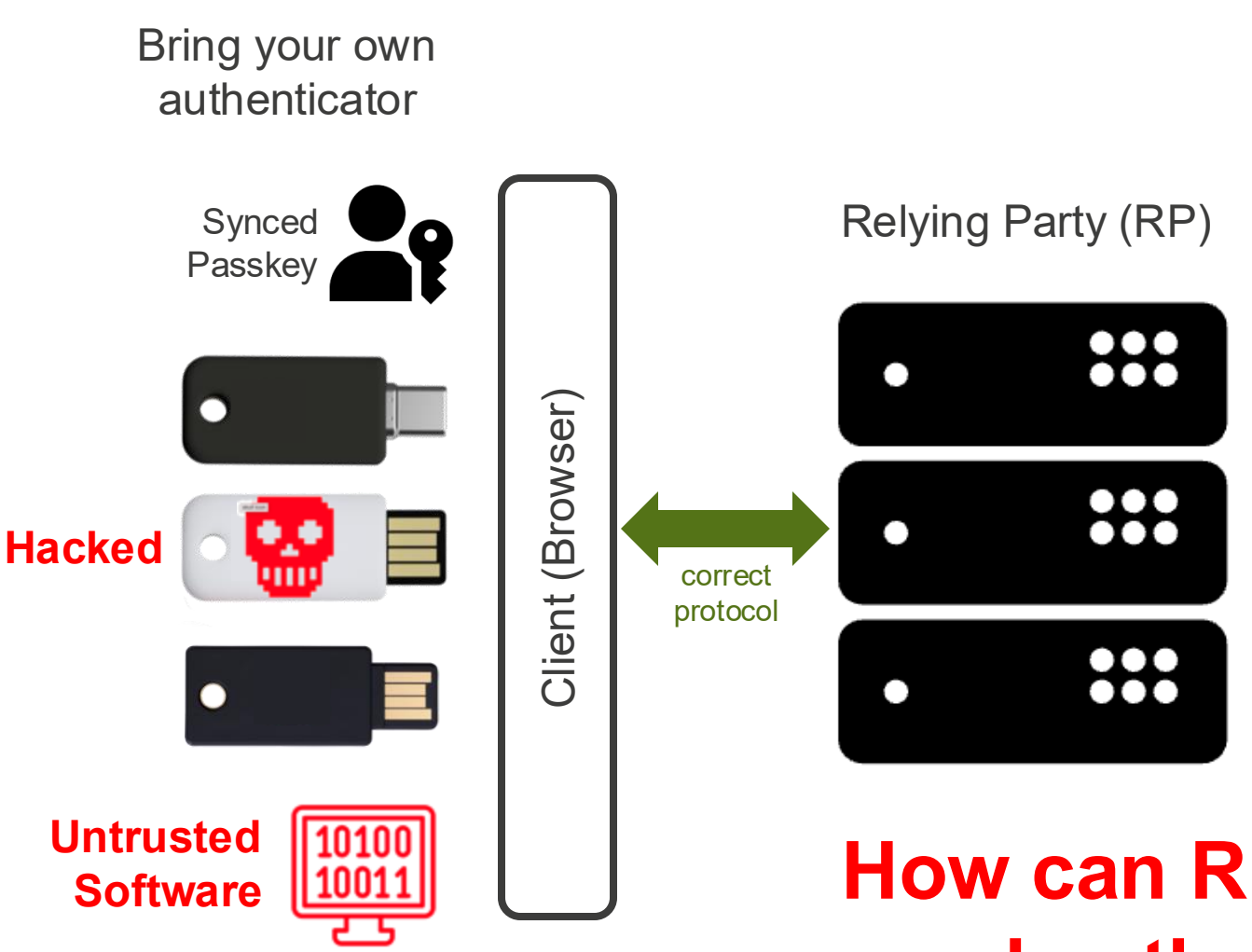
FIDO Relying Party



Relying Party – Main Tasks



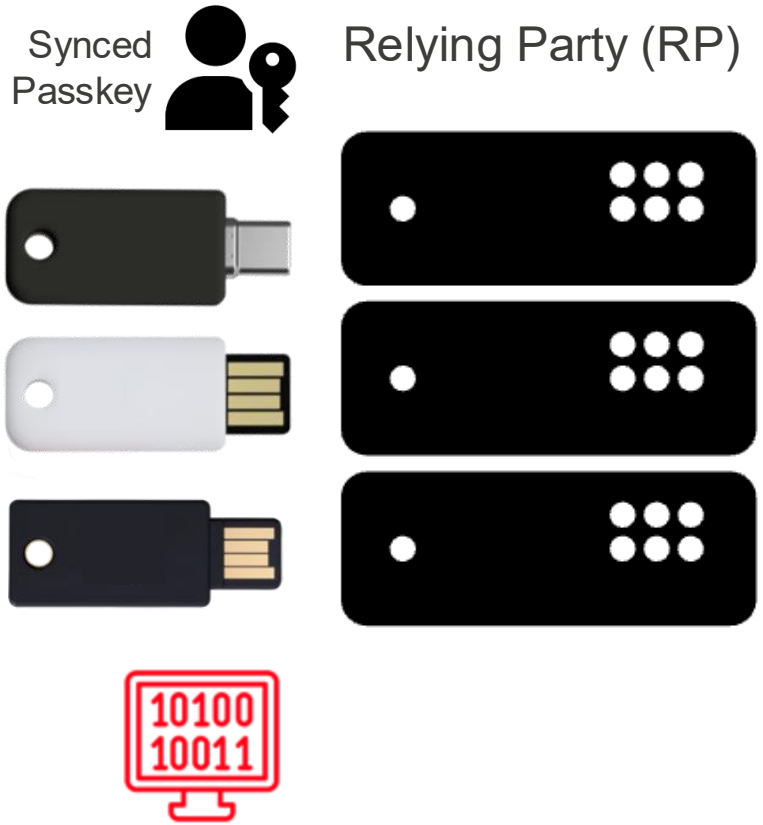
BYOA, FIDO & Attestations



- Trust the authenticator?
- Vulnerable key models?
- Synced passkeys?
- Untrusted software?

How can RP be sure of the used authenticator type?

FIDO Attestations



FIDO2 Attestation (during key registration)

- Process for verifying the **authenticity of the authenticator** (not the user)
- **Provides information** about the registered authenticator
- **Different types** of attestation (Basic, Self, AttCA/AnonCA, Enterprise, None)
- Attestation object may or may not be **signed**
- Attestations may be a **privacy** issue

FIDO Attestations – Apple iCloud passkey example

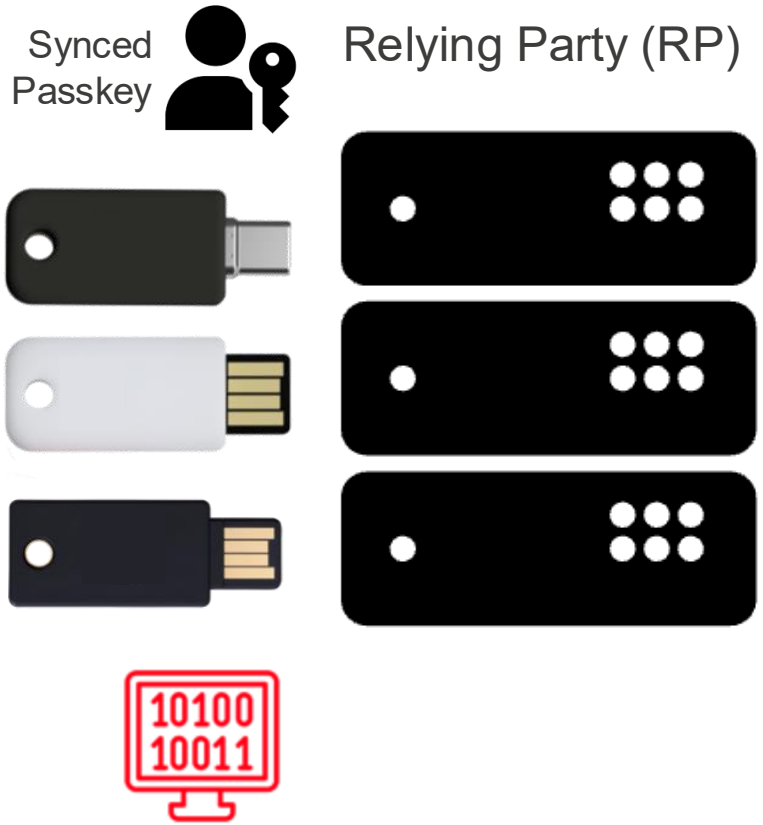

```
"attestationObject": {
  "fmt": "none",
  "attStmt": {},
  "authData": {
    "rpIdHash": "e9a88899f0e3ab9b98f693e
    "flags": {
      "userPresent": true,
      "reserved1": false,
      "userVerified": true,
      "backupEligibility": true,
      "backupState": true,
      "reserved2": false,
      "attestedCredentialData": true,
      "extensionDataIncluded": false
    },
    "signCount": 0,
    "attestedCredentialData": {
      "aaguid": "fbfc3007-154e-4ecc-8c0b-6e020557d7bd",
      "credentialId": "ca05e1b89caa87c1d34971d234a
      "credentialPublicKey": {
        "kty": "EC",
        "alg": "ECDSA_w_SHA256",
        "crv": "P-256",
        "x": "MJeoVq+Cv3wzhxxhrTlZ9FmndB/hUv1b0PN1
        "y": "C7mn4+5klzc3WyhxuJQTeKBA3zWhmQNtu7ZHdK6mDOU="
      }
    }
  }
},
```


No signature
Information not verifiable → only use for stats or UX but **not for security**

`flags`
Useful information on registration for RP

`aaguid: fbfc3007-1…`
Used to look up authenticator model and its properties

FIDO Attestations – YubiKey 5 Example




```
"attestationObject": {
  "fmt": "packed",
  "attStmt": {
    "alg": -7,
    "sig": "3046022100a69a62
    "x5c": [
      "308202bd308201a5a00302
    ]
  },
  "authData": {
    "rpIdHash": "e9a88899f0e3ab9b98f693e0738
    "flags": {
      "userPresent": true,
      "reserved1": false,
      "userVerified": true,
      "backupEligibility": false,
      "backupState": false,
      "reserved2": false,
      "attestedCredentialData": true,
      "extensionDataIncluded": false
    },
    "signCount": 1,
    "attestedCredentialData": {
      "aaguid": "2fc0579f-8113-47ea-b116-bb5
      "credentialId": "35fe9a83e634421e3da8b
      "credentialPublicKey": {
        "kty": "EC",
        "alg": "ECDSA_w_SHA256",
        "crv": "P-256",
        "x": "cw9J1L7oVemaPtjkJhJ+c1ejTtCUpfCTKRvf2x/GnKM=",
        "y": "L5PAgO2WhUrEwoT3tdXq/mwWgETsF8//bPsNg1kg8cU="
      }
    }
  }
},
```


→ Attestation data is **verifiable**
→ Eligible for **security-related decisions**

sig: `3046022100a69a62b15c…`
Digital signature on attestated data

x5c: `308202bd308201a5a0030201…`
Issuer certificate chain

Attestation signature verification

1. Attestation signature verification
Standard, well-known crypto operations

2. Establish in trust chain
Signature is useless if cert issuer is not trusted.

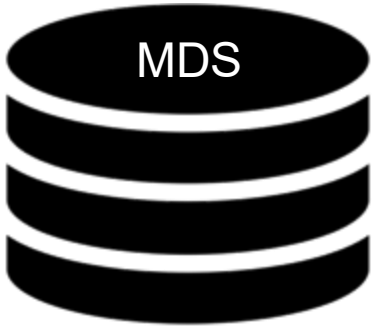
Option 1:
Configure trust roots in RP

→ works for small “closed” set of authenticator models.

Option 2:
Use FIDO MDS
→ next Slides


```
"attestationObject": {
  "fmt": "packed",
  "attStmt": {
    "alg": -7,
    "sig": "3046022100a69a62b15c0a1824c975c44dc40bce7e
    "x5c": [
      "308202bd308201a5a00302010202041e8f8734300d06092
    ]
  },
  "authData": {
    "rpIdHash": "e9a88899f0e3ab9b98f693e0738a37725a3ef
    "flags": {
      "userPresent": true,
      "reserved1": false,
      "userVerified": true,
      "backupEligibility": false,
      "backupState": false,
      "reserved2": false,
      "attestedCredentialData": true,
      "extensionDataIncluded": false
    },
    "signCount": 1,
    "attestedCredentialData": {
      "aaguid": "2fc0579f-8113-47ea-b116-bb5a8db9202a"
      "credentialId": "35fe9a83e634421e3da8b6c07716f61
      "credentialPublicKey": {
        "kty": "EC",
        "alg": "ECDSA_w_SHA256",
        "crv": "P-256",
        "x": "cw9J1L7oVemaPtjkJhJ+c1ejTtCUpfCTKRvf2x/G
        "y": "L5PAgO2WhUrEwoT3tdXq/mwWgETsF8//bPsNg1kg
      }
    }
  }
},
```

FIDO2 MDS (Meta Data Service)



Publishes MDS File

30 days

- Large JWT (signed JSON structure)
- Many attributes of > 300 FIDO authenticator models
- Attestation certificate roots
- FIDO Certification level
- Key protection type
- + many more attributes

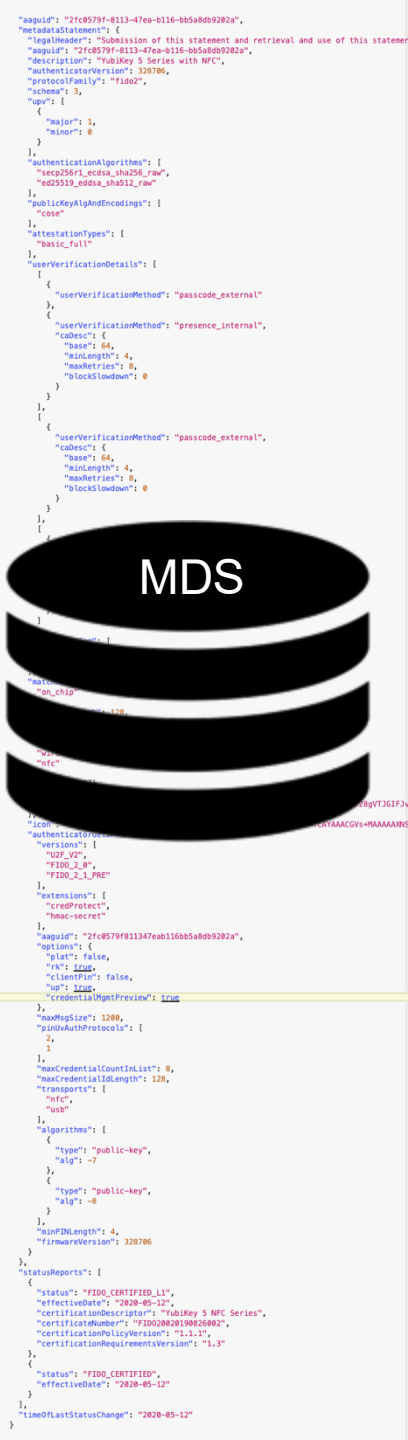
FIDO2 MDS usage in Relying Party


```
"attestationObject": {
  "fmt": "packed",
  "attStmt": {
    "alg": -7,
    "sig": "3046022100a69a62b15c0a1824c97
    "x5c": [
      "308202bd308201a5a00302010202041e8f8
    ]
  },
  "authData": {
    "rpIdHash": "e9a88899f0e3ab9b98f693e0
    "flags": {
      "userPresent": true,
      "reserved1": false,
      "userVerified": true,
      "backupEligibility": false,
      "backupState": false,
      "reserved2": false,
      "attestedCredentialData": true,
      "extensionDataIncluded": false
    },
    "signCount": 1,
    "attestedCredentialData": {
      "aaguid": "2fc0579f-8113-47ea-b116-
      "credentialId": "35fe9a83e634421e3d
      "credentialPublicKey": {
        "kty": "EC",
        "alg": "ECDSA_w_SHA256",
        "crv": "P-256",
        "x": "cw9J1L7oVemaPtjkJhJ+c1ejTtC
        "y": "L5PAgO2WhUrEwoT3tdXq/mwWgET
      }
    }
  }
},
```


1. Look up Authenticator using AAGUID

2. Verify attestation using trusted roots from MDS

3. Apply RP policy using MDS data.
   Example:
   - at least L1 certified
   - key must be in hardware
   - not revoked



“FIDO2 **attestation** – especially using the MDS – is a **must** for meaningful RP policies in **high-security** use-cases.“

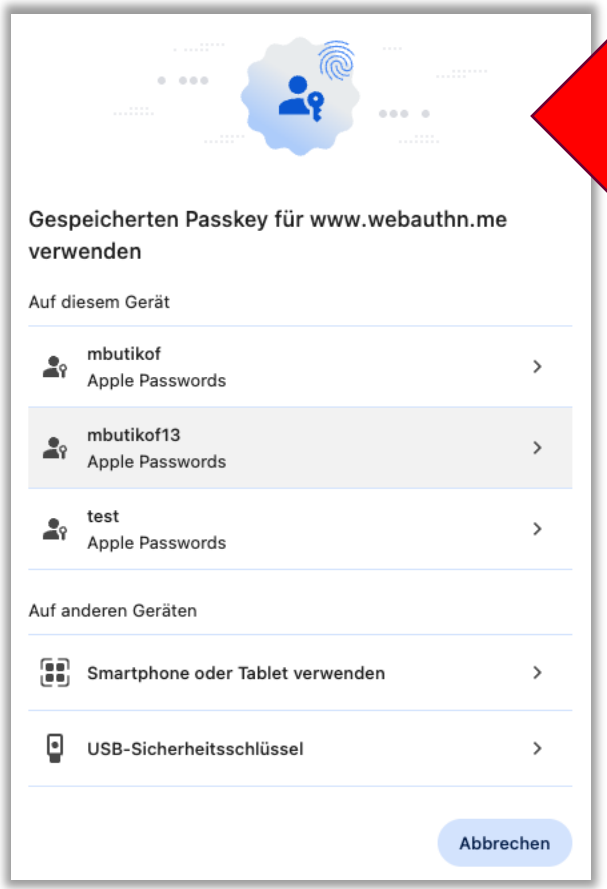
Anything else?

More crucial relying party tasks

Flexibility

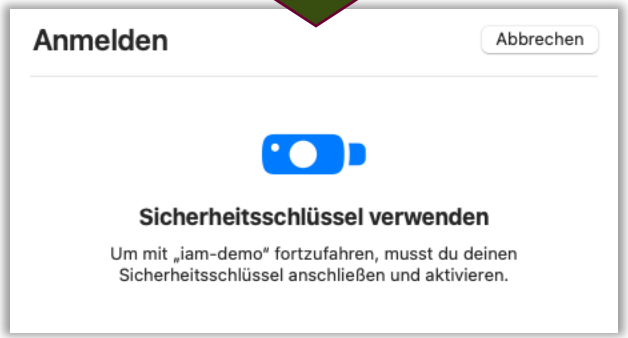
- ✓ Flexible Authentication workflows
- ✓ Allow coexistence of passkeys with other auth factors
- ✓ Migrate end-users from passwords to passkeys
- ✓ Self-services for passkeys
- ✓ Flexible FIDO policy options

Optimize User Experience (UX)



Bad UX:
Too many choices

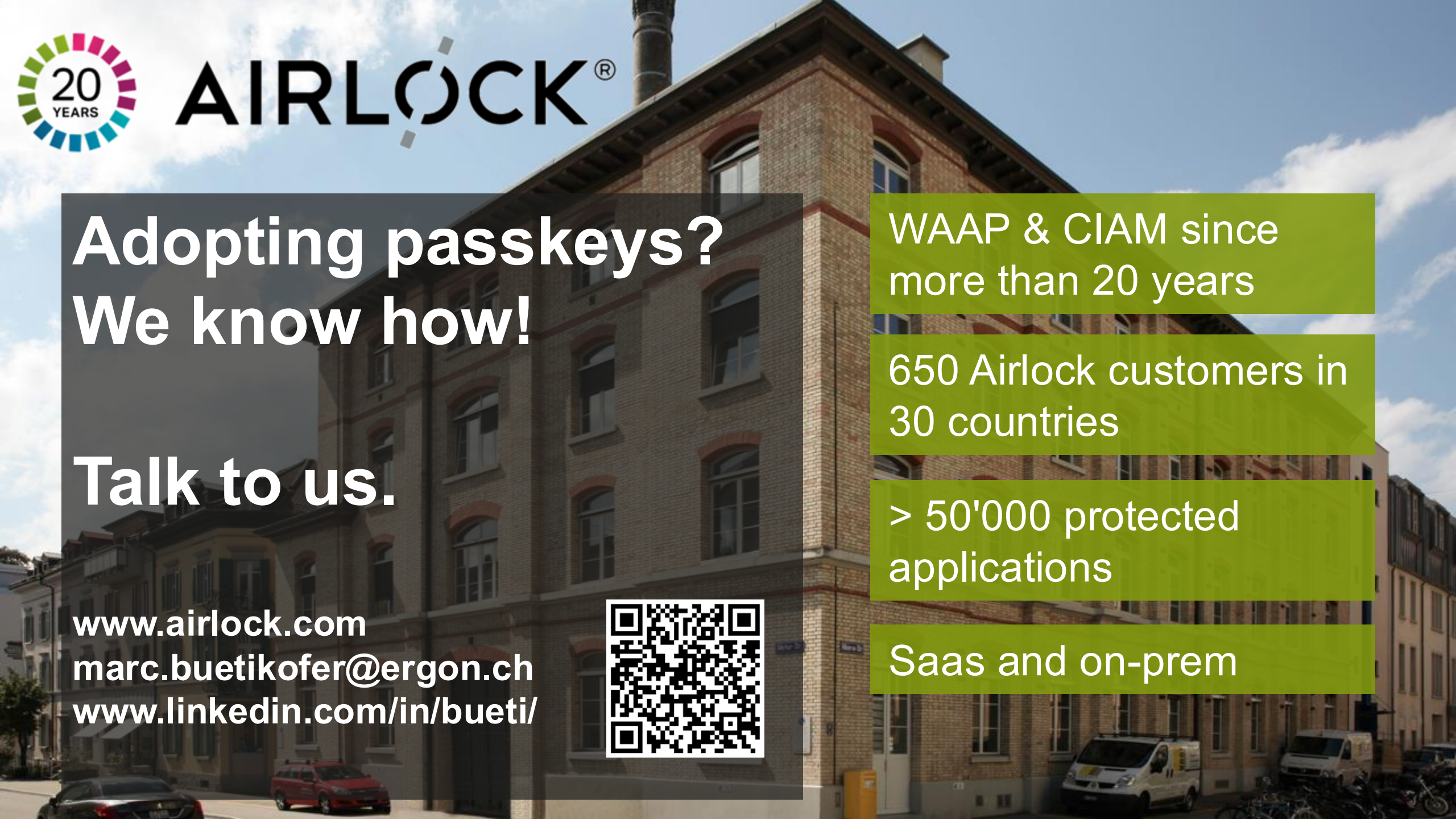
Good UX:
Relying party limits choices



- This is just one of many example
- The FIDO2 relying party has many options to influence end-user UX
- Passkey UX can be challenging for unexperienced end-users
- Optimized UX makes the the day in consumer use-cases

KEY LEARNINGS

- Relying party is crucial for security
- Verification of authenticator authenticity plays a major role
- Achieving good UX is not that easy
- IAM (RP) must be flexible and mature


20 YEARS
AIRLOCK®
Adopting passkeys?
We know how!
Talk to us.
www.airlock.com
marc.buetikofer@ergon.ch
www.linkedin.com/in/bueti/
WAAP & CIAM since more than 20 years
650 Airlock customers in 30 countries
> 50'000 protected applications
Saas and on-prem