iHub

Privacy Friendly Digital Identity Wallets?

The devil is in the details (unfortunately)!

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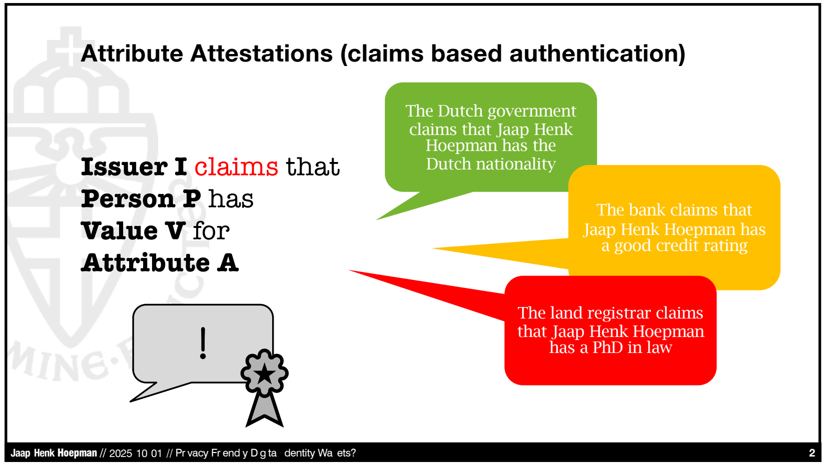

Attribute Attestations (claims based authentication)

Issuer I claims that
Person P has
Value V for
Attribute A

The Dutch government claims that Jaap Henk Hoepman has the Dutch nationality

The bank claims that Jaap Henk Hoepman has a good credit rating

The land registrar claims that Jaap Henk Hoepman has a PhD in law

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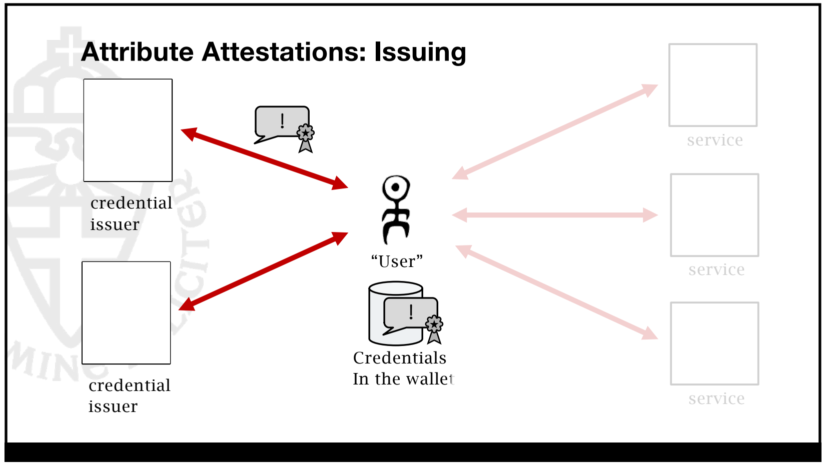

Attribute Attestations: Issuing

credential issuer

credential issuer

“User”

Credentials
In the wallet

service

service

service

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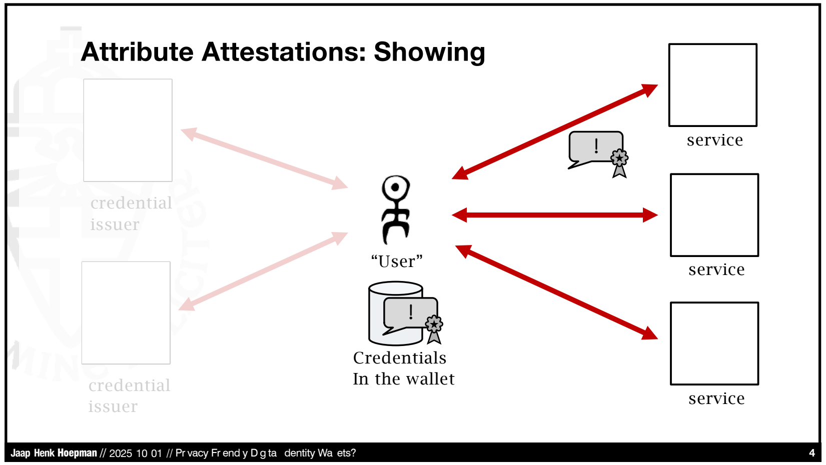

Attribute Attestations: Showing

credential issuer

credential issuer

“User”

Credentials
In the wallet

service

service

service

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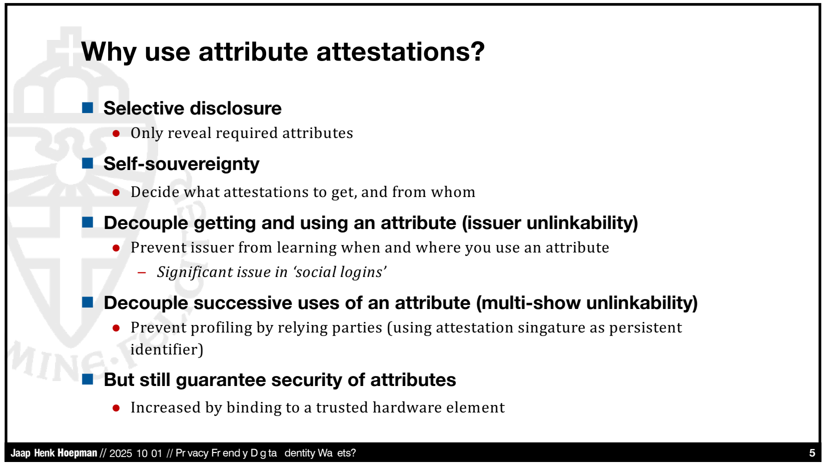
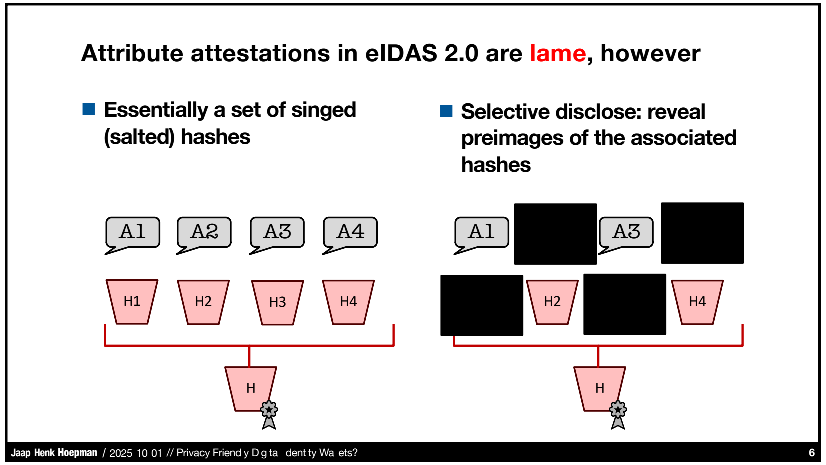


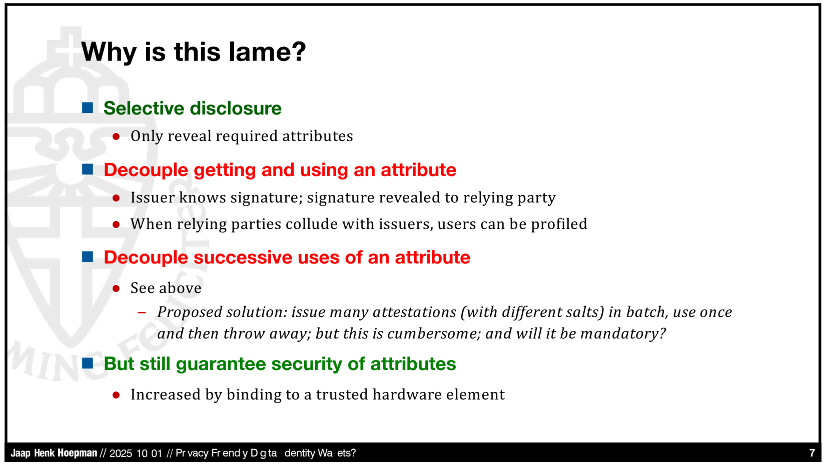
Why use attribute attestations?

- **Selective disclosure**
  - Only reveal required attributes
- **Self-souvereignty**
  - Decide what attestations to get, and from whom
- **Decouple getting and using an attribute (issuer unlinkability)**
  - Prevent issuer from learning when and where you use an attribute
    - *Significant issue in 'social logins'*
- **Decouple successive uses of an attribute (multi-show unlinkability)**
  - Prevent profiling by relying parties (using attestation singature as persistent identifier)
- **But still guarantee security of attributes**
  - Increased by binding to a trusted hardware element



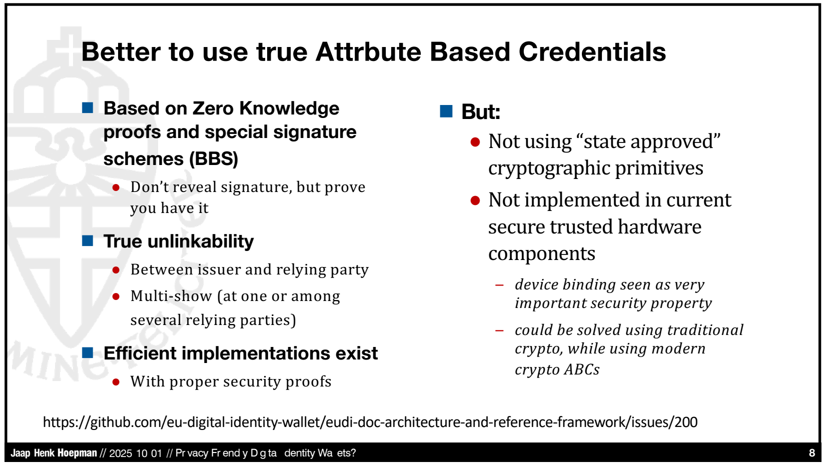
Attribute attestations in eIDAS 2.0 are lame, however

- **Essentially a set of singed (salted) hashes**
- **Selective disclose: reveal preimages of the associated hashes**



Why is this lame?

- **Selective disclosure**
  - Only reveal required attributes
- **Decouple getting and using an attribute**
  - Issuer knows signature; signature revealed to relying party
  - When relying parties collude with issuers, users can be profiled
- **Decouple successive uses of an attribute**
  - See above
    - *Proposed solution: issue many attestations (with different salts) in batch, use once and then throw away; but this is cumbersome; and will it be mandatory?*
- **But still guarantee security of attributes**
  - Increased by binding to a trusted hardware element

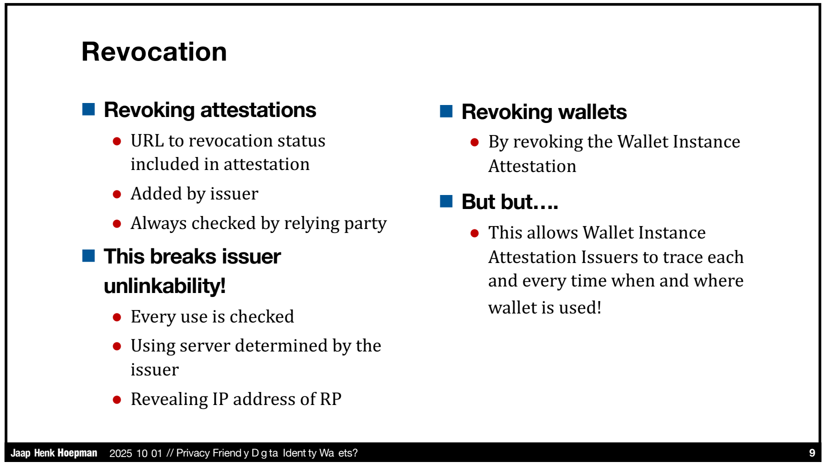


Better to use true Attrbute Based Credentials

- **Based on Zero Knowledge proofs and special signature schemes (BBS)**
  - Don't reveal signature, but prove you have it
- **True unlinkability**
  - Between issuer and relying party
  - Multi-show (at one or among several relying parties)
- **Efficient implementations exist**
  - With proper security proofs

- **But:**
  - Not using "state approved" cryptographic primitives
  - Not implemented in current secure trusted hardware components
    - *device binding seen as very important security property*
    - *could be solved using traditional crypto, while using modern crypto ABCs*

https://github.com/eu-digital-identity-wallet/eudi-doc-architecture-and-reference-framework/issues/200



Revocation

- **Revoking attestations**
  - URL to revocation status included in attestation
  - Added by issuer
  - Always checked by relying party
- **This breaks issuer unlinkability!**
  - Every use is checked
  - Using server determined by the issuer
  - Revealing IP address of RP
- **Revoking wallets**
  - By revoking the Wallet Instance Attestation
- **But but….**
  - This allows Wallet Instance Attestation Issuers to trace each and every time when and where wallet is used!

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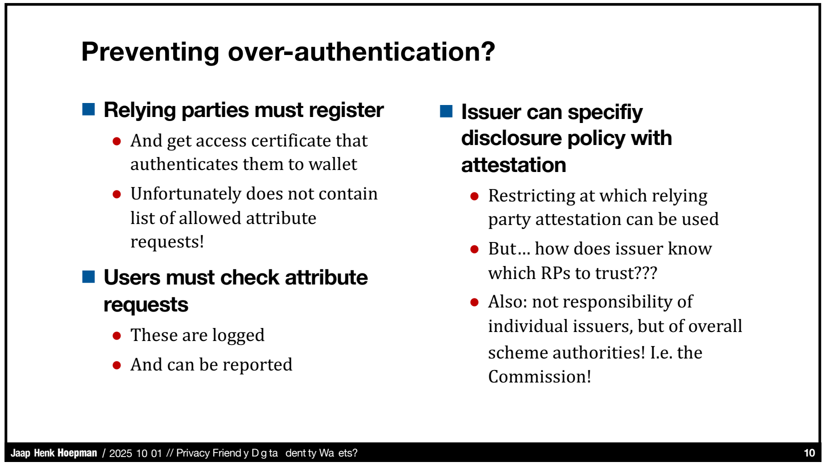

Preventing over-authentication?

- **Relying parties must register**
  - And get access certificate that authenticates them to wallet
  - Unfortunately does not contain list of allowed attribute requests!
- **Users must check attribute requests**
  - These are logged
  - And can be reported
- **Issuer can specifiy disclosure policy with attestation**
  - Restricting at which relying party attestation can be used
  - But… how does issuer know which RPs to trust???
  - Also: not responsibility of individual issuers, but of overall scheme authorities! I.e. the Commission!

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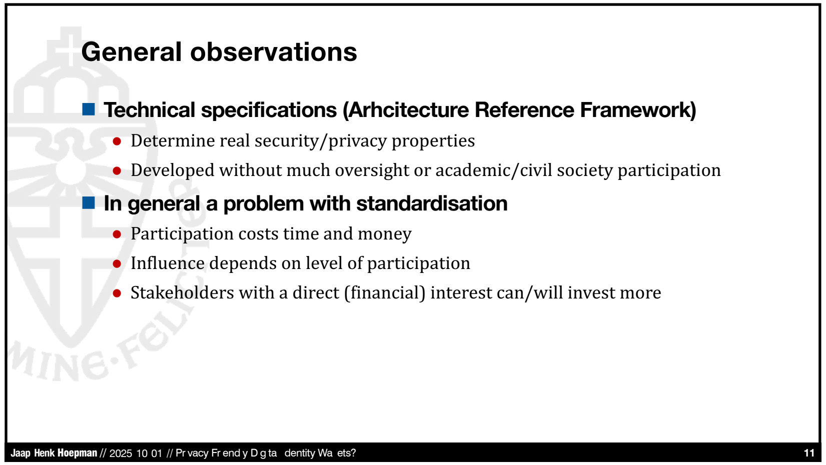

General observations

- **Technical specifications (Arhcitecture Reference Framework)**
  - Determine real security/privacy properties
  - Developed without much oversight or academic/civil society participation
- **In general a problem with standardisation**
  - Participation costs time and money
  - Influence depends on level of participation
  - Stakeholders with a direct (financial) interest can/will invest more

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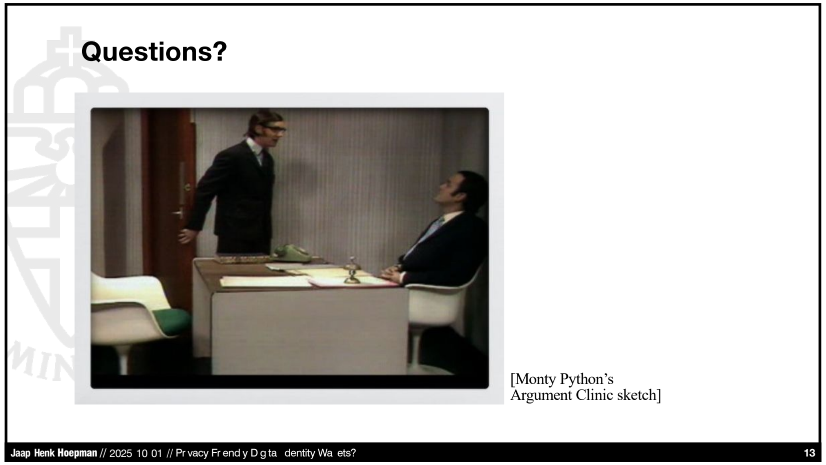

Questions?

[Monty Python's
Argument Clinic sketch]