Design Exploration of Transparency Enhancing Technology for Government

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Content

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Introduction

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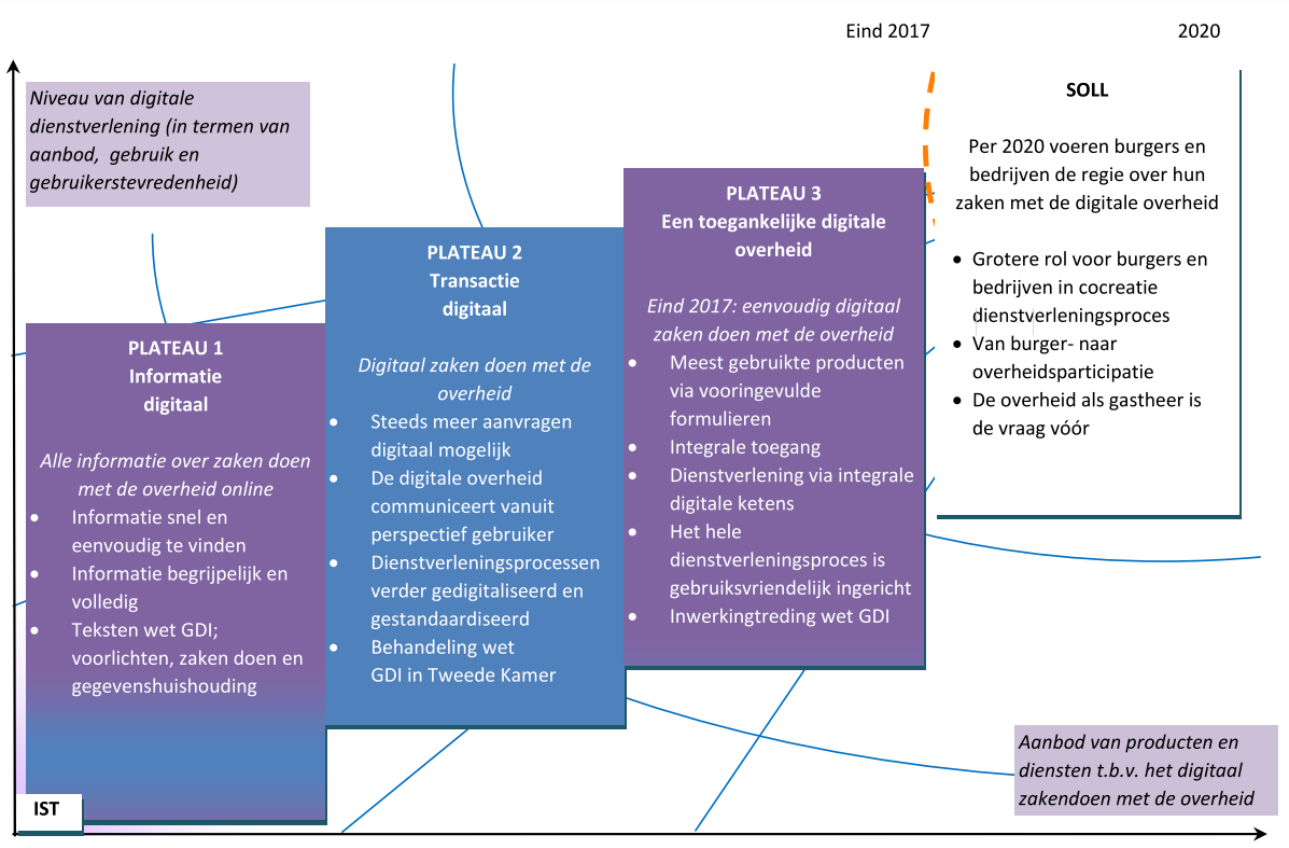
Vision of Dutch digital government by **2017** and **2020**



Citizens have right of **transparency** and **control** over their data

Research question

How could transparency enhancing technology be designed for use by the government without negatively impacting citizen privacy?

Requirements

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Citizens rights

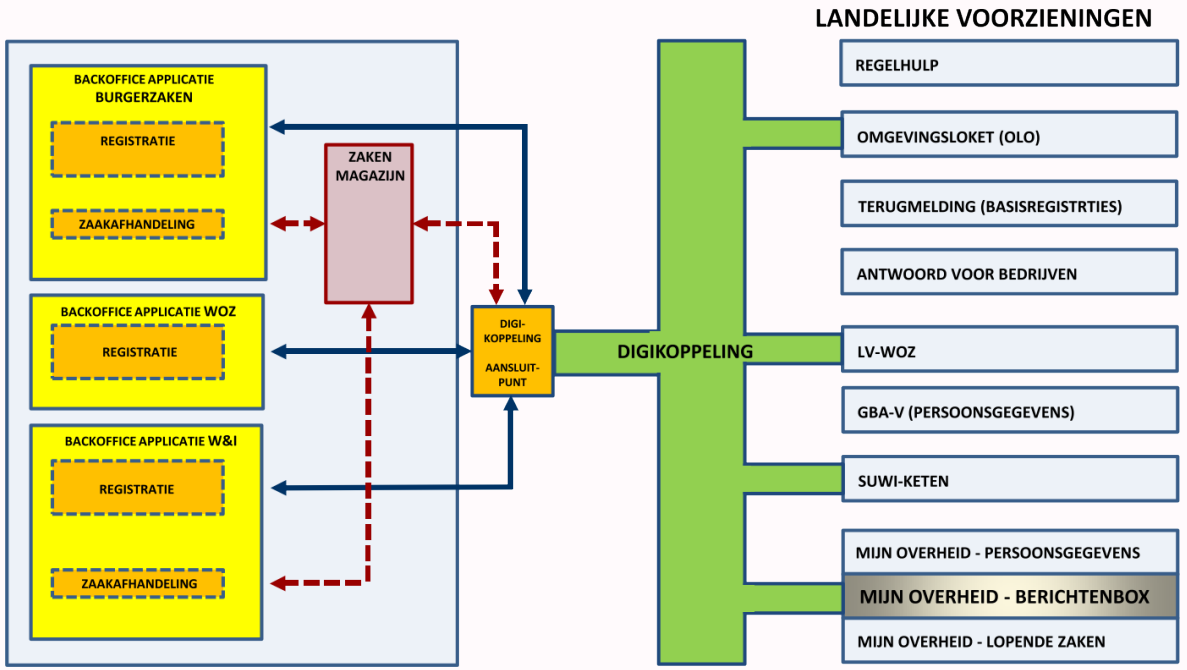
- View your data
- Correct your data
- Easily accessible
- Authorize others
- Granular access

Government

- Authentication
- Security
- Electronic ID
- Foreign eIDs
- Digital services

Existing Technology

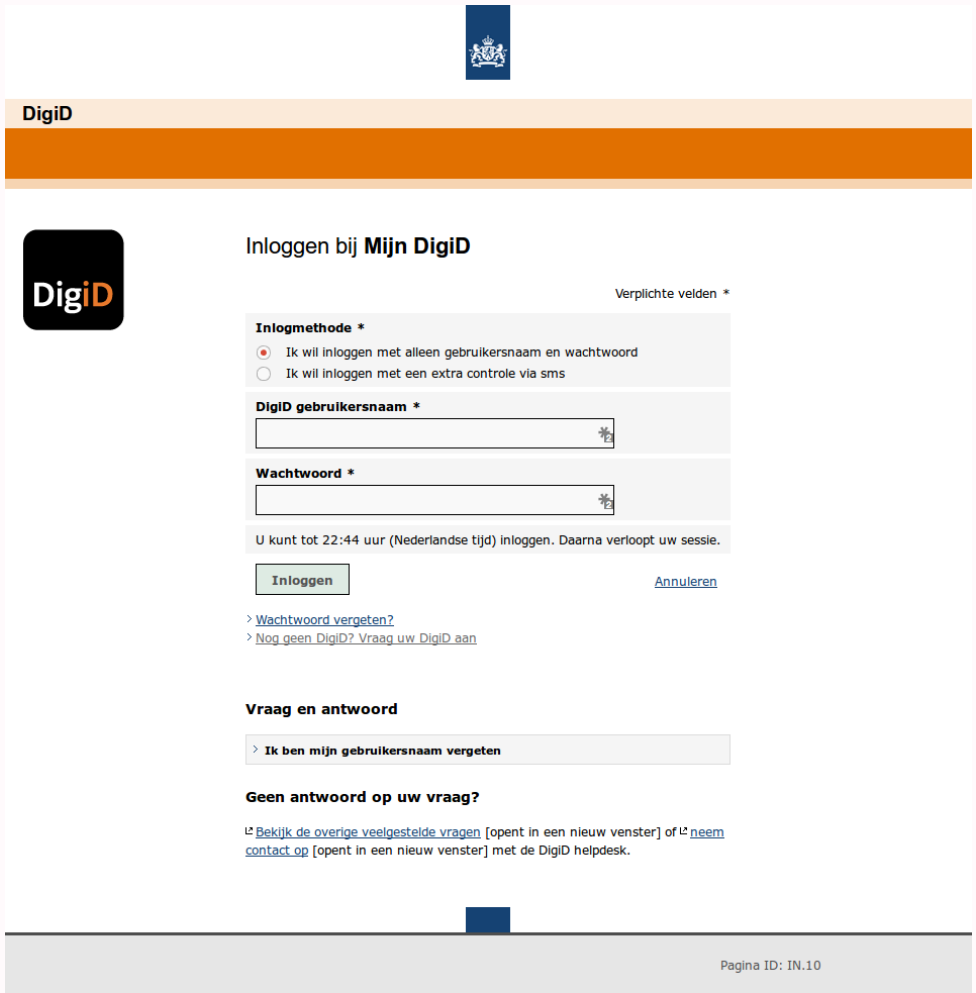
- DigiD
- eID / Idensys
- MijnOverheid



These example systems are all part of the solution currently implemented by the Dutch government.

DigiD

- **DigiD**
- eID / Idensys
- MijnOverheid



Secure* identity provider for government sites.

eID / Idensys

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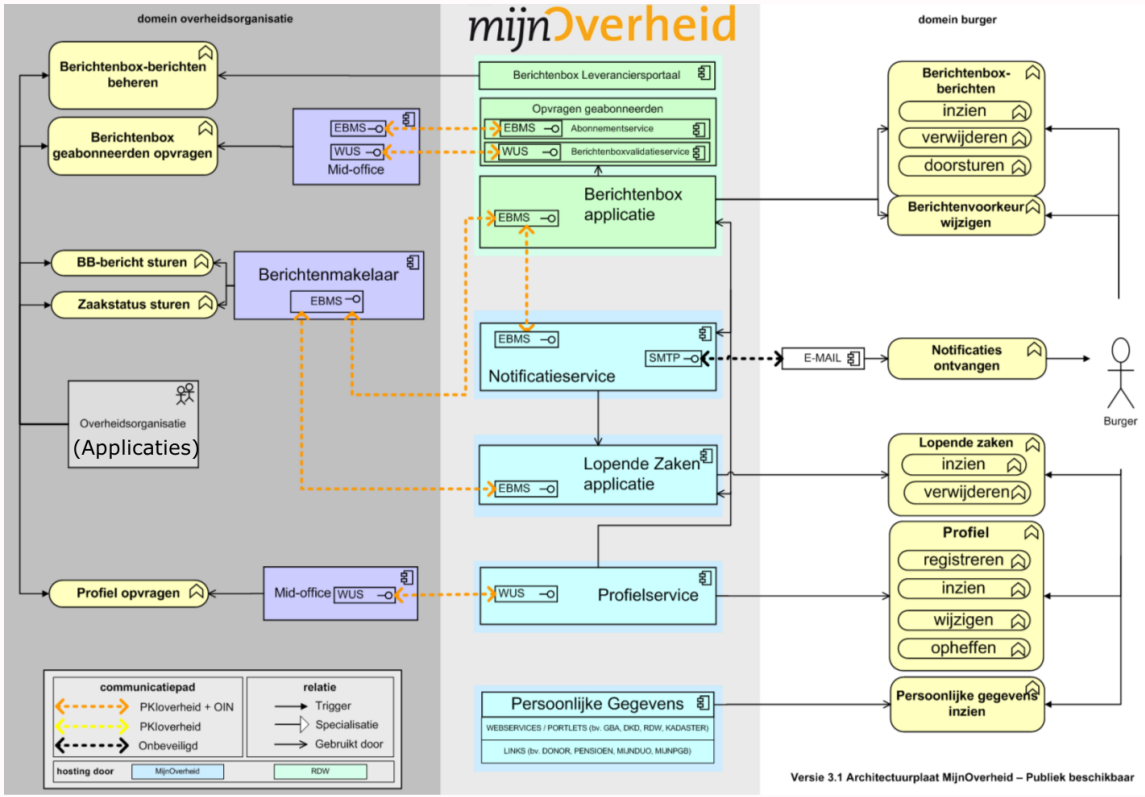
- DigiD
- **eID / Idensys**
- MijnOverheid

Secure identity provider for government and business providing STORK 3 / 4 level authentication.

MijnOverheid

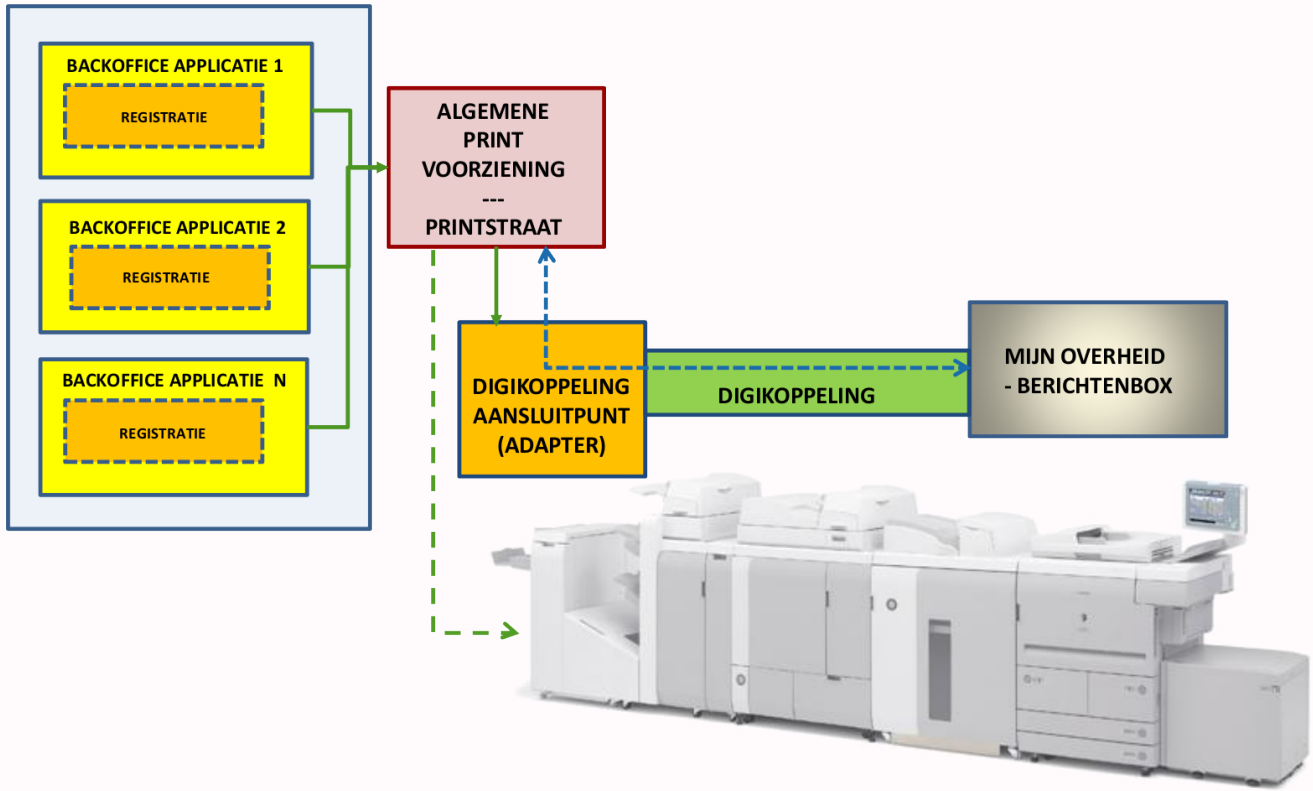
- DigiD
- eID / Idensys
- **MijnOverheid**



Digital postbox for official government mail.

MijnOverheid

- DigiD
- eID / Idensys
- **MijnOverheid**



printer

Digital ~~postbox~~ for official government mail.

Distribution Architecture

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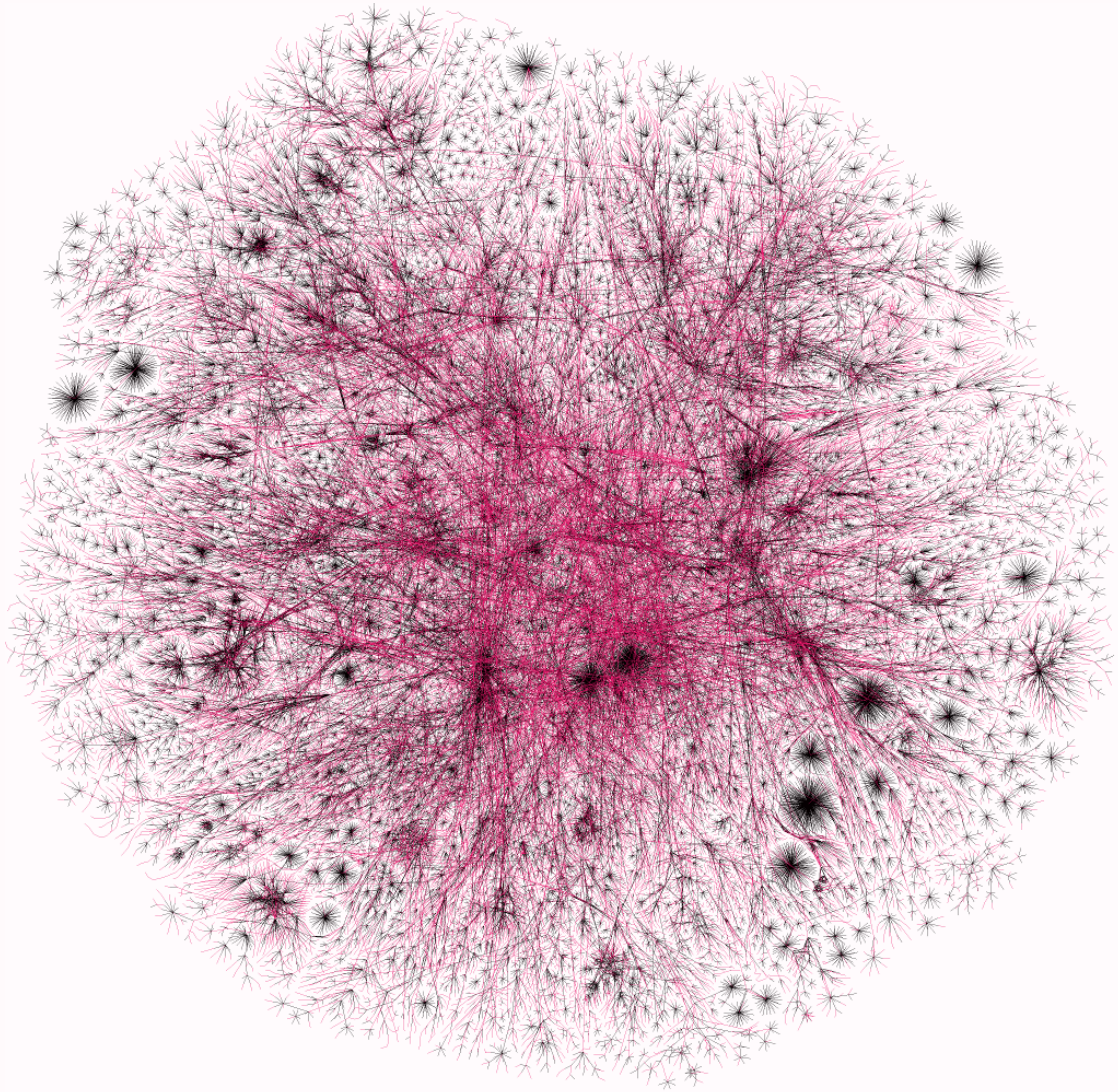
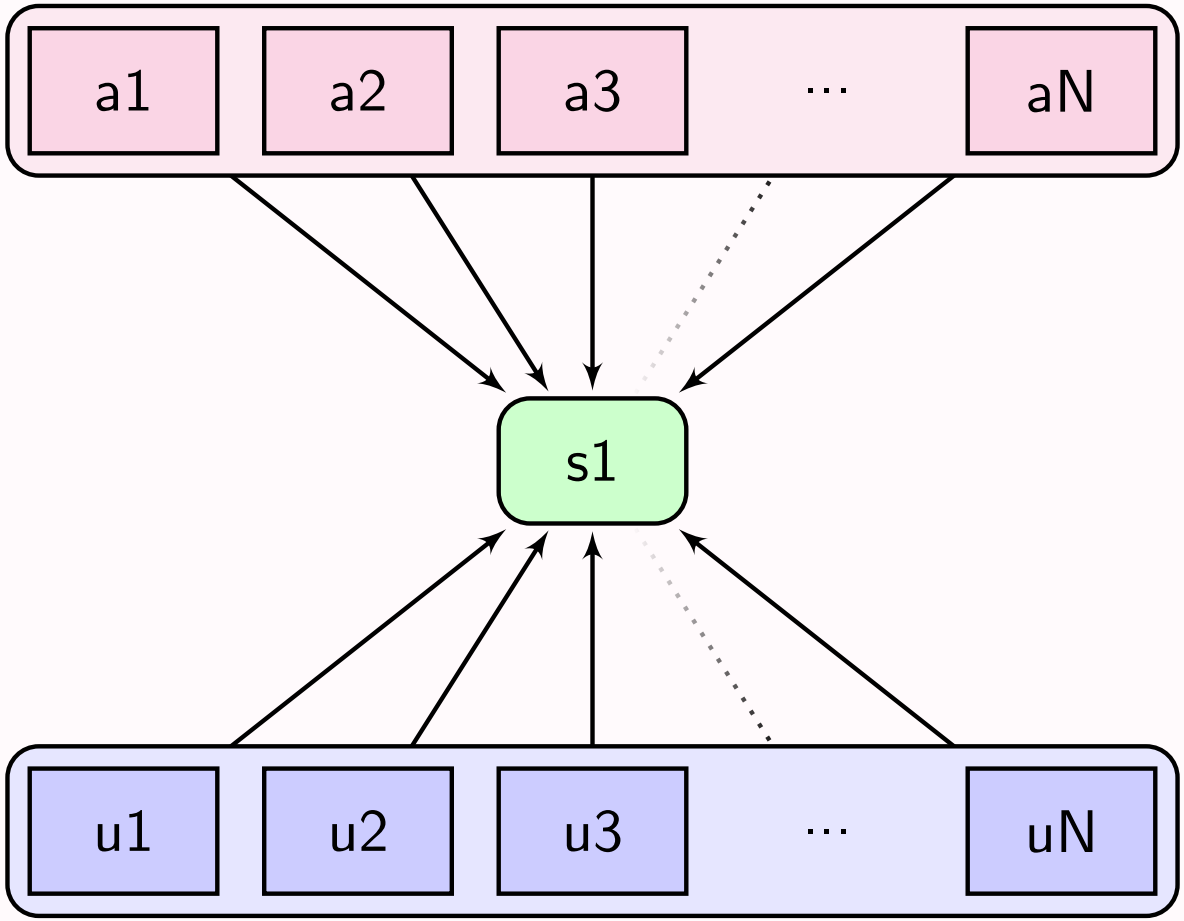
- Centralized
- Distributed
- Federated

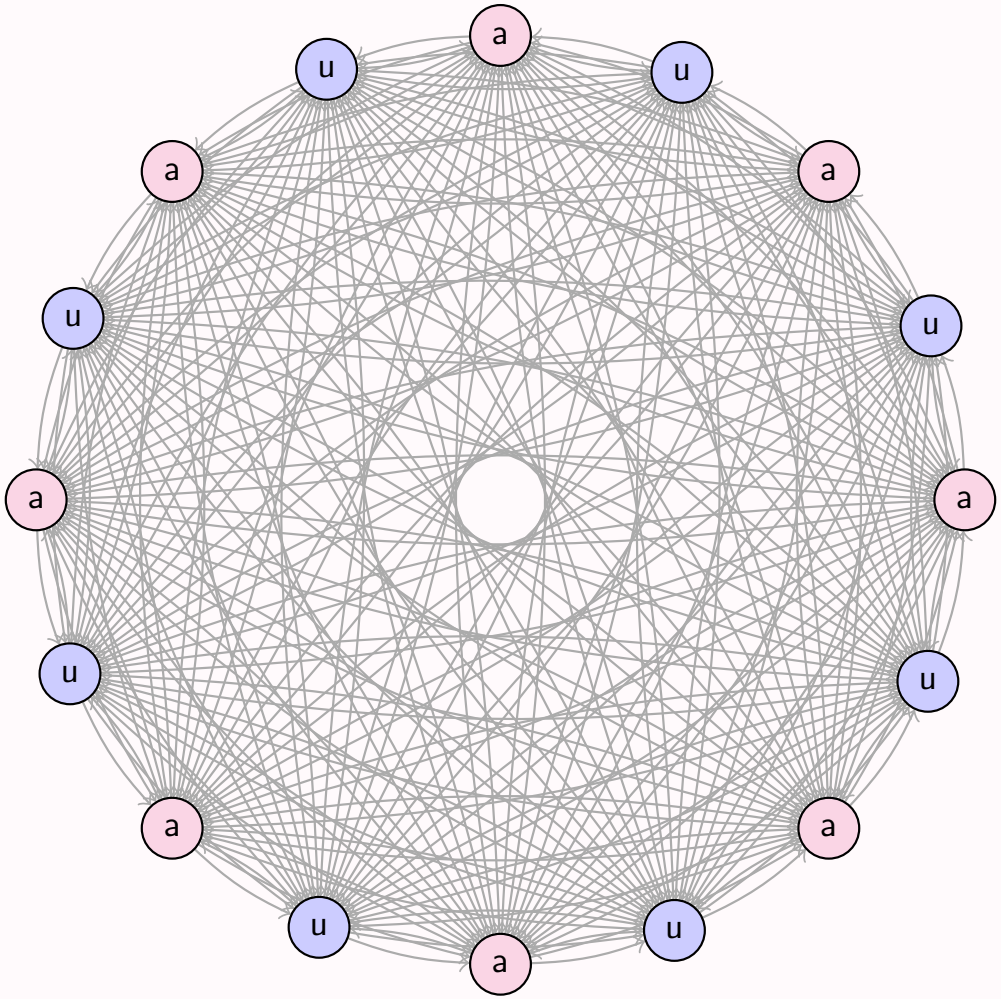


Architecture - Centralized



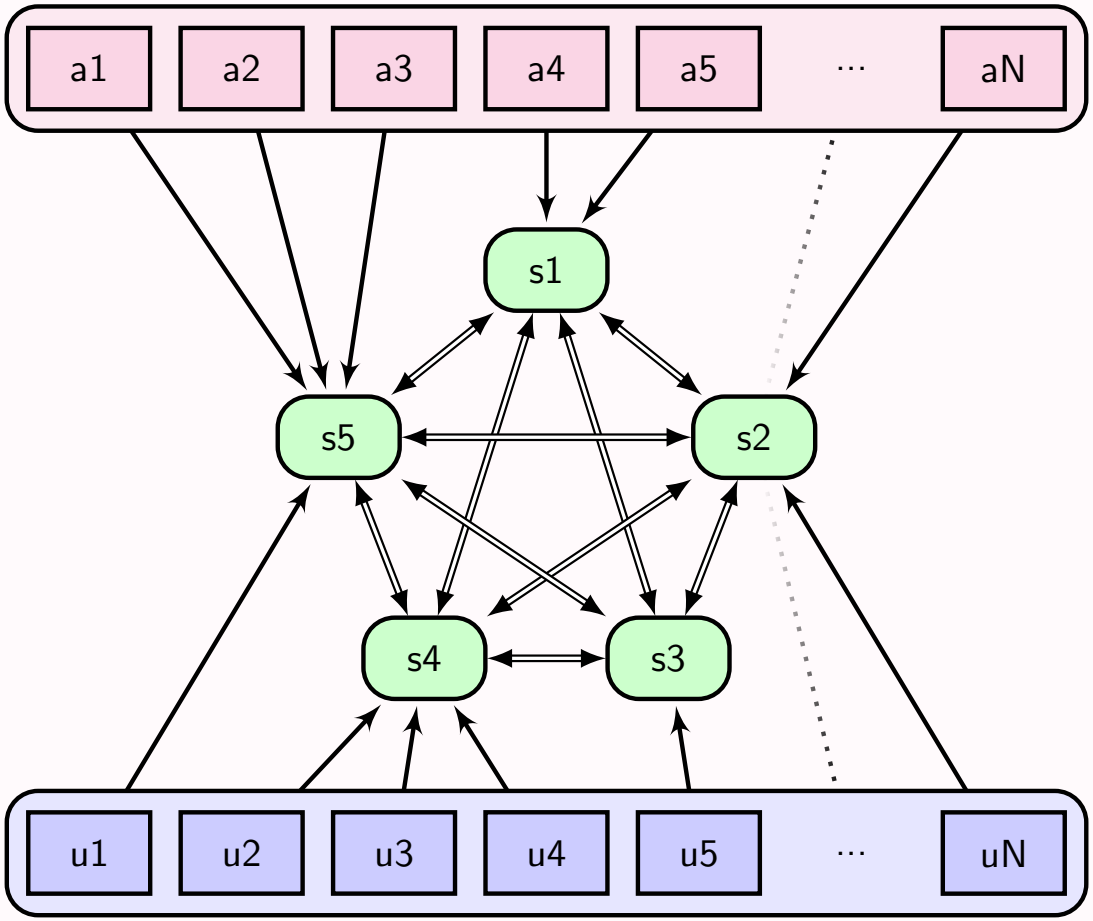
A centralized server architecture where all agencies (a1-aN) and users (u1-uN) use the same central service.

Architecture - Distributed



A distributed architecture where all agencies and users are peers.

Architecture - Federated

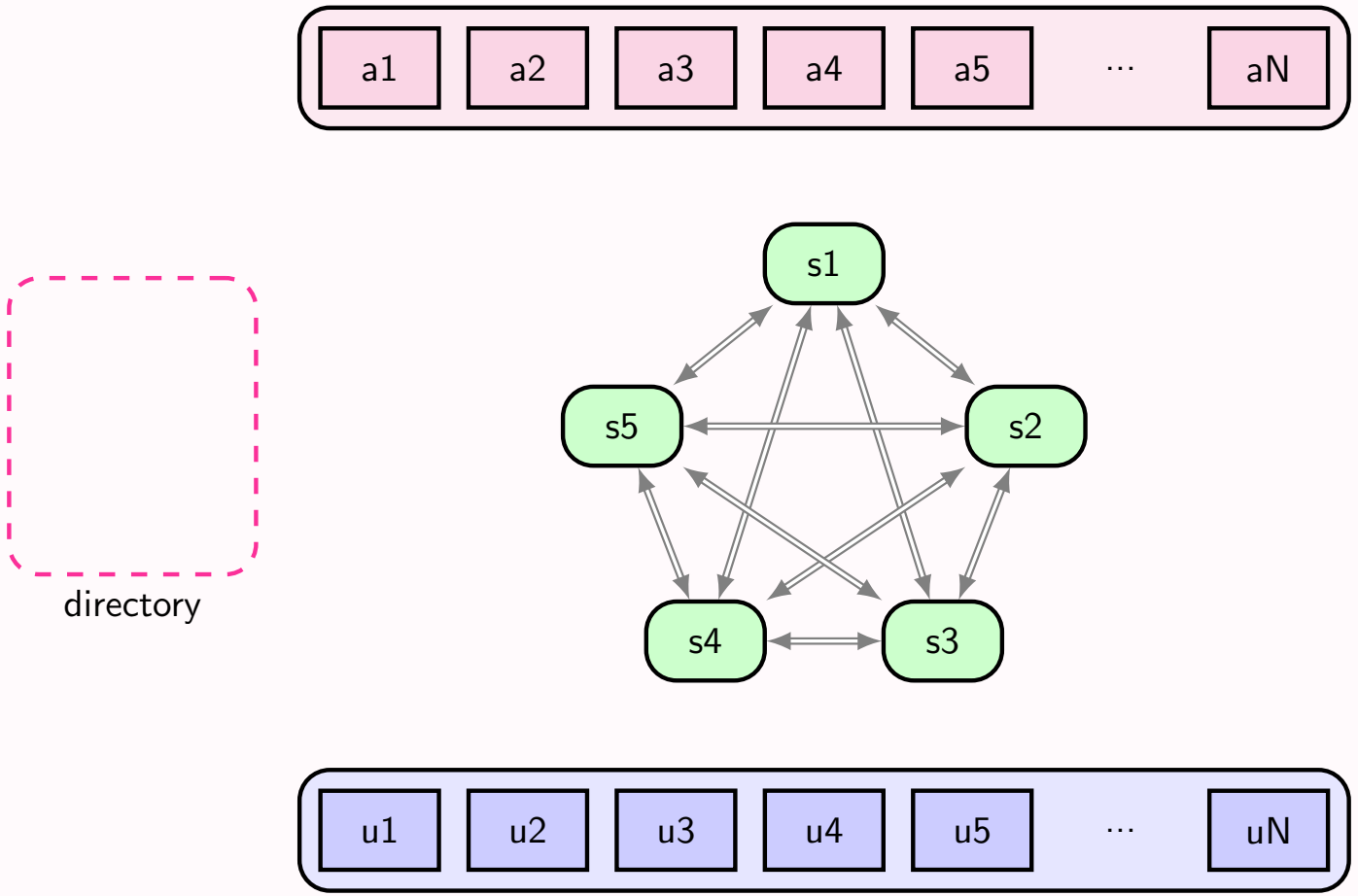


A Federated server architecture where all agencies (a1-aN) and users (u1-uN) choose which service they use.

Design Architecture

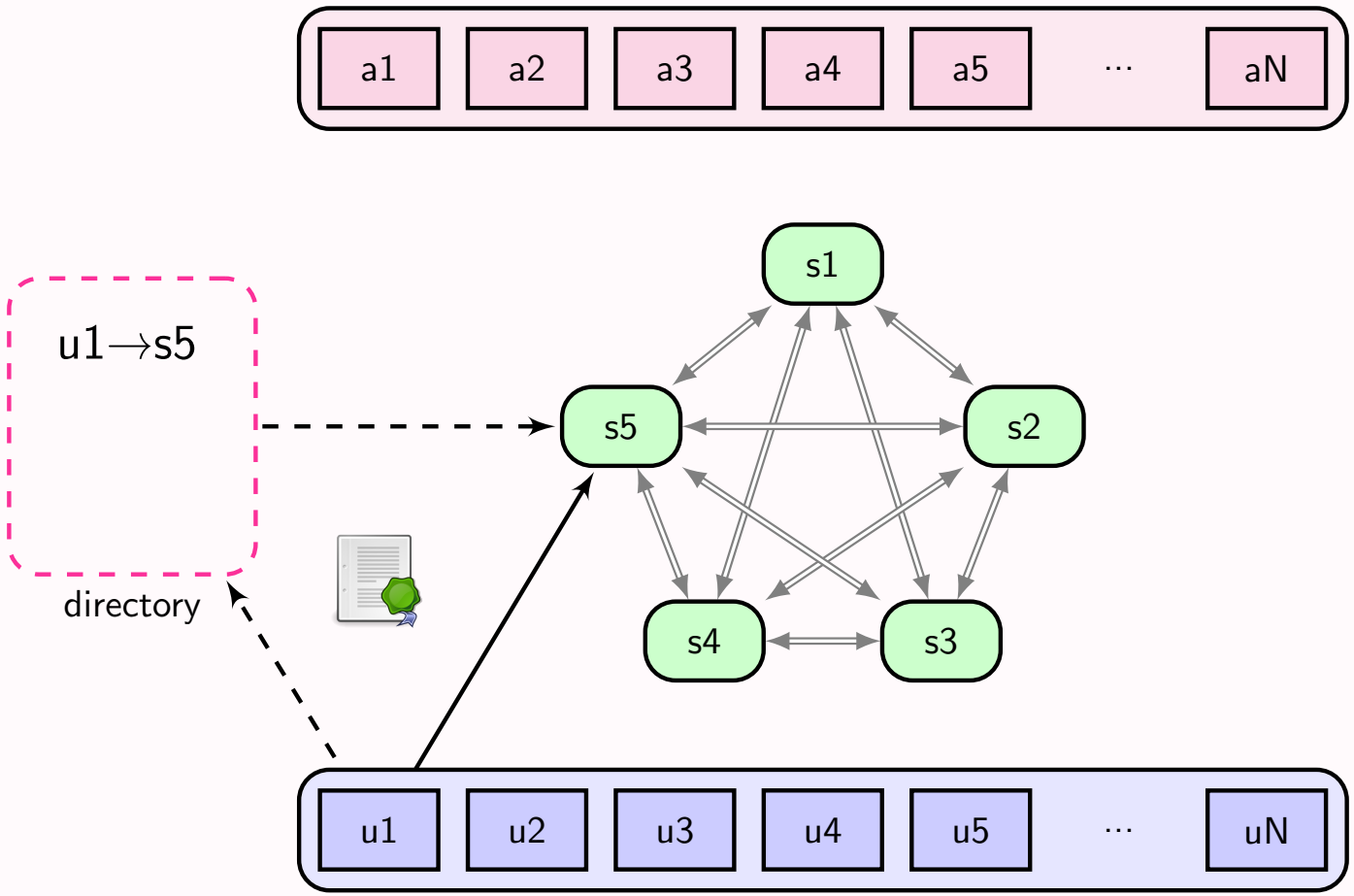
When we evaluate the requirements for the transparency enhancing system, with an additional focus on the requirement for **privacy by design**, it seems most promising to use a federated architecture for our design.

Design - Distribution



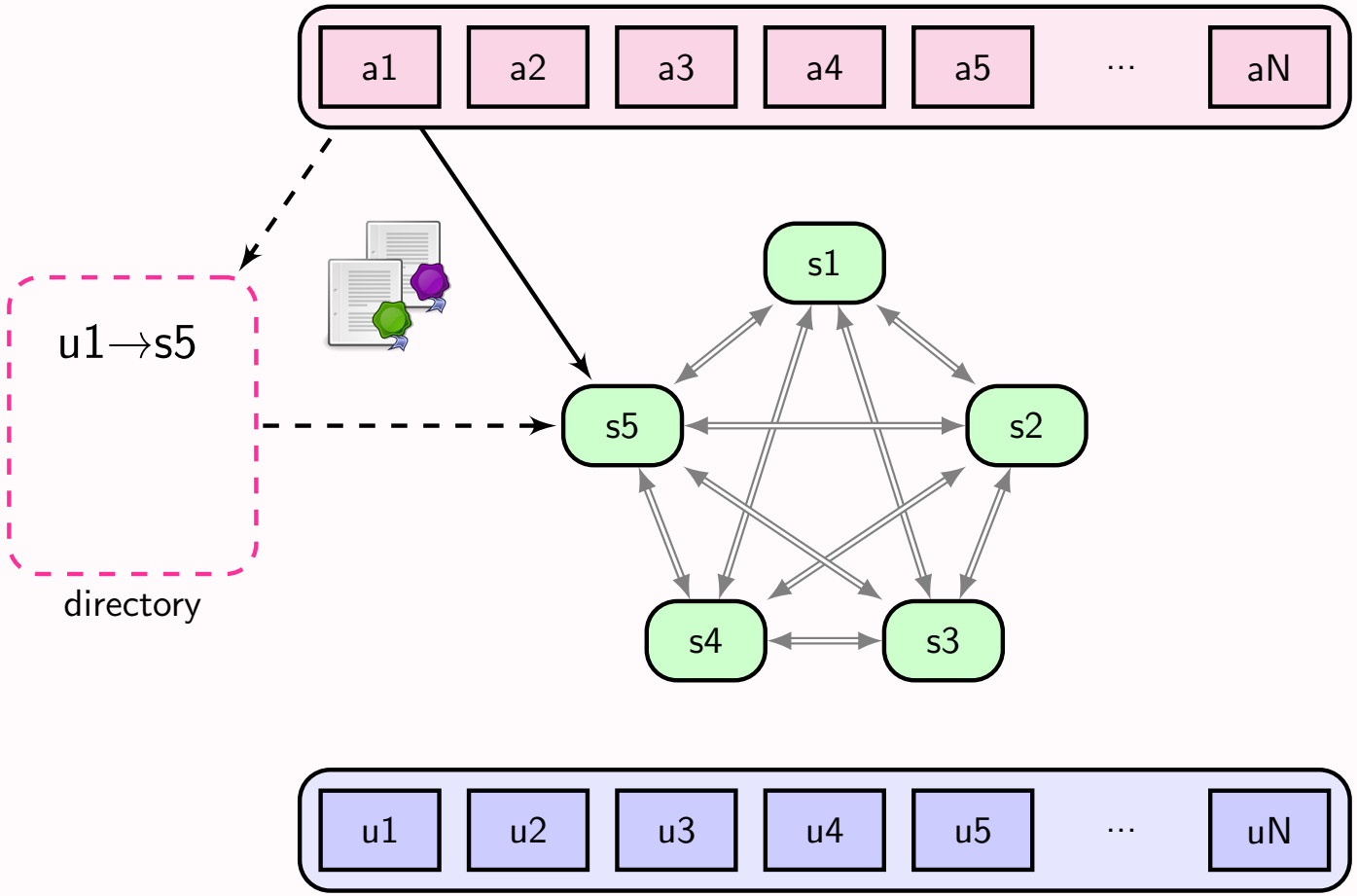
Design based on a federated architecture where all users can choose their **home service** by storing a signed pointer in a public directory.

Design - Home service



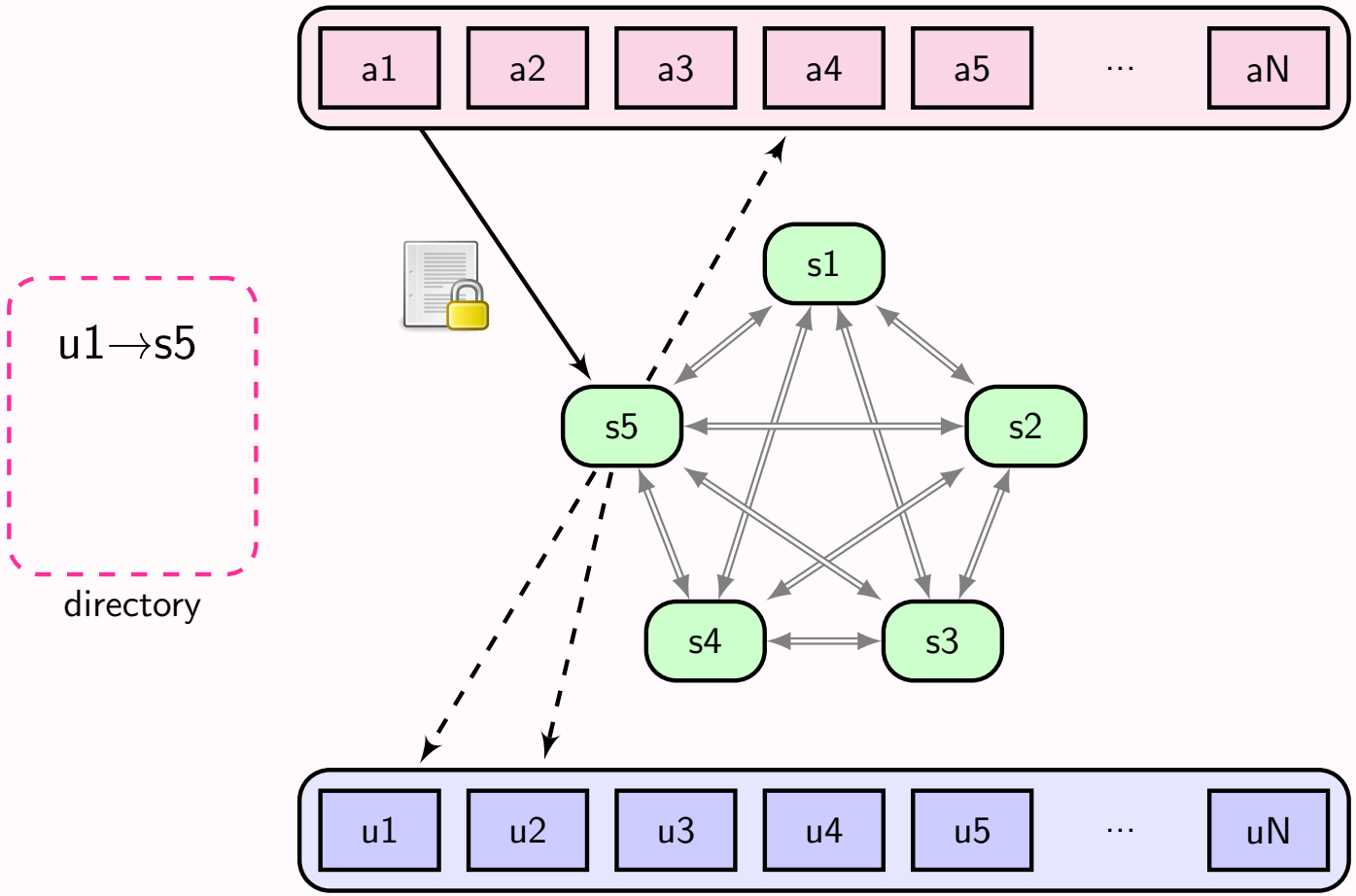
Public home service example:
User **u1** indicates his/her home service is **s5**.

Design - Home lookup



Public home service lookup example:
Agency **a1** needs to find **u1** home service.

Design - File push



Agency file push example:
Agency **a1** pushes a file to their user **u1** namespace at service **s5**.

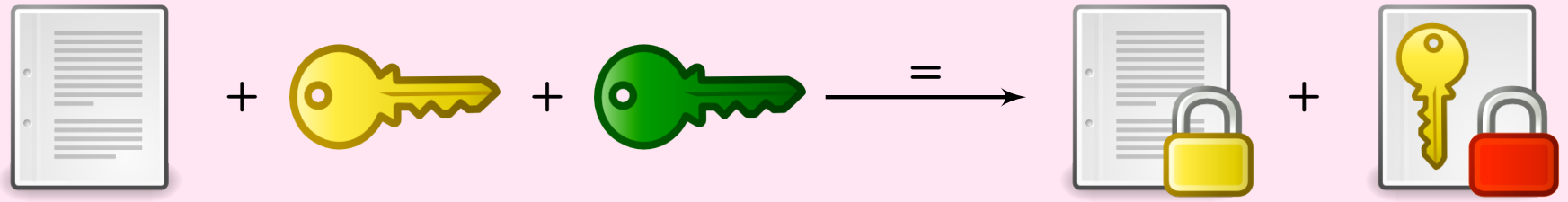
Design - Key issuance

Government key issuance

Own keypair registration

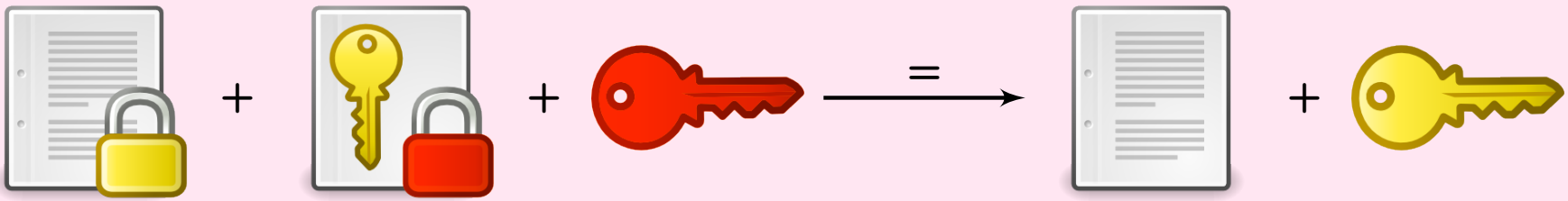
Design - Encryption

Symmetric file encryption with asymmetric key encryption



File Symmetric key Public key Encrypted file Encrypted key

Asymmetric key decryption with symmetric file decryption

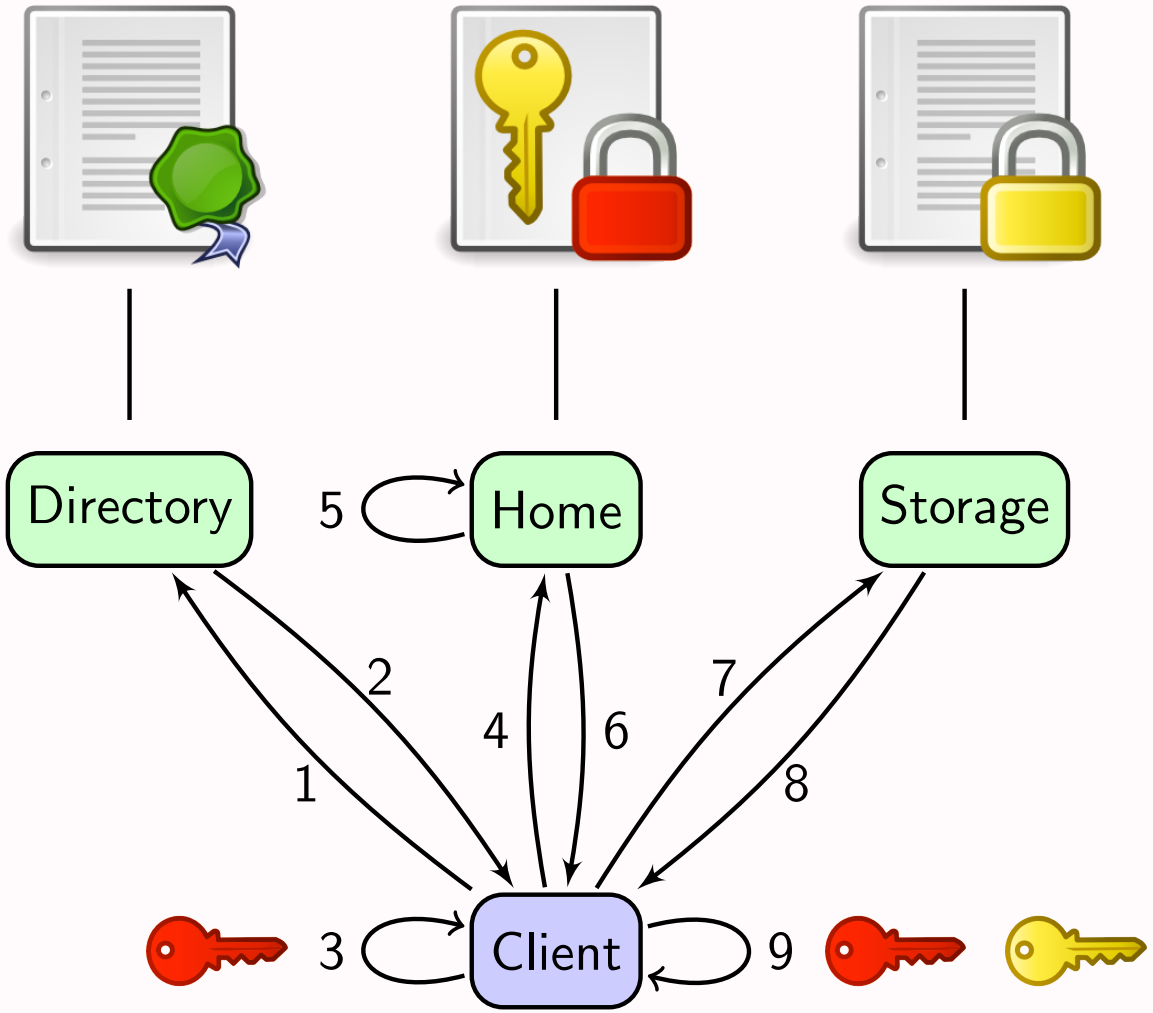


Encrypted file Encrypted key Private key File Symmetric key

Design - Request 1 file

Iteratively request a single user file:

1. Send user lookup
2. Return user home
3. Sign request
4. Send request
5. Authorise + Log
6. Return key + meta
7. Request file blob
8. Return file blob
9. Client decodes file



Design - Namespaces

Users have namespaces with separate access control, for example:

user12345678/belastingdienst

Signed ACL | Symmetric key | User12345678 key | Belastingdienst key | Accountant key

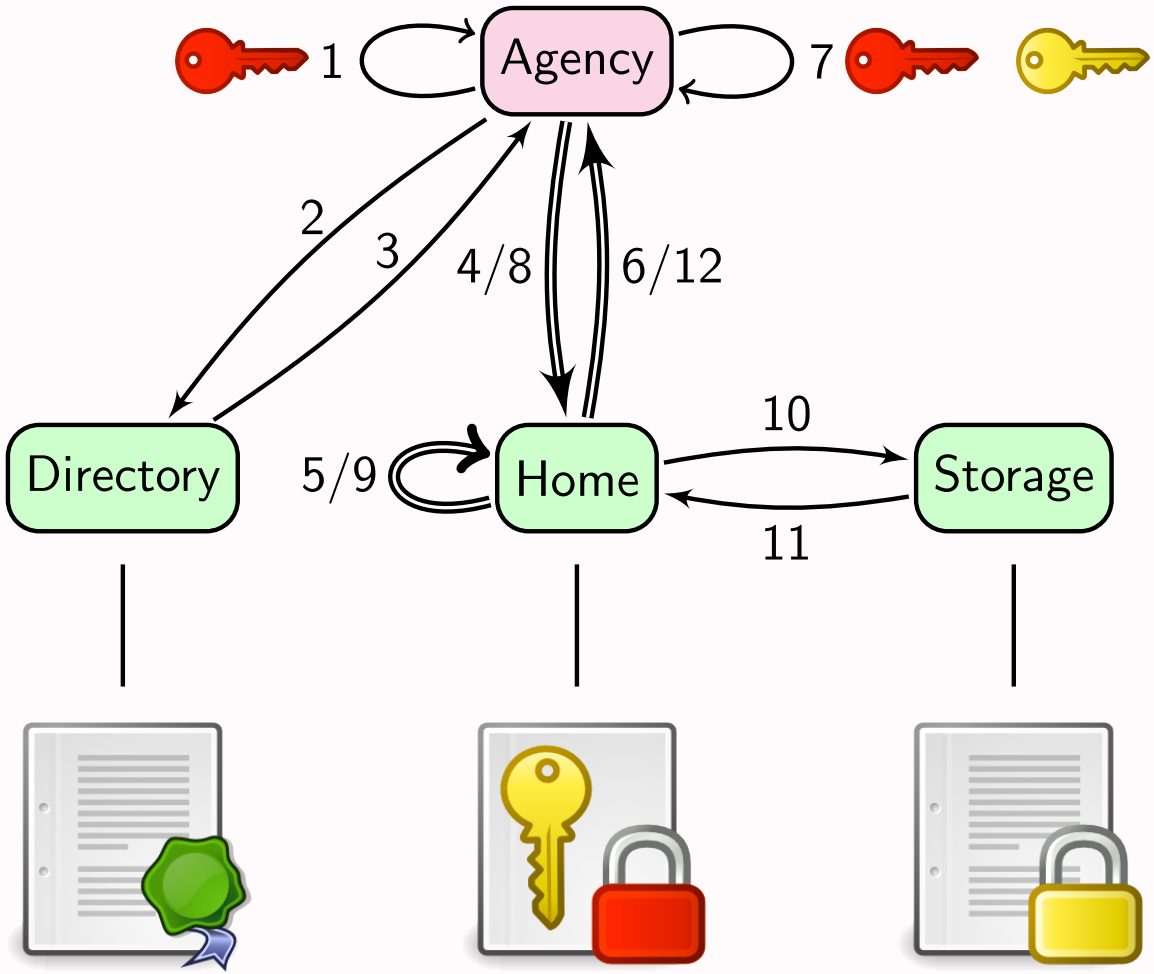
user12345678/gemeente_amsterdam

Signed ACL | Symmetric key | User12345678 key | E. van der Laan key | My wife's key

Design - Add file(s)

Add one or more files to a namespace:

1. Sign request
2. Send request
3. Return user home
4. Resend request
5. Authorise + Log
6. Return key + OK
7. Encrypt file(s)
8. Send file(s) + meta
9. Verify + Log
10. Forward file blob(s)
11. Report status
12. Forward status



Conclusion

Transparency enhancing technology that does not negatively impact user privacy is feasible.

Advantages

- Privacy by design
- Strong crypto
- Verifyable
- Scalable
- Future proof

Ideal scenario

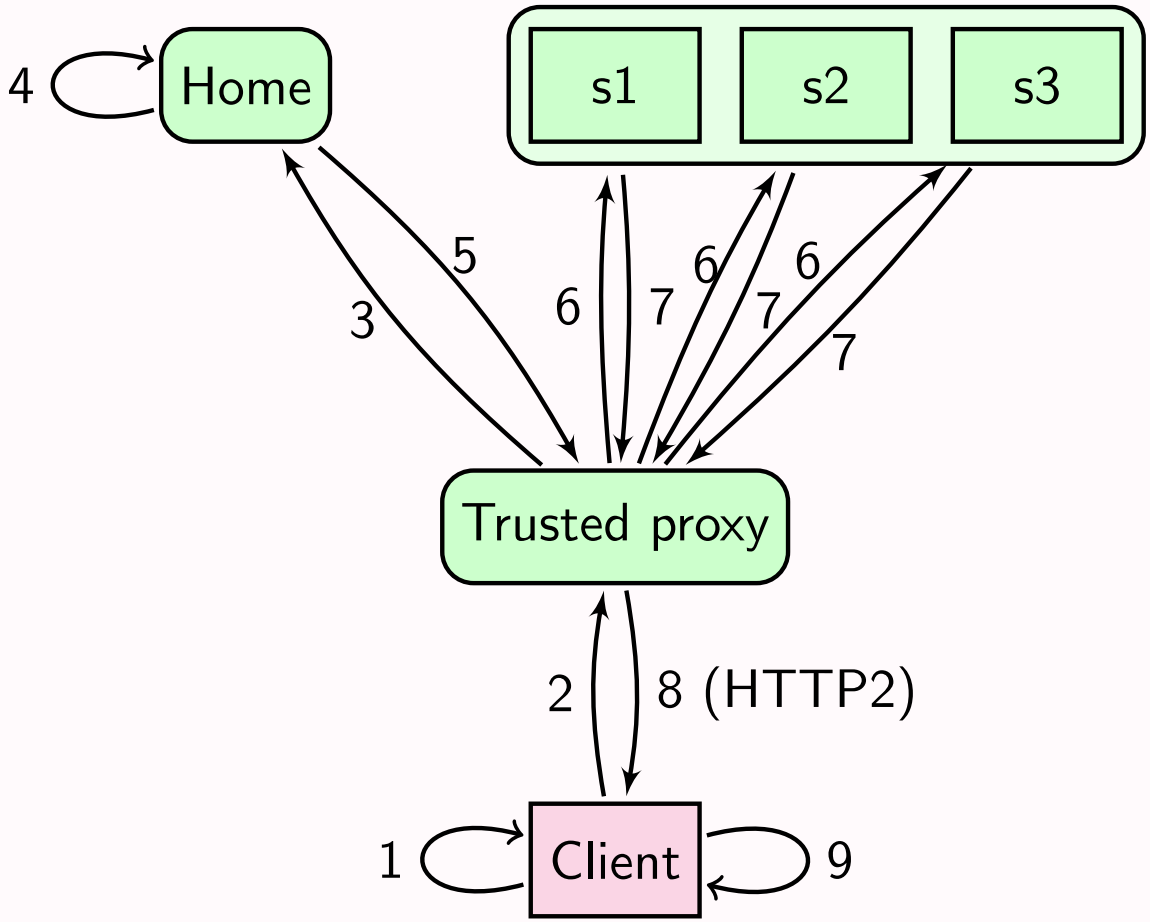
- Only hardware tokens
- No data leakage
- Independent audits
- Large infrastructure
- Forward compatibility

Questions

Design - Request N files

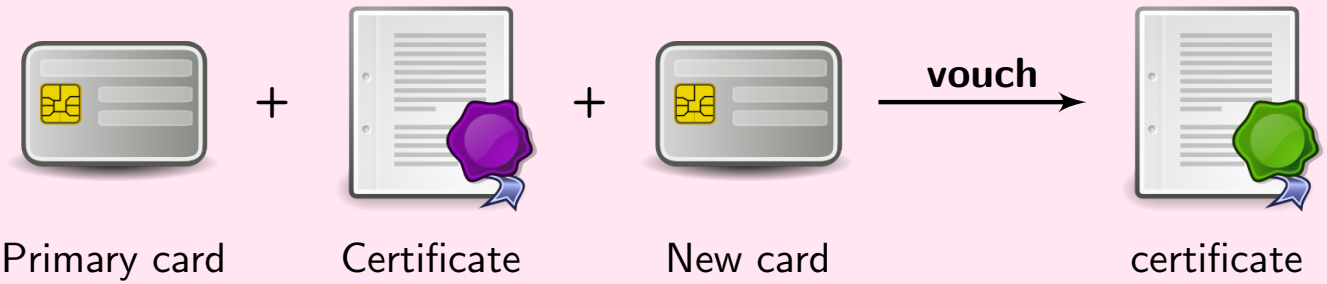
Recursively request multiple user files trough directory proxy:

1. Sign request
2. Send request
3. Forward request
4. Authorise + Log
5. Return key + meta
6. Request file blobs
7. Return file blobs
8. Forward file blobs
9. Client decodes files



Design - Additional keys

Register your own additional smart card



Design - Revocation

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There are two scenario's for compromised key revocation:

User has/had multiple keys

- Sign key revocation certificate with other key
- Re-sign important data with new primary key
- Effect is immediate
- No interruption
- No data loss

User has lost last/only key

- New key must be issued in person (STORK 4)
- Revocation takes duration of processing
- All namespaces need to be rebuilt
- May result in data loss