Attribute-based Authentication and Signatures

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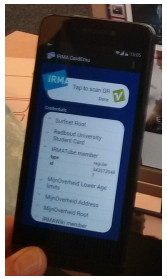
Outline

IRMA Demo



Two key aspects:

- attributes instead of identities
- decentralised architecture: attributes on users own phone

IRMA history, in two phases

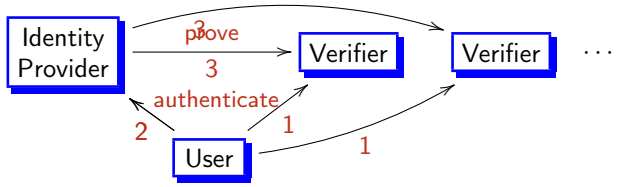
- **2008–now**: scientific research project at Radboud University
  - active research line on attribute-based authentication
  - 3 PhD theses so far, postdocs too, many publications
  - financial support from: NLnet, Translink, BZK, NWO, KPN
  - prototype implementations on:
    - smart card — at first, but no longer supported
    - smart phone — prototype for Android only
- **2016–now**: technology deployment via non-profit Foundation
  - `https://privacybydesign.foundation` set up in fall 2016
  - foundation runs infrastructure, and issues attributes
  - currently from: iDIN (banks), Surfconext (academia), BIG (health)
  - both Android and iOS apps, with common code-base in **Go**
  - attribute verification pilots are emerging

Example identity services

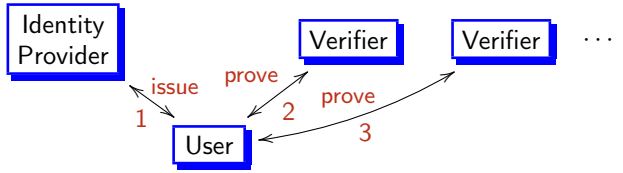
Public	Private	Non-profit
DigiD	Facebook login	SURFconext
~~iDensys~~		
iDIN		
		IRMA

Centralised versus decentralised, schematically

Centralised: everything goes via the Identity Provider (think iDIN)



Decentralised: everyting goes via the User (think IRMA)



Comparing iDIN and IRMA

- **iDIN**
  - operated jointly by banks in NL, based on iDeal
  - wide coverage, based on existing e-banking authentication
  - centralised architecture, with associated privacy concerns
  - payment per authentication (attribute delivery) — expensive
  - fixed number of attributes: name, date-of-birth, address, possibly BSN, but e.g. not bank account nr, email, phone nr ...
- **IRMA**
  - Operated by Privacy by Design foundation
  - decentralised architecture, emphasising self-sovereignty
  - app deployment very limited so far — but may increase quickly
  - verification is free of costs; issuance currently too
  - maximal flexibility of attributes, supporting "persona" concept
  - soon also attribute-based digital signatures, via subscription

Attribute-based signatures

Idea:

- personal attributes can be included in digital signature
- eg. a letter is signed by a doctor, lawyer, minister, citizen, etc.
- opens up many new applications, like new digital cheques, with bank account attribute in signature

IRMA realisation:

- exists, as prototype implementation "on the command line"
- development of signature ecosystem foreseen in late 2017
- based on "signature requests" that can be sent to someone's IRMA app for signing
- at first only for "flat text", later also for "pdf"

IRMA pilots and rollout

- The IRMA app is freely available for everyone
- The foundation issues multiple attributes
  - from iDIN, SURFconext, BIG, email
  - soon also: mobile phone nr, bank account (IBAN+BIC)
  - other options: from Facebook/Google+/Linkedin account
  - the sky is the limit, depending on demand
- Latest effort lies on verification, at merchants (relying parties)
  - since oct'17 available for all SURFconext parties (about 0.5M potential users)
  - pilot being set up in health care, with additional AGB codes
  - strong authentication pilot in preparation at Radboud
  - (your project?)
- Publicity effort is starting only now.

IRMA as societal experiment

Big questions (about situation in NL)

Will IRMA reach broad usage? Which forces work **Pro** and **Contra**?

- **Contra**: support Google's and Facebook's etc. not likely
  - they may even fight/obstruct IRMA, when it grows a bigger
- **Contra**: IRMA's business model is weak
- **Contra**: Some attribute management effort on user-side is required
- **Pro**: Private eID's have only limited trust
  - providing "source" identity is widely seen as public responsability
- **Pro**: NL-Government lacks vision and fails to defend public values
- **Pro**: IRMA has superior technology, including digital signatures
- **Pro**: Foundations, like SIDN, can play a trusted strategic IT-role
- **Pro**: GDPR-regulators could enforce privacy-friendly technology

Main points

- Information flows and authentication requirements determine power relations in modern societies
  - IRMA provides privacy-friendly empowerment of users
  - now organised and run by non-profit foundation
- The choice of authentication architecture is extremely sensitive
  - substantial differences exist between central and decentral
  - power and (financial) control are key in the central approach
  - privacy and autonomy are leading values in the decentral one

  What kind of society do we prefer to live in?
- IRMA is a decentralised, open source, non-profit, flexible system that is up and running, and being tested by various parties
- Attribute-based signatures are really cool & innovative
  - strategy: use paid signatures to provide authenation for free

We live in interesting times; thanks for your attention