PrimeLife

IBM

Privacy and ID Management for Life

From ID Cards, Cell Phones to the Internet

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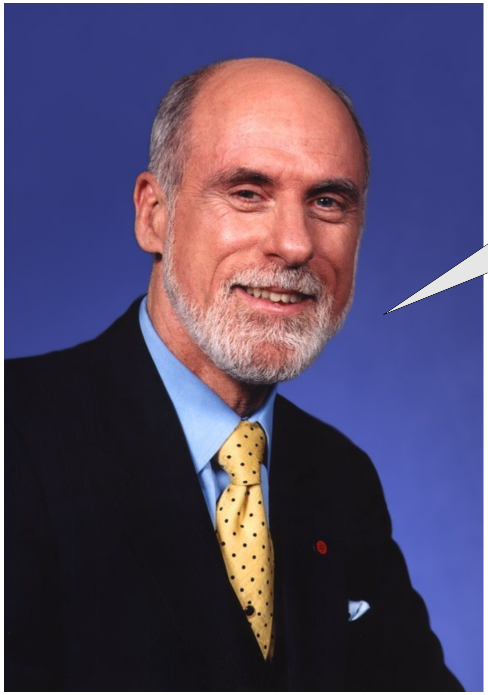
IBM Research
Technical Leader PrimeLife

November 27th, 2008

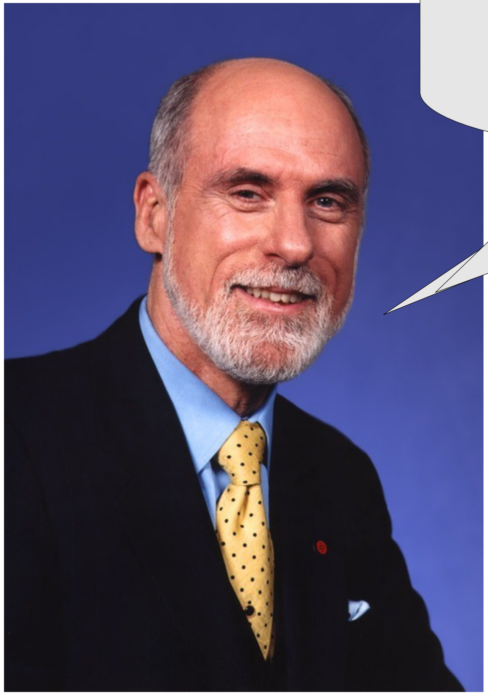
“The Internet will be everywhere, from every mote to interstellar communication”



Vint Cerf

“The Internet will be everywhere, from
stellar

“We need both: sometimes we
wanna be anonymous, sometimes
we need to be identified”



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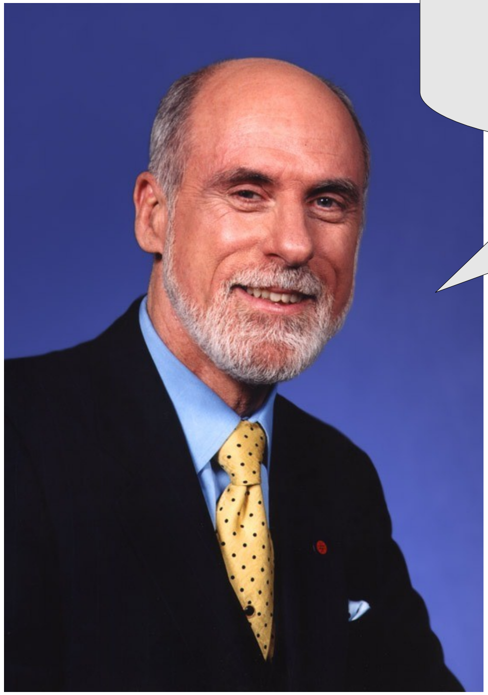


Vint Cerf

“...at the *same* time!”

A Surfer

Not Just the Internet...

...even if it is going to be everywhere ;-)

EUROPEAN UNION
IDENTIFICATION CARD
ISSUED FOR

FULL NAME
SARAH JANE BLOGGS

PLACE OF BIRTH
LONDON

NATIONALITY
BRITISH CITIZEN

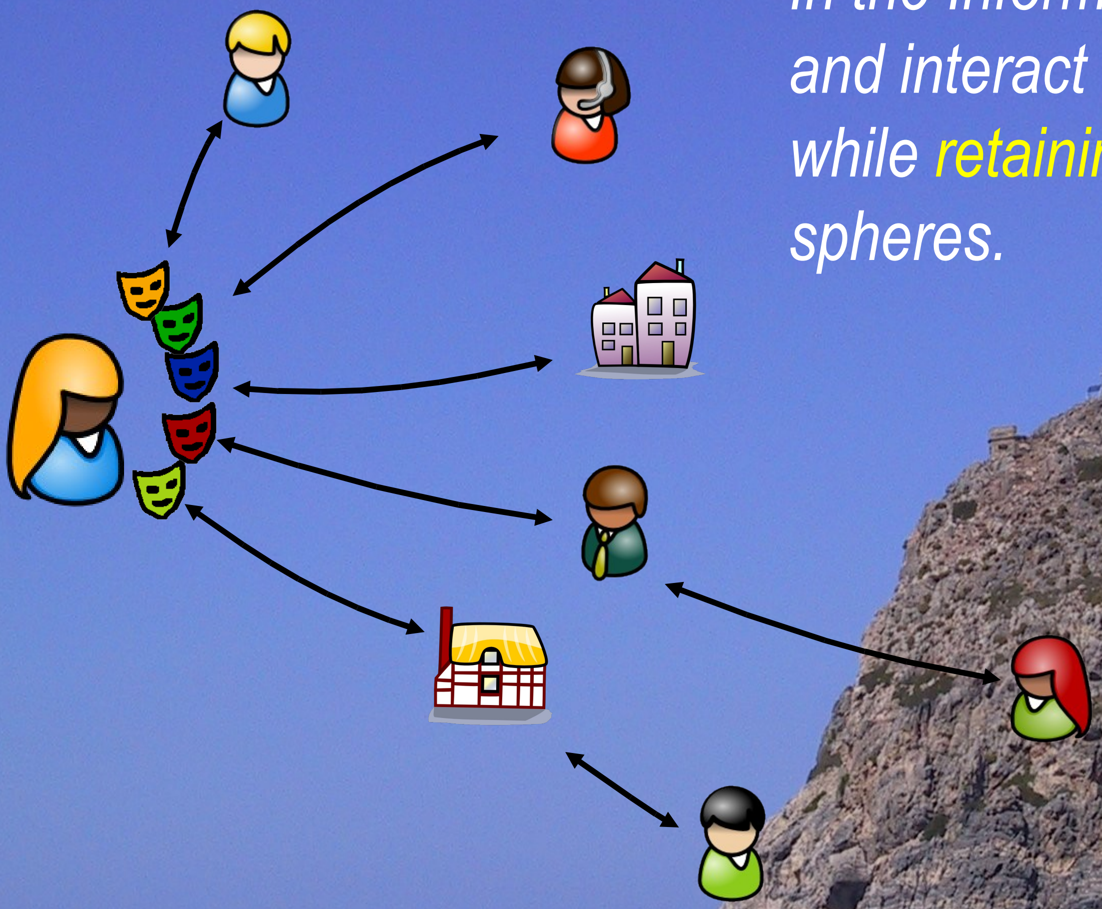
SIGNATURE

DATE OF BIRTH
16-09-84

SERIAL NUMBER | ISSUE CENTRE | CODE REF
34545 4545676-4555554

Vision: *Privacy, Trust and ID Management*

In the Information Society, users can act and interact in a safe and secure way while retaining control of their private spheres.



What's the Problem?

“Neil Armstrong’s Footsteps
are still there”

(Robin Wilton, Sun Microsystems)

Photo:cc-nc-by jahdakine

Computers don't forget

- Storage becomes ever cheaper
- Data mining ever better

So what do we need?

Privacy Built-In Everywhere!

- Network Layer Anonymity
  - ... in mobile phone networks
  - ... in the Future Internet as currently discussed
  - ... access points for ID cards
- Identification Layer
  - Access control & authorization
- Application Layer
  - “Standard” e-Commerce
  - Specific Apps, e.g., eVoting, ...
  - Web 2.0, e.g., Facebook & Wikis

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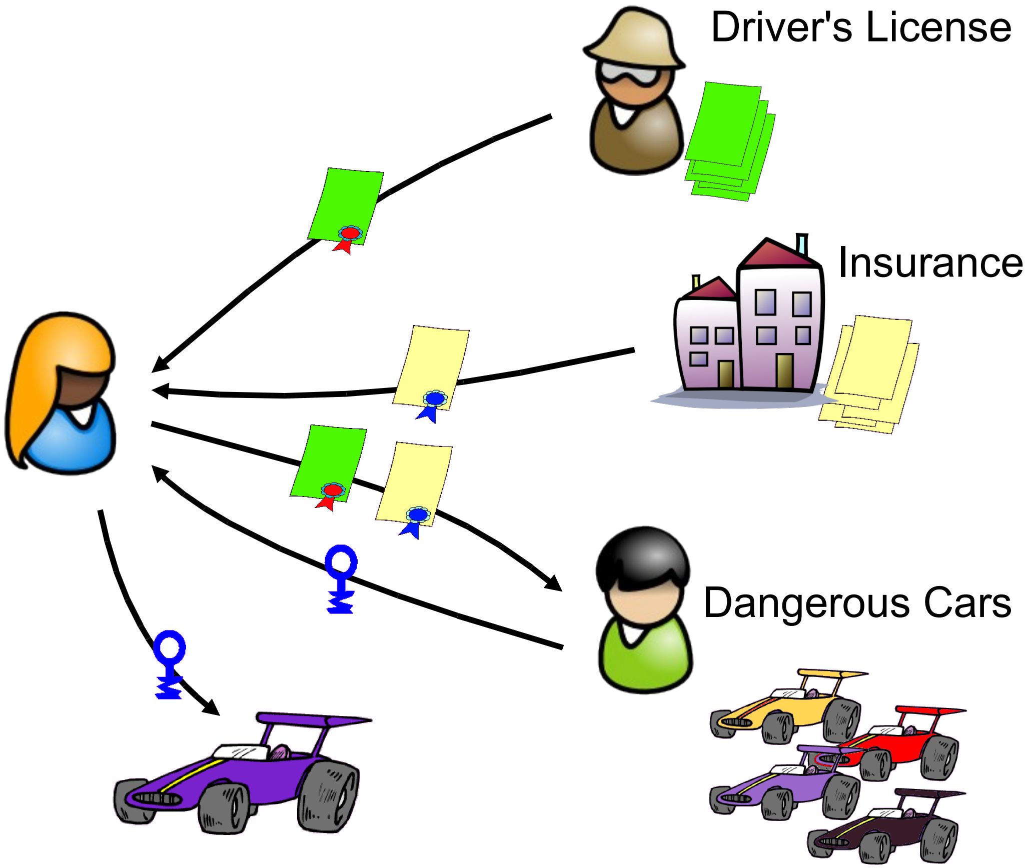
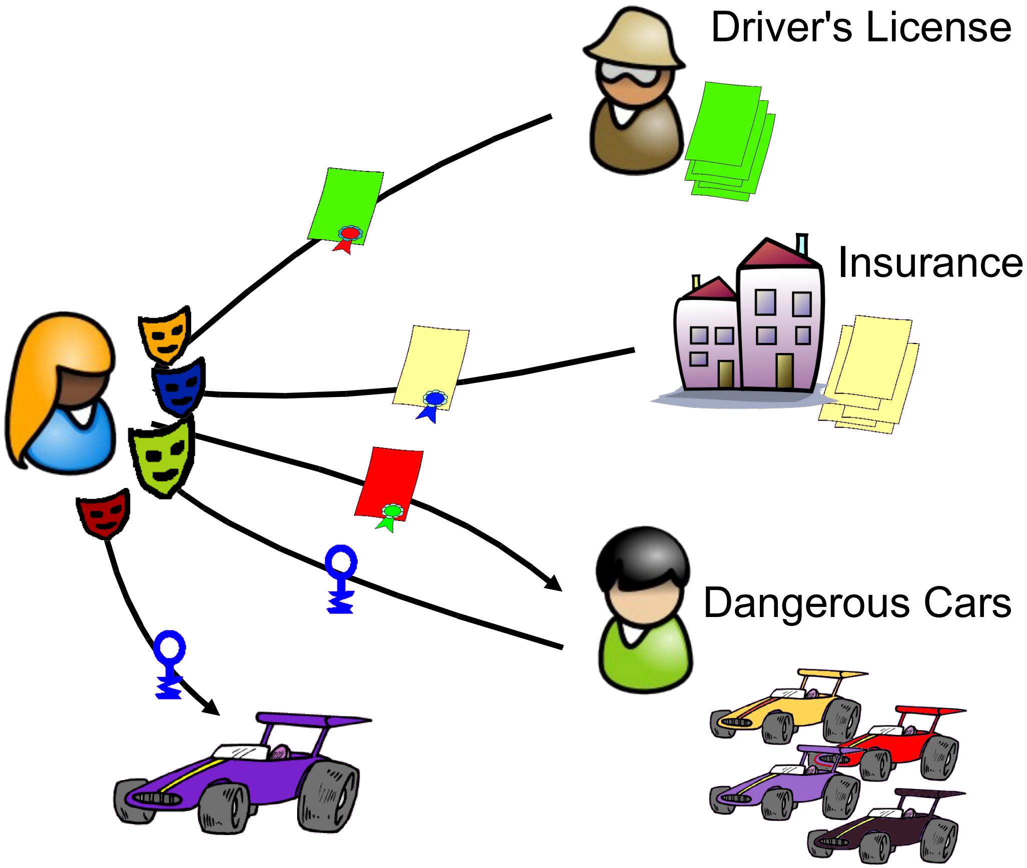
Privacy @ ID Layer

A Closer Look & Solutions

Digital Credentials



Solution: Private Digital Credentials

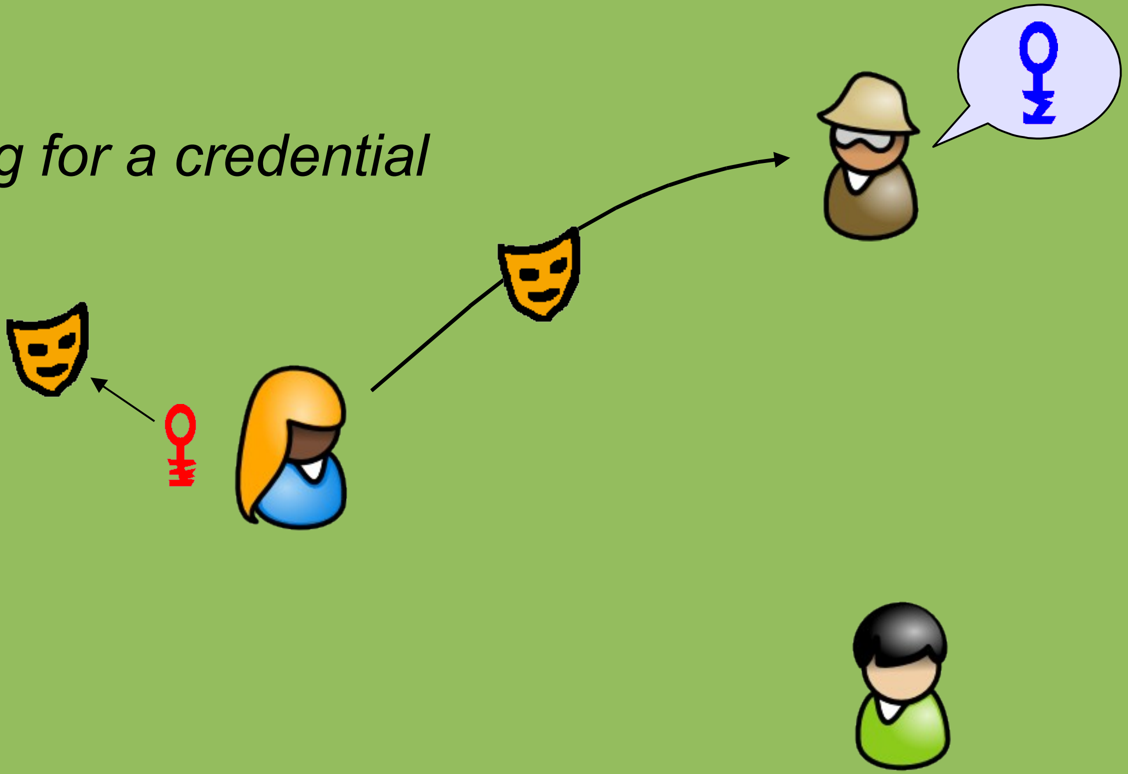


Private Credentials: How to Build Them

In the beginning...

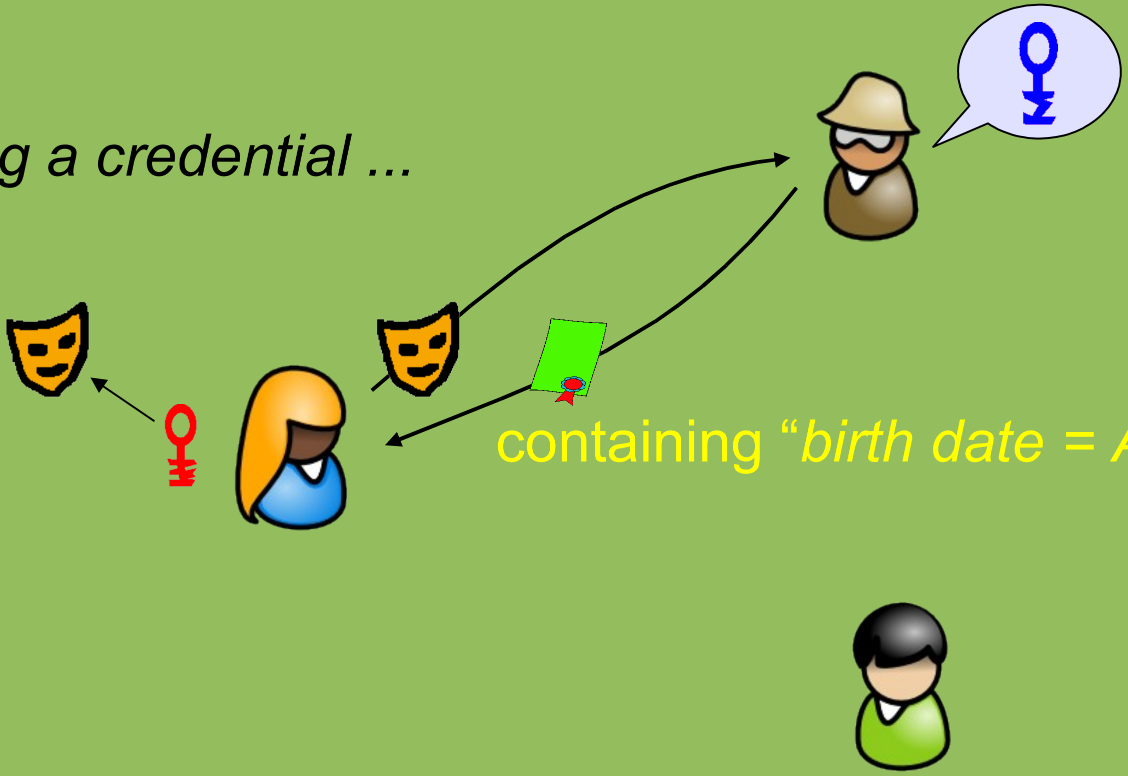
State of the Art: How to Build Them

asking for a credential



State of the Art: How to Build Them

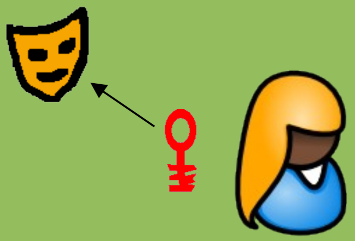
getting a credential ...



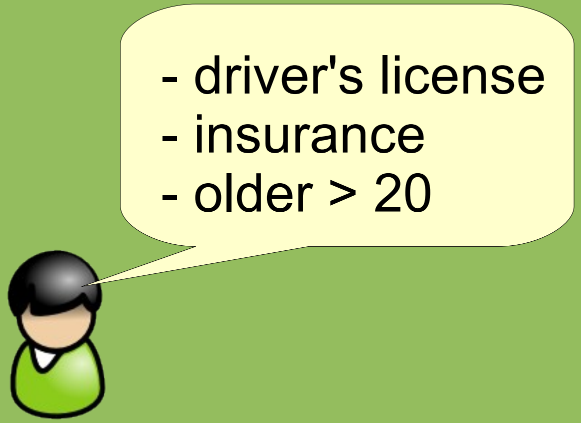
containing “*birth date = April 3, 1987*”

State of the Art: How to Build Them

showing a credential ...



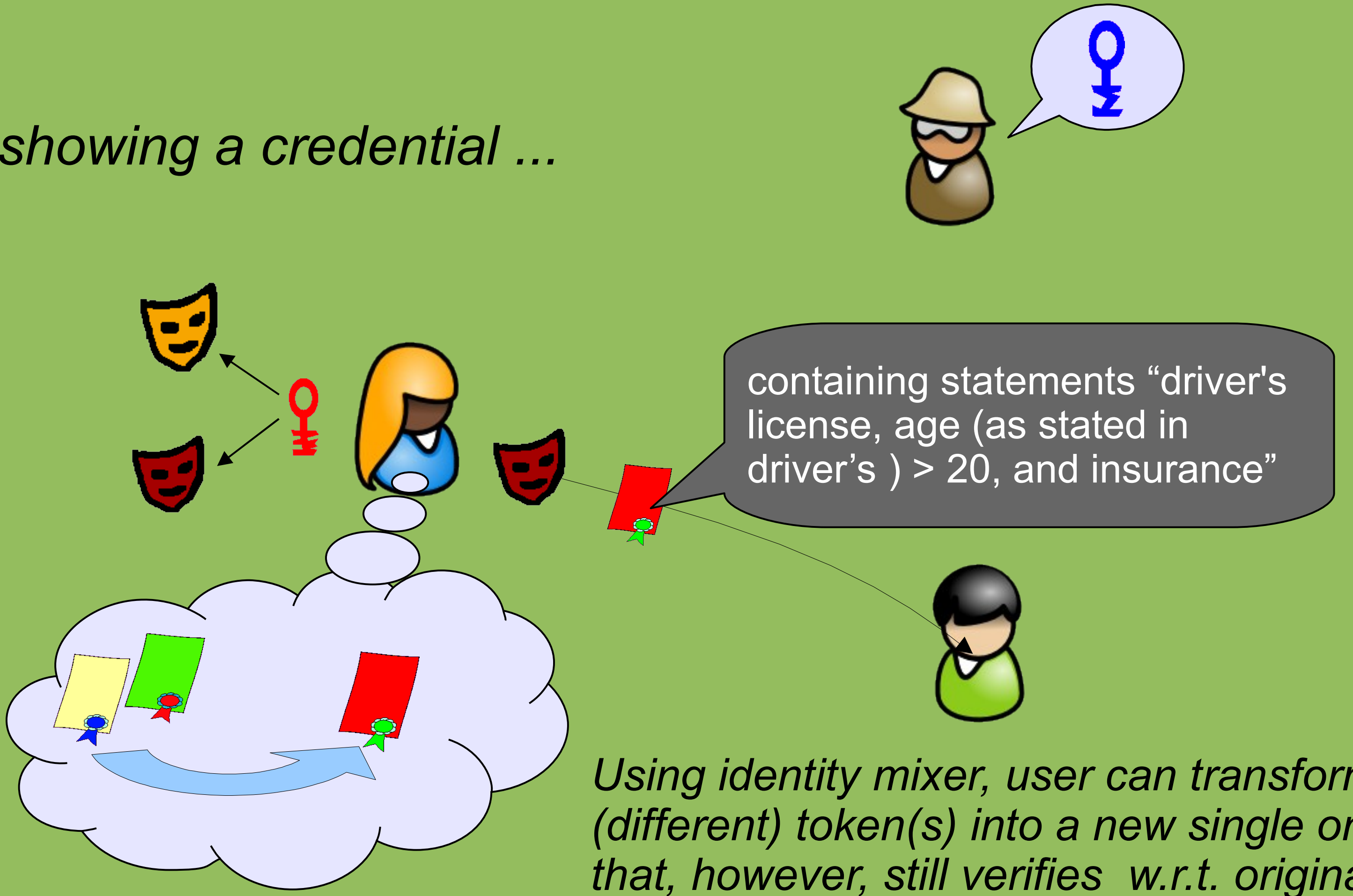
goes off-line



- driver's license
- insurance
- older > 20

State of the Art: How to Build Them

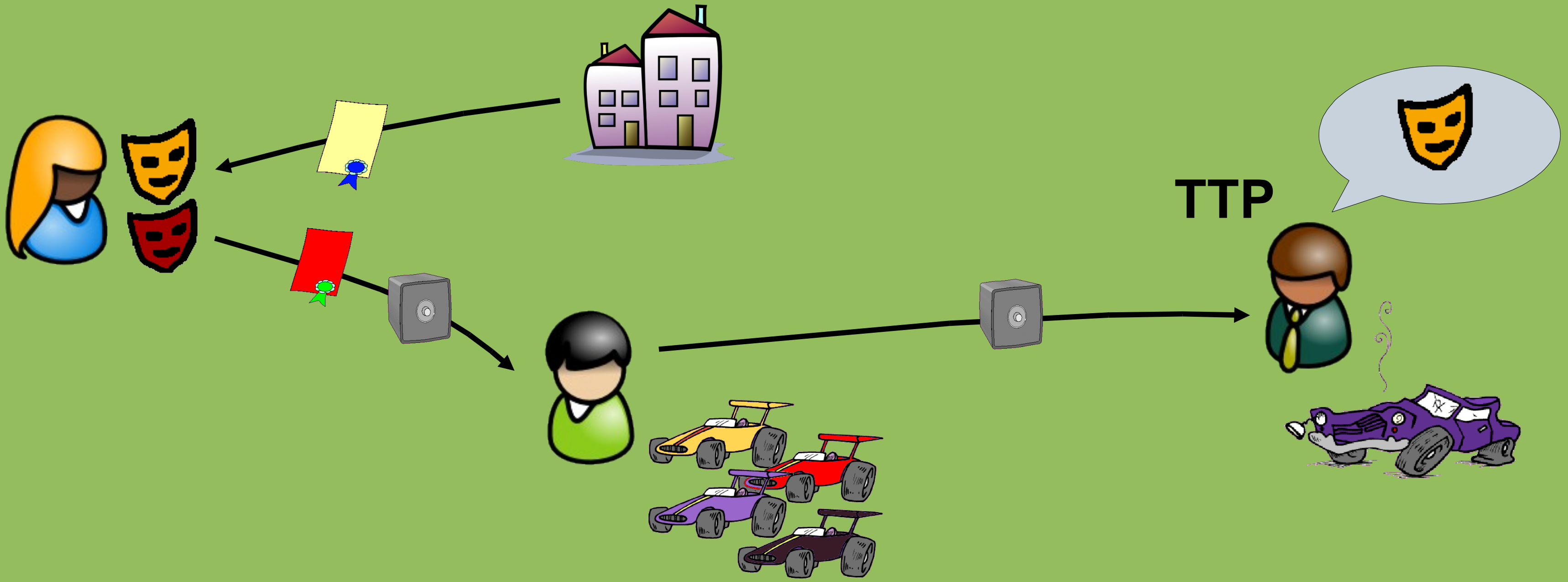
showing a credential ...



containing statements “driver's license, age (as stated in driver’s) > 20, and insurance”

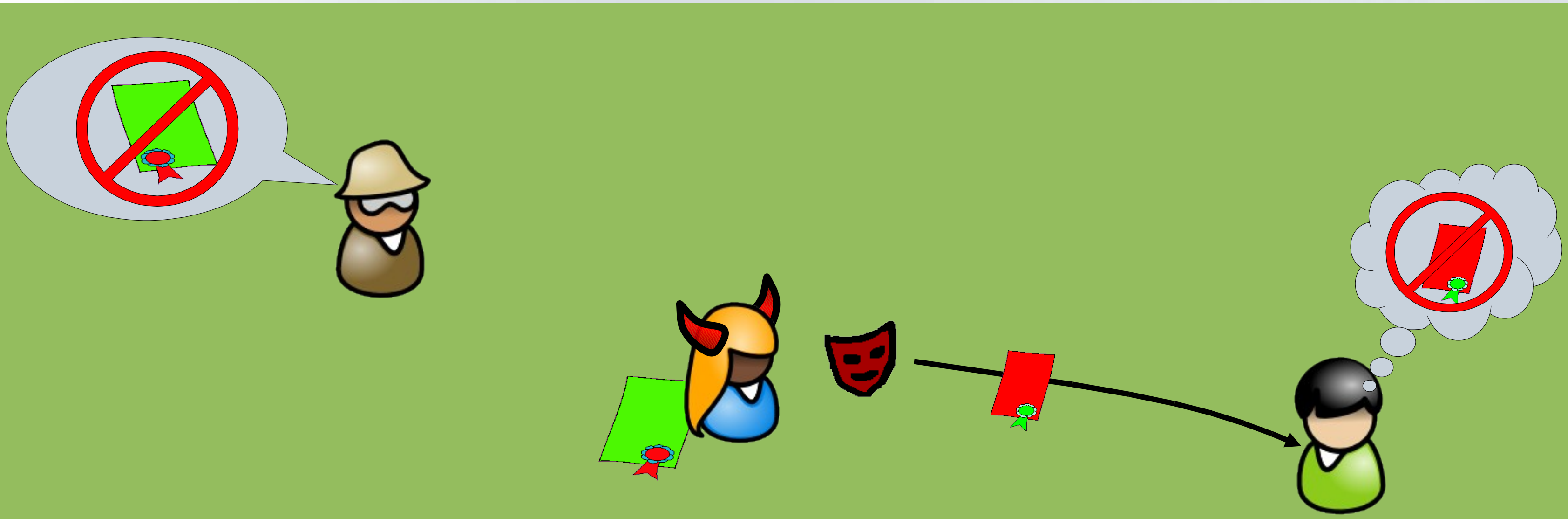
Using identity mixer, user can transform (different) token(s) into a new single one that, however, still verifies w.r.t. original signers' public keys.

Other Properties: Attribute Escrow (Opt-In)



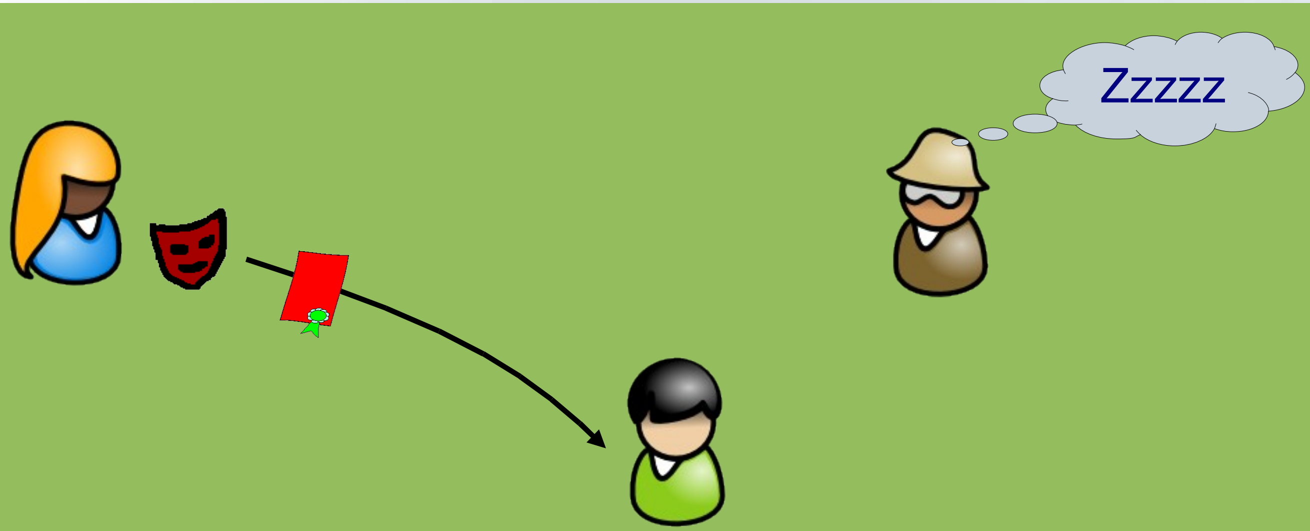
- If car is broken: ID with insurance needs be retrieved
- Can verifiably encrypt any certified attribute *(optional)*
- TTP is off-line & can be distributed to lessen trust

Other Properties: Revocation



- If Alice was speeding, license needs to be revoked!
- There are many different use cases and many solutions
  - Variants of CRL work (using crypto to maintain anonymity)
  - Limited validity – certs need to be updated
  - ... For proving age, a revoked driver's license still works

Other Properties: Offline Usage



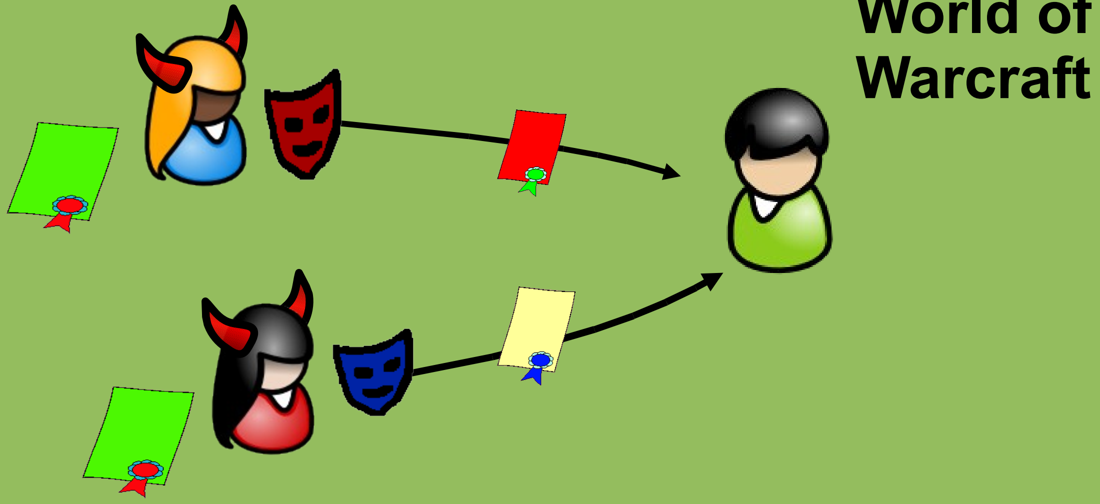
ID providers (issuers) need sleep, too!

- Sometimes it is too expensive to have connectivity
- Or a security risk (e.g., ID cards)

Certs can be used as many times as needed!

- cf. Revocation; can be done w/ signer's secrets offline

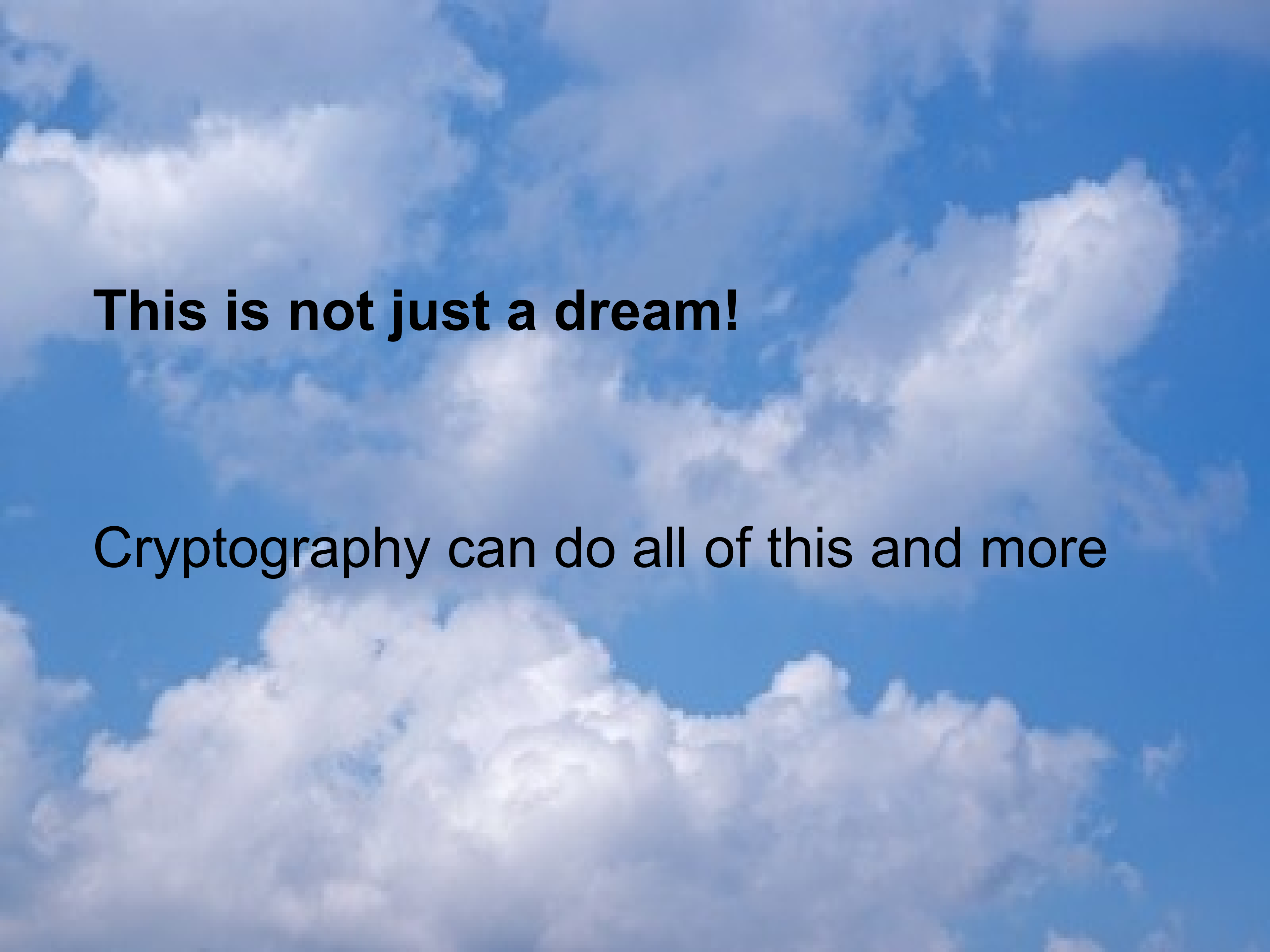
Other Properties: Cheating Prevention



Limits of anonymity possible *(optional)*:

- If Alice and Eve are on-line together they are caught!
- Use Limitation – anonymous until:
  - If Alice used certs > 100 times total...
  - ... or > 10'000 times with Bob
- Alice's cert can be bound to hardware token (e.g., TPM)

This is not just a dream!



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Cryptography can do all of this and more

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.... efficiently

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Cryptography can do all of this and more

.... efficiently

.... even on a smart card   :-)

What Else's Left to Do?

PrimeLife

Realizing Privacy

Make privacy-enhancing identity management widely available:

- Infrastructures, Open Source, and Standards
- Cooperation with other Projects (Master, PICOS, TAS3, SWIFT, ...),
- Education (summer schools, educational materials, …)

Research focus on main remaining issues:

- HCI, Policies, and Infrastructures (and some mechanisms)

Basic Research: Beyond data minimization:

- Address data-intensive scenarios and user-generated content (Web 2.0, virtual communities such as FaceBook, SecondLife)
- Trust building and Enforceable data protection (end-to-end policies)
- Real life privacy (and throughout life)

Let's Make it Real!

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www.primelife.eu
(www.prime-project.eu)