Trust Models In ICE-TEL

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Interworking Public Key
Certification Infrastructure for
Europe

European IVth Framework Project under the TELEMATICS Programme

THE UNIVERSITY OF SALFORD

COST
Computer Security Technologies

Overview

- A quick look at public key authentication
- Comparison of existing trust models
- ICE-TEL, the best of both worlds
- Examples

Public Key Authentication

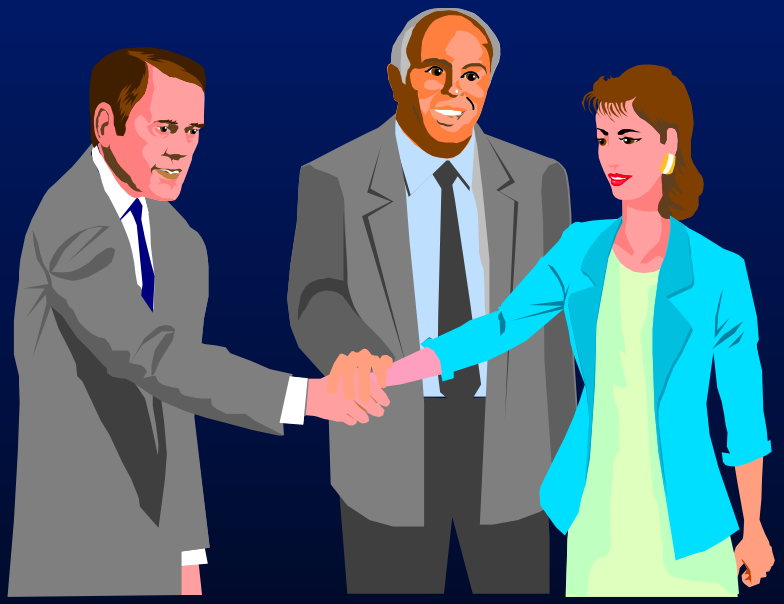
- To verify a digital signature, I need
  - the signer's public key
  - to be sure who "owns the public key"
    - (i.e. who knows the corresponding private key)
- Certification
  - Third party assertion of "who owns which public key"
- Which third parties do I trust?
  - On what basis do they make their assertion?
  - What guarantees do they give? Liability?

Certification

- Third party issues certificate, comprising:
  - Who is doing the asserting (issuer)
  - Who is the subject of the assertion
  - What is being asserted (public key)
  - The small print (certification policy)
  - Digital signature
- Syntactic check of certificates tells me if the public key is accurate
- Semantic check of policies tells me who the public key belongs to
  - or what can be done with it

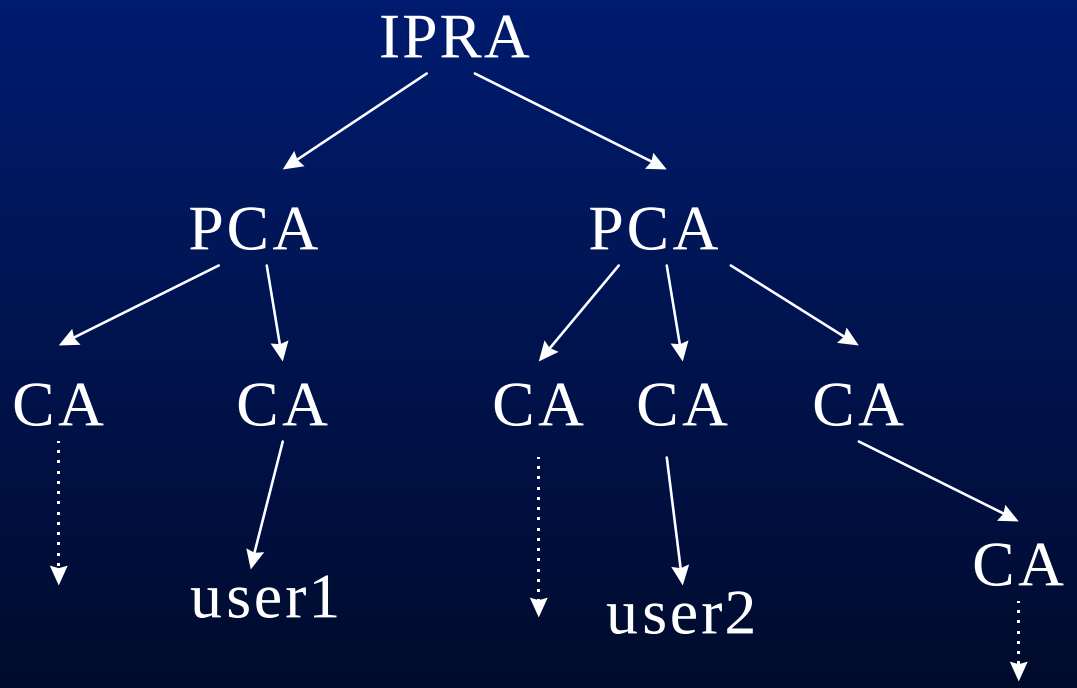
PGP Trust Model

- Web of trust
- Third party is “Trusted Introducer”
- Introducer does not have a “policy”



PEM Trust Model

- CA hierarchy
- PCAs publish a “certification policy”
- IPRA ties the PCAs together



The Gap in the Market

- PGP is user-centric
- PGP does not scale up to large communities
- PEM is organisation-centric
- PEM does not scale down to small communities

The ICE-TEL Trust Model

- Supports diverse security domains
  - single users
  - simple groups or small organisations
  - complex organisations
- Supports organic growth, allowing reorganisation of domains
- Trust between domains is by choice, and need not be mutual or transitive
- No central infrastructure

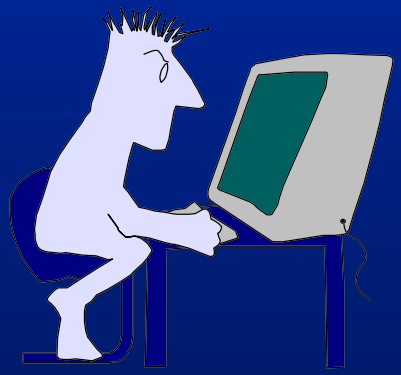
Trust Points

- Each security domain contains trust points
- A trust point is a CA with an advertised policy
- Security domains interlinked by cross-certification among trust points
- User advertises certification path to trust point
- Trust point advertises the cross-certificates it has issued

Personal Security Environment

- Each user securely stores
  - the public key of a trusted user
  - the public key and policy of a trusted CA

Example - two users

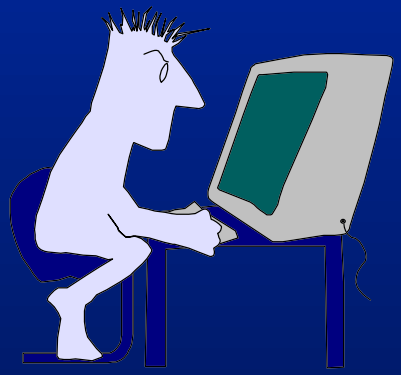


User A

User B

- User A obtains user B's public key by "secure means" and stores it in his PSE.
- User A can autheticate messages from user B
- User B need not do anything
- No policies involved

One user and a small company

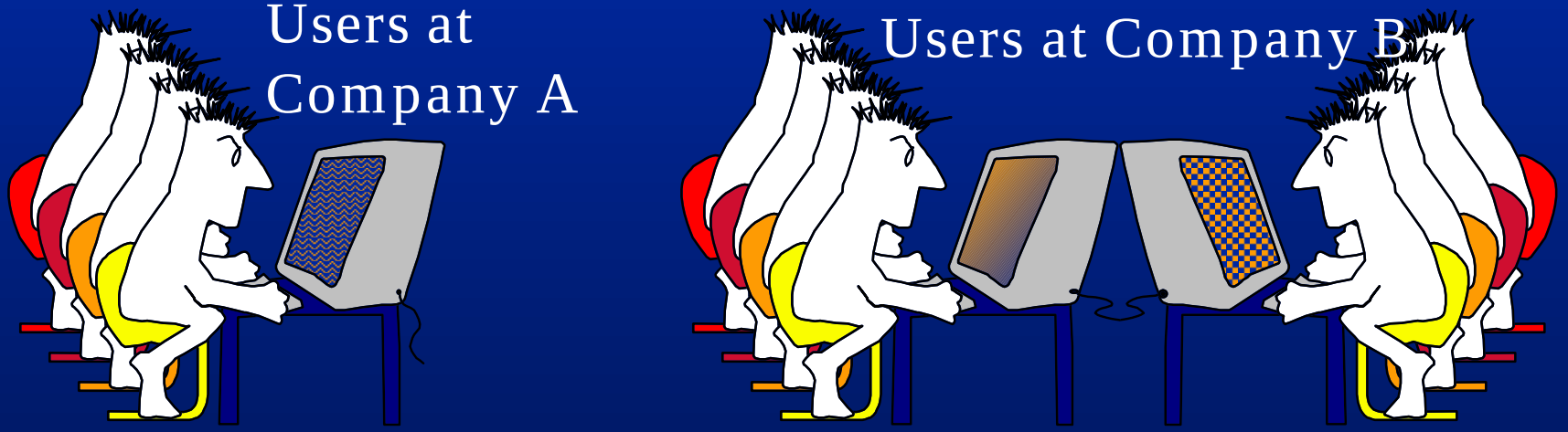


User A

Users at Company B

- Company B creates a CA and publishes a policy
- User A obtains company B's CA's public key and policy and stores it in his PSE.
- User A can autheticate messages from users in company B

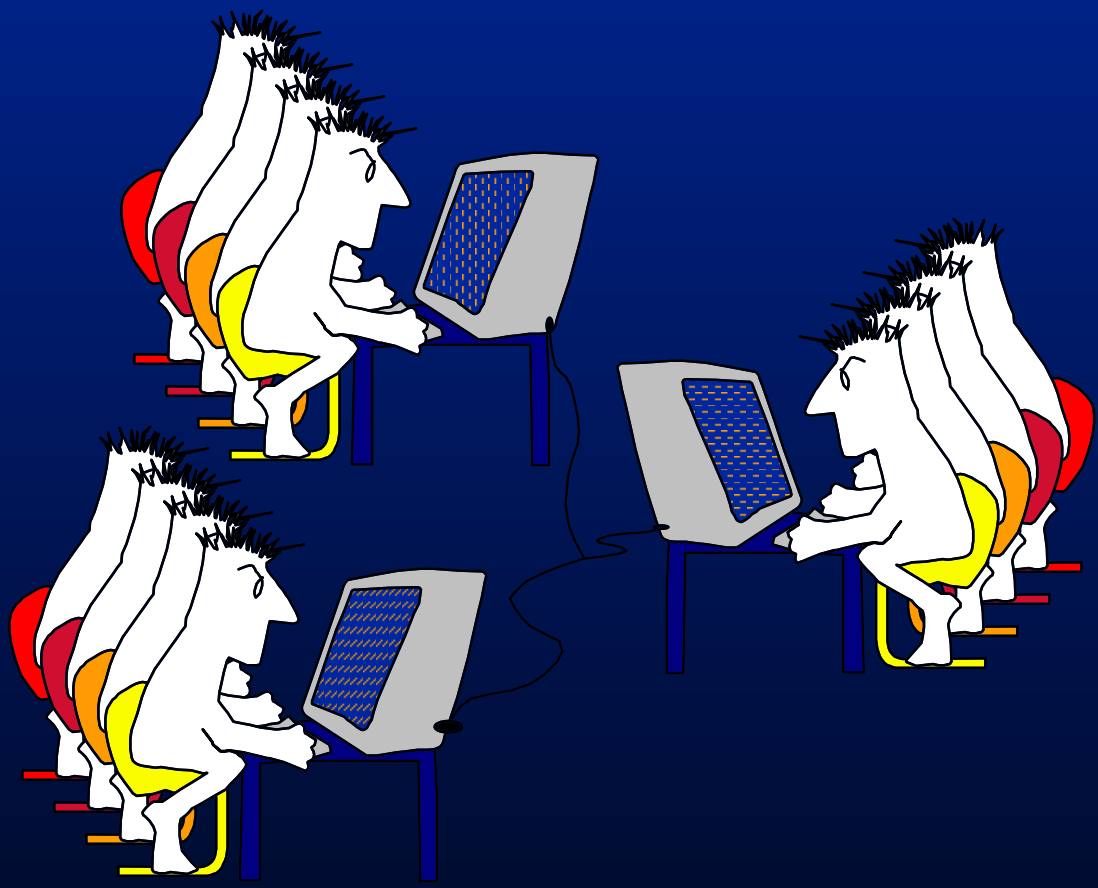
A small company and a big company



- Company B creates a CA hierarchy and publishes a policy for the root CA.
- Company A's CA issues a cross-certificate for Company B's root CA
- Users in company A know their CA's public key and policy.
- Users in company A can autheticate messages from users in company B

Organic growth

Users at Company B



Conclusions

- Scalable deployment model
- Flexibility permits reorganisation
- Supports embedded high security domains
- Explicit use of CA policy

For more information on ICE-TEL

http://www.darmstadt.gmd.de/ice-tel/ice-home.html

Interworking Public Key Certification Infrastructure for Europe

European IVth Framework Project under the TELEMATICS Programme

- 17 partners from 13 countries
- Build and operate CA infrastructure
- Build and pilot secure applications WWW, S/MIME, X.500
- Software from Cost, GMD, Isode, SSE