Controlling digital multisignature with attribute certificate

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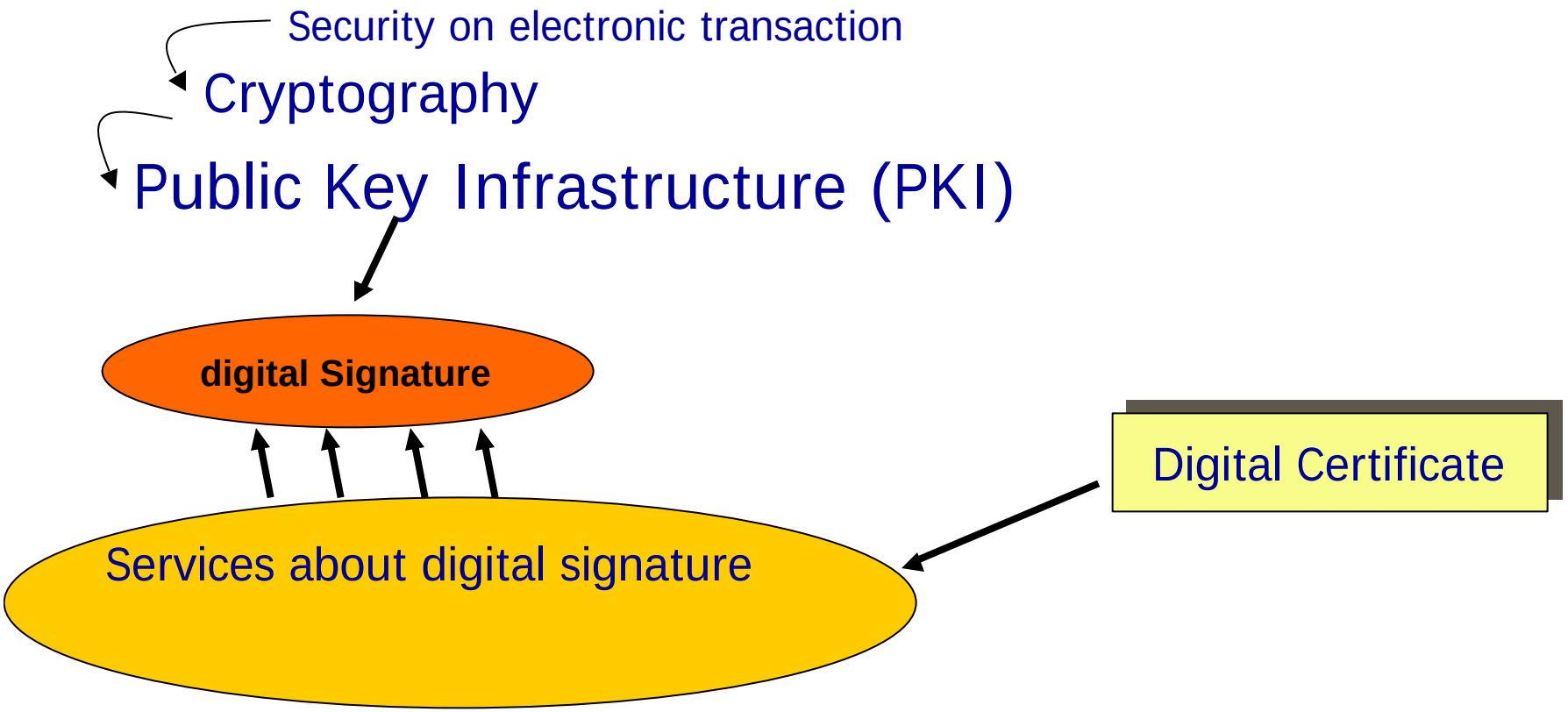
Outline

- Context
- Technology
- Proposition
  - Attribute certificate
  - Format for the Multisignature
  - ICARE Ver. 0.1 Tool
- Conclusion

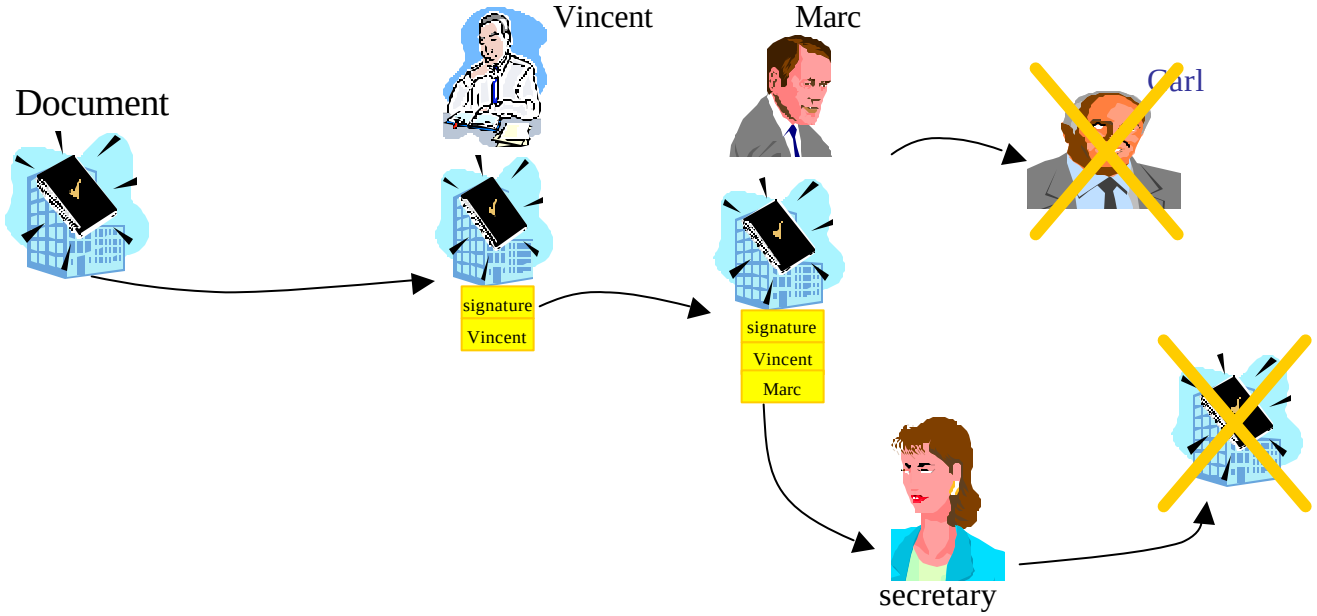
Context

Motivation



PKI : Public Key Infrastructure
Asymmetric encryption = public key cryptography

Why new e-services ?



Digital signature is not valid

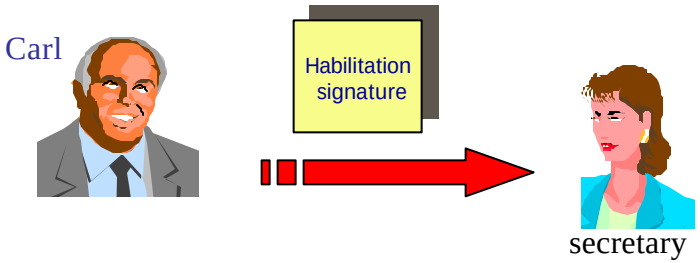
Who is enable to sign ?

In which order must they sign ?

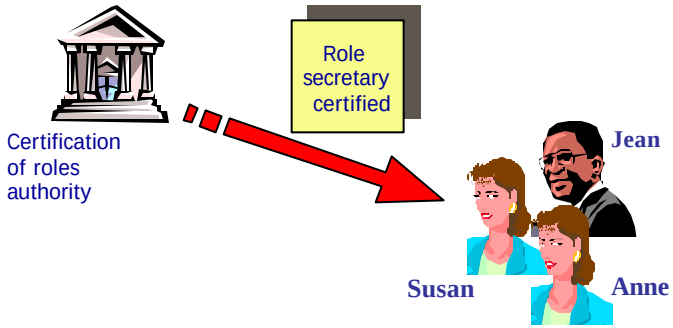
E-services

The **attribute certificate** is an ideal way to add functionality to a conventional digital signature.

1) Habilitation/delegation



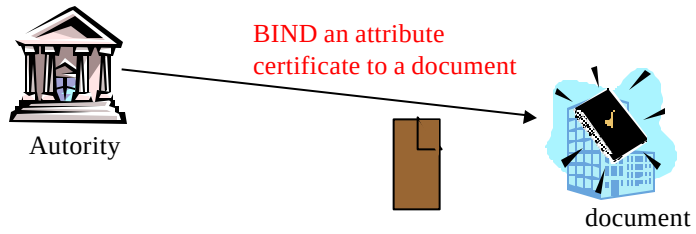
2) Certification of role



3) Controlling digital multisignature

Controlling digital multisignature

- Characteristics:
  - Adds constraints to digital signature to:
    - Indicate the entities authorized to sign the document,
    - Tressle the order in which they must sign the document, ...
  - Protects the Timestamp
  - Includes information additionally to validate the signature.
  - Archives the signature.



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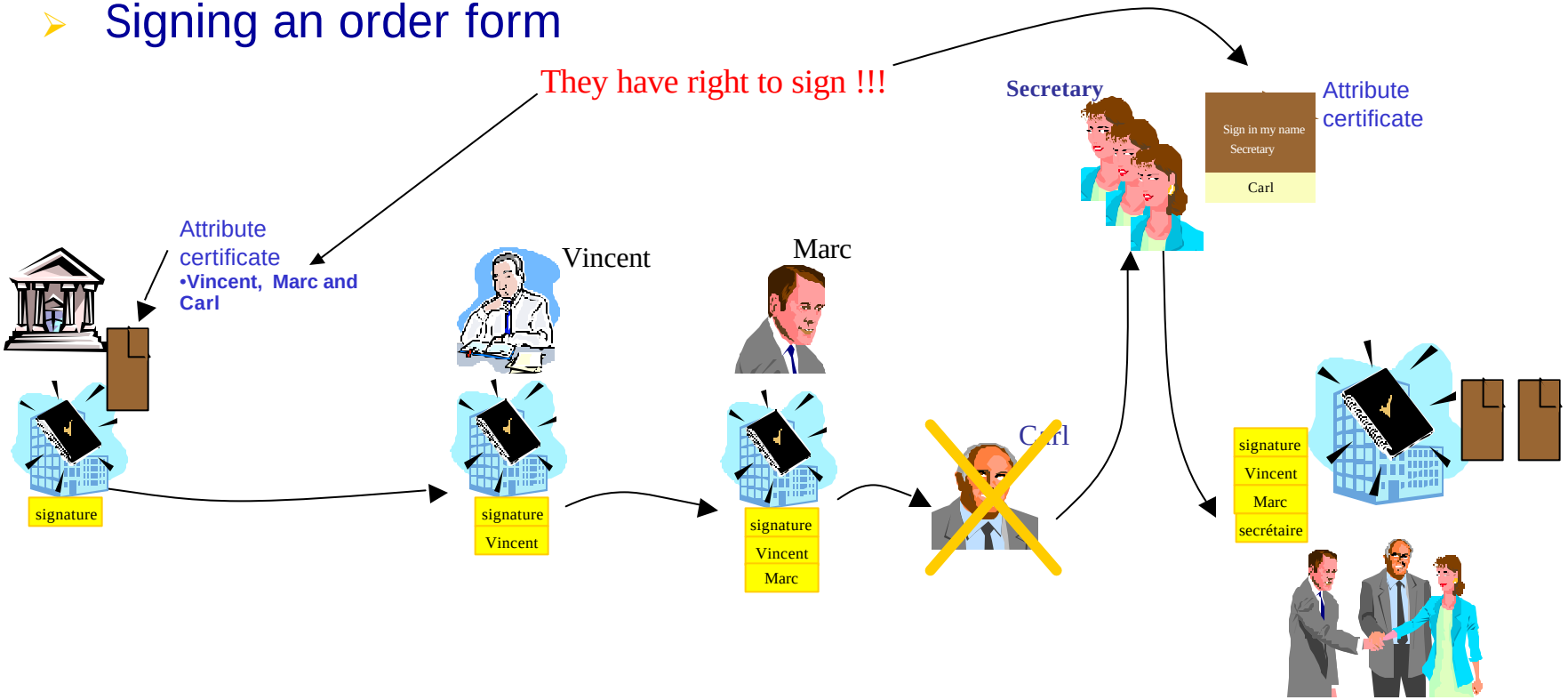
Application e-services

- Signing an order form



Digital Multisignature is valid !!!

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Current Technology and Proposition

Digital certificates

- Identity certificate (X.509 v3)
  - Bind key - entity (DN)
  - Authentication
- Attribute certificate
  - Bind permission – entity
  - Permission

are complementary

X.509 v3 : Digital certificate standard proposed fot ITU-T, ISO
DN : Distinguer Name of X.500 standard

Approaches of attribute certificates

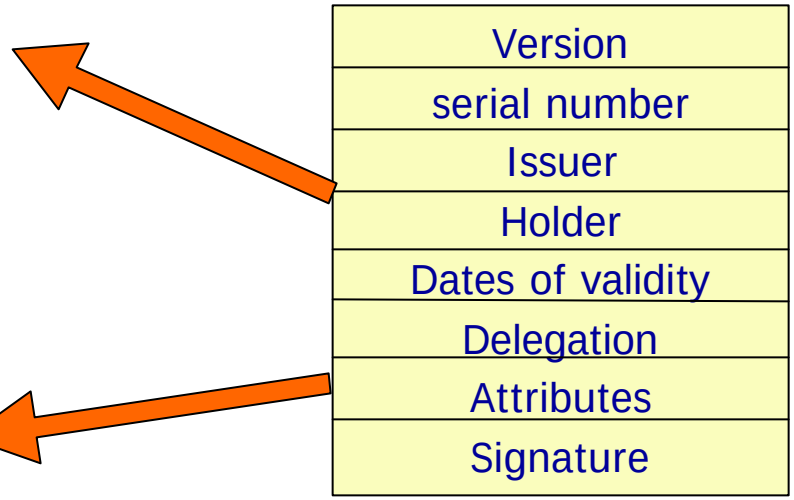
- SPKI
  - Bind permission – key or name
  - Encoder in S-expressions
  - Allow anonymity and delegation
  - Decentralize Infrastructure Management
  - Supporter ACLs and names SDSI

- X.509 version 2000
  - Bind permission – entity
  - Allow access control
  - Centralize Infrastructure Management
  - Encoder in ASN.1
  - Supporter CRL and name X. 500

SPKI : Simple public Key Infrastructure
X.509 v 2000 : Digital certificate standard proposed fot ITU-T, ISO
ASN. 1 : Abstract Syntax Notation One
SDSI : Simple Distributed Security Infrastructure

New attribute certificate

- Bind permissions to :
  - Certificate (or reference)
  - Public key (or hash)
  - Role
  - Name valid for X.509 v. 2002
    - BaseCertificatId
    - EntityName
    - ObjectDigestInfo
- Extensible infrastructure
- Attributes structure:
  - `AttributeName`
  - `AttributeValue`
  - `AttributeDescription`
- Encoder in XML



New attributes

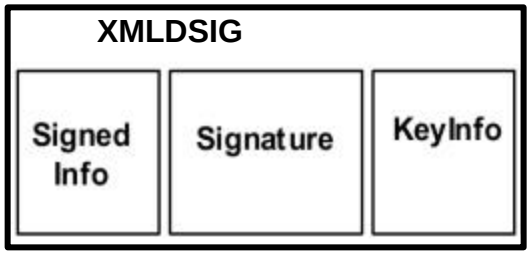
- SignatureDelegation to:
  - Empower the signature

- SignaturePath to:
  - Indicate the signatories
  - Indicate the sequence of signatures
  - Allow habilitation certificates

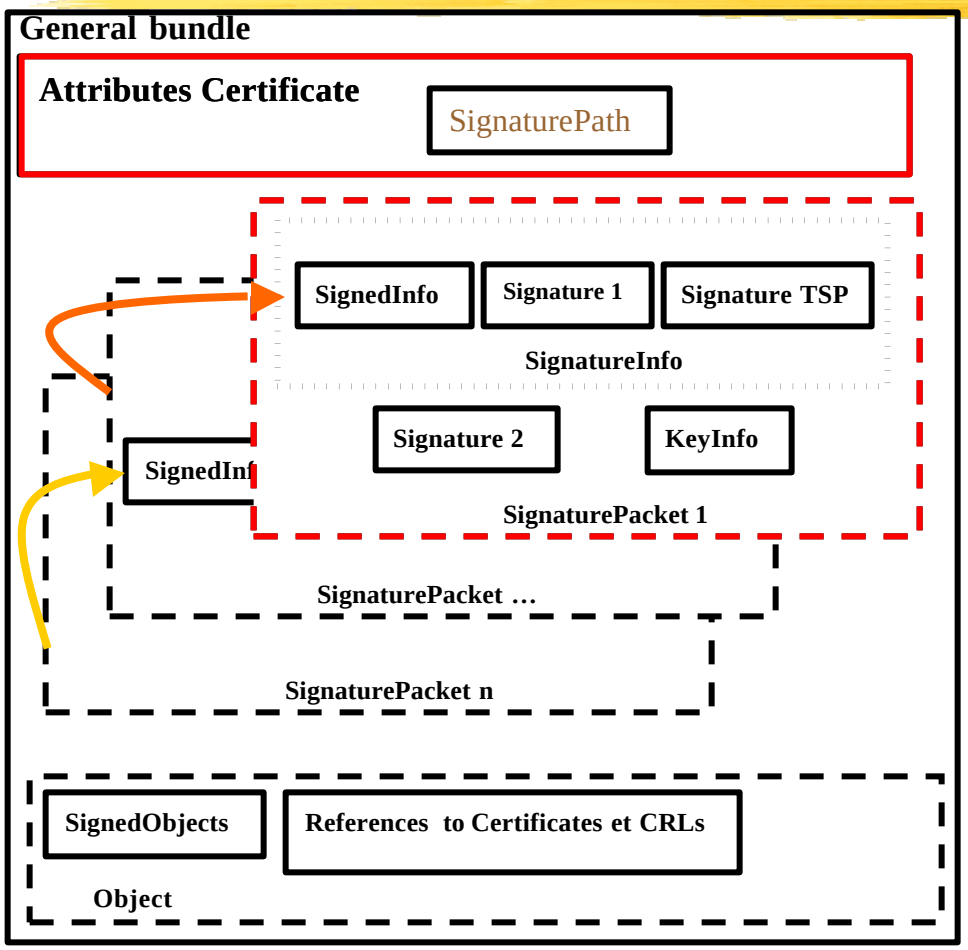
Format XMLDSIG

- **XMLDSIG (W3C – IETF)**
  - To ensure the integrity of the message and to confirm the identity of the sender.

- Characteristics
  - Several persons can to sign different portions of the same message.
  - Usages of different cryptographic algorithms
  - Multipart encoding
  - The signature is encoded in XML.
  - Partial information to check the signature:
    - Inexistent timestamp protection
    - Does not consider: order of signatures, dates and policies associated to each signatories



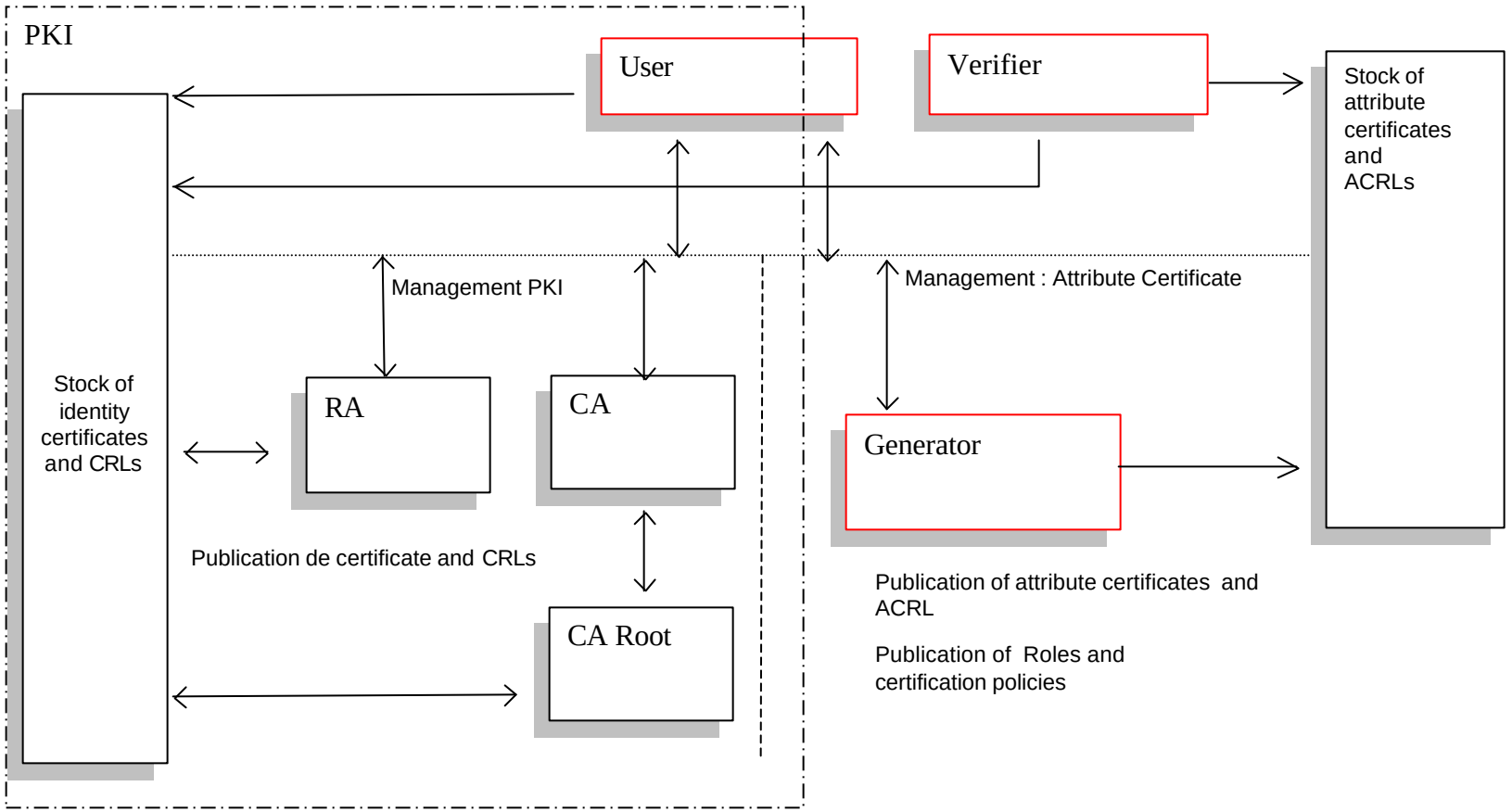
New format to multisignature control



- To bind XMLDSIG recommendation + attribute certificate to:
  - Indicate the constraints (Who, When, How).
  - Give indications (signature polices).
- To ensure the Timestamp.
- To have the references to:
  - Signed Objects.
  - Certificates and CRL necessary to check the signature.

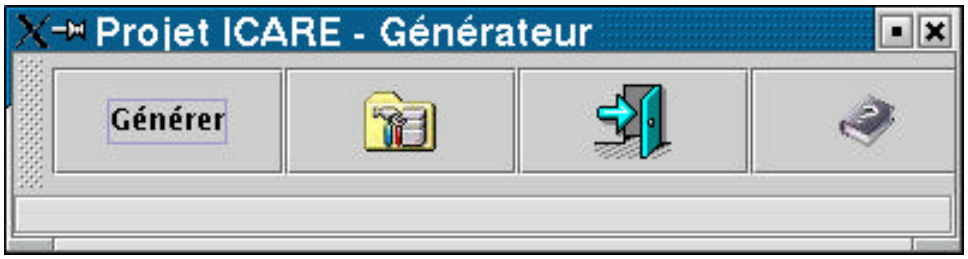
ICARE ver. O.1 Tool

Infrastructure



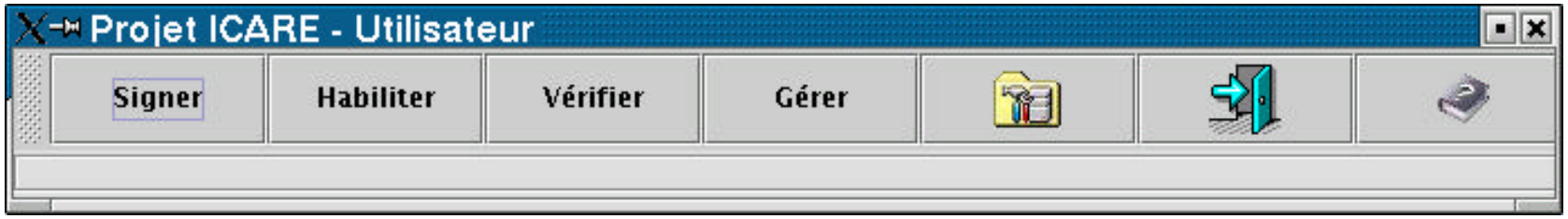
Application Generator

- Generate attributes certificates.
- Manage roles.
- Manage signature policies.
- Definite signatures path.



Application user to:

- Sign objects (simple and multiple)
- Empower the signature
- Check signatures
- Interact with the PKI



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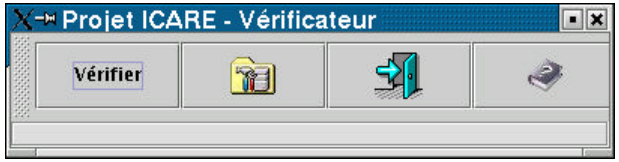
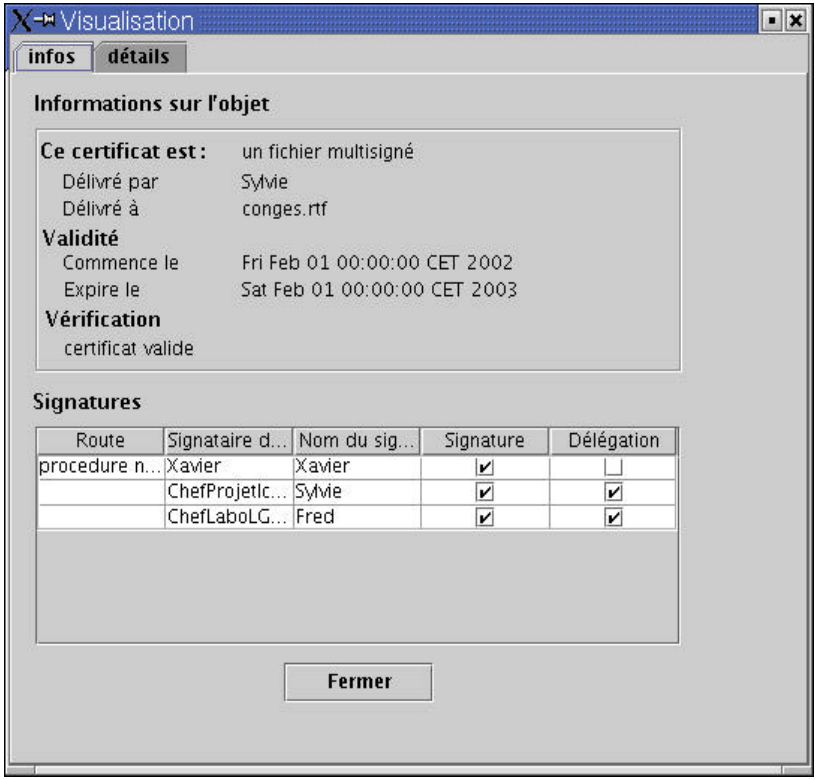
Application verifier to:

- Make the verification of :
  - The integrity of the documents
  - The validity of the signatures
  - The sequence of signatories
  - The dates of validity
  - The validity of attributes certificates
  - The validity of identity certificates





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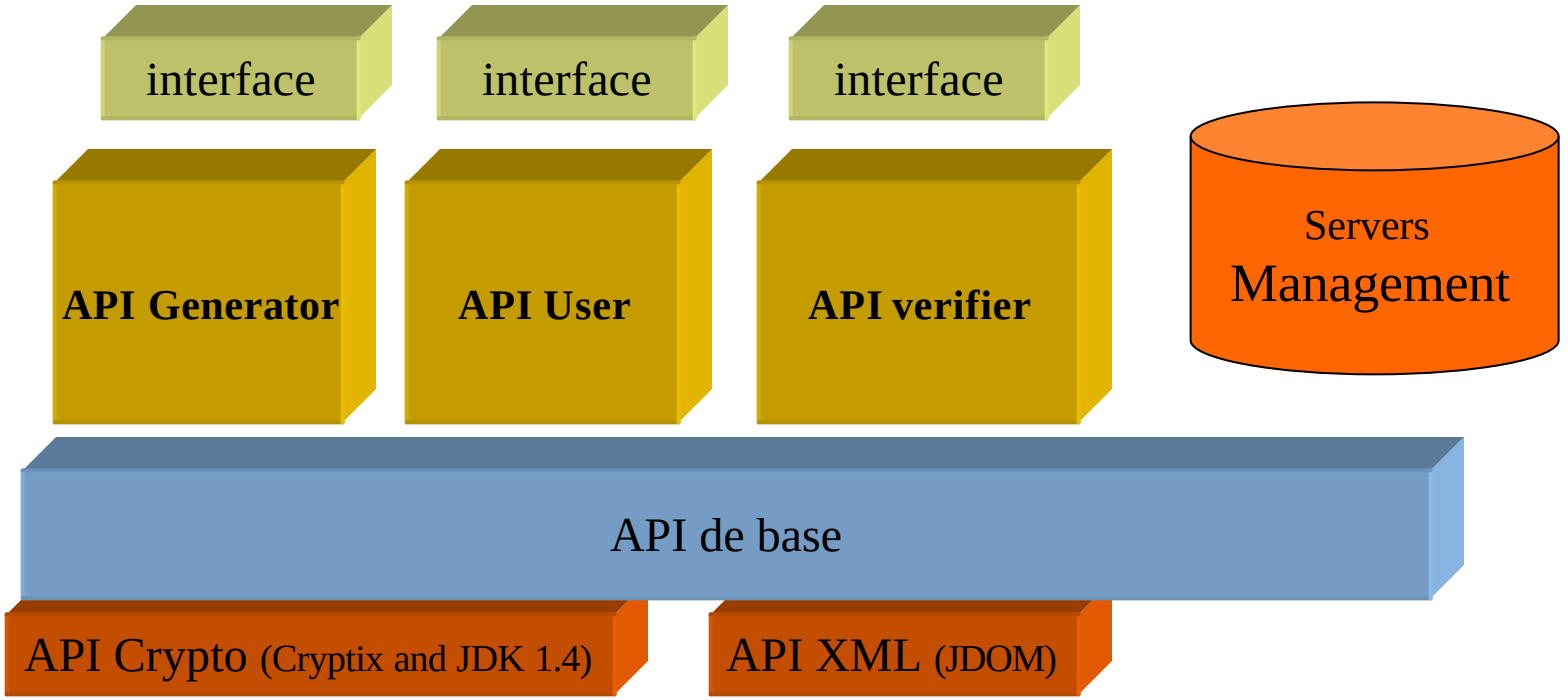
Architecture of ICARE Tool



Conclusion

Conclusion

- Usage of attributes certificates to:
  - Control the signature/multisignature.
  - Empower, delegate the signature.
  - Permit anonymity.
- Usage of language XML to:
  - Make/interpret easy the format of the signature.
  - Adapter to transactions electronic.
- Trust infrastructure is:
  - Adapter a new services.
  - Extensible and configurable.
- Possibility of extension:
  - Access control

That's all, thank you!

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