SAML 2.0 Refresher

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Víctor Aké
Identity and Federation Architect
victor.ake@sun.com

SAML 2

- What is it ?
- What does it do ?
- How does it work ?
- SAML2 components
- Web Single Sign On
- Security considerations
- Privacy recommendations

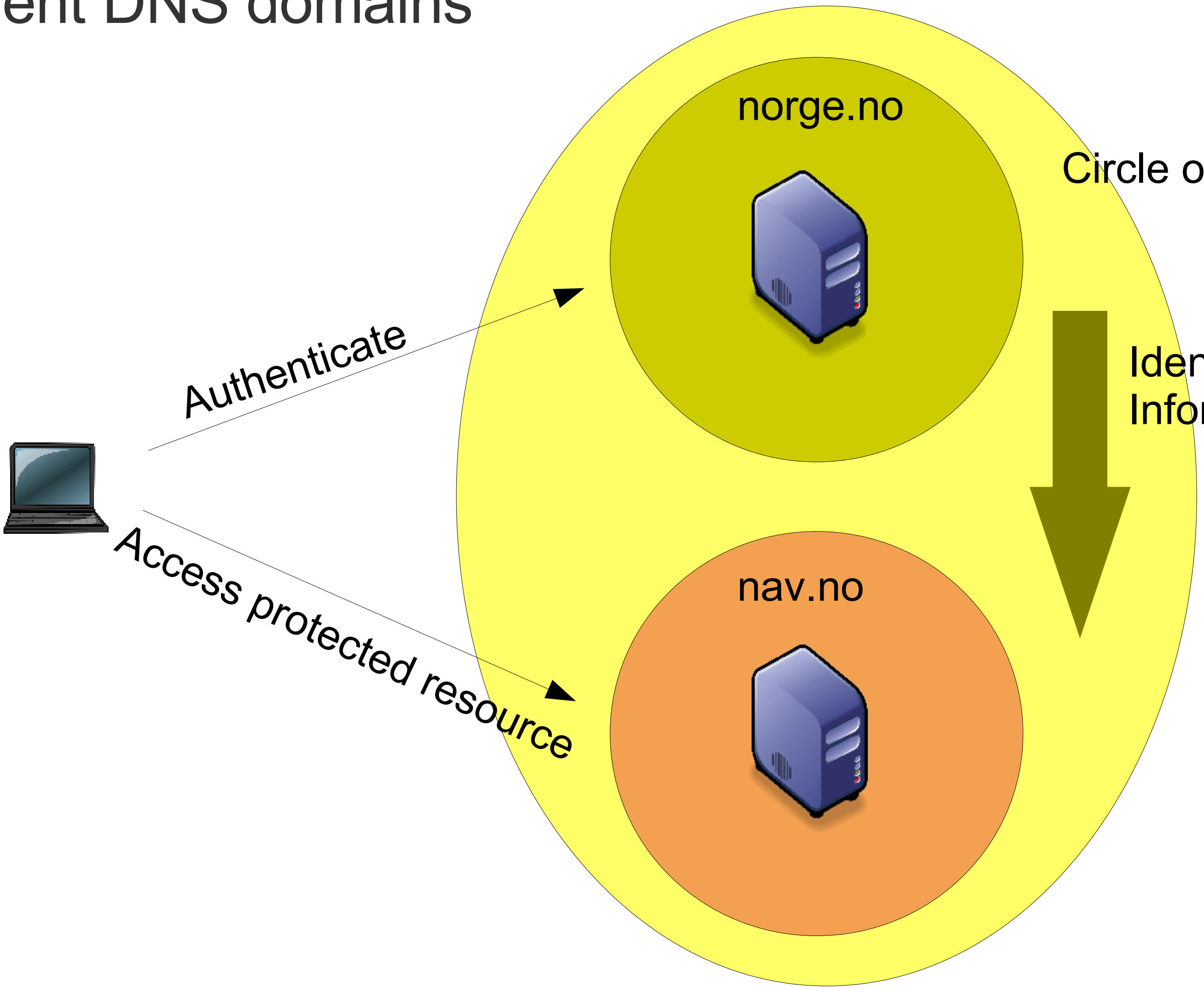
SAML 2 : What is it ?

- It is a standard document format to exchange security information
- It is also a set of protocols that solves common patterns while exchanging security information
- It is technology neutral, inter operable and standardized
- The standard is maintained by the OASIS Security Services Technical Committee

OASIS = Organization for the Advancement of Structured Information Standards

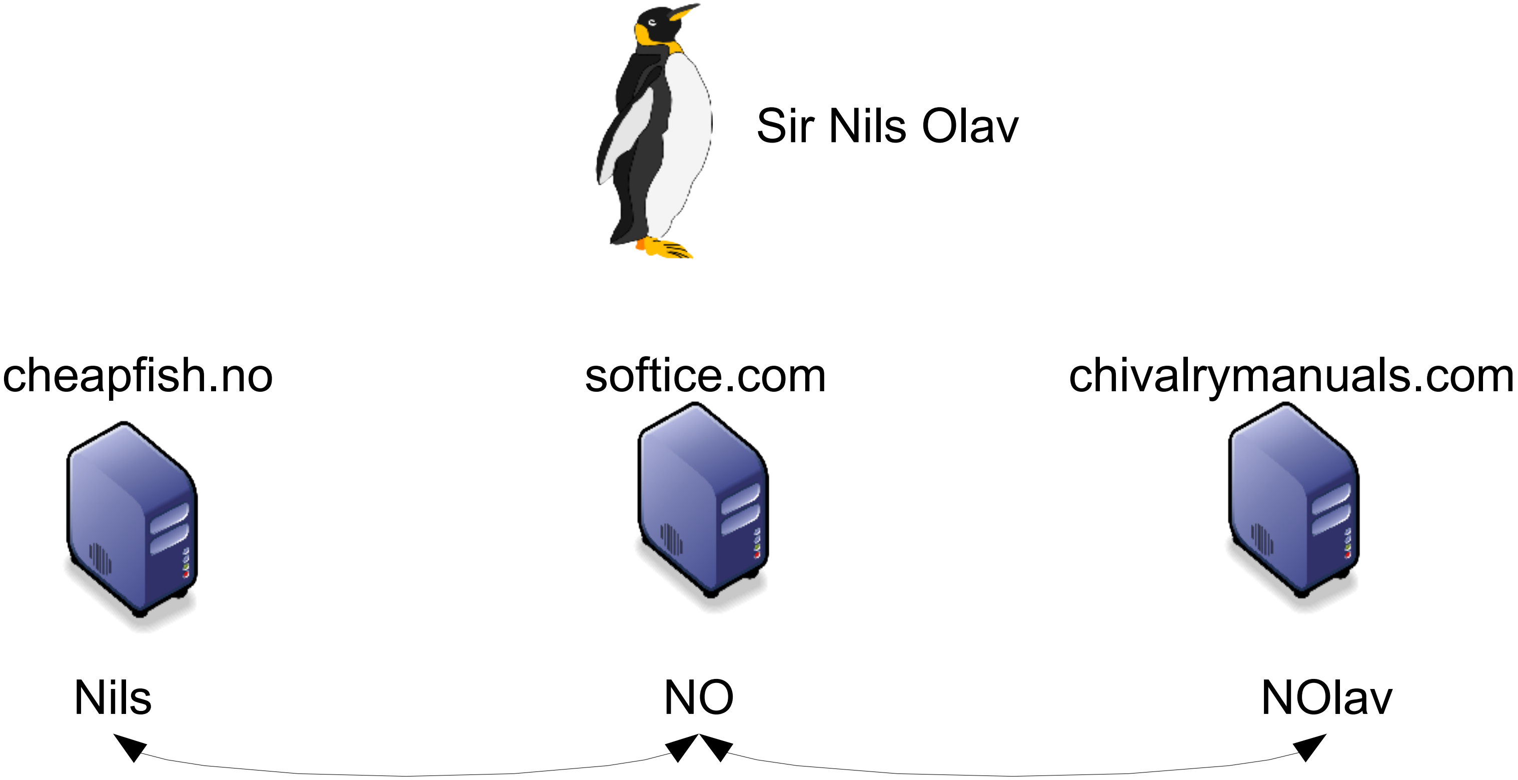
SAML2: What does it do ?

- Enables Single Sign On among trusted partners that reside in different DNS domains



SAML2: What does it do ?

- Enables account linking (or Federation of Identities)



Sir Nils Olav

cheapfish.no

softice.com

chivalrymanuals.com

Nils

NO

NOlav

Refer to Nils Olav
as xy56Xdf12

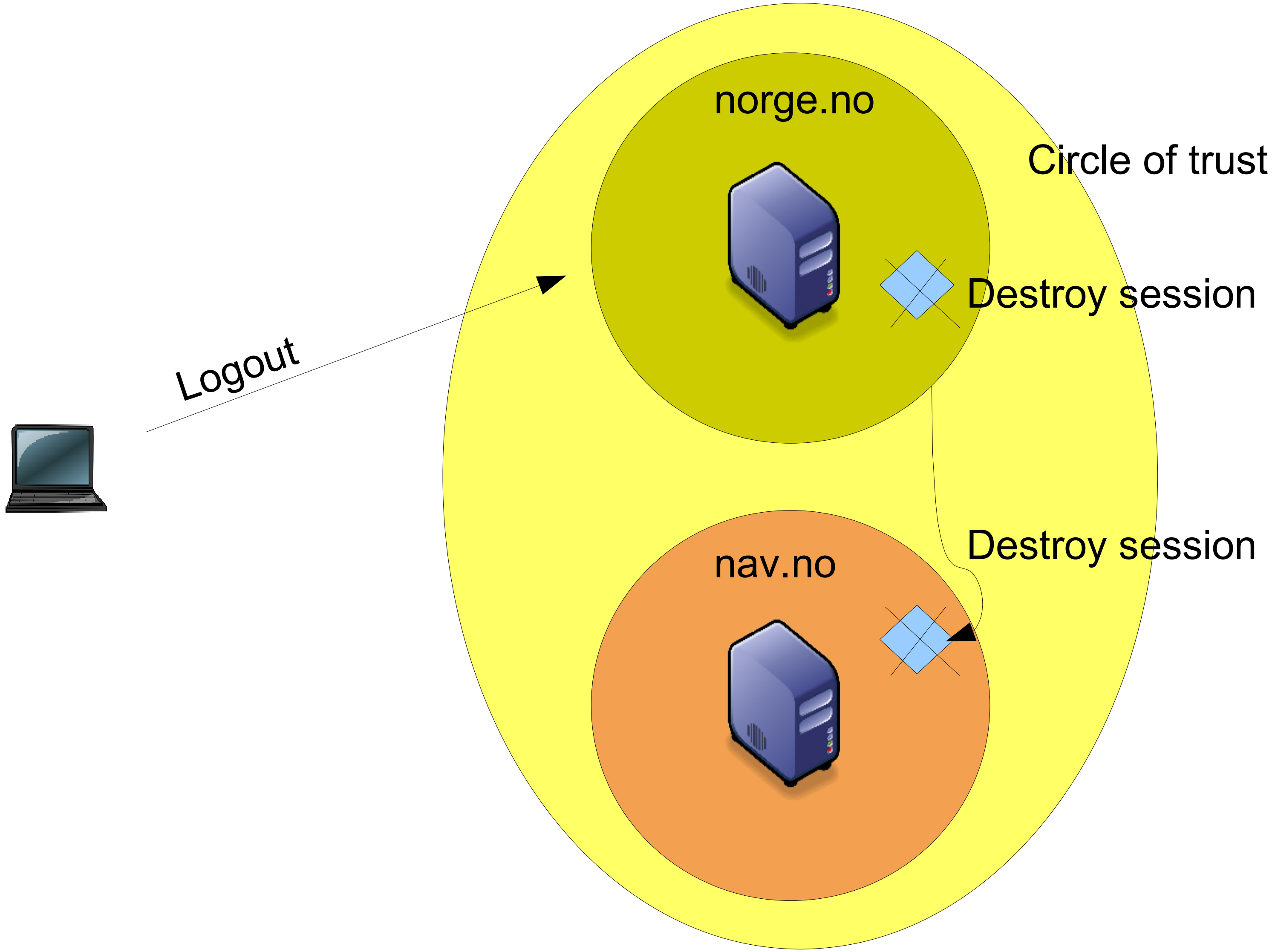
Neither of them know
the user id in the
other party

Refer to Nils Olav
as 45Th7812g

Neither of them know
the user id in the
other party

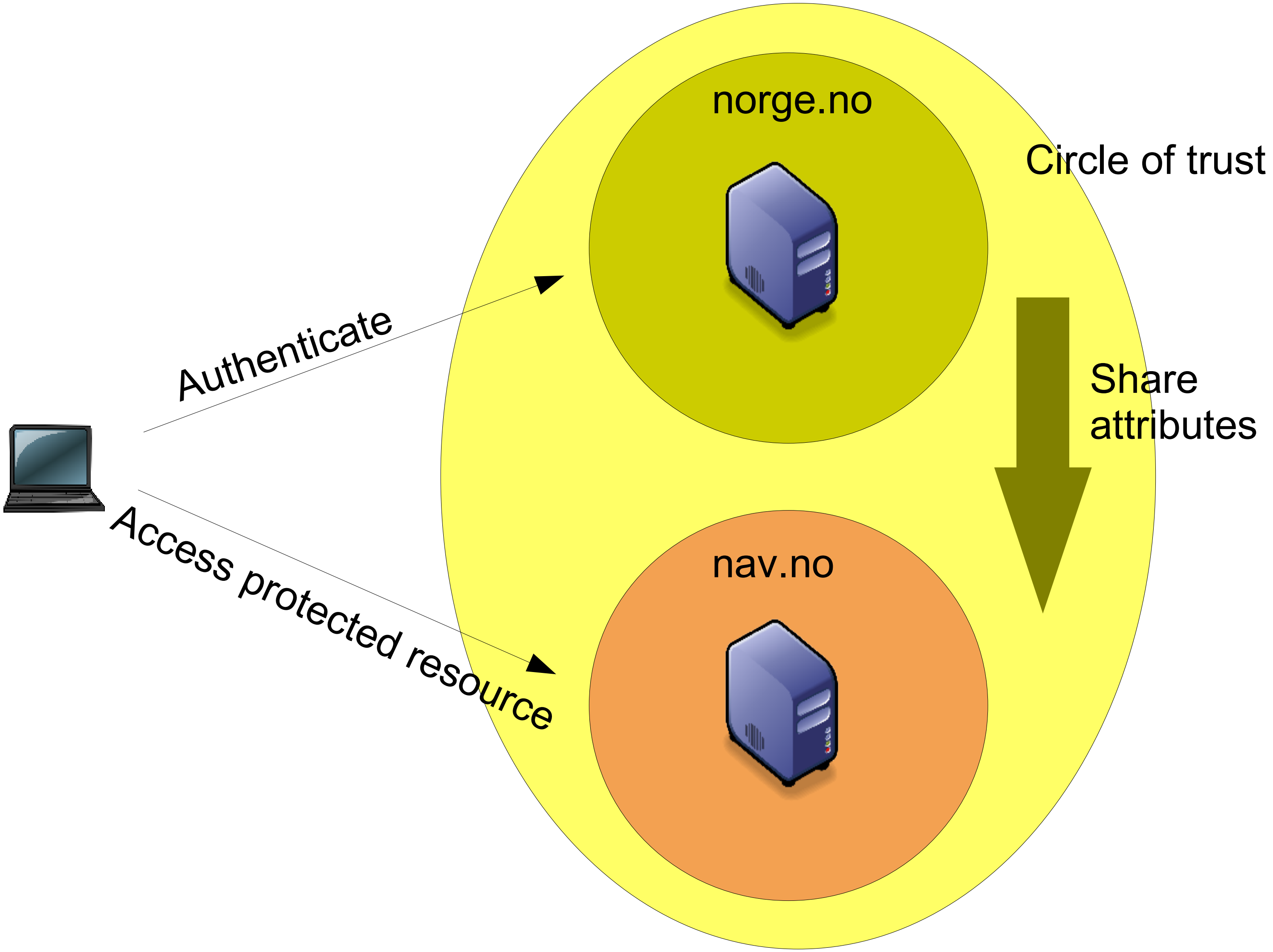
SAML2: What does it do ?

- Provides Single Log Out !



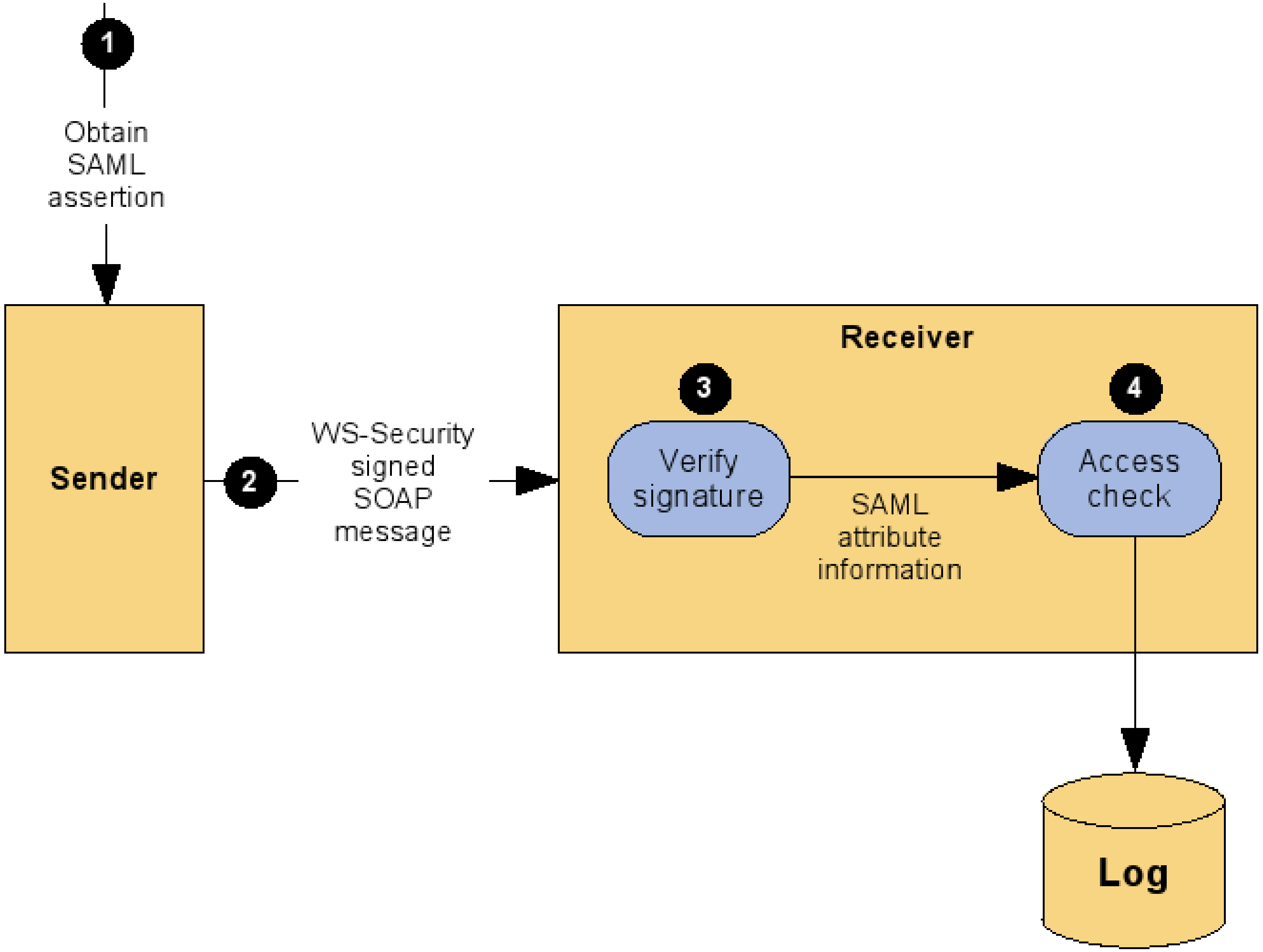
SAML2: What does it do ?

- Enables the sharing of attributes amongst trusted partners



SAML2: What does it do ?

- Can be used to convey security information outside its “native” SAML-based protocol context, i.e. Web Services



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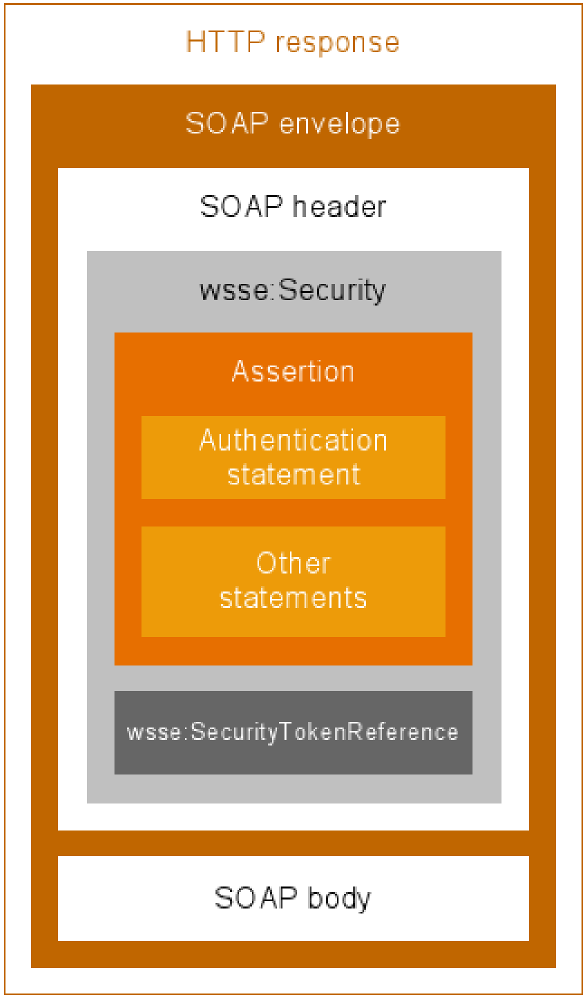
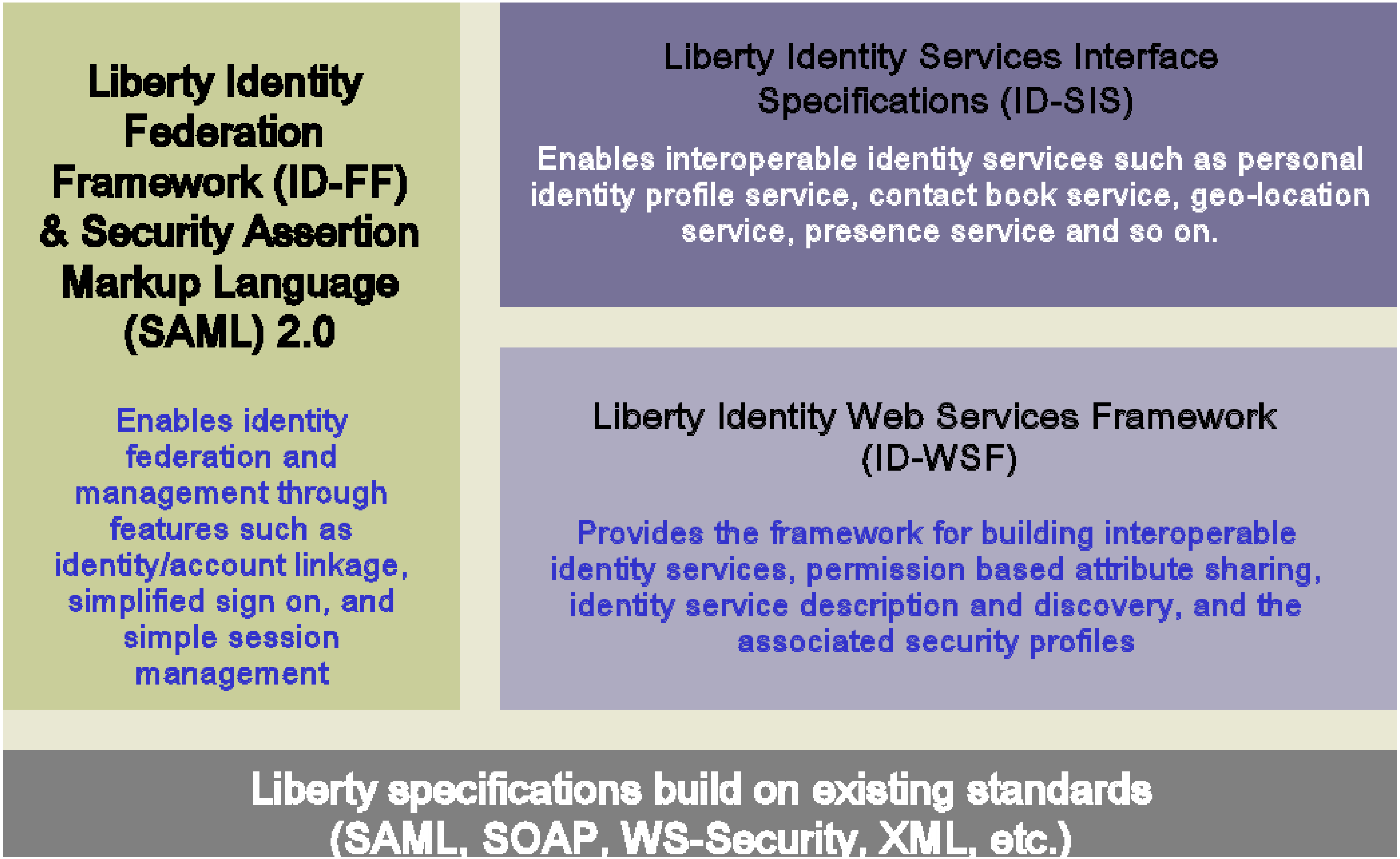


Where does it fit in the Liberty specifications



Liberty Identity Federation Framework (ID-FF) & Security Assertion Markup Language (SAML) 2.0

Enables identity federation and management through features such as identity/account linkage, simplified sign on, and simple session management

Liberty Identity Services Interface Specifications (ID-SIS)

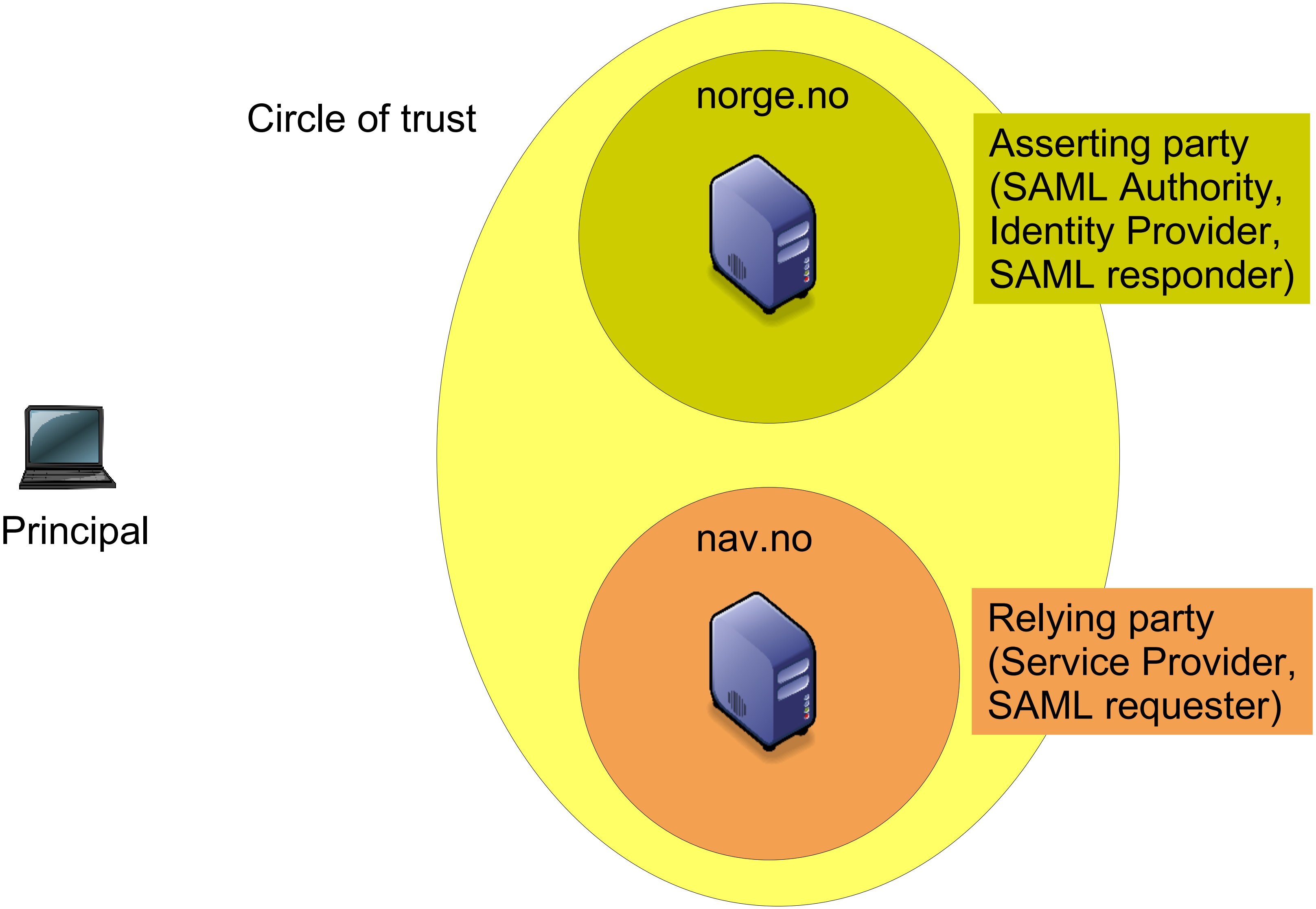
Enables interoperable identity services such as personal identity profile service, contact book service, geo-location service, presence service and so on.

Liberty Identity Web Services Framework (ID-WSF)

Provides the framework for building interoperable identity services, permission based attribute sharing, identity service description and discovery, and the associated security profiles

Liberty specifications build on existing standards (SAML, SOAP, WS-Security, XML, etc.)

Elements participating



Circle of trust

norge.no

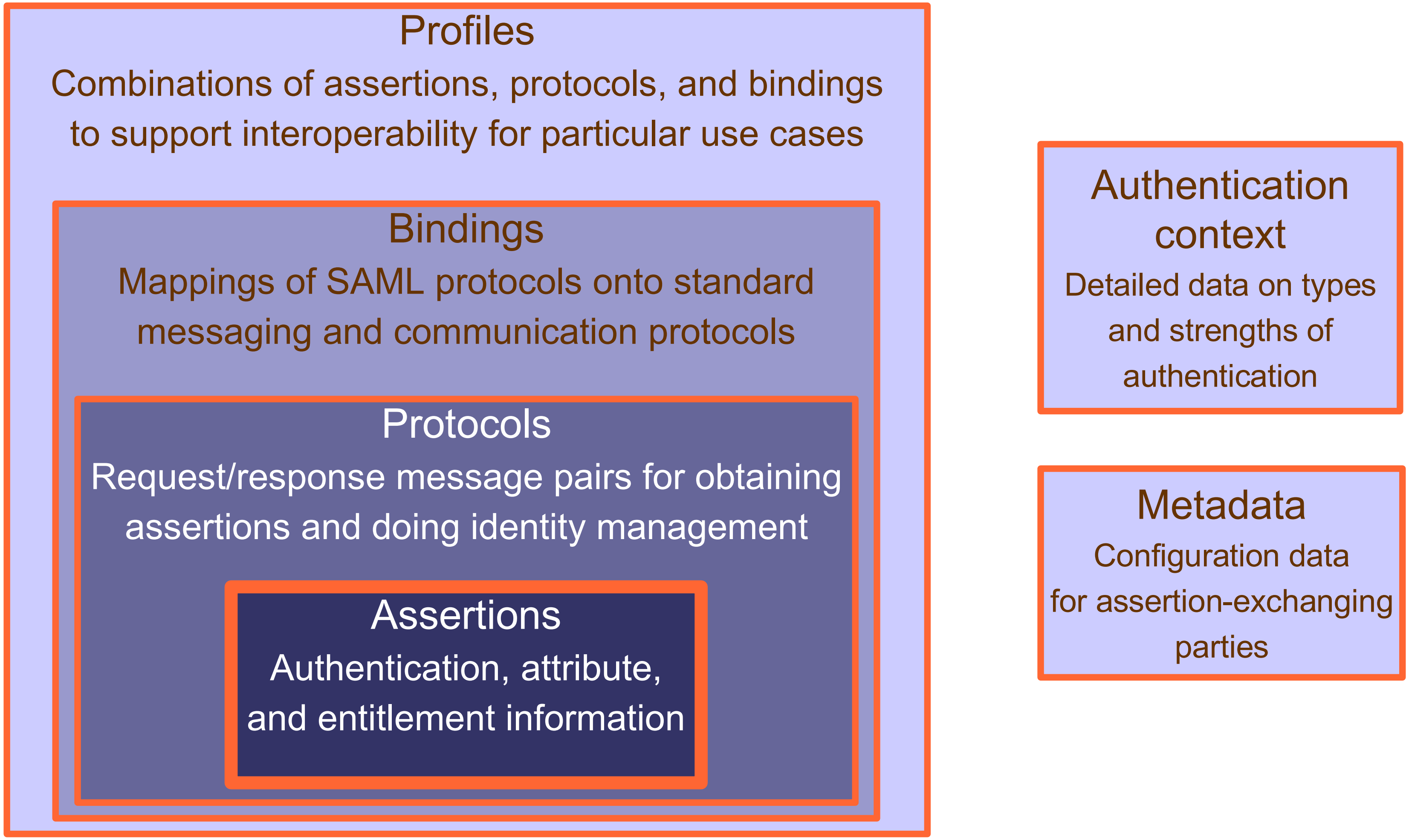
Asserting party (SAML Authority, Identity Provider, SAML responder)

Principal

nav.no

Relying party (Service Provider, SAML requester)

SAML 2 components



Profiles

Combinations of assertions, protocols, and bindings to support interoperability for particular use cases

Bindings

Mappings of SAML protocols onto standard messaging and communication protocols

Protocols

Request/response message pairs for obtaining assertions and doing identity management

Assertions

Authentication, attribute, and entitlement information

Authentication context

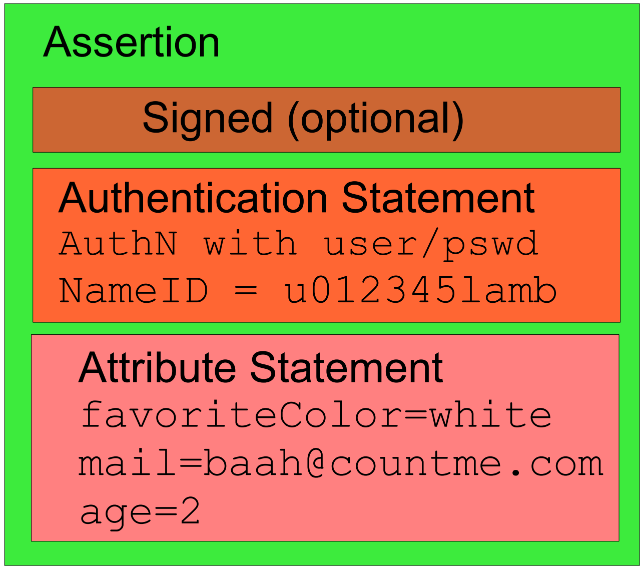
Detailed data on types and strengths of authentication

Metadata

Configuration data for assertion-exchanging parties

SAML2 Assertions

- An assertion is a declaration of fact (according to someone)
- SAML assertions contain one or more statements about a subject:
  - Authentication statement: “Joe authenticated with a password at 9:00am”
  - Attribute statement (which itself can contain multiple attributes): “Joe is a manager with a $500 spending limit”
  - Authorization decision statement (now deprecated)



Assertion

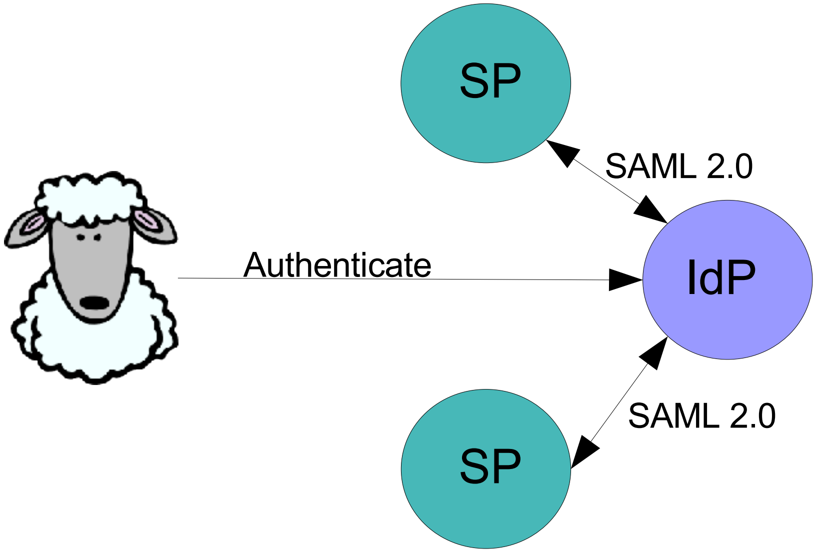
Signed (optional)

Authentication Statement

```
AuthN with user/pswd
NameID = u012345lamb
```

Attribute Statement

```
favoriteColor=white
mail=baah@countme.com
age=2
```

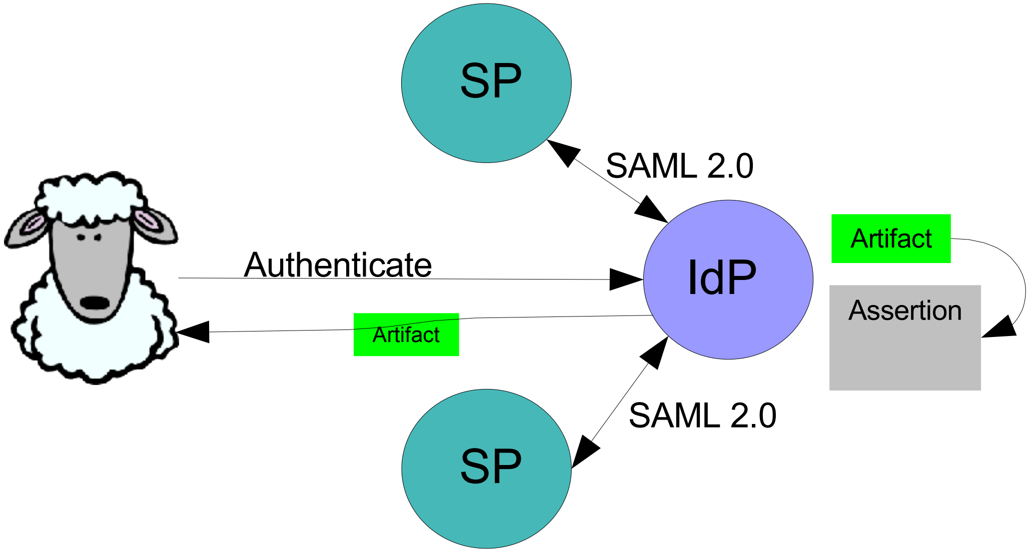


SAML2: Components

- Protocols
  - Authentication Request
  - Single Logout
  - Assertion Query and Request
  - Artifact resolution
  - Name Identifier Management
  - Name Identifier Mapping
- Bindings
  - HTTP Redirect
  - HTTP POST
  - HTTP Artifact
  - Reverse SOAP (PAOS)
  - SAML URI
- Profiles
  - Web Browser SSO Profile
  - Enhanced Client Proxy (ECP)
  - Identity Provider Discovery
  - Single Logout
  - Assertion Query/Request
  - Artifact resolution
  - Name Identifier Management
  - Name Identifier mapping

Artifacts

- An artifact is a small, fixed-size, structured data object pointing to a typically larger, variably sized SAML protocol message
  - Designed to be embedded in URLs and conveyed in HTTP messages
  - Allows for “pulling” SAML messages rather than having to push them
- SAML defines one preferred artifact format



What's in an authentication request

- Authentication request
  - Request ID
  - Issuer
  - Protocol version and binding
  - Assertion Consumer endpoint
  - Requested Authentication Context
  - Name ID Policy
- Authentication response
  - Request ID
  - In Response To
  - Issuer
  - Status code
  - Artifact or Assertion

What's in an assertion

- Assertion
  - ID
  - Signature (optional)
  - Subject
    - Subject confirmation
    - Name ID
  - Conditions: Time constraint, IP address, audience, etc
  - Authentication Statement
    - Authentication Instant (time stamp)
    - Session Index
    - Authentication Context
  - Attribute Statement (optional)
    - Attribute name, value pairs
    - Name spaces

Name ID Format

- Email address
- X.509 subject name
- Windows domain qualified name
- Kerberos principal name
- Entity identifier
- Persistent identifier
- Transient identifier

These 2 provide privacy-preserving pseudonyms

This provide anonymity

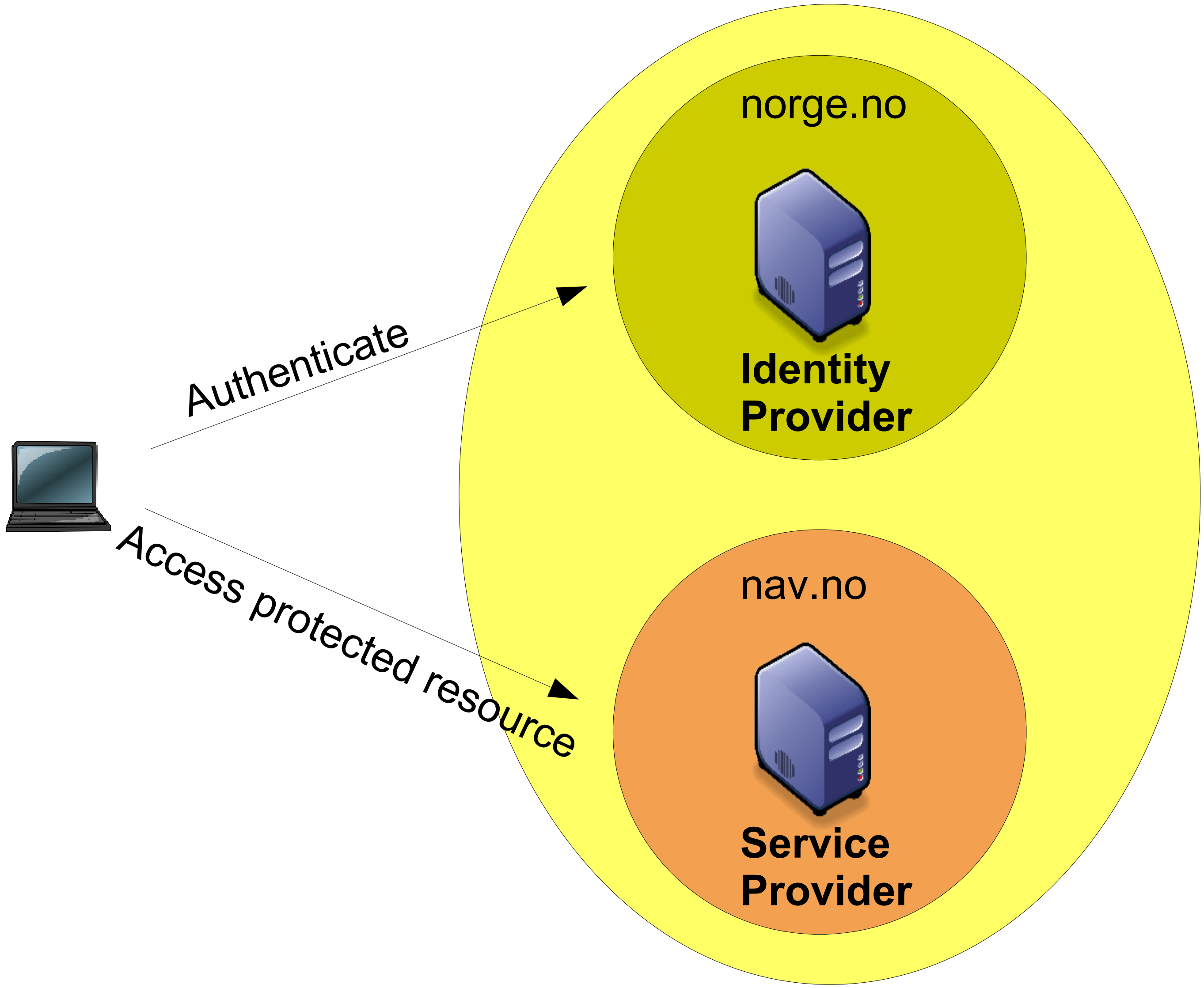
Authentication contexts

- Internet Protocol
- Internet Protocol Password
- Kerberos
- Mobile One Factor Unregistered
- Mobile Two Factor Unregistered
- Mobile One Factor Contract
- Mobile Two Factor Contract
- Password
- Password Protected Transport
- Previous Session
- Public Key – X.509
- Public Key – PGP
- Public Key – SPKI
- Public Key – XML Signature
- Smartcard
- Smartcard PKI
- Software PKI
- Telephony
- Nomadic Telephony
- Personalized Telephony
- Authenticated Telephony
- Secure Remote Password
- SSL/TLS Cert-Based Client Authn
- Time Sync Token
- Unspecified
- Your own customized classes...

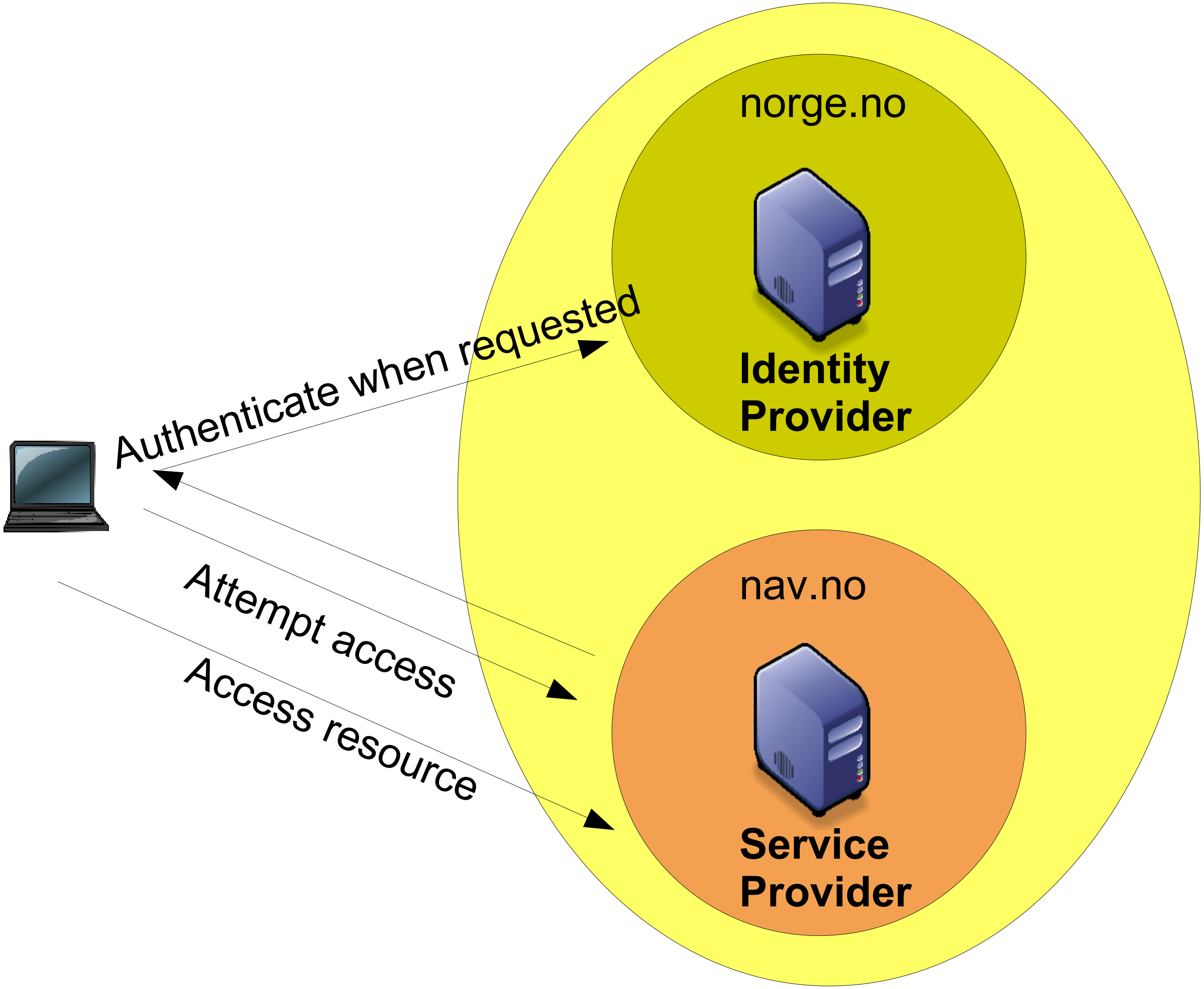
Metadata

- Describes the configuration of a SAML entity in a standard way
  - Service endpoint URLs
  - Key material for verifying signatures
  - Supported bindings
  - Supported Name ID formats
  - Operational role, etc
- Examples of metadata
  - Identity Provider metadata
  - Service Provider metadata

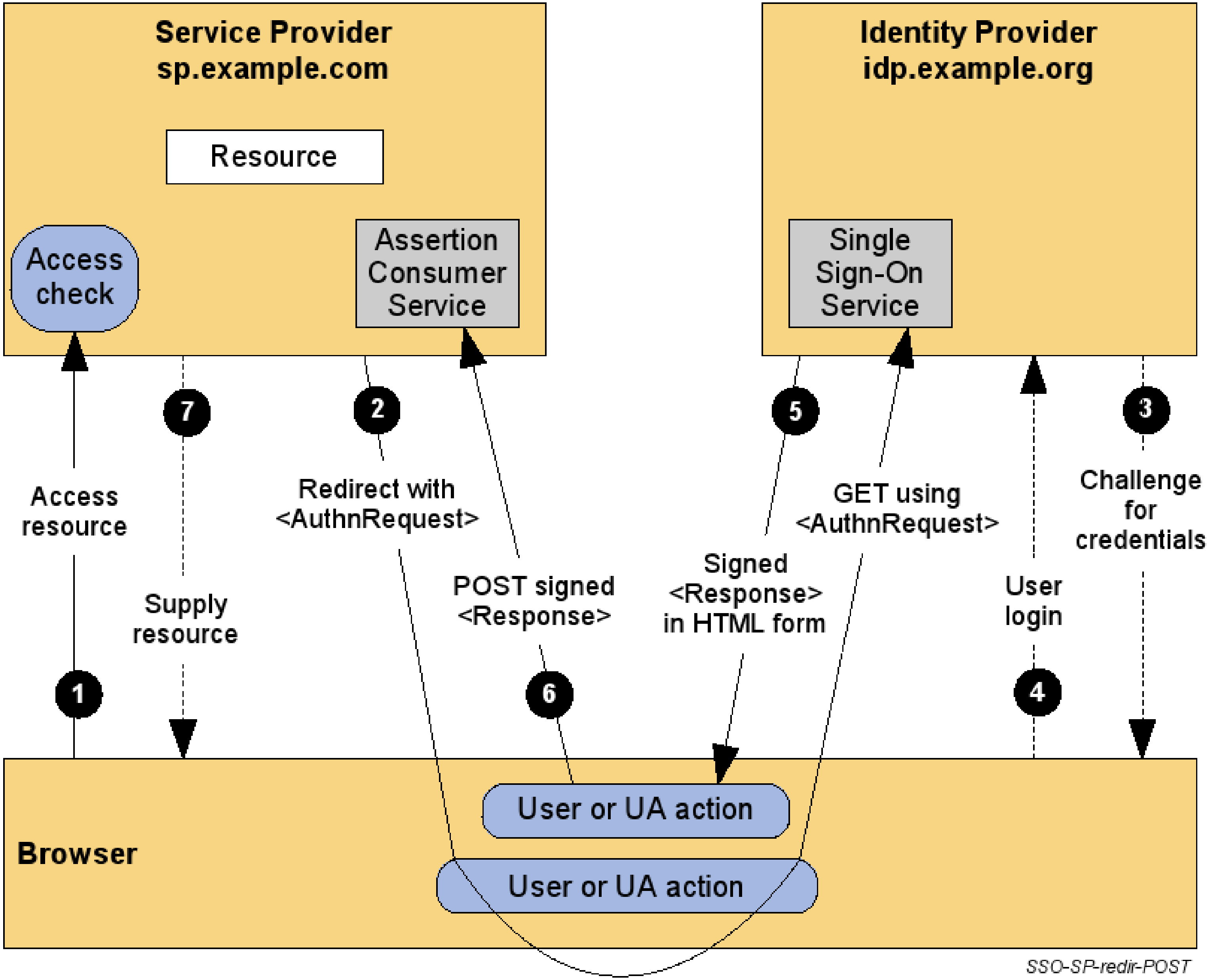
IDP Initiated Web Single Sign On



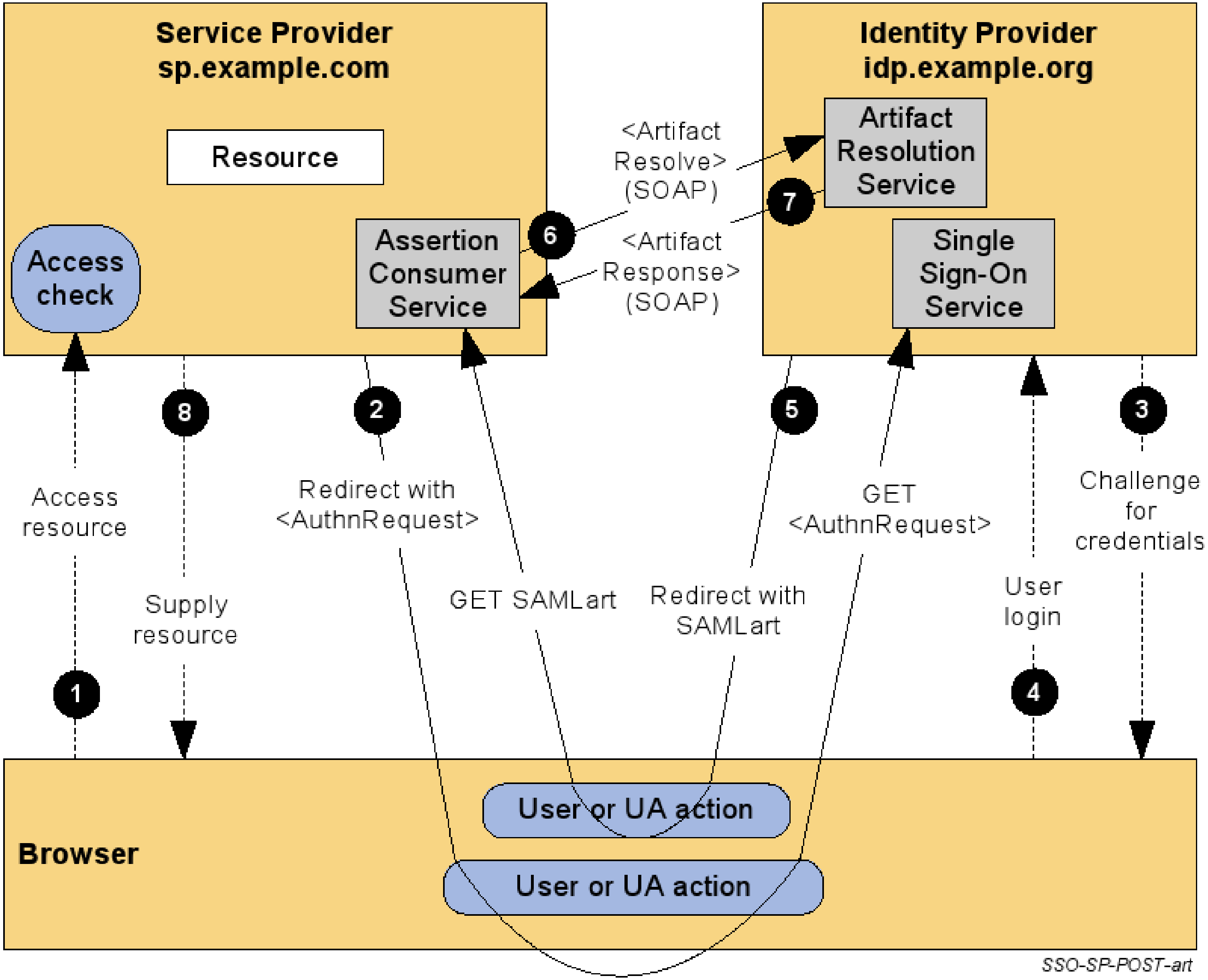
SP Initiated Web Single Sign On



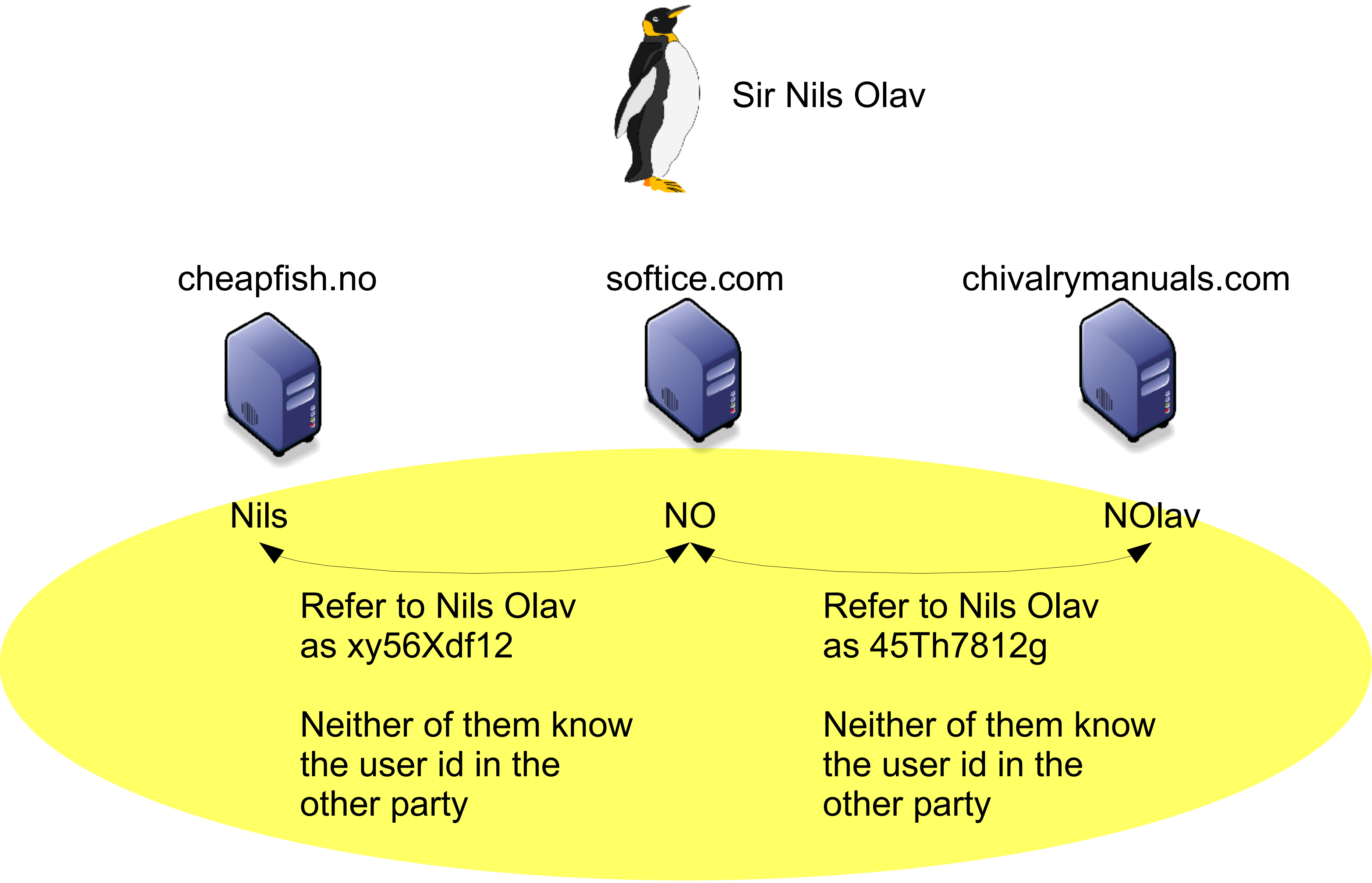
SP Initiated SSO with Redirect/POST bindings



SP initiated SSO with POST/artifact bindings



Account linking



Sir Nils Olav

cheapfish.no

softice.com

chivalrymanuals.com

Nils

NO

NOlav

Refer to Nils Olav
as xy56Xdf12

Neither of them know
the user id in the
other party

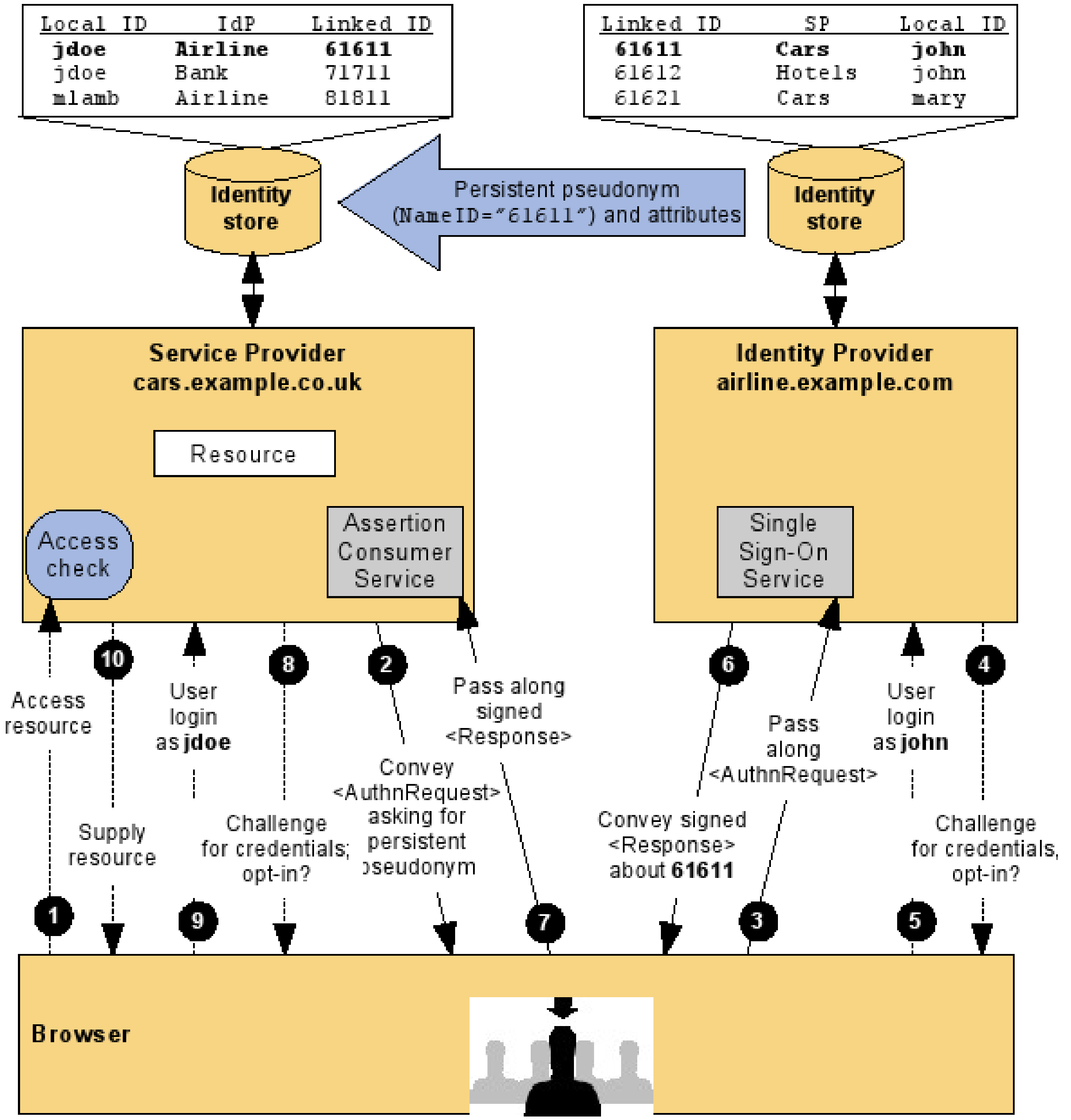
Refer to Nils Olav
as 45Th7812g

Neither of them know
the user id in the
other party

Account linking

- Account linking is the federation of identities
- Use cases
  - Federation via Out-of-Band account linking
  - Federation via Persistent pseudonym identifiers
  - Federation via Transient pseudonym identifiers
  - Federation via Identity attributes
  - Federation termination

Persistent pseudonym identifier

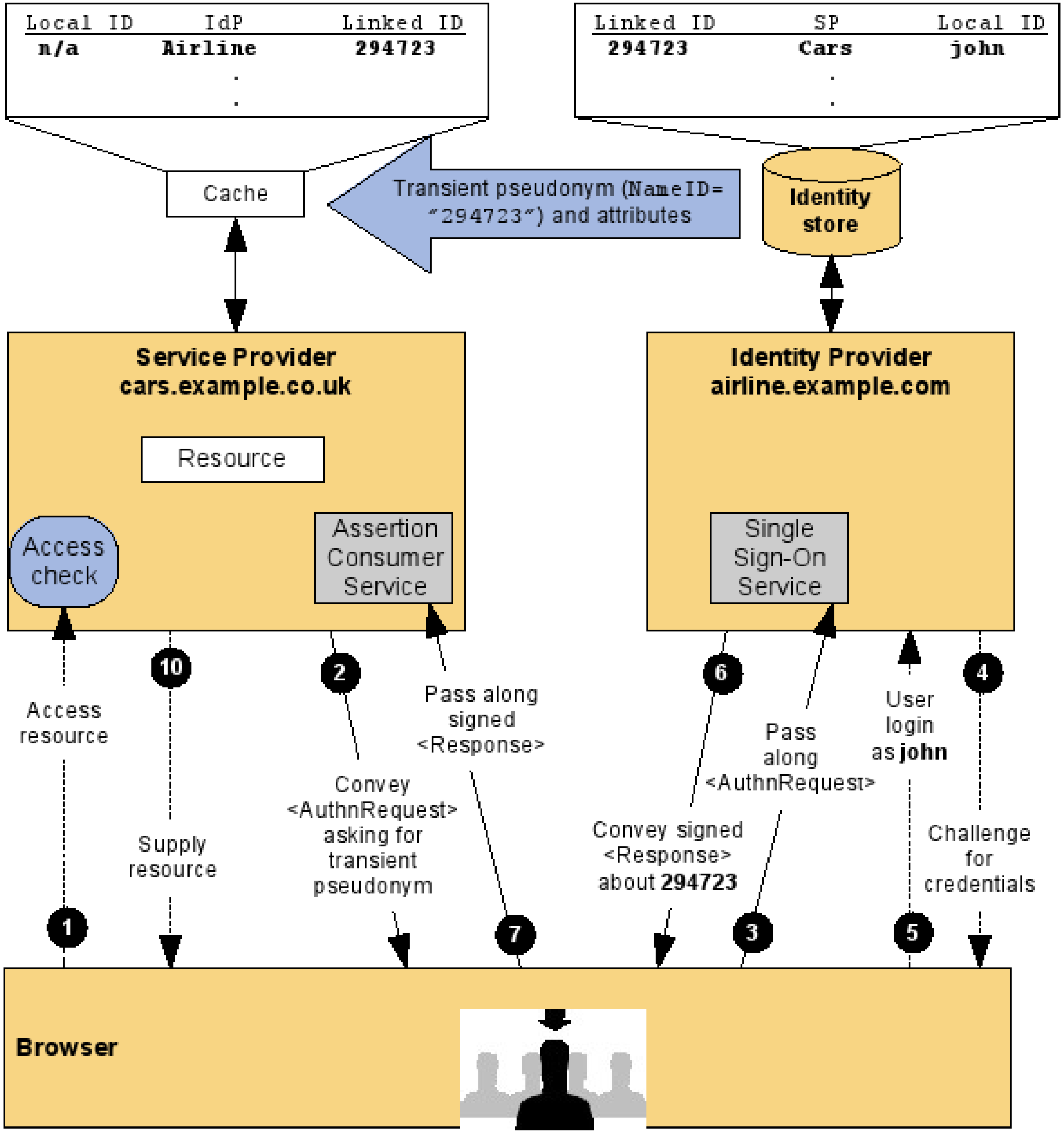


Local ID	IdP	Linked ID
jdoe	**Airline**	**61611**
jdoe	Bank	71711
mlamb	Airline	81811

Linked ID	SP	Local ID
61611	**Cars**	**john**
61612	Hotels	john
61621	Cars	mary

Identity store
Persistent pseudonym (NameID="61611") and attributes
Identity store
Service Provider cars.example.co.uk
Resource
Access check
Assertion Consumer Service
Identity Provider airline.example.com
Single Sign-On Service
1
Access resource
10
Supply resource
User login as **jdoe**
9
8
Challenge for credentials; opt-in?
2
Convey <AuthnRequest> asking for persistent pseudonym
Pass along signed <Response>
7
6
Convey signed <Response> about **61611**
Pass along <AuthnRequest>
3
User login as **john**
5
4
Challenge for credentials, opt-in?
Browser

Transient pseudonym identifier



Local ID	IdP	Linked ID
n/a	Airline	294723
	.	
	.	

Linked ID	SP	Local ID
294723	Cars	john
	.	
	.	

Cache
Transient pseudonym (NameID= "294723") and attributes
Identity store
Service Provider
cars.example.co.uk
Resource
Access check
Assertion Consumer Service
Identity Provider
airline.example.com
Single Sign-On Service
1 Access resource
2 Convey <AuthnRequest> asking for transient pseudonym
3 Pass along <AuthnRequest>
4 Challenge for credentials
5 User login as john
6 Convey signed <Response> about 294723
7 Pass along signed <Response>
10 Supply resource
Browser

SAML 2 attribute sharing

- SAML 2.0 allows the inclusion of user attributes as attribute statements in the assertion
- Some examples on how the attribute sharing can be used
  - Transfer of profile information to personalize services
  - Transfer of attributes to create an account at the SP
  - Authorization based on the attributes received, etc
- It is important to highlight that the user should be informed about the transfer of information and if required user consent must be explicitly obtained

Privacy in SAML 2.0

- SAML supports the use of pseudonyms between an IDP and an SP, so the real name of the user does not need to be disclosed
- Transient (or one-time) identifiers
- Authentication Contexts allow user to be authenticated to a sufficient (but not more than necessary) assurance level

Security recommendations

- Message integrity and confidentiality
  - HTTP over SSL 3.0 or TLS is recommended
- Relying party requesting assertions from asserting party
  - Bilateral authentication between parties using SSL 3.0 or TLS 1.0
  - Authentication via digital signature
- Response messages via a user's web browser
  - Digitally signed using XML signature to ensure message integrity

More info:

http://www.oasis-open.org

http://www.projectliberty.org

Thanks for your time !