

### Security-by-design e Identità Digitale: da Entra con CIE/SPID al Digital Wallet

Giada Sciarretta

Fondazione Bruno Kessler

Per le domande:



wooclap.com e codice WSGARR24

# Who we are Fondazione Bruno Kessler (FBK)

- Research and Innovation institute in Trento, Italy
- 12 research centers: from technology to humanities and social sciences



#### FBK at a glance

450+

researchers

#### 136

PhD students from 25 different

Countries

#### 200+

thesis students, visiting professor,

visitors

#### 700+

students involved in the FBK activities

#### 4.645 sq m

labs for scientific research

230.000

and more titles in a special library



# Center for Cybersecurity Fondazione Bruno Kessler (FBK)



Digital Identity



**Applied Cryptography** 



Threat and Anomaly Detection







# Center for Cybersecurity Digital Identity





### **OpenID Connect Specification**

iGOV and OIDC Federation profiles



#### Activities in the context of EUDIW

PID Issuance, Trust model, Threat Model, Revocation



# Center for Cybersecurity Digital Identity





#### OpenID Connect Specification

iGOV and OIDC Federation profiles

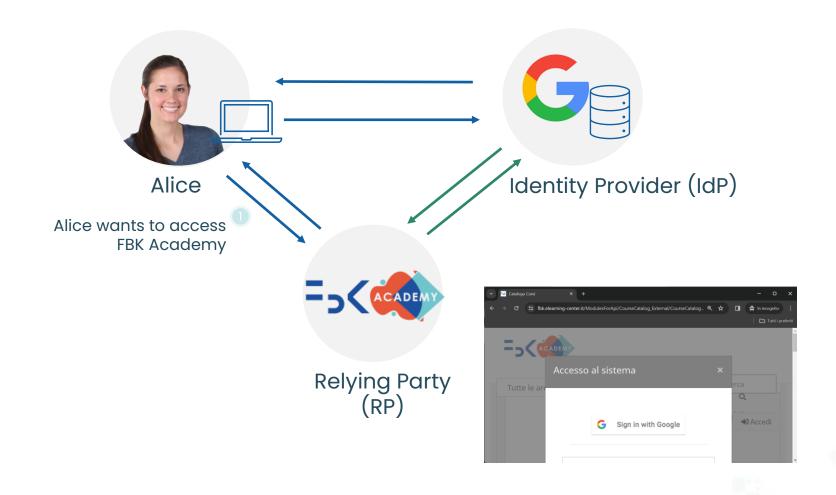


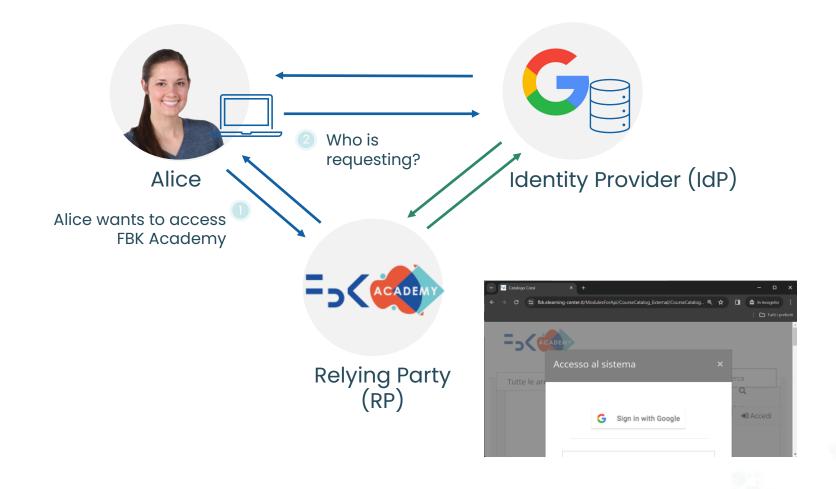
#### Activities in the context of EUDIW

PID Issuance, Trust model, Threat Model, Revocation

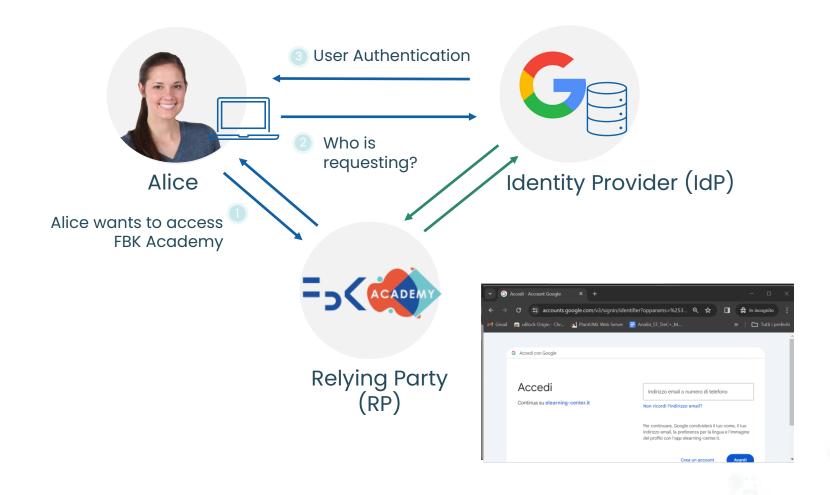




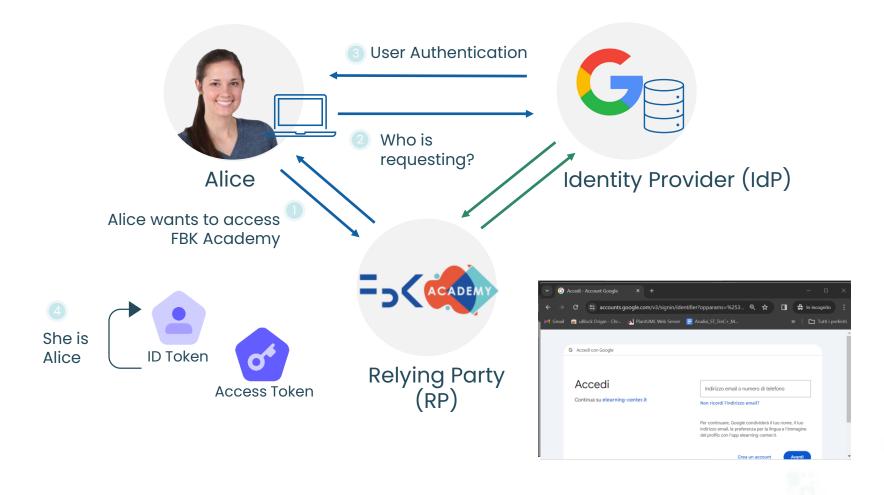




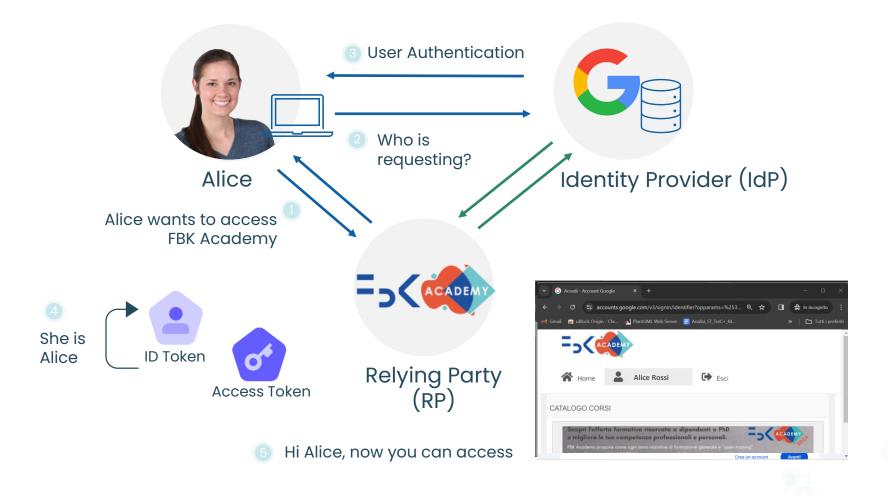












# Italian eIDAS notified eID schemes SPID and CIE



#### 2 elD schemes:



SPID, Public Digital Identity System

(handled by AgID)





CIE id, based on

(owned by Ministry of Interior, handled by IPZS)



Amir Sharif, Matteo Ranzi, Roberto Carbone, Giada Sciarretta, Silvio Ranise. **SoK: A Survey on Technological Trends for (pre)Notified eIDAS Electronic Identity Schemes.** In: 17th International Workshop on Frontiers in Availability, Reliability and Security (*FARES2022*).





## Italian eIDAS notified eID schemes SPID and CIE



#### 2 elD schemes:



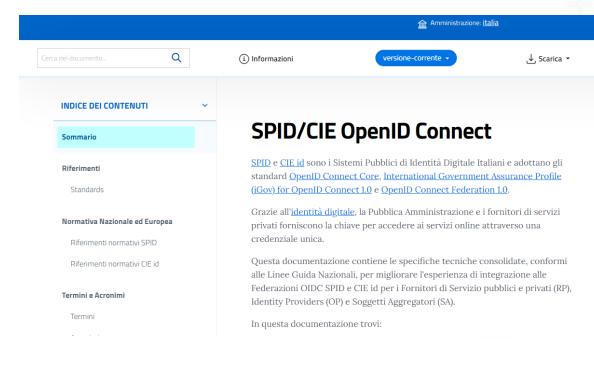
SPID, Public Digital Identity System (handled by AgID)



CIE id, based on



(owned by Ministry of Interior, handled by IPZS)



#### From SAML 2.0 to OpenID Connect



https://docs.italia.it/italia/spid/spid-cie-oidc-docs



Amir Sharif, Matteo Ranzi, Roberto Carbone, Giada Sciarretta, Silvio Ranise. **SoK: A Survey on Technological Trends for (pre)Notified eIDAS Electronic Identity Schemes.** In: 17th International Workshop on Frontiers in Availability, Reliability and Security (*FARES2022*).





# OpenID Connect in Italy Challenges and motivation





# OpenID Connect in Italy Challenges and motivation



The OAuth 2.0 Authorization Framework RFC 6749

OAuth 2.0 Dynamic Client Registration Management Protocol JSON Web Token (JWT) Profile for OAuth 2.0 Access Tokens RFC 7592 RFC 9068 Experimental **JSON Web Token Best Current Practices OAuth 2.0 Dynamic Client Registration Protocol** RFC 8725 Best Current Practice RFC 7591 Resource Indicators for OAuth 2.0 JSON Web Token (JWT) Profile for OAuth 2.0 Client Authentication and Authorization Grants RFC 8707 RFC 7523 OAuth 2.0 Mutual-TLS Client Authentication and Certificate-Bound Access Tokens Security Assertion Markup Language (SAML) 2.0 Profile for OAuth 2.0 Client Authentication and RFC 8705 Authorization Grants RFC 7522 OAuth 2.0 Token Exchange RFC 8693 Assertion Framework for OAuth 2.0 Client Authentication and Authorization Grants RFC 7521 OAuth 2.0 Device Authorization Grant RFC 8628 JSON Web Token (JWT) RFC 7519 OAuth 2.0 Authorization Server Metadata RFC 8414 OAuth 2.0 Token Revocation RFC 7009 OAuth 2.0 for Native Apps RFC 8252 **OAuth 2.0 Threat Model and Security Considerations** Best Current Practice RFC 6819 Informational **Authentication Method Reference Values** RFC 8176 An IETF URN Sub-Namespace for OAuth Proof-of-Possession Key Semantics for JSON Web Tokens (JWTs) RFC 6755 RFC 7800 Informational OAuth 2.0 Token Introspection The OAuth 2.0 Authorization Framework: Bearer Token Usage RFC 7662 RFC 6750 **Proof Key for Code Exchange by OAuth Public Clients** The OAuth 2.0 Authorization Framework RFC 7636 RFC 6749

OAuth 2.0 Dynamic Client Registration Management Protocol JSON Web Token (JWT) Profile for OAuth 2.0 Access Tokens RFC 7592 RFC 9068 Experimental **JSON Web Token Best Current Practices OAuth 2.0 Dynamic Client Registration Protocol** RFC 8725 Best Current Practice RFC 7591 Resource Indicators for OAuth 2.0 JSON Web Token (JWT) Profile for OAuth 2.0 Client Authentication and Authorization Grants RFC 8707 RFC 7523 OAuth 2.0 Mutual-TLS Client Authentication and Certificate-Bound Access Tokens Security Assertion Markup Language (SAML) 2.0 Profile for OAuth 2.0 Client Authentication and RFC 8705 RFCs OAuth 2.0 Token Exchange RFC 8693 OAuth 2.0 Step Up Authentication Challenge Protocol luthentication and Authorization Grants RFC 9470 OAuth 2.0 Device Authorization Grant RFC 8628 OAuth 2.0 Demonstrating Proof of Possession (DPoP) OAuth 2.0 Authorization Server Metadata RFC 9449 RFC 8414 **OAuth 2.0 Rich Authorization Requests** OAuth 2.0 for Native Apps RFC 9396 RFC 8252 derations Best Current Practice JWK Thumbprint URI RFC 9278 **Authentication Method Reference Values** RFC 8176 OAuth 2.0 Authorization Server Issuer Identification RFC 9207 Proof-of-Possession Key Semantics for JSON Web RFC 7800 **OAuth 2.0 Pushed Authorization Requests** OAuth 2.0 Token Introspection RFC 9126 earer Token Usage RFC 7662 The OAuth 2.0 Authorization Framework: JWT-Secured Authorization Request (JAR) Proof Key for Code Exchange by OAuth Public Clie RFC 9101 RFC 7636

JSON Web Token (JWT) Profile for OAuth 2.0 Access Tokens RFC 9068 JSON Web Token Best Current Practices RFC 8725 Best Current Practice Resource Indicators for OAuth 2.0 RFC 8707 OAuth 2.0 Mutual-TLS Client Authentication and Certificate-Bound Access Tokens RFC 8705 OAuth 2.0 Token Exchange RFC 8693 OAuth 2.0 Device Authorization Grant RFC 8628 **OAuth 2.0 Authorization Server Metadata** RFC 8414 OAuth 2.0 for Native Apps RFC 8252 Best Current Practice **Authentication Method Reference Values** RFC 8176 Proof-of-Possession Key Semantics for JSON Web RFC 7800 OAuth 2.0 Token Introspection RFC 7662 Proof Key for Code Exchange by OAuth Public Clie

RFCs OAuth 2.0 Step Up Authentication Challenge RFC 9470 OAuth 2.0 Demonstrating Proof of Possessic RFC 9449 OAuth 2.0 Rich Authorization Requests RFC 9396 JWK Thumbprint URI RFC 9278 OAuth 2.0 Authorization Server Issuer Ident RFC 9207 **OAuth 2.0 Pushed Authorization Requests** RFC 9126 The OAuth 2.0 Authorization Framework: JV RFC 9101

**Active Individual Drafts Identity Assertion Authorization Grant** 2024-10-20 draft-parecki-oauth-identity-assertion-authz-grant **OAuth Profile for Open Public Clients** 2024-10-15 draft-jenkins-oauth-public Global Token Revocation 2024-09-22 draft-parecki-oauth-global-token-revocation-01 **OAuth 2.0 for First-Party Applications** 2024-07-08 draft-parecki-oauth-first-party-apps-00 Proof of Issuer Key Authority (PIKA) 2024-07-08 draft-barnes-oauth-pika OAuth Client ID Metadata Document 2024-07-08 draft-parecki-oauth-client-id-metadata-document AuthZEN Request/Response Profile for OAuth 2.0 Rich Authorization Requests 2024-07-08 draft-brossard-oauth-rar-authzen **OAuth Status Assertions** 2024-06-18 draft-demarco-oauth-status-assertions OAuth 2.0 Delegated B2B Authorization 2024-05-13 draft-janicijevic-oauth-b2b-authorization

OAuth 2.0 Dynamic Client Registration Management Protocol

**OAuth 2.0 Dynamic Client Registration Protocol** 

RFC 7592

RFC 7591

Experimental

RFC 7636

Active Drafts	
OAuth 2.0 Attestation-Based Client Authentication draft-ietf-oauth-attestation-based-client-auth-01	2024-10-21
Token Status List draft-ietf-oauth-status-list-00	2024-10-21
OAuth 2.0 for Browser-Based Applications draft-ietf-oauth-browser-based-apps-15	2024-10-20
Selective Disclosure for JWTs (SD-JWT) draft-ietf-oauth-selective-disclosure-jwt-07	2024-10-18
OAuth 2.0 Protected Resource Metadata draft-ietf-oauth-resource-metadata-01 RFC Ed Queue	2024-10-15
OAuth 2.0 for First-Party Applications draft-ietf-oauth-first-party-apps	2024-10-08
SD-JWT-based Verifiable Credentials (SD-JWT VC) draft-ietf-oauth-sd-jwt-vc-01	2024-09-18
Cross-Device Flows: Security Best Current Practice draft-ietf-oauth-cross-device-security-04	2024-07-08
OAuth Identity and Authorization Chaining Across Domains draft-ietf-oauth-identity-chaining	2024-07-08
Transaction Tokens draft-ietf-oauth-transaction-tokens-00	2024-07-04
OAuth 2.0 Security Best Current Practice draft-ietf-oauth-security-topics-24 RFC Ed Queue	2024-06-03
The OAuth 2.1 Authorization Framework draft-ietf-oauth-v2-1-09	2024-05-15
JWT Response for OAuth Token Introspection draft-ietf-oauth-jwt-introspection-response RFC Ed Queue	2021-09-04

OAuth 2.0 Dynamic Client Registration Management Protocol RFC 7592 Experimental	
OAuth 2.0 Dynamic Client Registration Protocol RFC 7591	
Active Individual Drafts	
Identity Assertion Authorization Grant draft-parecki-oauth-identity-assertion-authz-grant	2024-10-20
OAuth Profile for Open Public Clients draft-jenkins-oauth-public	2024-10-15
Global Token Revocation draft-parecki-oauth-global-token-revocation-01	2024-09-22
OAuth 2.0 for First-Party Applications draft-parecki-oauth-first-party-apps-00	2024-07-08
Proof of Issuer Key Authority (PIKA) draft-barnes-oauth-pika	2024-07-08
OAuth Client ID Metadata Document draft-parecki-oauth-client-id-metadata-document	2024-07-08
AuthZEN Request/Response Profile for OAuth 2.0 Rich Authorization Requests draft-brossard-oauth-rar-authzen	2024-07-08
OAuth Status Assertions draft-demarco-oauth-status-assertions	2024-06-18
OAuth 2.0 Delegated B2B Authorization draft-janicijevic-oauth-b2b-authorization	2024-05-13

# OpenID Connect in Italy Challenges and Motivation

#### **Final Specifications**

#### **Drafts**

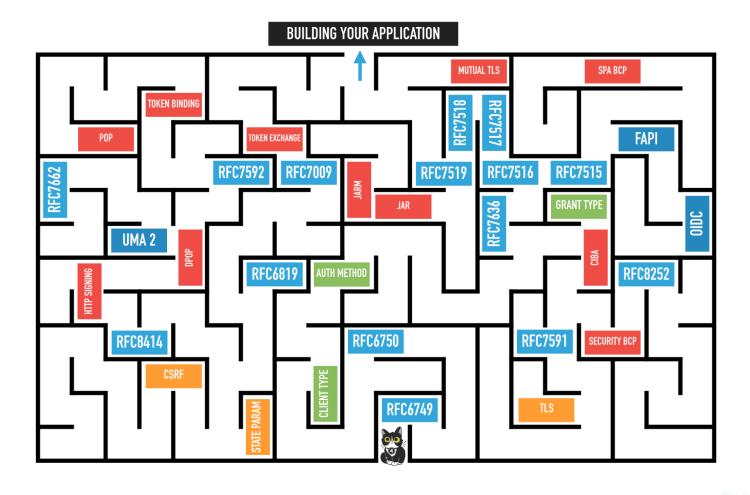
- OpenID Connect Claims Aggregation Enables RPs to request and Claims Providers to return aggregated claims through Ops
- OpenID Federation Extended Subordinate Listing Extends OpenID Federation to facilitate listings of large numbers of subordinates
- OpenID Federation Wallet Architectures Defines how to perform trust establishment for Wallet ecosystems with OpenID Federation
- OpenID Connect Relying Party Metadata Choices Enables RPs to express a set of supported values for RP metadata parameters
- OpenID Connect Core Defines the core OpenID Connect functionality: authentication built on top of OAuth 2.0 and the use of claims to communicate information about the End-User
- OpenID Connect Discovery Defines how clients dynamically discover information about OpenID Providers
- OpenID Connect Dynamic Registration Defines how clients dynamically register with OpenID Providers
- OAuth 2.0 Multiple Response Types Defines several specific new OAuth 2.0 response types
- OAuth 2.0 Form Post Response Mode Defines how to return OAuth 2.0 Authorization Response parameters (including OpenID Connect Authentication Response parameters) using HTML form values that are auto-submitted by the User-Agent using HTTP POST
- OpenID 2.0 to OpenID Connect Migration 1.0 Defines how to migrate from OpenID 2.0 to OpenID Connect
- OpenID Connect RP-Initiated Logout Defines how a Relying Party requests that an OpenID Provider log out the End-User
- Session Management Defines how to manage OpenID Connect sessions, including postMessage-based logout functionality
- Front-Channel Logout Defines a front-channel logout mechanism that does not use an OP iframe on RP pages
- Back-Channel Logout Defines a logout mechanism that uses direct back-channel communication between the OP and RPs being logged out
- OpenID Connect Core Error Code unmet\_authentication\_requirements Defines the unmet\_authentication\_requirements authentication response error code
- Initiating User Registration via OpenID Connect Defines the prompt=create authentication request parameter

#### Implementer's Drafts

- OpenID Federation 1.0 Defines how parties within a federation can establish trust with one another
- Self-Issued OpenID Provider V2 Enables End-users to use OpenID Providers (OPs) that they control
- OpenID Connect Native SSO for Mobile Apps Enables native applications by the same vendor to share login information
- OpenID for Verifiable Presentations (OpenID4VP) Defines a mechanism on top of OAuth 2.0 to allow presentation of claims in the form of Verifiable Credentials as part of the protocol flow



# OpenID Connect in Italy Challenges and Motivation



# OpenID Connect in Italy Challenges and Motivation

- The Italian OIDC specification is based on the *International Government Assurance* profile (iGov) for OpenID Connect 1.0 [iGov.OIDC] that is built on top of the *OpenID Connect Core profile* [OpenID.Core]
- Metadata exchange and trust are managed adopting OpenID Federation 1.0 [OID-FED]



[iGov.OAuth2.0] Richer, J.,Varley, M., and P. Grassi. International Government Assurance Profile (iGov) for OAuth 2.0 [iGov.OIDC] Varley, M., and P. Grassi. International Government Assurance Profile (iGov) for OpenID Connect 1.0 [OpenID.Core] Sakimura, N., Bradley, J., Jones, M., de Medeiros, B. and C. Mortimore. OpenID Connect Core 1.0. [OID-FED] Hedberg, R., Jones, M., Solberg, A., Bradley, J., De Marco, G., and V. Dzhuvinov. OpenID Connect Federation 1.0. [RFC7636] Sakimura, N., Bradley, J. and N. Agarwal. Proof Key for Code Exchange by OAuth Public Clients. [RFC6749] D. Hardt. The OAuth 2.0 Authorization Framework.



# OpenID Connect in Italy Security Considerations

### Security 🗖

Mitigate code injection/replay (authorization code + PKCE)

Mitigate Mix-Up attack (iss)

Mitigate Authn request modification (request)

**Enable Strong Authentication** (acr\_value)

Mitigate client impersonation (private\_key\_jwt)

Mitigate CSRF (PKCE or State or Nonce)

Mitigate ID Token replay (nonce)

### Privacy 🕰

Mitigate User's tracking using sub (pairwise)

**Data minimization** (Claims)

**User consent** (prompt=login consent)



# OpenID Connect in Italy Security Considerations

### Security 6



Mitigate code injection/replay (authorization code + PKCE)

Mitigate Mix-Up attack (iss)

Mitigate Authn request modification (request)

**Enable Strong Authentication** (acr\_value)

Mitigate client impersonation (private\_key\_jwt)

Mitigate CSRF (PKCE or State or Nonce)

Mitigate ID Token replay (nonce)

### Privacy &

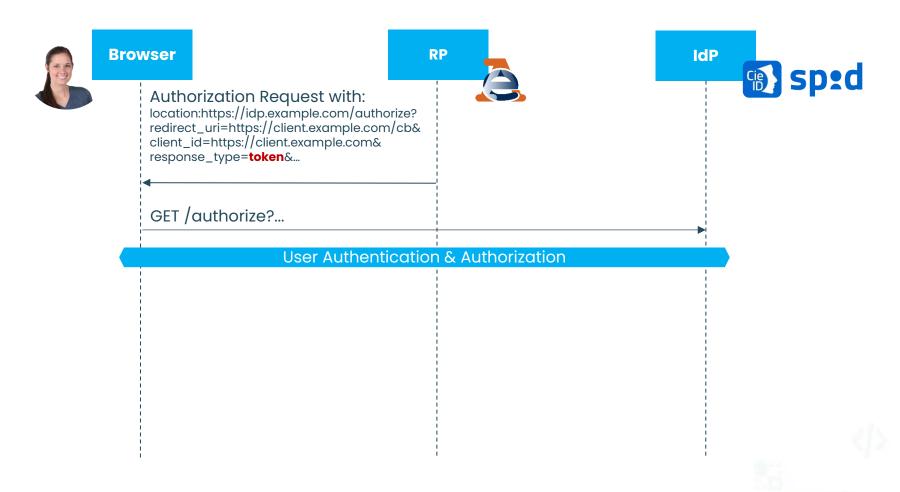
Mitigate User's tracking using sub (pairwise)

**Data minimization** (Claims)

**User consent** (prompt=login consent)

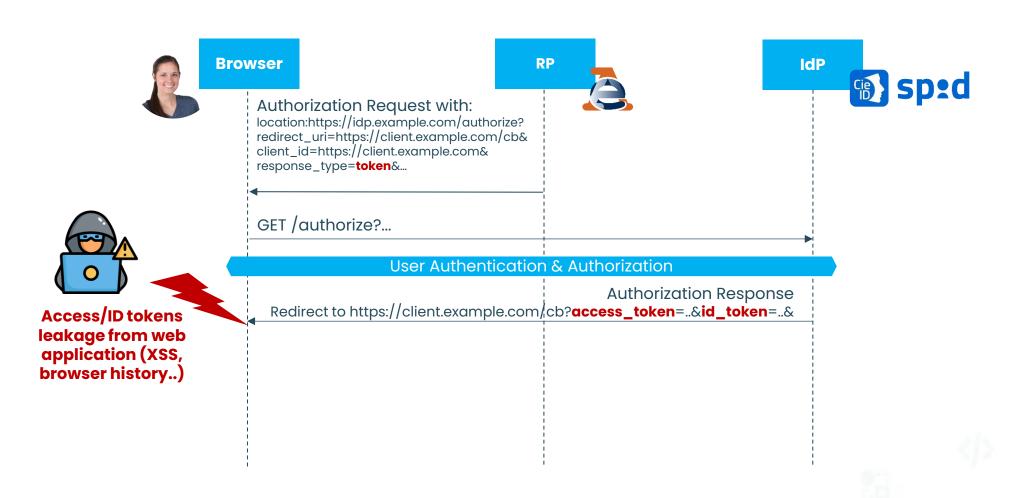


# OpenID Connect in Italy Authorization Request: DO NOT USE Implicit Flow



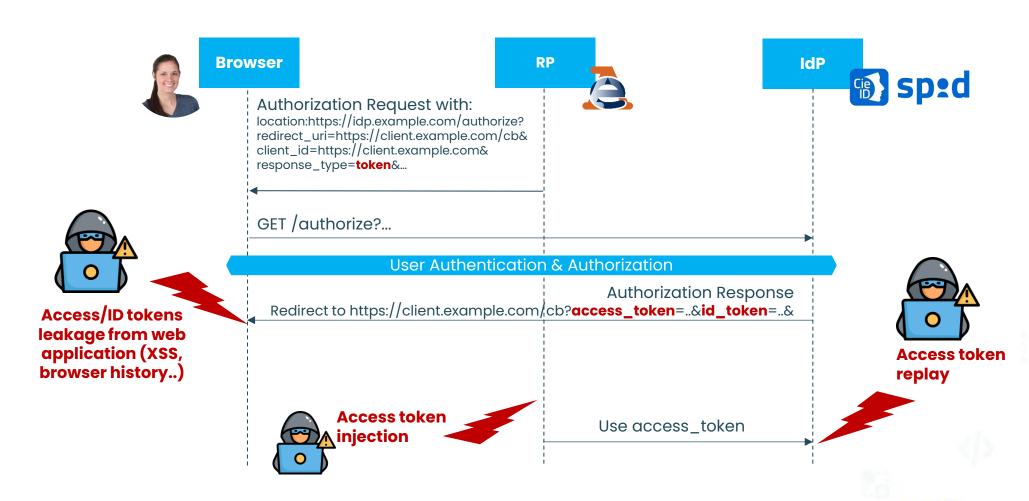


### **Authorization Request: DO NOT USE Implicit Flow**



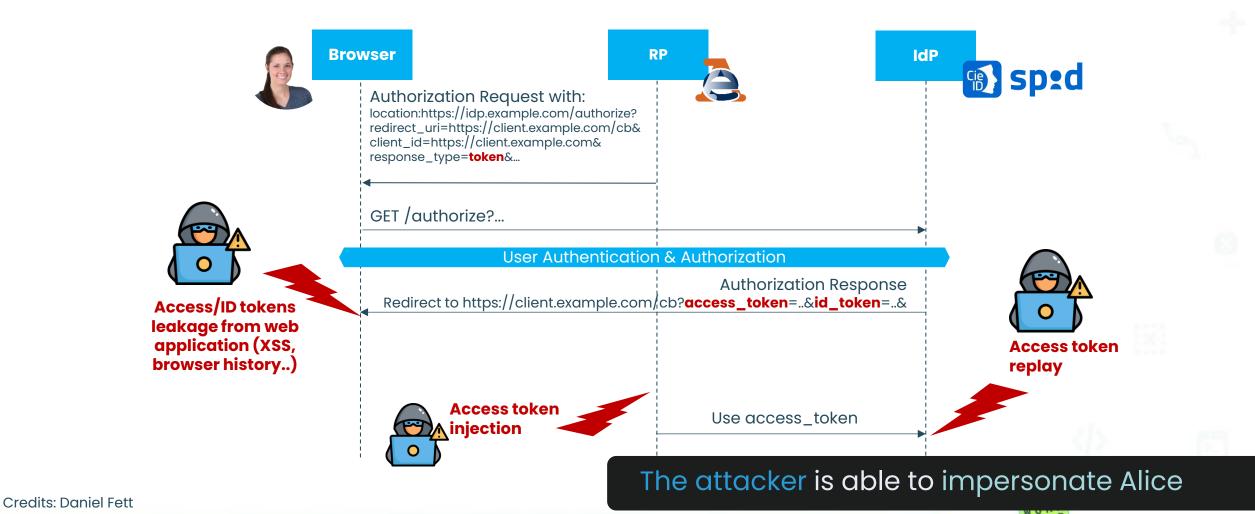
Credits: Daniel Fett

### **Authorization Request: DO NOT USE Implicit Flow**

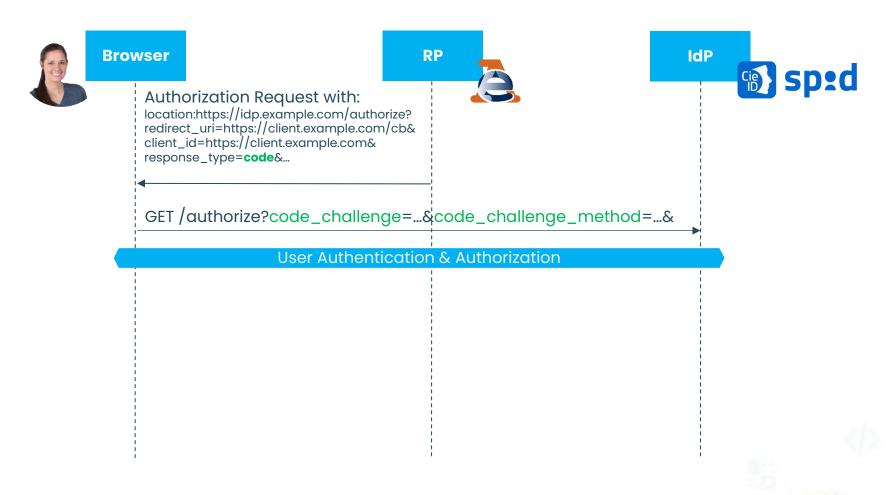


Credits: Daniel Fett

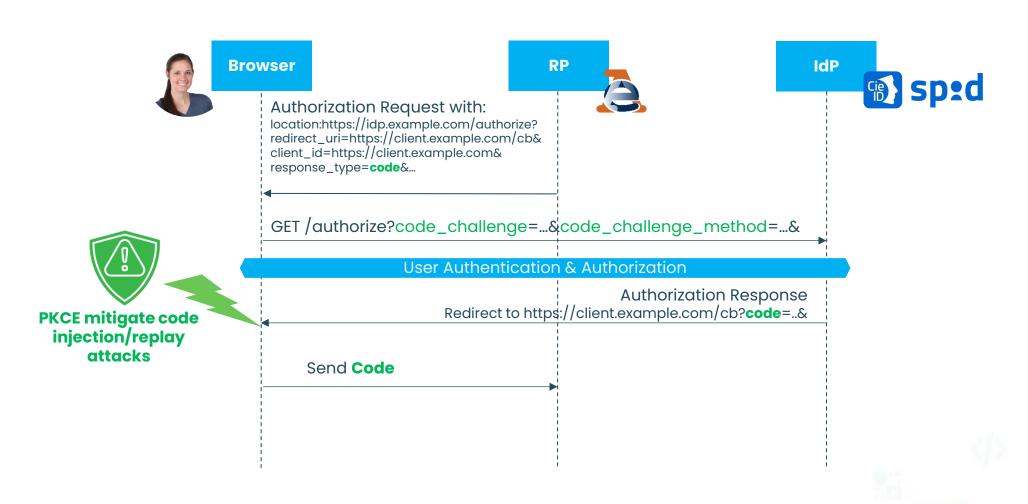
### **Authorization Request: DO NOT USE Implicit Flow**



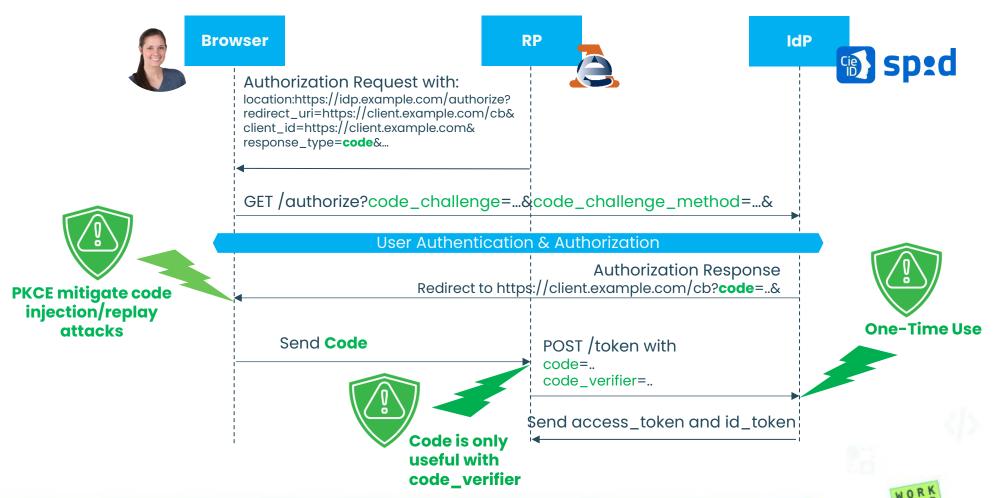
### **Authorization Request: Authorization Code Flow + PKCE**



### **Authorization Request: Authorization Code Flow + PKCE**



### **Authorization Request: Authorization Code Flow + PKCE**



# Actionable Security Enforce Security with Automatic Tools

#### Micro-Id-Gym

MIG is a flexible and extendable tool designed to perform security testing on Identity Management protocol implementations like SAML, OIDC and OAuth.



https://github.com/stfbk/mig



https://developers.italia.it/it/software/github.com/stfbk/mig



Andrea Bisegna, Roberto Carbone, Ivan Martini, Valentina Odorizzi, Giulio Pellizzari, Silvio Ranise. **Micro-Id-Gym: Identity Management Workouts with Container-Based Microservices.** In: International Journal of Information Security and Cybercrime (IJISP), Volume 8, Issue 1.



### Actionable Security Enforce Security with Automatic Tools

#### Micro-Id-Gym

MIG is a flexible and extendable tool designed to perform security testing on Identity Management protocol implementations like SAML, OIDC and OAuth.



https://github.com/stfbk/mig



https://developers.italia.it/it/software/github.com/stfbk/mig

#### **TLSAssistant**

TLS analyzer that provides:

- · actionable hints that can be used to patch the identified vulnerability
- compliance analyses against five agency-issued technical guidelines: AgID ver.2020-01, ANSSI v1.2, BSI TR-02102-2 and TR-03116-4, Mozilla v5.7, NIST SP 800-52 Rev. 2 (and related)



https://github.com/stfbk/tlsassistant



https://developers.italia.it/it/software/github.com/stfbk/tlsassistant





Matteo Rizzi, Salvatore Manfredi, Giada Sciarretta, Silvio Ranise. **A Modular and Extensible Framework for Securing TLS.** In: 12th ACM Conference on Data and Application Security and Privacy (CODASPY 2022).

Riccardo Germenia, Salvatore Manfredi, Matteo Rizzi, Giada Sciarretta, Alessandro Tomasi, Silvio Ranise. **Automating Compliance for Improving TLS Security Postures: An Assessment of Public Administration Endpoints.** In: 21th International Conference on Security and Cryptography (SECRYPT 2024).



# Center for Cybersecurity Digital Identity





### **OpenID Connect Specification**

iGOV and OIDC Federation profiles



#### Activities in the context of EUDIW

PID Issuance, Trust model, Threat Model, Revocation



#### elDAS Timeline

National eID schemes <2014



September 2018











July 2014



September 2019





2022

transition from SAML 2.0 to OpenID Connect



#### **eIDAS Timeline**

National eID schemes <2014



September

2018

elD.AS Revision

Trust services

eSeals



June 2021

eSign

website auth















2022

elD schemes

July 2014



September 2019









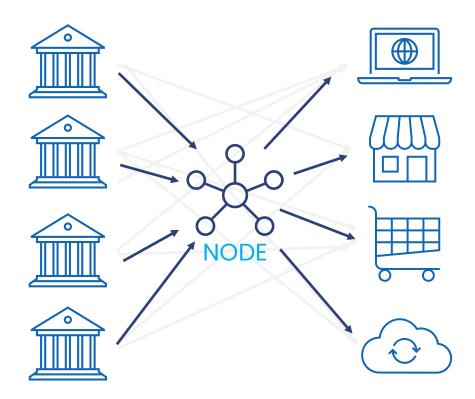




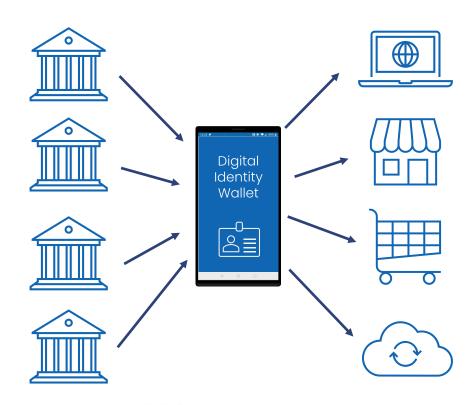


#### **EUDI Wallet**

### A Different Paradigm











#### **EUDI Wallet**

#### **New Set of Standards**

- O. Terbu, D. Fett, B. Campbell. SD-JWT-based Verifiable Credentials (SD-JWT VC) draft 05.
- T. Lodderstedt, K. Yasuda, T. Looker. **OpenID for Verifiable Credential Issuance draft 14**. (OpenID4VCI)
- O. Terbu, T. Lodderstedt, K. Yasuda, T. Looker. OpenID Connect for Verifiable Presentations draft 22. (OpenID4VP)
- ISO/IEC 18013-5: Personal identification --- ISO-compliant driving licence Part 5: Mobile driving licence (mDL) application, First edition, 2021-09.
- ISO/IEC 18013-7: Personal identification ISO-compliant driving licence Part 7: Mobile driving licence (mDL) add-on functions
- ISO/IEC 23220-1: Cards and security devices for personal identification Building blocks for identity management via mobile devices, Part 1: Generic system architectures of mobile eID systems
- ISO/IEC TS 23220-3: Cards and security devices for personal identification Building blocks for identity management via mobile devices, Part 3: Protocols and services for issuing phase
- ISO/IEC TS 23220-4: Cards and security devices for personal identification Building blocks for identity management via mobile devices Part 4: Protocols and services for operational phase.
- G. De Marco, R. Hedberg, M.B. Jones, J. Bradley. OpenID Federation Wallet Architectures 1.0 draft 03.
- T. Looker, P. Bastian, C. Bormann. Token Status List draft 05.
- G. De Marco, O. Steele, F. Marino, M. Adomeit. OAuth Status Assertions draft 05.

•



#### **EUDI Wallet**

#### **New Set of Standards**



- O. Terbu, D. Fett, B. Campbell. **SD-JWT-based Verifiable Credentials (SD-JWT VC) draft 05**.
- T. Lodderstedt, K. Yasuda, T. Looker. **OpenID for Verifiable Credential Issuance draft 14**. (OpenID4VCI)
- O. Terbu, T. Lodderstedt, K. Yasuda, T. Looker. OpenID Connect for Verifiable Presentations draft 22. (OpenID4VP)
- ISO/IEC 18013-5: Personal identification --- ISO-compliant driving licence Part 5: Mobile driving licence (mDL) application, First edition, 2021-09.
- ISO/IEC 18013-7: Personal identification ISO-compliant driving licence Part 7: Mobile driving licence (mDL) add-on functions
- ISO/IEC 23220-1: Cards and security devices for personal identification Building blocks for identity management via mobile devices, Part 1: Generic system architectures of mobile eID systems
- ISO/IEC TS 23220-3: Cards and security devices for personal identification Building blocks for identity management via mobile devices, Part 3: Protocols and services for issuing phase
- ISO/IEC TS 23220-4: Cards and security devices for personal identification Building blocks for identity management via mobile devices Part 4: Protocols and services for operational phase.
- G. De Marco, R. Hedberg, M.B. Jones, J. Bradley. OpenID Federation Wallet Architectures 1.0 draft 03.
- T. Looker, P. Bastian, C. Bormann. Token Status List draft 05.
- G. De Marco, O. Steele, F. Marino, M. Adomeit. OAuth Status Assertions draft 05.

•





Study of selective disclosure mechanisms XALEPH





Hiding-Commitment and selective disclosure signature mechanims

18/01/1995



Andrea Flamini, Giada Sciarretta, Amir Sharif, Alessandro Tomasi, Silvio Ranise. A First Appraisal of Cryptographic Mechanisms for the Selective Disclosure of Verifiable Credentials. In: 20th International Conference on Security and Cryptography (SECRYPT 2023).

A. Flamini, G. Sciarretta, M. Scuro, A. Sharif, A. Tomasi, S. Ranise. On Cryptographic Mechanisms for the Selective Disclosure of Verifiable Credentials. In: Journal of Information Security and Applications (JISA).



- Study of selective disclosure mechanisms
- Definition of the PID/(Q)EAA Issuance flow



PID credential request replay (c\_nonce)

#### **EUDIW** impersonation

(client authentication and Wallet Attestation check)

#### **Tamper Authentication request**

(Push Authorization Request)

#### Obtaining access token

Obtaining authorization code

#### **Session misuse**

(PKCE or State or Nonce)

#### Malicious Issuer/Wallet

(OpenID Federation Trust Model)

Privacy 🕰

Selective disclosure

(SD-JWT)
User consent

(prompt=login consent)

**Unlinkability** (Ephemeral keys)

OpenID For Verifiable Credentials [OID4VCI]	
OAuth Authorization Framework [RFC6749]	
OAuth 2.0 Attestation-Based Client Authentication [OAUTH-ATTESTATION-CLIENT-AUTH].	
Pushed Authorization Requests (PAR) [RFC 9126]	Rich Authorization Requests (RAR) [RFC 9396]
JWT Authorization Requests (JAR) [RFC 9101]	JWT Authorization Response Modes (JARM)
Proof Key for Code Exchange (PKCE) [RFC7636]	
OAuth 2.0 Demonstrating Proof-of-Possession (DPoP) [RFC9449]	
SD-JWT-VC [I-D.ietf-oauth-sd-jwt-vc] and MDOC-CBOR [ISO18013-5]	
	OAuth Authorization From OAuth 2.0 Attestation-Based Client Authentical Pushed Authorization Requests (PAR) [RFC 9126]  JWT Authorization Requests (JAR) [RFC 9101]  Proof Key for Code Exchance OAuth 2.0 Demonstrating Proof-of



https://italia.github.io/eudi-wallet-it-docs/versione-corrente/en/pid-eaa-issuance.html





- Study of selective disclosure mechanisms
- Definition of the PID/(Q)EAA Issuance flow
- Threat model and risk assessment

Our current threat model counts:

72 threats

83 security controls

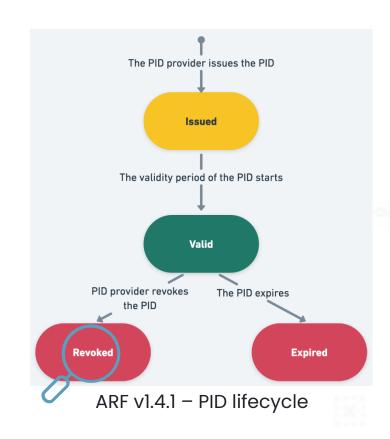
We are currently working on a <u>risk assessment tool</u> to help stakeholders in the decision-making process to prioritize the security controls to implement.



Amir Sharif, Zahra Ebadi Ansaroudi, Giada Sciarretta, Daniela Pöhn, Majid Mollaeefar, Wolfgang Hommel, Silvio Ranise. **Protecting Digital Identity Wallet: A Threat Model in the Age of elDAS 2.0**. In: 19th International Conference on Risks and Security of Internet and Systems (CRISIS 2024).



- Study of selective disclosure mechanisms
- Definition of the PID/(Q)EAA Issuance flow
- Threat model and risk assessment
- Study of credential status mechanisms
  - CRL
  - OCSP (with stapling)
  - Token Status List
  - OAuth Status Assertions
  - Dynamic Status List
  - Accumulators



European Digital Identity Wallet Architecture and Reference Framework (ARF). https://github.com/eu-digital-identity-wallet/eudi-doc-architecture-and-reference-framework/blob/main/docs/arf.md



- Study of selective disclosure mechanisms
- Definition of the PID/(Q)EAA Issuance flow
- Threat model and risk assessment
- Study of credential status mechanisms
- Definition of an interoperable Trust Framework

#### **OpenID Federation Wallet Architectures 1.0**

https://github.com/openid/federation-wallet

### EUDI Wallet Large Scale Pilot





#### As FBK, we beneficiary in the POTENTIAL Large-Scale Pilot

- PilOTs for EuropeaN digital Identity wALlet
- 140+ organizations, 20 member states
- Aims at fostering innovation, collaboration and growth in 6 digital identity sectors:
  - eGov Services
  - Bank Account Opening
  - SIM Card Registration
  - Mobile Driving Licence
  - Qualified eSignature
  - ePrescription











### Thanks!

g.sciarretta@fbk.eu https://st.fbk.eu/ Per le domande:



wooclap.com e codice WSGARR24