

e-ID as a building block for e-Government: Architecture, Regulation (eIDAS), Market Opportunities and Barriers

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Guest Lecture for the course „Information & Communication Security“

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Overview

Myself

**eID &
eGovernment**

**eIDAS – Overview
& Building Blocks**

**eID market size &
eIDAS use case**

**eID and
adoption**

**eIDAS Interoperability
Network & Multilateral
Aspects of eID schemes**

**Concluding
remarks**



Myself



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Local Business Security Manager
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@Capgemini
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College, Kosovo

Languages: Albanian, English,
German

Education & Competences

2020	<i>Dr. rer. nat.</i> (Doctor of natural sciences) – Computer Science, Faculty of Computer Science and Mathematics, Goethe University Frankfurt, Germany Thesis title: <i>A framework for evaluating privacy-enhancing attribute-based credential systems</i>
2011	<i>M.Sc. Information Security</i> , Faculty of Computer Science and Media, NTNU, Norway
2010	<i>B.Sc. Mathematics – Computer Science</i> , Faculty of Mathematics and Natural Sciences, University of Prishtina, Kosovo
2009	<i>B.Sc. Economics – Management & Informatics</i> , Faculty of Economics, University of Prishtina, Kosovo

Certifications

- CISSP, TOGAF Certified, Prince2 Practitioner, SAFe 5 Agilist, ITIL v4, Certified Architect (L1), Professional Scrum Master (PSM) 1, Microsoft Certified: Azure Fundamentals (AZ900), ISO 27001 Lead Auditor

More than 13 years professional experience (research and industry)

- Technical / management roles in research and innovation projects
- Consultancy in cybersecurity in private and public sector in Germany
- Member of ENISA's Ad-Hoc Working Group on Privacy Engineering
- Member of the Working Group of the Government of Kosovo on Cyber Security & Critical Infrastructure
- More than 13 semester teaching experience
 - *Information and communication security* (Master), Goethe University Frankfurt
 - *Mobile Business I: Technology, Markets, Platforms & Business Models*, Goethe University Frankfurt
 - *Mobile Business II: Application Design, Applications, Infrastructures and Security*, Goethe University Frankfurt
 - Supervised over 20 Master, Bachelor, and seminar theses
 - Data Security, Advanced Protocols and Network Security @Riinvest College, Kosovo



eID & eGovernment



What is an e-ID to you?



Identity and eID

- ***Identity:***
The characteristics (*attributes*) representing an acting *entity*
- ***Partial identity:***
A subset of the characteristics of an identity
- ***ISO/IEC 24760 “A framework for identity management”:***
 - **Identity** (partial identity): Set of **attributes** related to an **entity**
 - **Identifier:** attribute or set of attributes that uniquely characterizes an identity in a domain
- ***eID: digital (electronic) solution for proof of identity***
 - Physical persons (citizens)
 - Legal persons (organizations)



Identification
(of a person or organization)

Authentication
(of a person or organization)

Electronic signature



Examples of eID use cases

Businesses

- Registering a company
- Managing work permits
- Declaring taxes
- Digitally signing documents and contracts
- Opening a bank account

Citizens

- Enrollment at university
- Applying for child benefits
- Applying for an ID
- Registering a car
- Moving
- Opening a bank account
- Declaring taxes



**When was your last
time you went to your
bank?**



Customer expectations (banking)

Opening a bank account in less than one hour

57% of customers

Frustration because of data re-submission

- Opening bank account (38%)
- Applying for a credit card (36%)



Source: Mulesoft Consumer Connectivity Insights, 2018



**What would be an
important use case for
e-ID for you?**



Tallinn Declaration on eGovernment (2017)

Building on previous initiatives, ..., we confirm our commitment to the vision laid out in the **EU eGovernment Action Plan 2016-2020** and in the **European Interoperability Framework**. Thus, the overall vision remains to **strive to be open, efficient and inclusive, providing borderless, interoperable, personalized, user-friendly, end-to end digital public services to all citizens and businesses** – at all levels of public administration.



Tallin Declaration on eGovernment – Policy action lines

Digital by default, inclusiveness and accessibility

Once only

Trustworthiness and Security

Interoperability by Default: uptake of eIDs, eSignatures, etc.

Protection of personal data and privacy



eIDAS – Overview & Building Blocks



eIDAS Regulation

- **eIDAS** (**e**lectronic **ID**entification, **A**uthentication and trust **S**ervices) - EU regulation on electronic identification and trust services for electronic transactions in the EU
 - Entered into force in 2014
 - Interoperability
 - Transparency



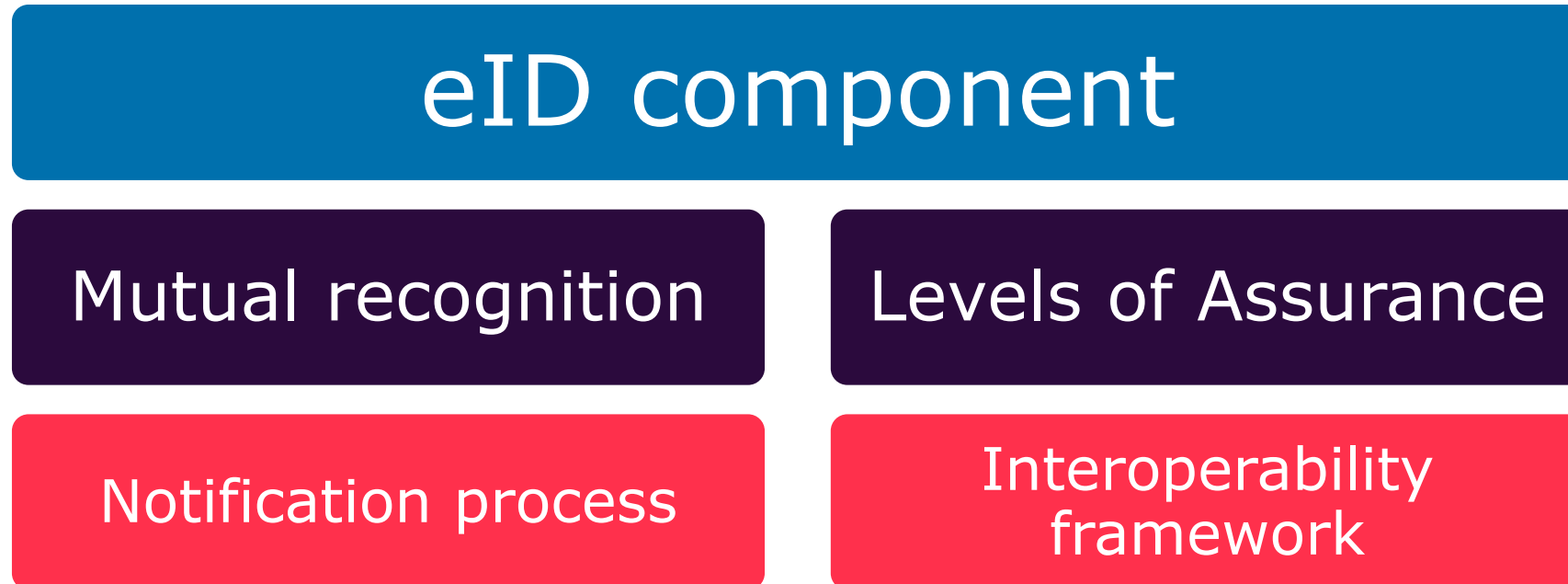
eIDAS key components

eID

- mutual recognition of eIDs in the EU
- enable people and businesses to use their electronic identification schemes (eIDs) to access public services available online in other EU countries

e-Trust services

- internal market for Trust Services
 - electronic signatures
 - electronic seals
 - time stamp,
 - electronic delivery service and
 - website authentication
- ensuring interoperability across borders and having the same legal status as their traditional paper based equivalents





eIDAS mutual recognition

- Enable **cross-border mobility**
 - A citizen of Slovenia can use her Slovenian eID to get access to an eGovernment service in Austria
 - A business from Germany can use a public service in Sweden
- Recognition is **mandatory** for „foreign“ eID schemes if
 - A service is offered for the eID of the (sending) member state
 - The „foreign“ eID scheme is „**notified**“
 - The notified eID scheme (of the receiving state) provides provides at least the given LoA



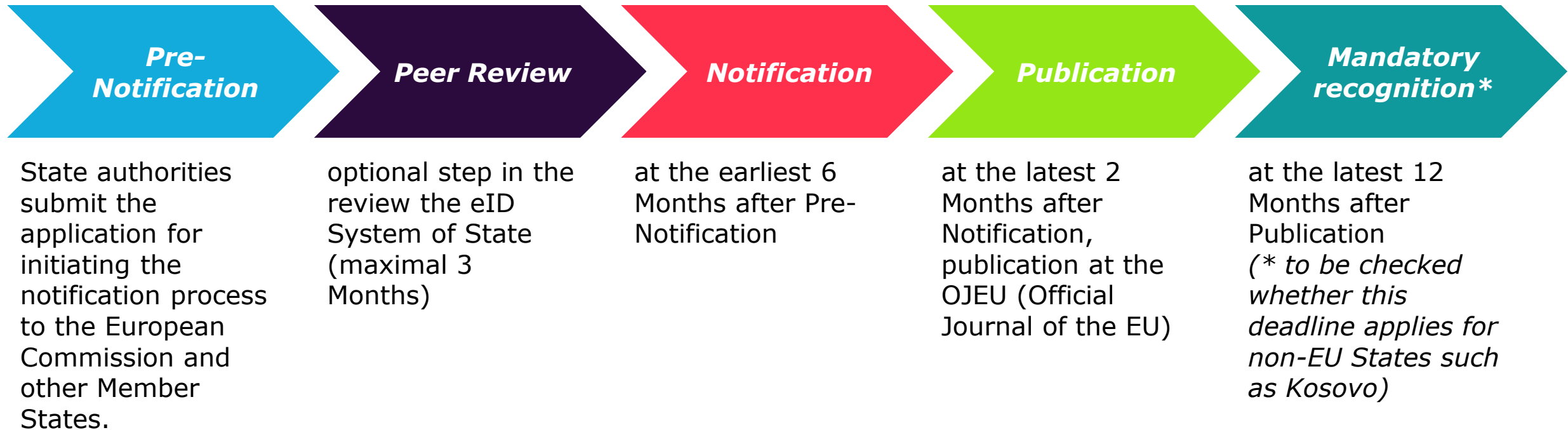
eIDAS technical aspects

- **Level of Assurance**
 - Low
 - Substantial
 - High
- **eIDAS Minimal data set**
- **Technical specifications**
 - *eIDAS Attribute profile version*
 - *eIDAS Message format version*
 - *eIDAS Cryptographic requirements for the Interoperability Framework - TLS and SAML*
 - *eIDAS Interoperability Architecture*



eIDAS notification process overview

Example if a state would notify its eID scheme with the EU





Excerpt from the list of notified eID schemes

			magna key card (OTP)		
Spain	The Kingdom of Spain	Documento Nacional de Identidad electrónico (DNIE)	Spanish ID card (DNIE)	High	NOTIFIED
Malta	Malta	Identity Malta	Maltese eID card and e-residence documents	High	NOTIFIED
Latvia	Latvia	Latvian eID scheme (eID)	eID karte eParaksts karte eParaksts karte+ eParaksts	Substantial, High	NOTIFIED
Germany	Federal Republic of Germany	German eID based on Extended Access Control	National Identity Card Electronic Residence Permit eID Card for Union Citizens and EEA Nationals	High	NOTIFIED
The Netherlands (DTF/eHerkenning)	The Kingdom of the Netherlands	Trust Framework for Electronic Identification (Afsprakenstelsel Elektronische Toegangsdiensien)	Means issued under eHerkenning (for businesses)	Substantial, High	NOTIFIED
Slovakia - eID Scheme	Slovak Republic	National identity scheme of the Slovak Republic	Slovak Citizen eCard Foreigner eCard	High	NOTIFIED
Croatia	Republic of Croatia	National Identification and Authentication System (NIAS)	Personal Identity Card (eOI)	High	NOTIFIED
Belgium - eID	The Kingdom of	Belgian eID Scheme FAS / eCards	Belgian Citizen eCard	High	NOTIFIED

EC Europa, [Overview of pre-notified and notified eID schemes under eIDAS](https://ec.europa.eu/digital-building-blocks/wikis/display/EIDCOMMUNITY/Overview+of+pre-notified+and+notified+eID+schemes+under+eIDAS), <https://ec.europa.eu/digital-building-blocks/wikis/display/EIDCOMMUNITY/Overview+of+pre-notified+and+notified+eID+schemes+under+eIDAS> (Last accessed 3.6.2022)



eID market size & eIDAS use case

eIDAS market potential (estim.)



\$2.47bn

ADDRESSABLE MARKET SIZE

**FOR AUTHENTICATION,
AUTHORISATION, IDENTITY &
ATTRIBUTE SERVICES FOR eIDAS
IN 2022 (USD\$)**

447m

ENABLED USERS

**FOR AUTHENTICATION,
AUTHORISATION, IDENTITY &
ATTRIBUTE SERVICES FOR eIDAS
IN 2022**

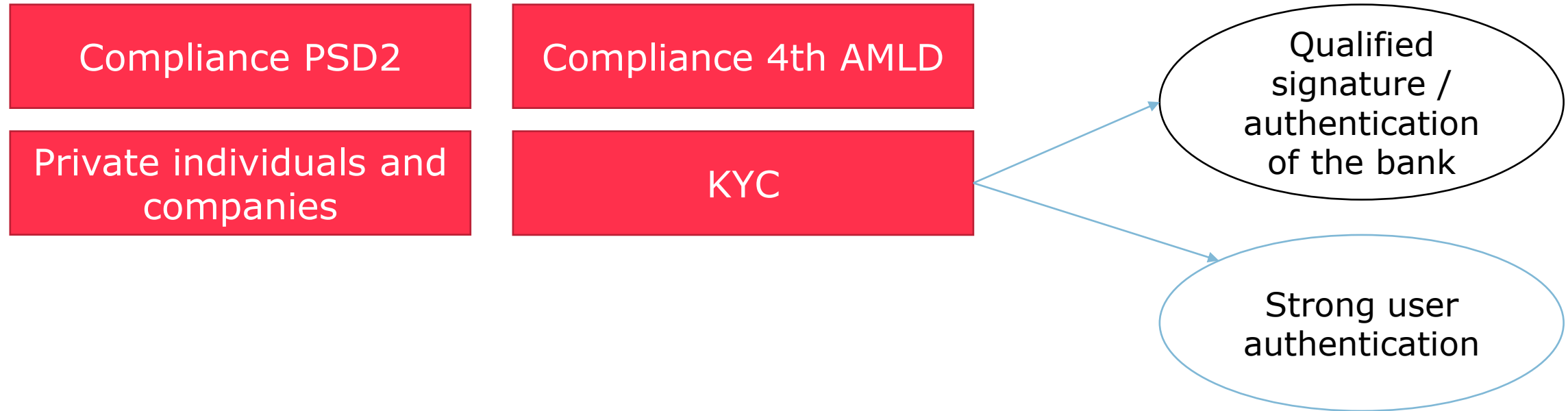
\$5.53

PER ENABLED USER PER YEAR

**FOR AUTHENTICATION,
AUTHORISATION, IDENTITY &
ATTRIBUTE SERVICES FOR eIDAS
IN 2022 (USD\$)**

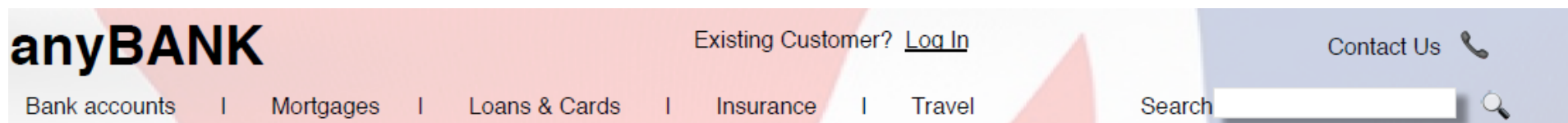
GSMA Mobile Connect for Cross-Border Digital Services, Lessons Learned from the eIDAS Pilot (2018)

Customer onboarding with eIDAS – Advantages



[[Andrea Servida](#), eIDAS & 4th Anti-Money Laundering Directive - a short update, 2016]

Example: eIDAS in action (1)



Open an anyBank current account today....



Get our award winning Distinction Account

- 5★ mobile banking app
- No monthly fees*
- Earn interest** on your savings
- Optional interest free £500 overdraft for eligible customers***

Sign up today using your digital ID for:

- An immediate decision on your application
- Instant access to your account
- Ability to start spending straight away using Apple or Android pay

....and we'll give you £100[†] to say thank you

Apply Now



Example: eIDAS in action (2)

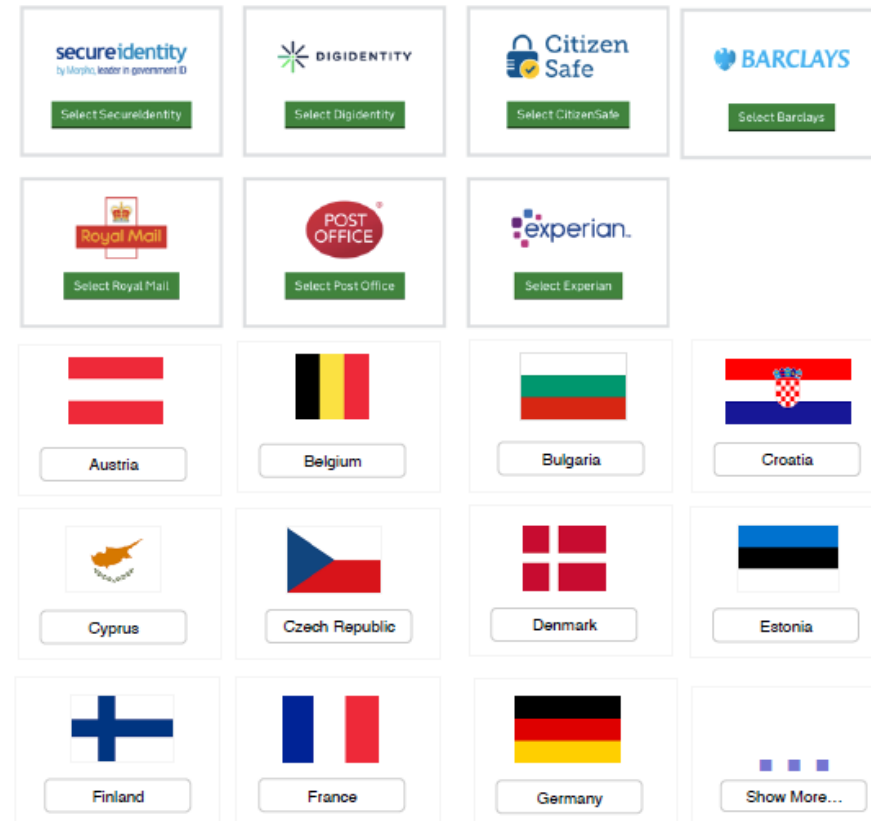
Select your identity provider

- Choose the provider you registered with
- You'll need your log in details
- Prove your ID on many websites

[How does Verify work?](#)

[Don't have a Verify digital identity? Register now.](#)

- If your digital ID is with another EU country, select your national scheme





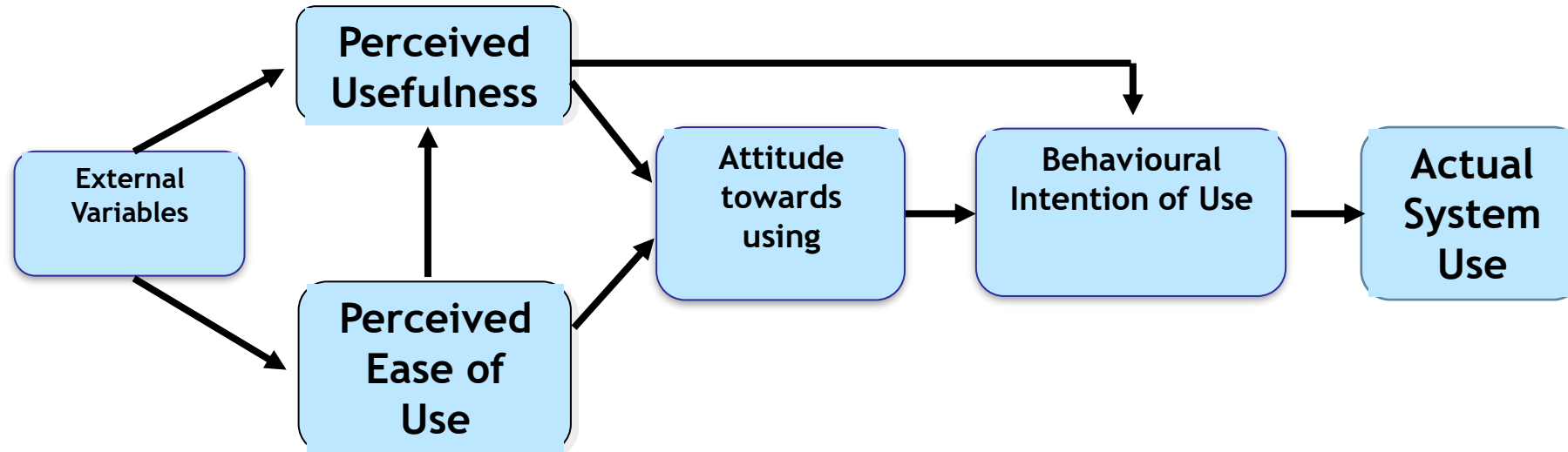
eID and adoption



**Do you possess an e-ID?
If so, do you (ever) use
it?**



TAM (Technology Acceptance Model)



Perceived usefulness: The degree to which a person believes that using a particular system would enhance his or her job performance

Perceived ease-of-use: The degree to which a person believes that using a particular system would be free from effort

Davis, F. D.: *Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology*, MIS Quarterly Vol. 13, No. 3, pp. 319-339, 1989.



Diffusion of Innovations

Key Innovation Characteristics



Relative Advantage

The degree to which the innovation is perceived as being better than the practice it supersedes



Compatibility

The extent to which adopting the innovation is compatible with what people do



Complexity

The degree to which an innovation is perceived as relatively difficult to understand and use



Trialability

The degree to which an innovation may be experimented with on a limited basis before making an adoption (or rejection) decision



Observability

The degree to which the results of an innovation are visible to others

Rogers, E. M.: The Diffusion of Innovations, 5th Edition, Free Press, New York, London, Toronto, Sidney, 2003.



eID models and adoption examples in Europe

UK Verify, UK

- <10%
- Public sector

BankID, Sweden

- ~75%
- Launched by financial institutions
- Recognized by government

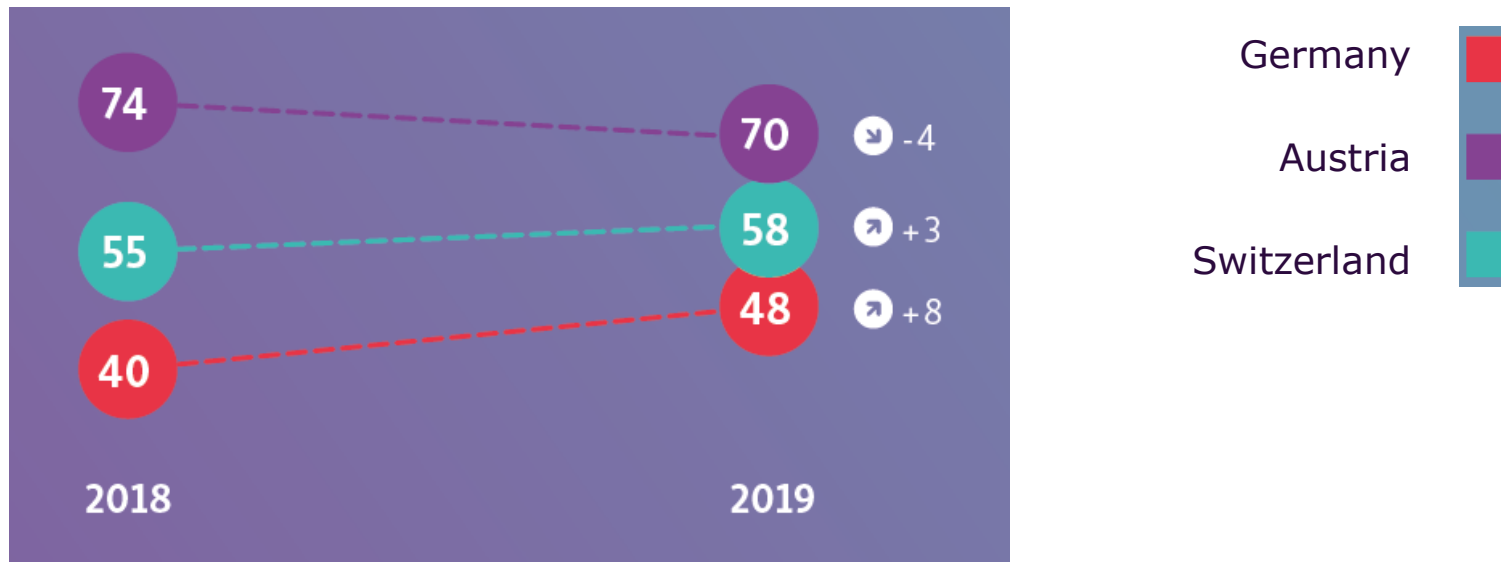
Estonia

- >90% adoption
- Launched by public sector
- Recognized both in private and public sector

McKinsey Global Institute, *Digital identification, a key to inclusive growth*, 2019



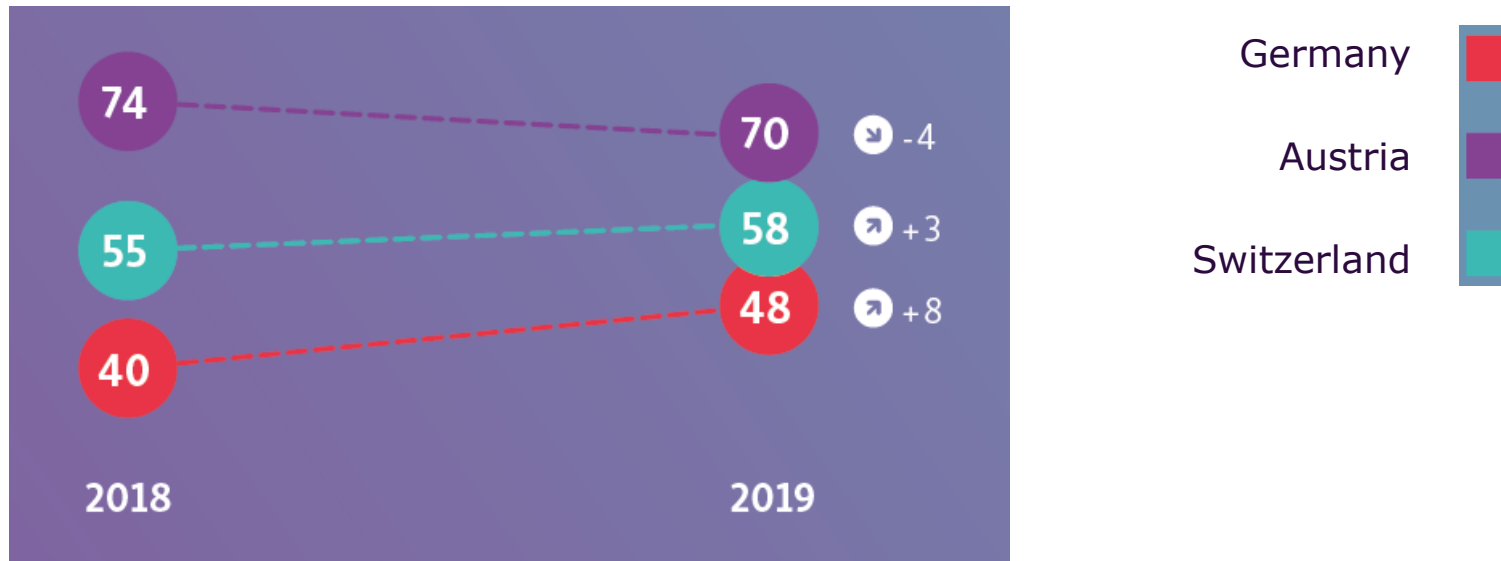
eID adoption in German speaking countries in Europe



[Initiative D21, eGovernment MONITOR 2019]

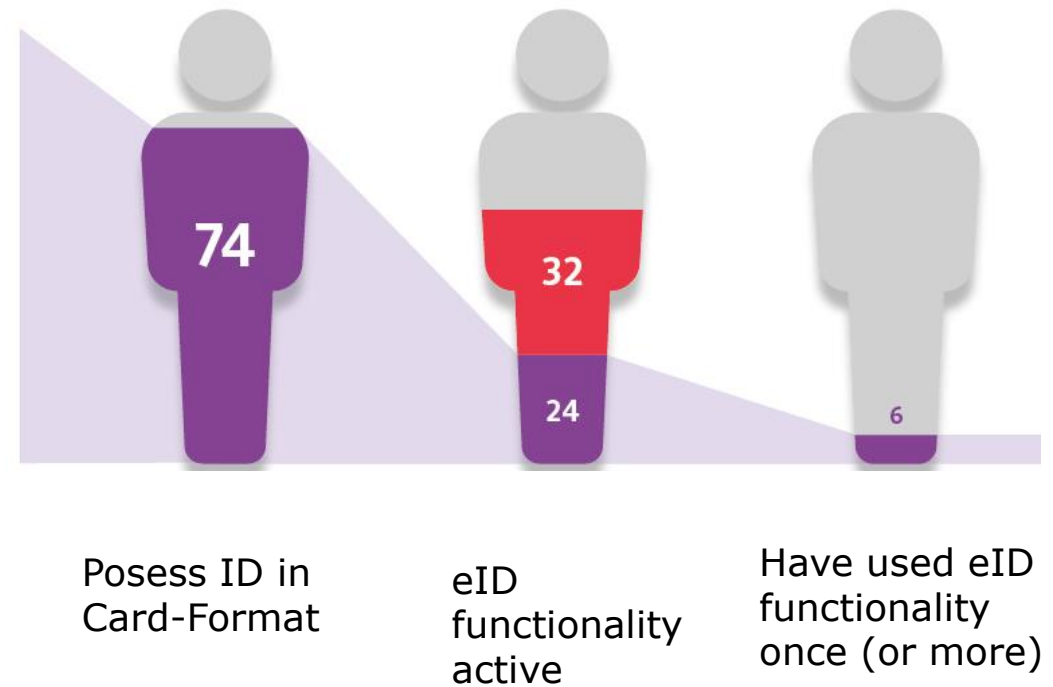
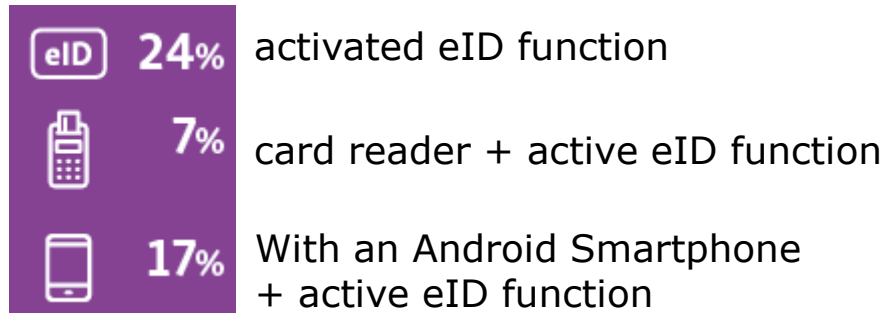


Adoption of eID in Germany, Austria dhe Switzerland



[Initiative D21, eGovernment MONITOR 2019]

Adoption of eID in Germany



[Initiative D21, eGovernment MONITOR 2019]



62%

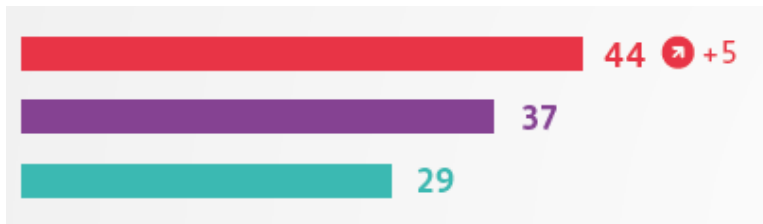
**Of Smartphone-users with an active
eID are not aware about the
possibility to use the eID with NFC**

[Initiative D21, eGovernment MONITOR 2019]

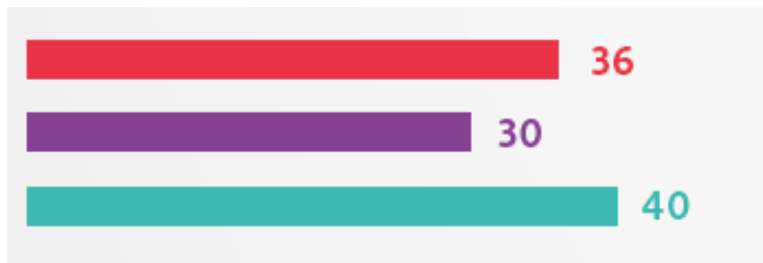


Adoption barriers

Additional hardware required



Security / privacy concerns



[Initiative D21, eGovernment MONITOR 2019]



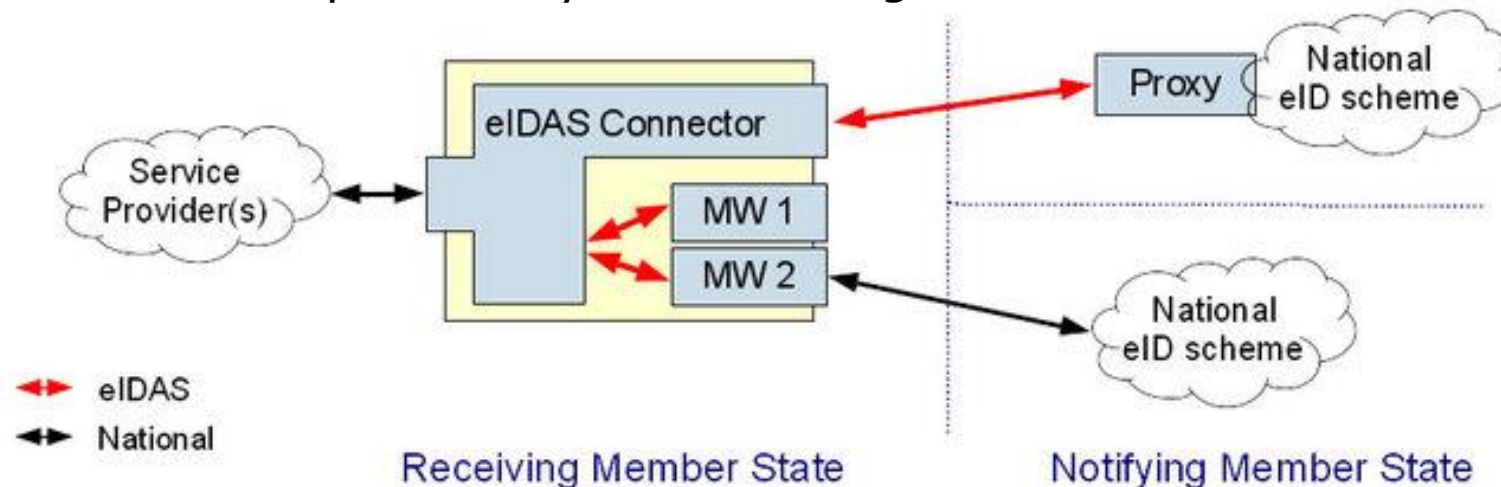
eIDAS Interoperability Network & Multilateral Aspects of eID schemes

eIDAS Interoperability architecture

Integration scenarios: convenience and privacy



- **Proxy-based:**
 - *Sending member* operates a central Proxy.
 - This proxy acts as an intermediary translates between the eIDAS Connector of the receiving member and the national eID system.
- **Middleware-based:**
 - *Sending member* provides a *Middleware* component for the other members.
 - The middleware is operated by the *receiving members*.

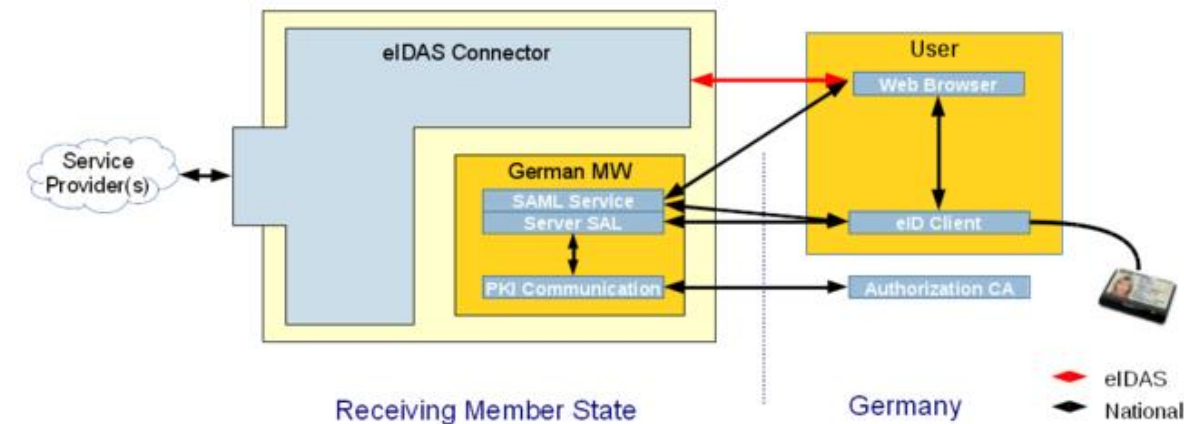


BSI, eIDAS Verordnung – Interoperabilität: https://www.bsi.bund.de/DE/Themen/DigitaleGesellschaft/eIDAS/Elektronische_Identifizierung/Interoperabilitaet/Interoperabilitaet_node.html

eIDAS Interoperability architecture

Example: Middleware-based integration of German eID

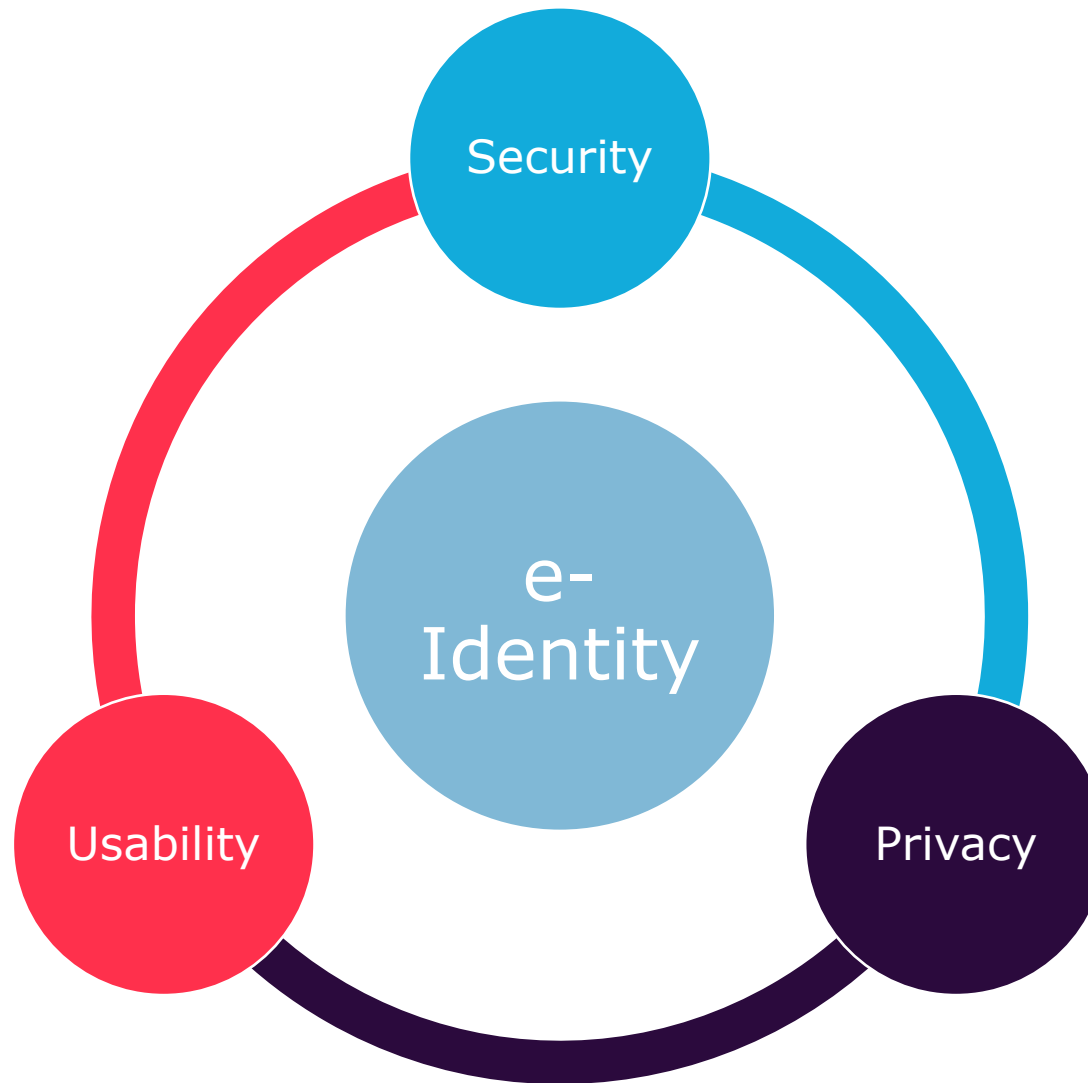
- **German eID by design without a central authentication authority (privacy)**
- Therefore, **Germany provides other member states a middleware**
 - The middleware implements an adapted eID Server
 - Performs the server-side part of the authentication using the eID function of the German eID
 - Has an eIDAS-compliant interface
 - Middleware is published as open-source on Github
- **Access of a service provider to the German eID function requires authorization certificates**
 - For public authorities, Germany provides these for each member state
 - For private companies, such certificates can be issued when this is grounded and requested



BSI, eIDAS Verordnung – Interoperabilität: https://www.bsi.bund.de/DE/Themen/DigitaleGesellschaft/eIDAS/Elektronische_Identifizierung/Interoperabilitaet/Interoperabilitaet_node.html



Multilateral aspects (challenges) of eID





Card
first

Mobile
first

Card +
mobile





Further points

- Government-issued vs. Private issued
- e-ID for businesses
 - Support for multiple levels of assurance
 - Multiple users
 - Accountability
 - Roles
 - Trust services



Concluding remarks



Conclusion

- **eID beneficial for citizens and businesses**
 - eIDAS enables usage of eID across EU borders
 - Enables **mobility**
- **eID architecture** should address security, usability, privacy
 - eIDAS integration scenarios consider eID goals (Proxy vs. Middleware)
 - Mobile-first vs. Card first (usability vs. Privacy vs security)

Thank you!

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