

LMU

LUDWIG-
MAXIMILIANS-
UNIVERSITÄT
MÜNCHEN

ZENTRALE UNIVERSITÄTSVERWALTUNG

DEZERNAT VI – INFORMATIONS- UND KOMMUNIKATIONSTECHNIK



the future of campus cards and
student IDs are mobile credentials

eduTAP

Elatec Webinar on „Mobile Credentials“
2024-02-22 – online

Alexander Loechel
Referent IT-Projekte





Status Quo LMUcard – where we are coming from

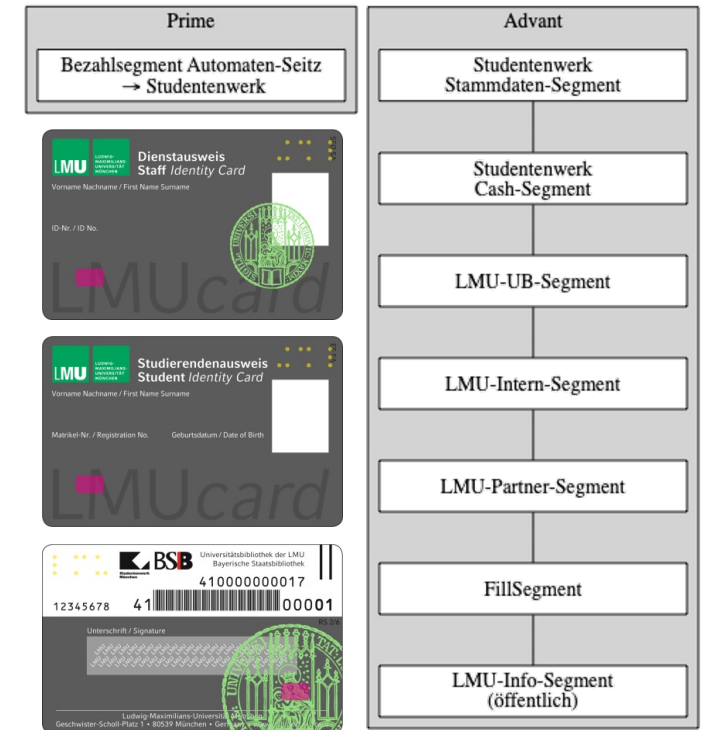
→ Services

Services used via LMUcard

- Visual ID document (Student ID, Staff ID)
- Library ID (University Library + Bavarian State Library)
- Payment function of the Munich Student Affairs Union
 - Payment in canteens, cafeterias, and vending machines
 - Identification and payment for LMU Cloud Printing (secure Follow me printing)
- Physical Access Control and Time Recording
- Identification at service points (e.g. Student registrar / Examination offices)
 - enrollment/registration number
- Public Transport Ticket for Students

Based on the technology decision of the Munich Student Affairs Union

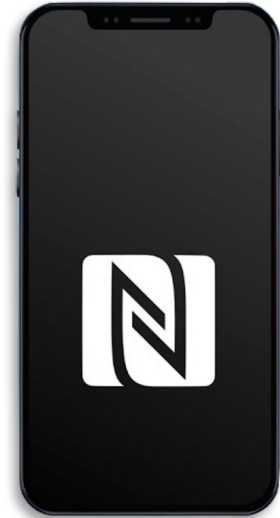
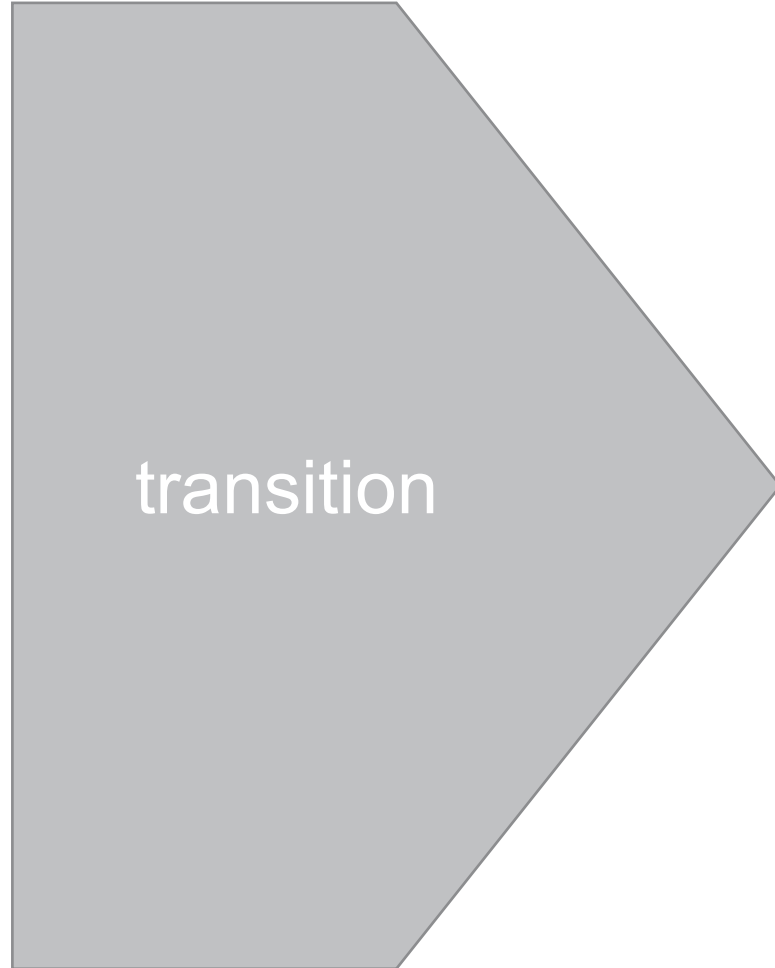
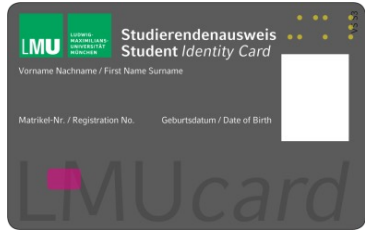
- ✓ Legic CTC4096-MM410
- ✓ LMU itself only uses Legic Advant with its own Master Token





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Transition of credentials into the Smartphone



Transition of credentials into the Smartphone

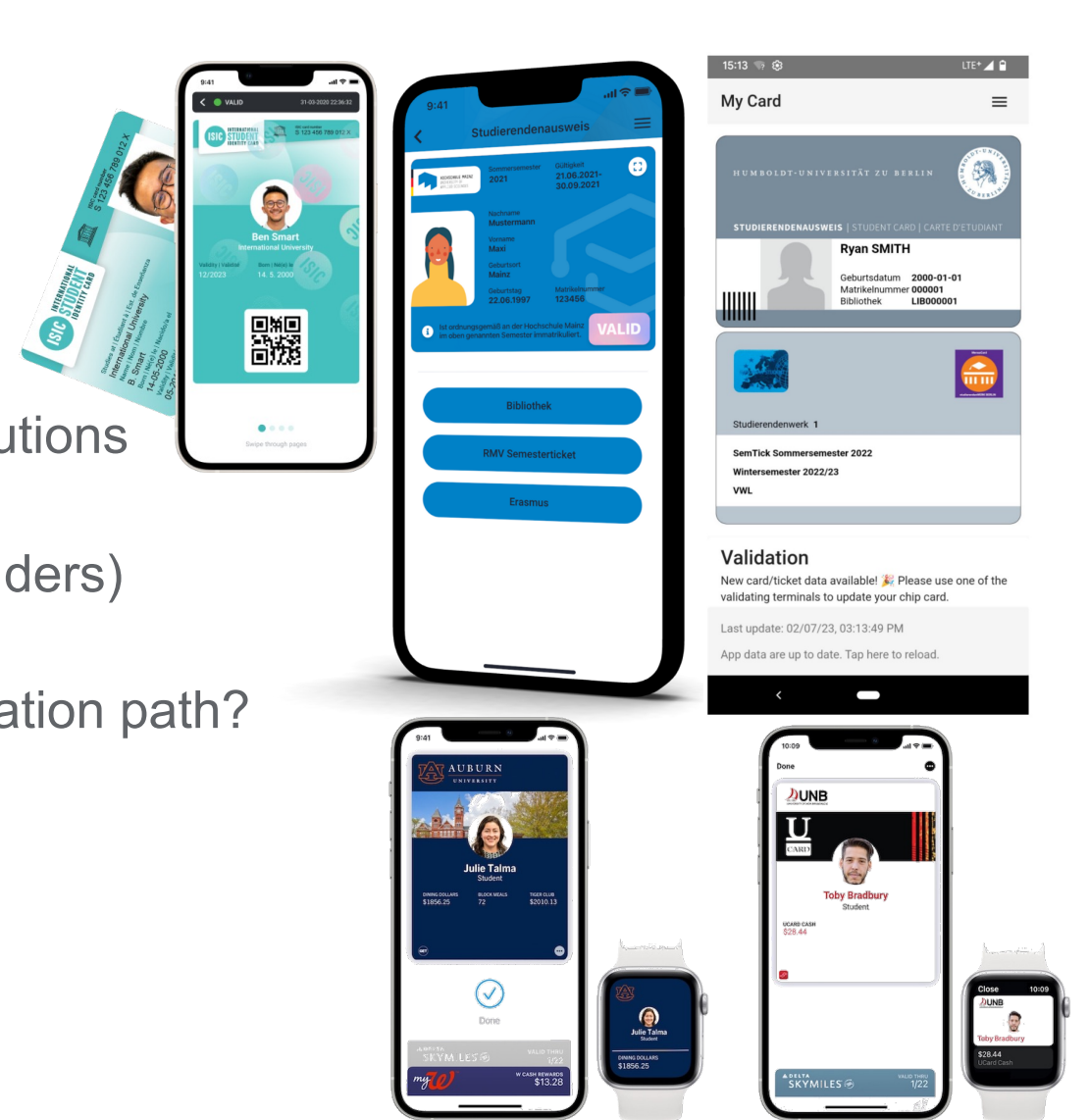
The Question: Transition into which Digitized world?

If we transition to mobile credentials,

- ✓ which features do we have?
- ✓ which convenience can we provide?

The problem for Universities / Higher Education Institutions (*at least in Europe*):

- We are not a full-service provider (multiple Stakeholders)
- Existing (legacy) solutions and migration path/costs
→ full migration with a big bang or a long-term migration path?
- Procurement laws and vendor dependencies
- Binding contracts, with vendors or Erasmus+
- European Student Card





Transition of credentials into the Smartphone Wallets

2020: LMU and three other universities have started to cooperate and plan to transition their university credentials into smartphone / smart device wallets.

- Concept
- Migration path
- Interoperability questions for a joined service provision
- Implementation

Project eduTAP

This is a joined action of the EUGLOH ESC working group



To answer: *why the future of campus cards and student IDs are **mobile credentials***



European University Alliance for Global Health

eduTAP

*Bridging **online identity** to **mobile credentials** for
reliable and trustworthy **on-site service access**
(in the educational sector)*





European University Alliance for Global Health



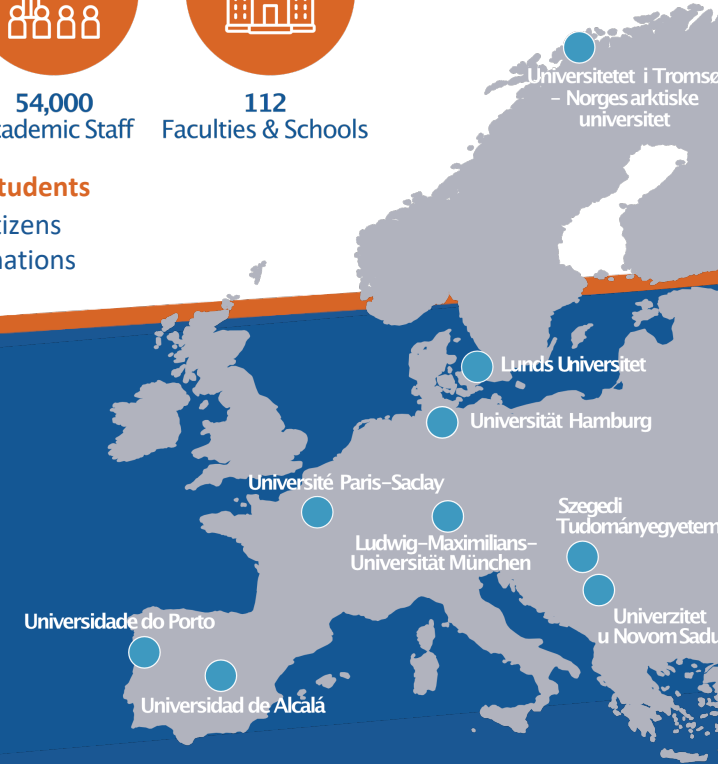
EUGLOH 2.0 Consortium Partners



→ UNS & UiT are from non-member states of the European Union

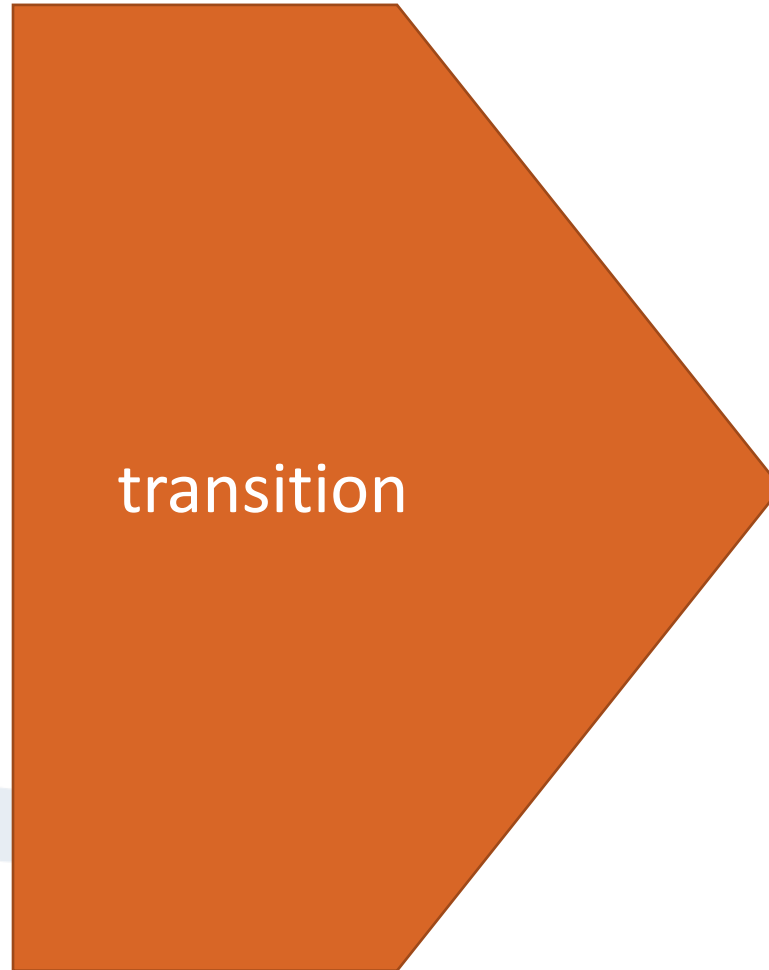


15-20 % foreign students
 40 % European citizens
 60 % from other nations



Digitizing cards vs. leveraging the possibilities of smart devices

chip card / smart card



Digitizing cards vs. leveraging the possibilities of smart devices

chip card / smart card

Front

Back

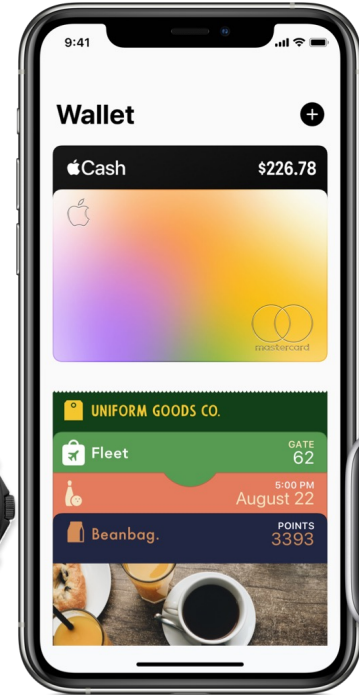
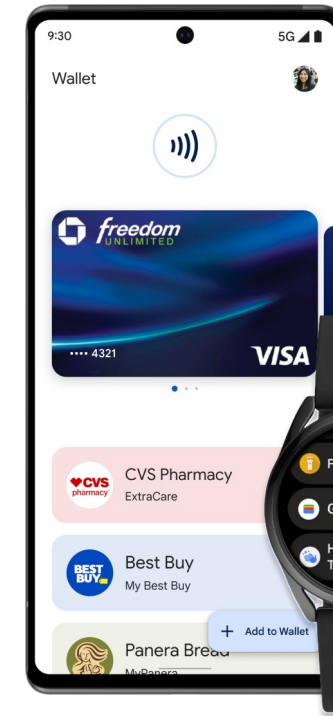
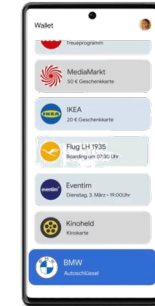
We are still thinking in cards terms

→ campus cards / corporate cards
(Student IDs / employee badge)

- Card as an integrated element
→ multiple applications in one card
- Front & Back of a CR80 / ID-1 card
- Limited amount of visual space
- Card as branding space (Corporate Design)

→ Passes in smart device wallets are a disruptive technology,

→ Let's think in terms of this technology



Digitizing cards vs. leveraging the possibilities of smart devices

→ Users Expectations

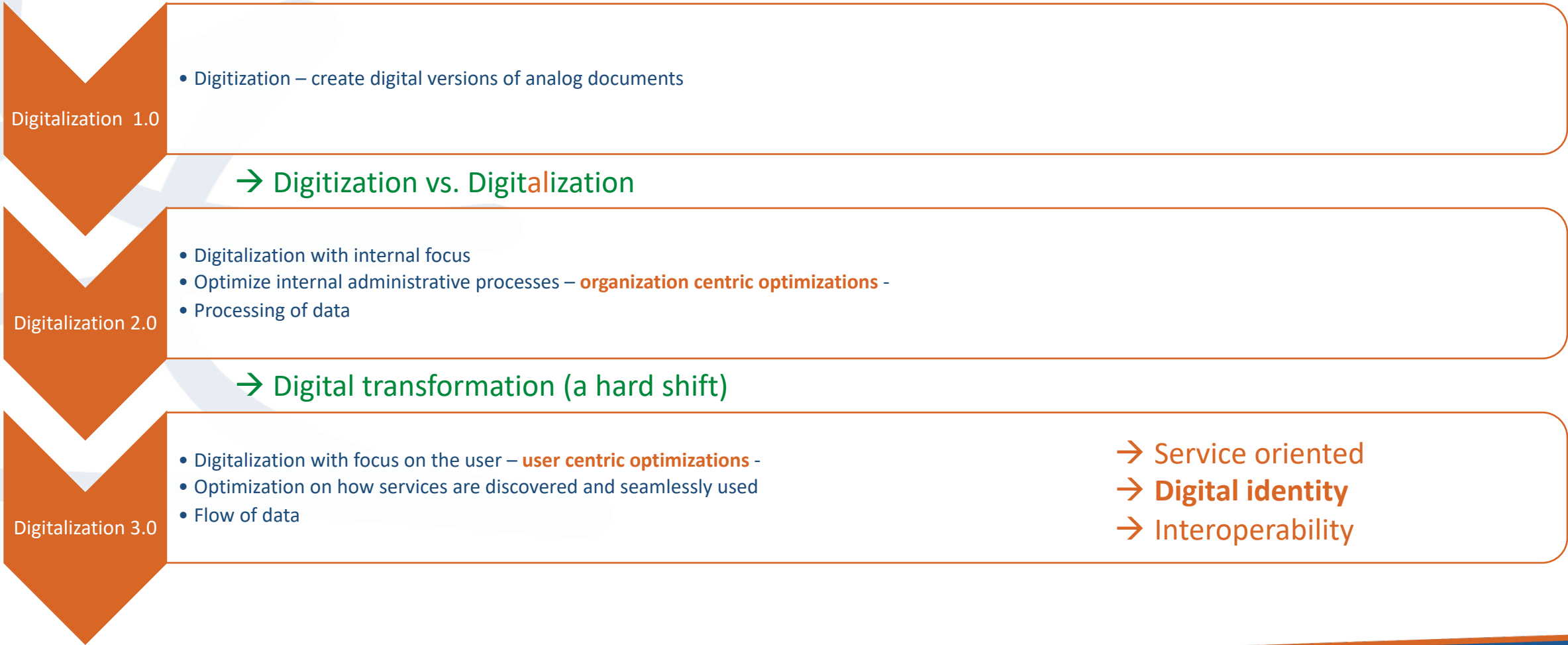
- Don't stick to old technology if your user expects something modern
 - Integration and **Interoperability**
 - The **Smartphone** is the essential working tool for younger generations
 - Higher Education Institutions should provide credentials in modern ways
 - **Student IDs / Campus IDs should be recognized and accepted anywhere just as plastic Student IDs**
- ✓ Be compliant
 - ✓ Be Secure → implement IT-Security best practices
 - ✓ Respect privacy
 - ✓ Respect self-sovereignty and decisions of users

→ Think from a **user perspective** (*user-centric-optimization*)



Digitizing cards vs. leveraging the possibilities of smart devices

→ Stages of Digitalization – Period of Digital transformation



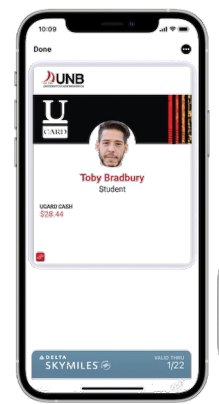
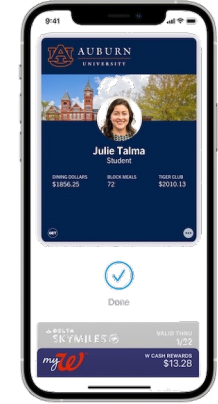
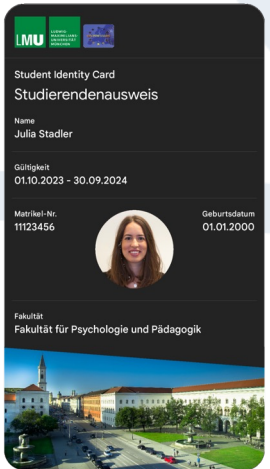
Digitizing cards vs. leveraging the possibilities of smart devices Reinvent the wheel vs. evolution of the wheel



and disruptive innovation

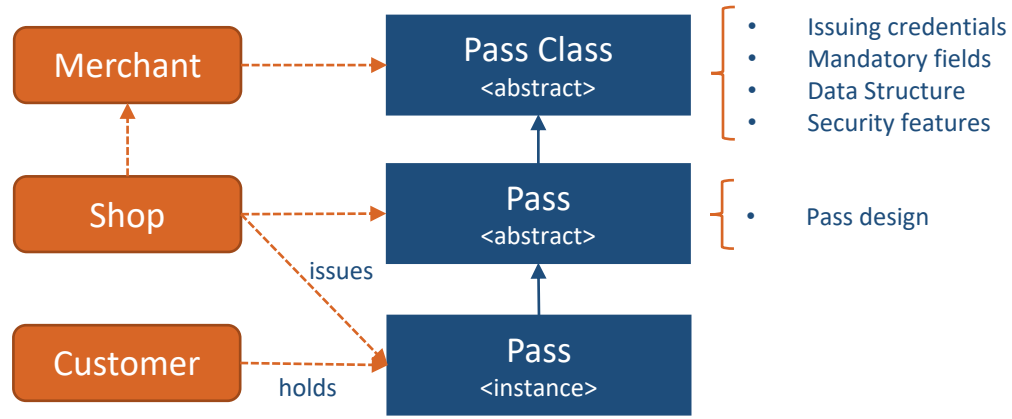
Wallet as a container for multiple “cards”

- ➔ link **one service per wallet pass**
- ✓ each pass has its own design
- ✓ additional information for the users
- ✓ User can select which service they want to use
➔ digital self-sovereign identity (SSI)



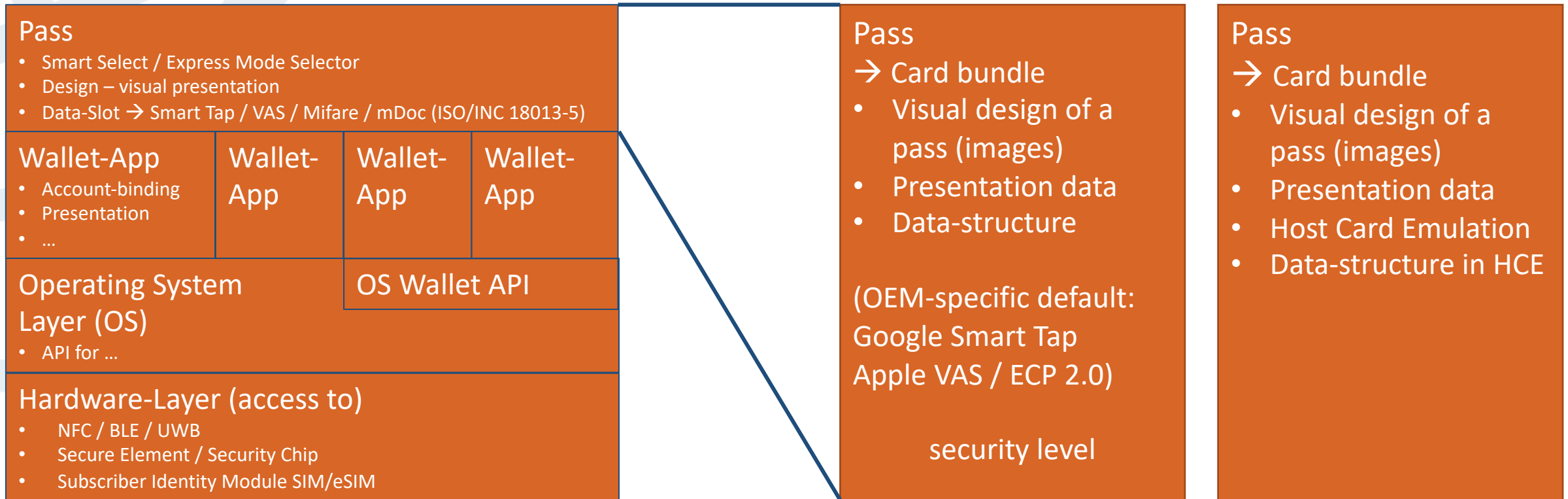
Technical details and features of Wallets / Passes

- The wallet is a **container for multiple passes**
- **Smart / Quick Select option (Express-Mode)** ← reader selects the specific pass to read (if available)
- **Battery reserve** (important for keys, transit tickets, payment)
- Authentication requirements ← **security features**
- Groupable
- Validity dates
- Remote updateable / revokable
- **Offline usable** (→ non traceable)
- *Host Card Emulation possible*



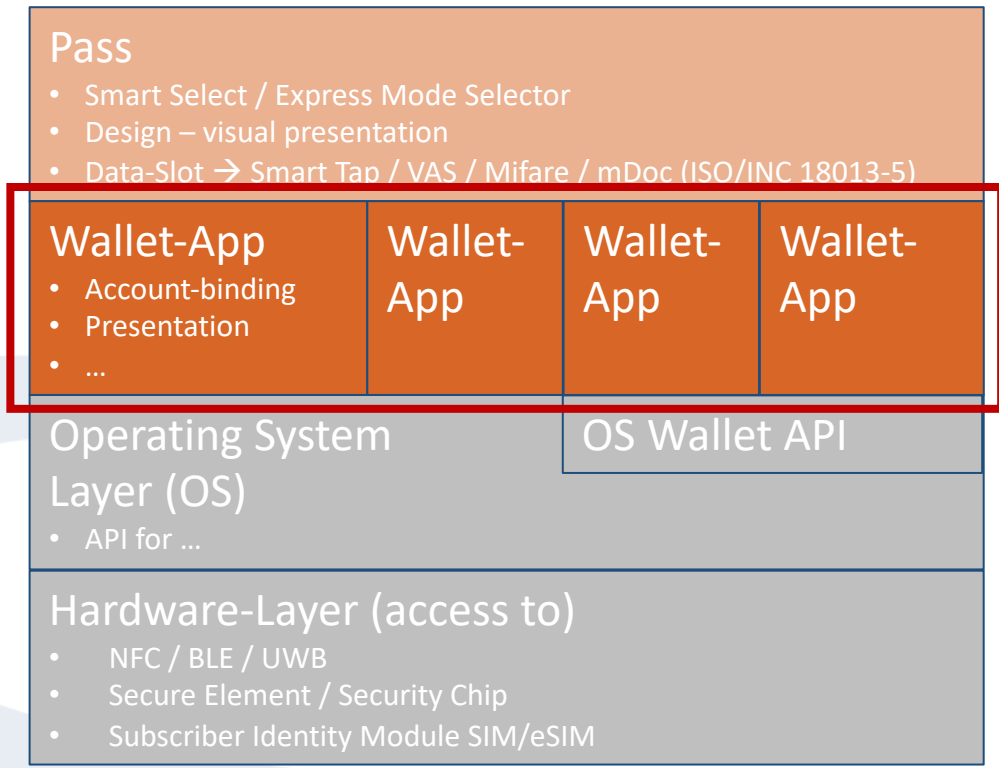
Technical details and features of Wallets / Passes

Detail view on the Pass



Technical details and features of Wallets / Passes

Detail view on the Wallet



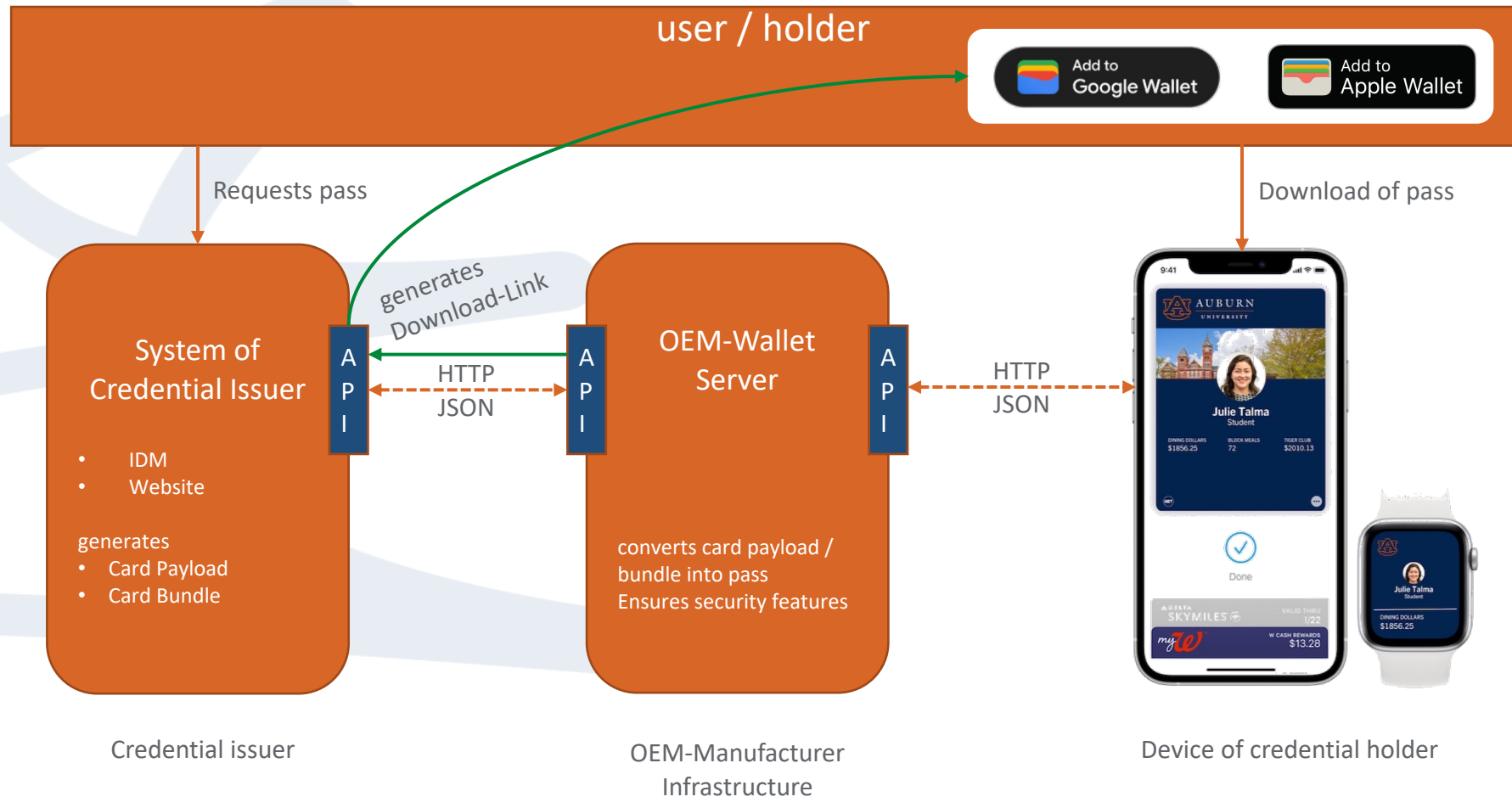
→ The eduTAP solution is wallet **agnostic**, not bound to a specific Wallet provider or company

→ eduTAP just enables you to easily **create** and **issue wallet passes**

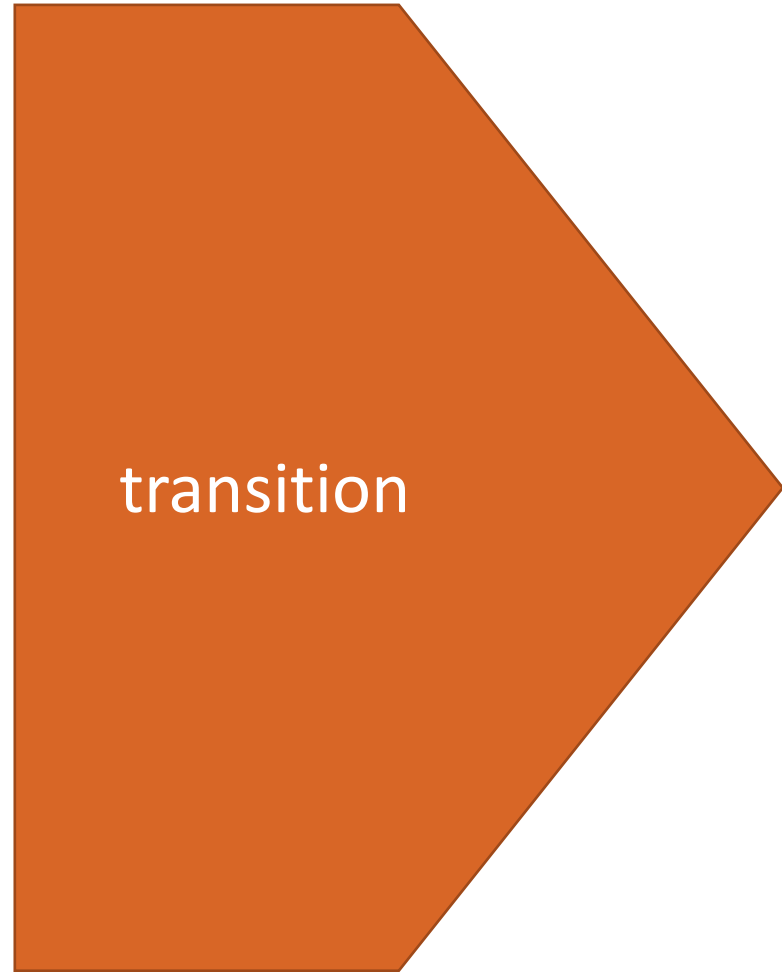
Issuing process of wallet passes

→ importance for the users – always the same process

redeming



Transition of credentials into the Smartphone Wallets



providing services on-site → card / smart device as a medium

Identification

- Identification
- Status verification
- Proof of entitlement
- Single Sign On / 2FA / FIDO2
- Attendance check
 - Check-in for exams
 - attendance at courses
 - Time recording
- Electronic Signature (of legal documents)

Electronic payment / cashless campus

- Canteen & cafeterias
- Vending machines
- Printing / scanning (secure & follow me printing)
- Ticketing (secure & follow me printing)



Physical Access Control

- Areas (campus, parking lot)
- Buildings
- Rooms
 - Classrooms
 - Labs
 - Computer rooms
 - Learning spaces
 - Offices
 - Accommodation facilities (i.e., dorms)
- Sports facilities



Library services

- Access to / borrow
 - Physical media (book, audio and video media)
 - E-media (book, audio and video media)
- Learning spaces



Transport

- On campus services (university shuttle service)
- Public transport tickets & discounts



Discount and promotions

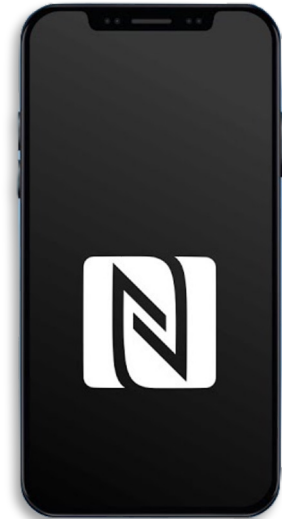
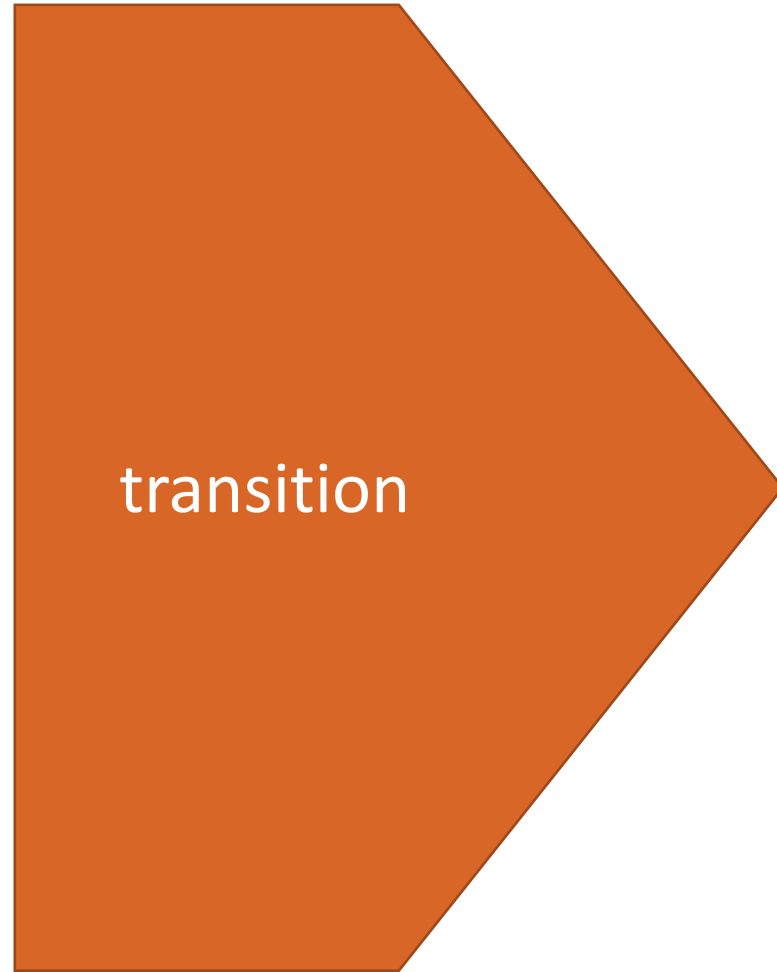
- Discounts on cultural activities
 - Museums
 - theaters
 - cinemas
- Shops
- Restaurants

on- & off-campus → on-site usage
online services



providing service → create benefits

Transition of credentials into the Smartphone Wallets



Is there already an approach?

The European Student Card

- ✓ Vision of the European Commission: Towards a European Education Area
- ✓ The **European Student Card Initiative** (ESCI)
 - Students can get their **status verified** easily across Europe
 - **Access to on- and off-campus services**
 - **easier** access to student services at host universities on a **mobility** programme
- ✓ European Charter for Higher Education (ECHE) of the Erasmus+ Program



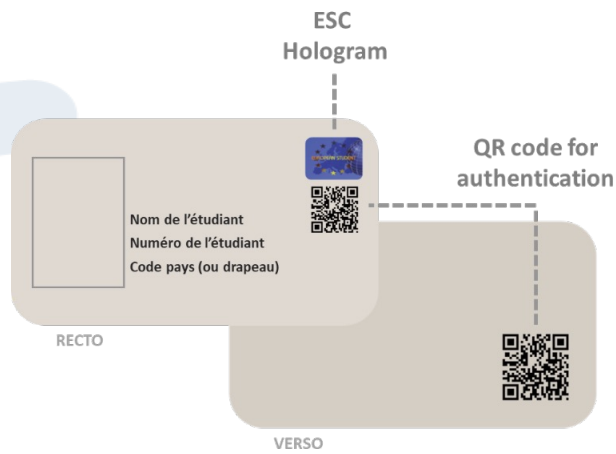
A great vision!

European Student Card Technology and Features

The European Student Card (1st Gen) is a **solution added to existing cards**, and implemented through a **centralised digital platform called the ESC Router** that allows participant institutions to **(1) generate student cards** and to **(2) validate student status**

ESCN - European Student Card Number
Unique card identifier of 16 bytes that serves to link a specific card to the specific HEI who produced it and to identify a card.

ESI - European Student Identifier
A digital identifier enabling students to uniquely identify themselves when they access student mobility services online.



European Student Card QR Code
Two-dimensional barcode printed on the ESC to ensure compatibility with any type of passive card and to automatically verify the data of the student's status.



European Student Card Hologram
Logo on the front of the European Student Card that certifies the authenticity of the card and serves as an identifier to access services at European level.





Interoperability ?

a hologram does not provide interoperability

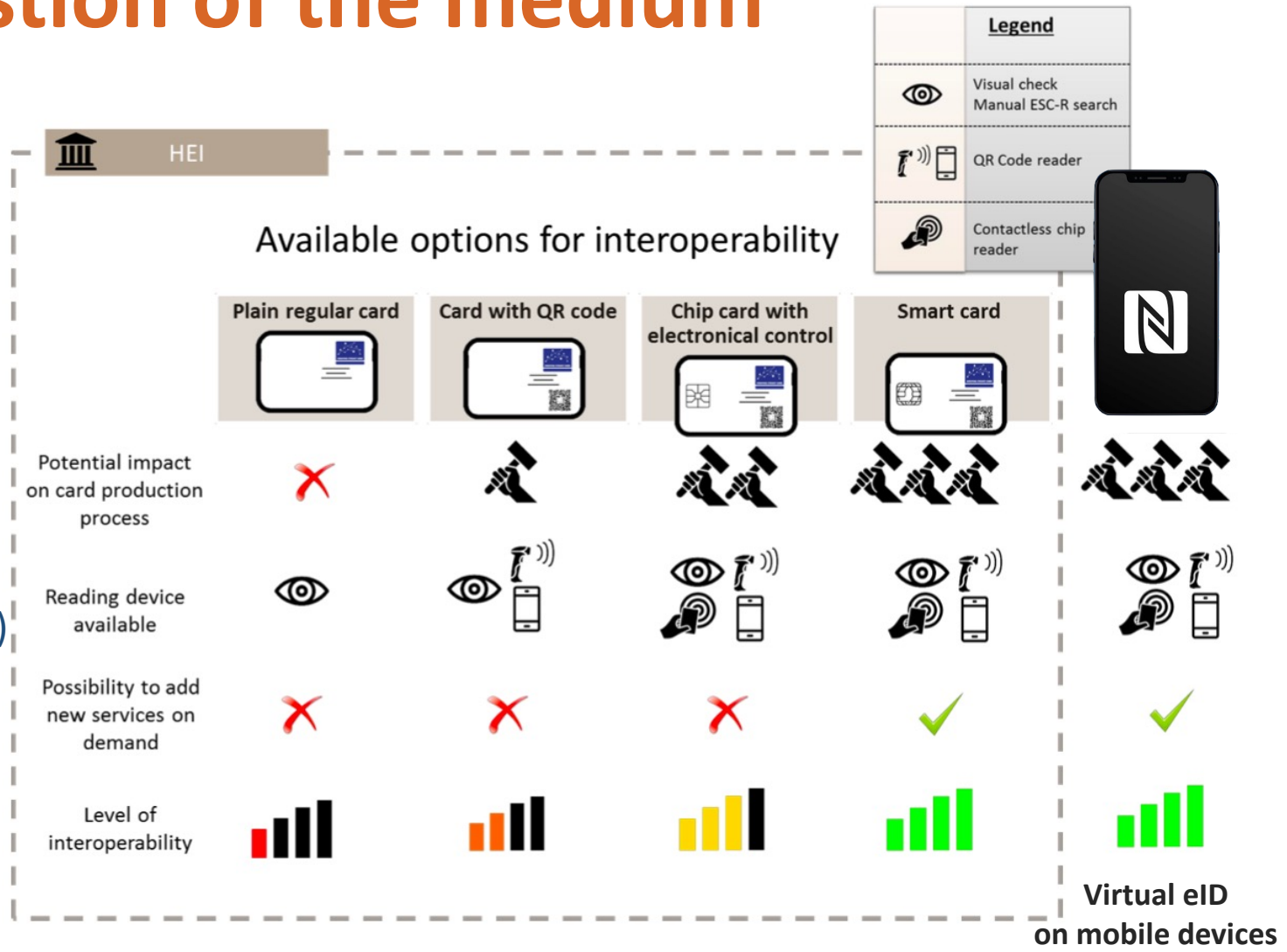
security, privacy, ...?

Interoperability: Question of the medium

Baselined on the ESC specification

Possible technological implementations:

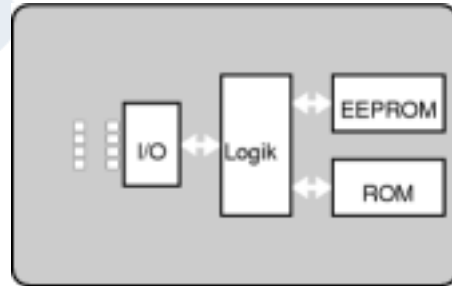
1. Plain Card with Hologram
2. Plain Card with **Hologram + QR-Code**
3. **Chip card** (with Hologram + QR-Code)
 1. Chip card technology neutral
 2. Mifare DESfire chip card with App
 3. Multi-technology chip card with App
4. **Smart card** (with Hologram + QR-Code + App)
5. **Virtual eID** (Smartphone)



Interoperability: Physical card side?

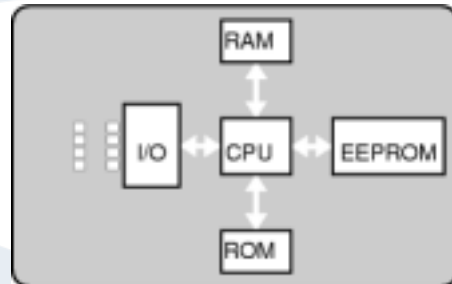
Chip cards → bind to one certain technology

- NXP Mifare DESfire
- Legic Advant
- HID iClass
- ...



Smartcards → expensive

- JCOP



→ Plastic cards are not the solution, so...

- ✓ Sustainability
 - ✓ Interoperability
- } Responsibility

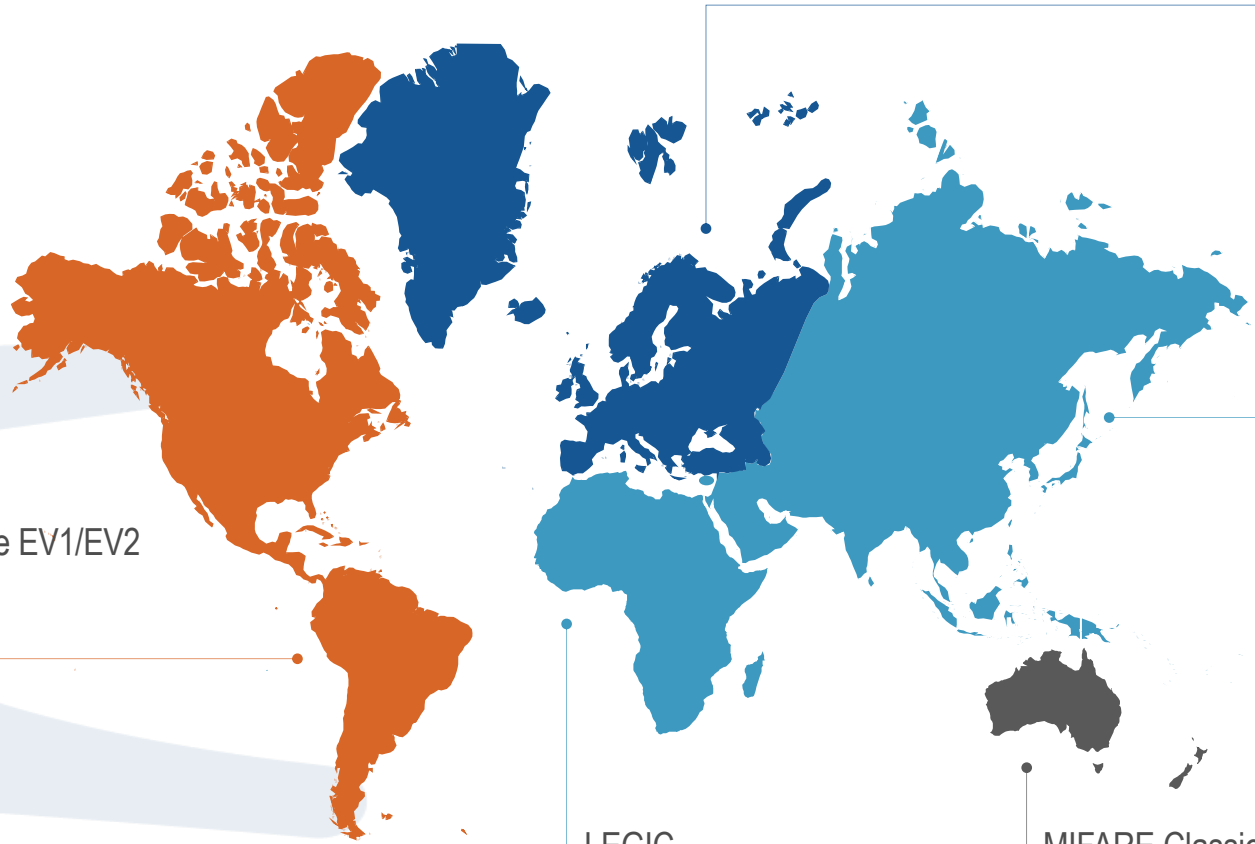
Interoperability: Cards – Communication Protokolls and Data / File Systems

Different standards of Transponder technologies – “standards” – NOT Compatible to each other

MIFARE Classic
MIFARE DESFire EV1/EV2
HID iCLASS
HID Prox
Indala
ioProx
AWID
Keri
CASI-RUSCO

MIFARE Classic
MIFARE DESFire EV1/EV2
HID Prox
EM4102

ISO 14443A ECM-340
ISO 14443B ECMA-352
ISO 15693 ISO 11784
ISO 18000 ISO 11785
ISO 18092 NFC Tag Types 1-5



MIFARE Classic
MIFARE DESFire EV1/EV2
LEGIC
Calypso
Moneo
Oyster
HID Prox
EM4102

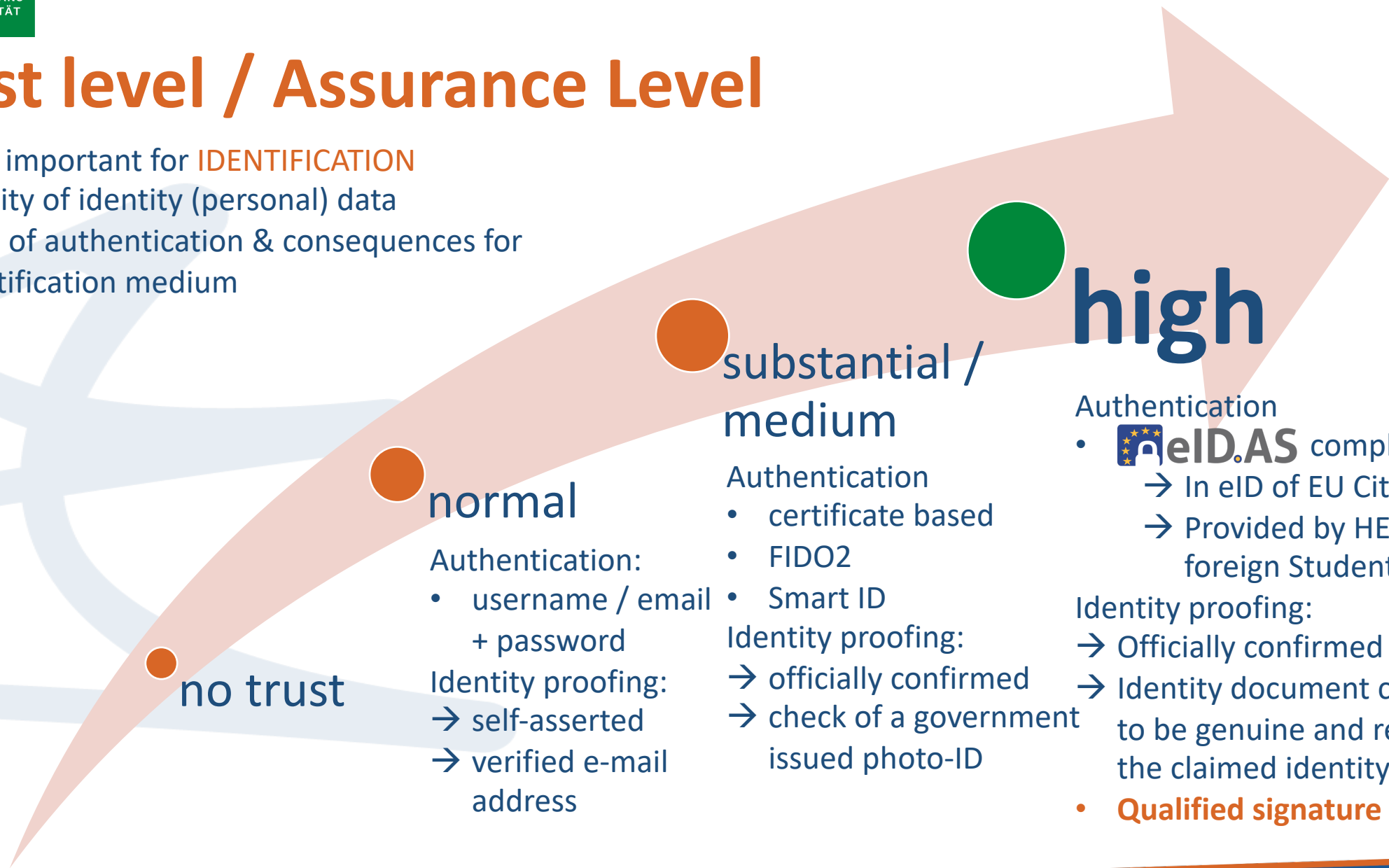
LEGIC
MIFARE Classic
MIFARE DESFire EV1/EV2
SONY Felica
TIRIS
CEPAS
Octopus
EM4102

LEGIC
MIFARE Classic
MIFARE DESFire EV1/EV2
EM4102

MIFARE Classic
MIFARE DESFire EV1/EV2
HITAG
HID Prox

Trust level / Assurance Level

- Very important for IDENTIFICATION
- Quality of identity (personal) data
- Type of authentication & consequences for identification medium




no trust

- Authentication:
- username / email + password
- Identity proofing:
- self-asserted
 - verified e-mail address

normal

- Authentication
- certificate based
 - FIDO2
 - Smart ID
- Identity proofing:
- officially confirmed
 - check of a government issued photo-ID

substantial / medium

- Authentication
-  **eIDAS** compliant
 - In eID of EU Citizen IDs
 - Provided by HEI for foreign Students
- Identity proofing:
- Officially confirmed
 - Identity document checked to be genuine and represent the claimed identity
- **Qualified signature**

high

providing services on-site → card / smart device as a medium

Identification

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- Proof of entitlement
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Physical Access Control

- Areas (campus, parking lot)
- Buildings
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on- & off-campus → on-site usage
online services



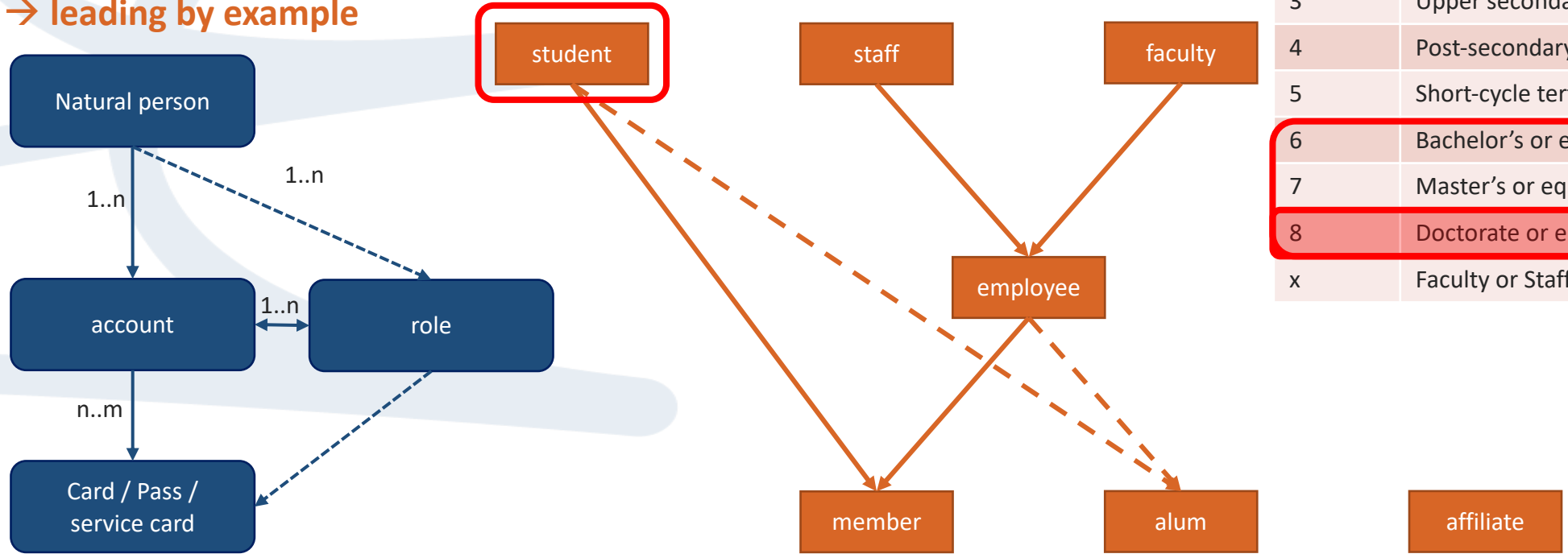
providing service → create benefits

European Student Card → Services and Service Consumers

- Why focus on students and ISCED:2011 Level 6/7/8 for ESC?
- It is about **providing services** → **eduTAP is for anyone**
 - For users of the (home or host) institution
 - User incoming for a short-term or long-term mobility
- Staff / faculty members are more likely on short-term mobility than students
→ **leading by example**

ISCED:2011 Level

Level	Label
0	Early childhood education
1	Primary education
2	Lower secondary education
3	Upper secondary education
4	Post-secondary non-tertiary education
5	Short-cycle tertiary education
6	Bachelor's or equivalent
7	Master's or equivalent
8	Doctorate or equivalent
x	Faculty or Staff member of HEI





European University Alliance for Global Health

9 Universities, 1 Goal: Building Europe's Campus for Global Health



EUGLOH 2.0 Consortium Partners



→ UNS & UiT are from non-member states of the European Union



15-20 % foreign students
40 % European citizens
60 % from other nations



Key Goals

- Interdisciplinary Global Health programmes across universities – striving towards a joint European degree.
- A vibrant, multicultural and inclusive inter-university campus.
- Seamless mobility for students, staff and professionals – physical and virtual.
- Strong links between higher education, research and local socio-economic ecosystems to prepare young people for the jobs of tomorrow.
- Empowering future generations to find solutions for Global Health challenges.

} Interoperable services and identification



European University Alliance for Global Health

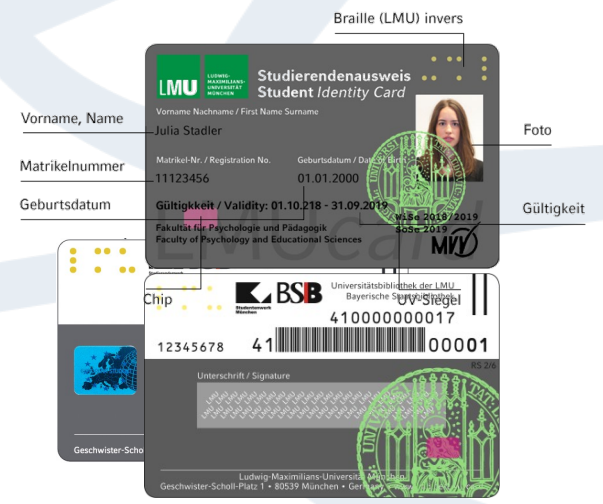
9 Universities, 1 Goal: Building Europe's Campus for Global Health

*A vibrant, multicultural and inclusive inter-university campus.
Seamless mobility for students, staff and professionals – physical and virtual.*

EUGLOH campus cards current state and connected services

→ Vision:

All university members should be able to use services of host university while on visit



Braille (LMU) invers

Vorname, Name: Julia Stadler

Matrikelnummer: 11123456

Geburtsdatum: 01.01.2000

Gültigkeit: 01.10.2018 - 31.09.2019

Foto

Gültigkeit

Chip

BSB

12345678 41 410000000017 00001

Unterschrift / Signature

Geschwister-Scho



LUNDS UNIVERSITET

Biblioteken vid Lunds universitet

Student

FORNAMN: [redacted]

EFTERNAMN: [redacted]

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UNIVERSITY OF PORTO

www.up.pt



CARTE ETUDIANT

université PARIS-SACLAY

NOM : MERCIER

Prénom : Claude



U PORTO

CT 08/19

Este cartão é pessoal e intransmissível e a sua utilização pressupõe o conhecimento e aceitação das condições de emissão do mesmo. A quem o encontrar pede-se o favor de o entregar num edifício da Instituição de Ensino Superior correspondente.

Siga-nos nas redes sociais

apoi@santanderuniversidade@santander.pt

www.banca-santander.com

Santander UNIVERSIDADES

Status of four core members (IT wise)

Ludwig-Maximilians-Universität München

- Legic CTC Cards (Legic Advant + Prime)
- Payment (Studierendenwerk München)
- Cloud-Printing and Scanning (Secure-Printing and Payment)
- Library
- Ticket for Public Transport System

Université Paris-Saclay

- NXP Mifare DESfire Cards
- Payment (izly – les Crous)
- Library
- Physical Access Control

Lunds universitet

- NXP Mifare Classic Cards
- Physical Access Control (online and offline)
- Login at copiers (for copy/print/scan)
- Library
- Several other services, but not any payment services

Universidade do Porto

- NXP Mifare Classic Cards / Java Cards with Mifare Classic emulation
- Library
- Physical Access Control
- Canteen & cafeterias
- Printing Service
- Attendance

Not compatible technologies

LMU's International network

Strategic partnerships

- LMU-Bordeaux Research Cooperation Program
- Cambridge LMU Strategic Partnership
- LMU-China Academic Network (LMU-ChAN)
- LMU-NYU Research Cooperation Program
- LMU-TAU Research Cooperation Program
- LMU-Todai Cooperation in the Sciences
- LMU-UCB Research in the Humanities

EU projects

European University Alliance for Global Health (EUGLOH)



Global collaborations

- LMU - China Scholarship Council (CSC) Program
- LMU-Harvard Young Scientists' Forum
- LMU's Latin America Network



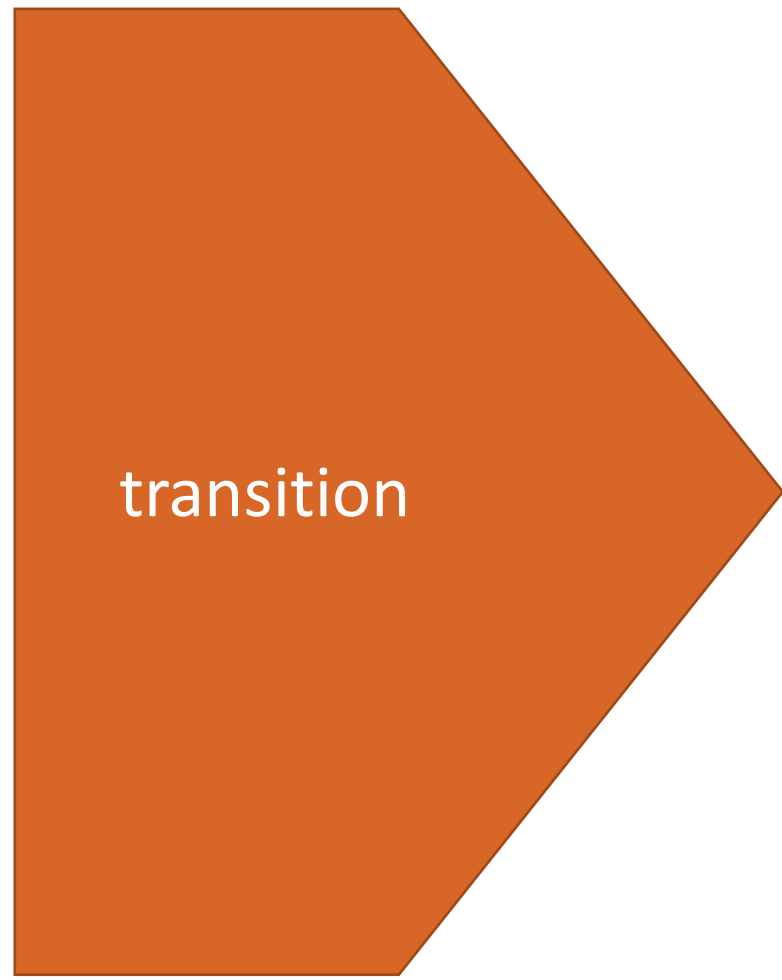
International alliances

- League of European Research Universities (LERU)
- European University Association (EUA)
- THE EUROPAEUM



Infinity partners → infinity stakeholders → infinity systems

Path to an interoperable campus card



eduTAP

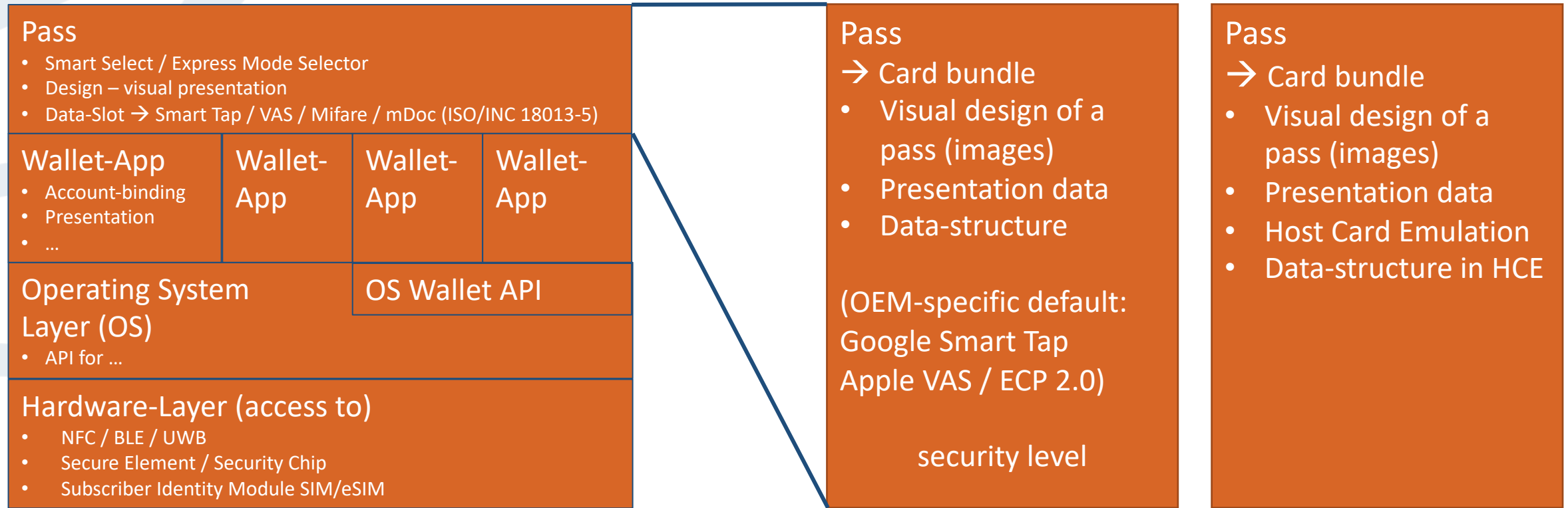
- ✓ state-of-art technology,
- ✓ secure and trustworthy,
- ✓ compliant to **GDPR**
- ✓ ensures interoperability

Trust-Level: NO-TRUST

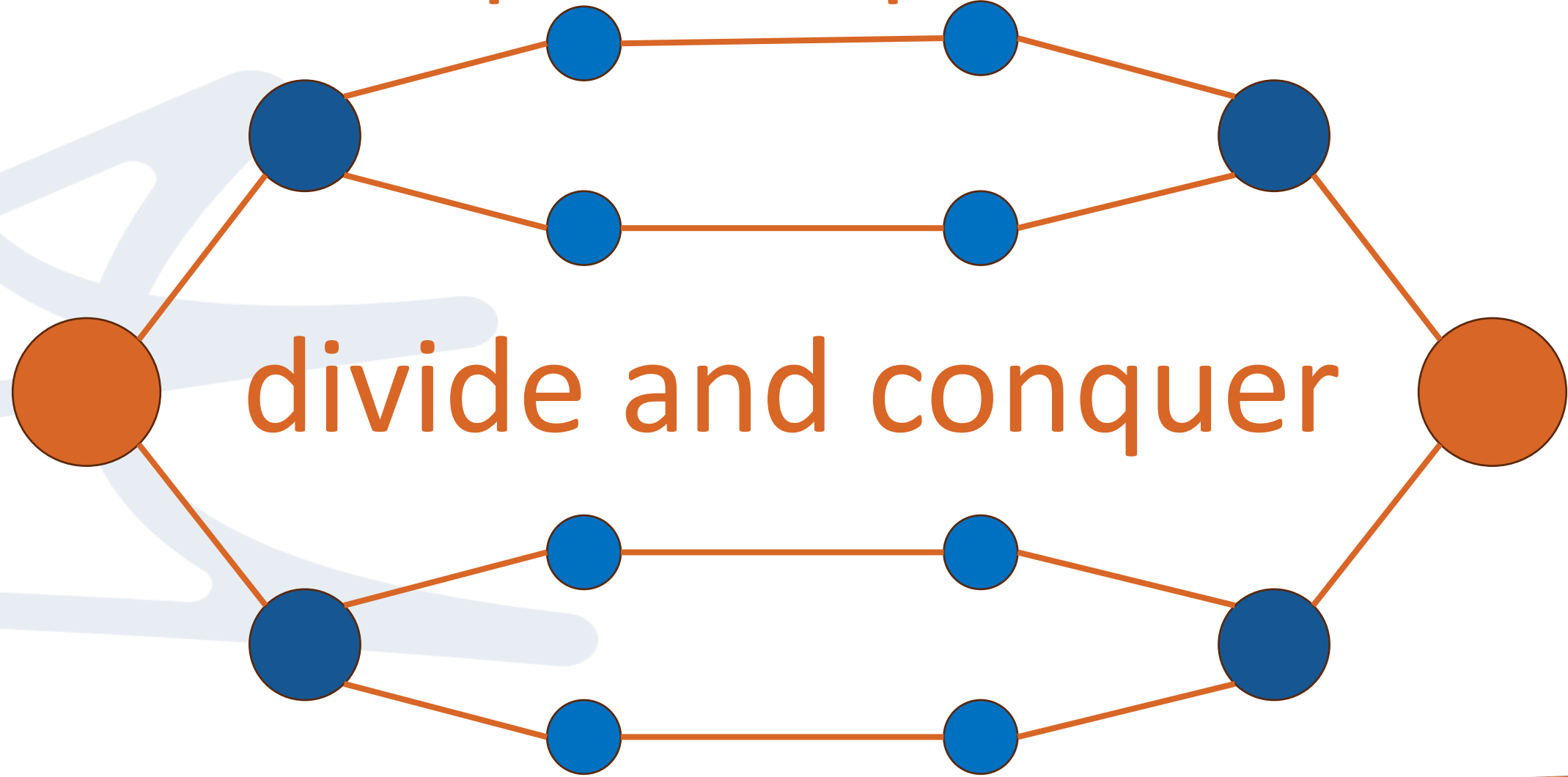
Path to an interoperable campus card

- ✓ Technical details and features of Wallets / Passes
- ✓ if each pass (technology) can be individually selected and leveraged, and the Pass in the Wallet can be selected by the reader (**Smart Select**)

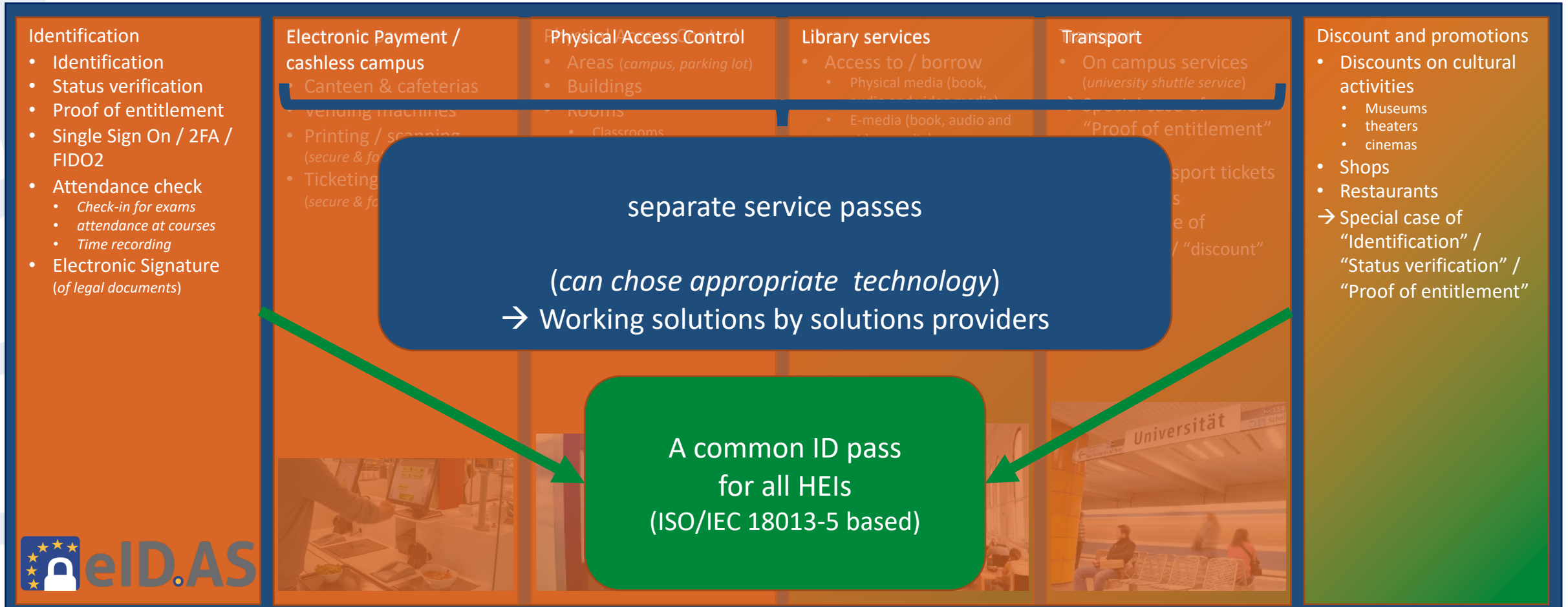
→ one pass per service



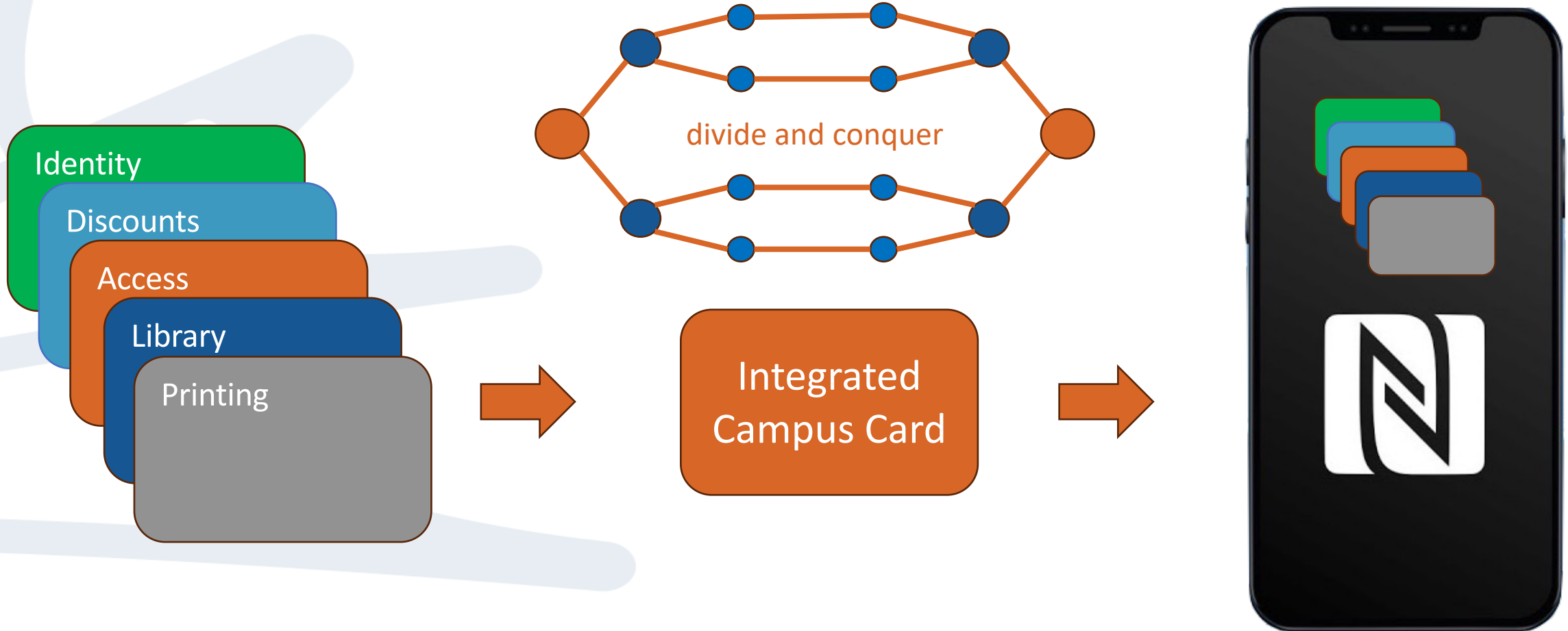
Path to an interoperable campus card



Path to an interoperable campus card



Path to an interoperable campus card





European University Alliance for Global Health

eduTAP

*Bridging **online identity** to **mobile credentials** for
reliable and trustworthy **on-site service access**
(in the educational sector)*



eduTAP – educational tapping

- ✓ tap to identify yourself,
- ✓ tap to claim a discount,
- ✓ tap to pay (open and close loop-payments),

TAP TO PAY



- ✓ tap to open a door,
- ✓ tap to lend a book,
- ✓ tap to take a campus shuttle.



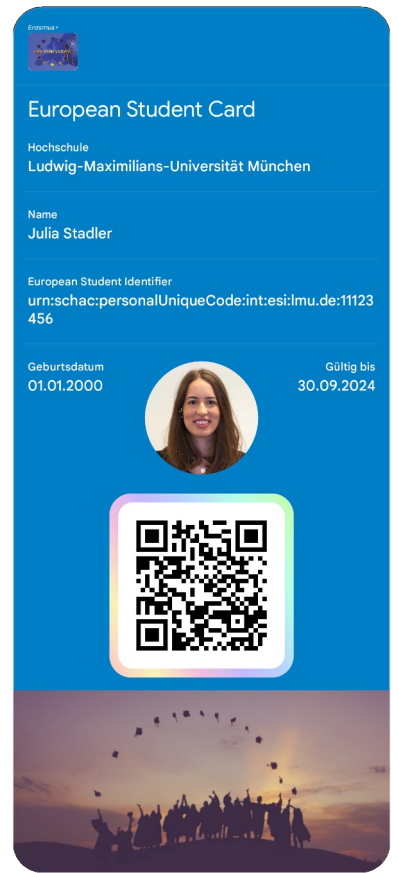
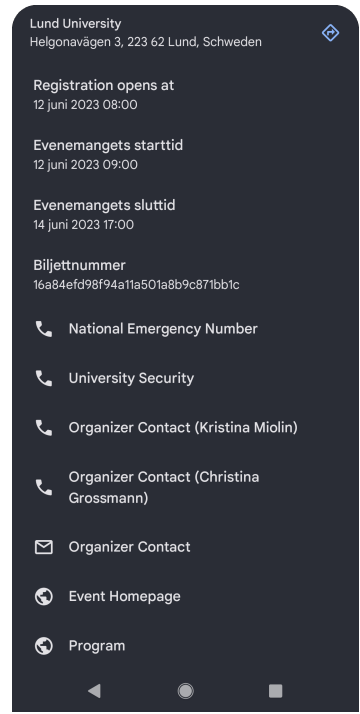
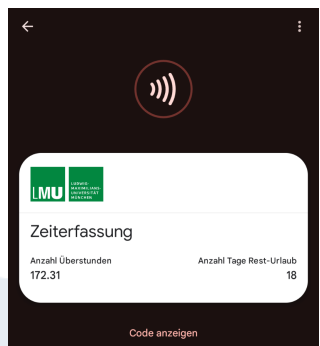
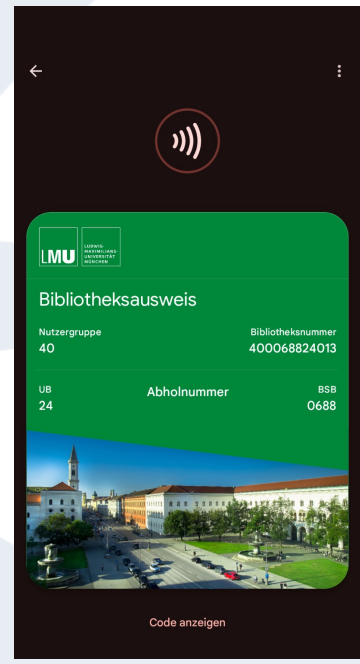
Transition of credentials into the Smartphone Wallets

Examples:

potential IDs for LMU Munich

Event-ticket for EUGLOH Annual Summit 2023 in Lund

European Student Card



→ all **NFC enabled**



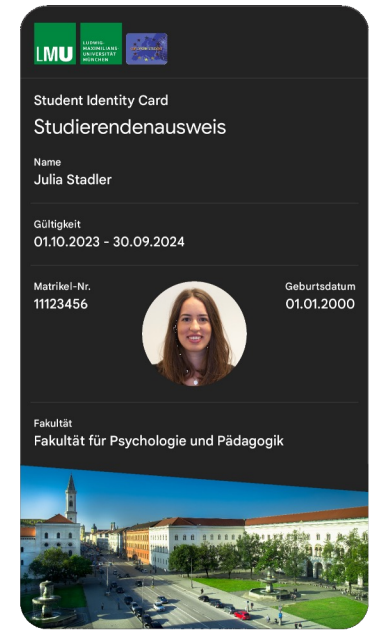
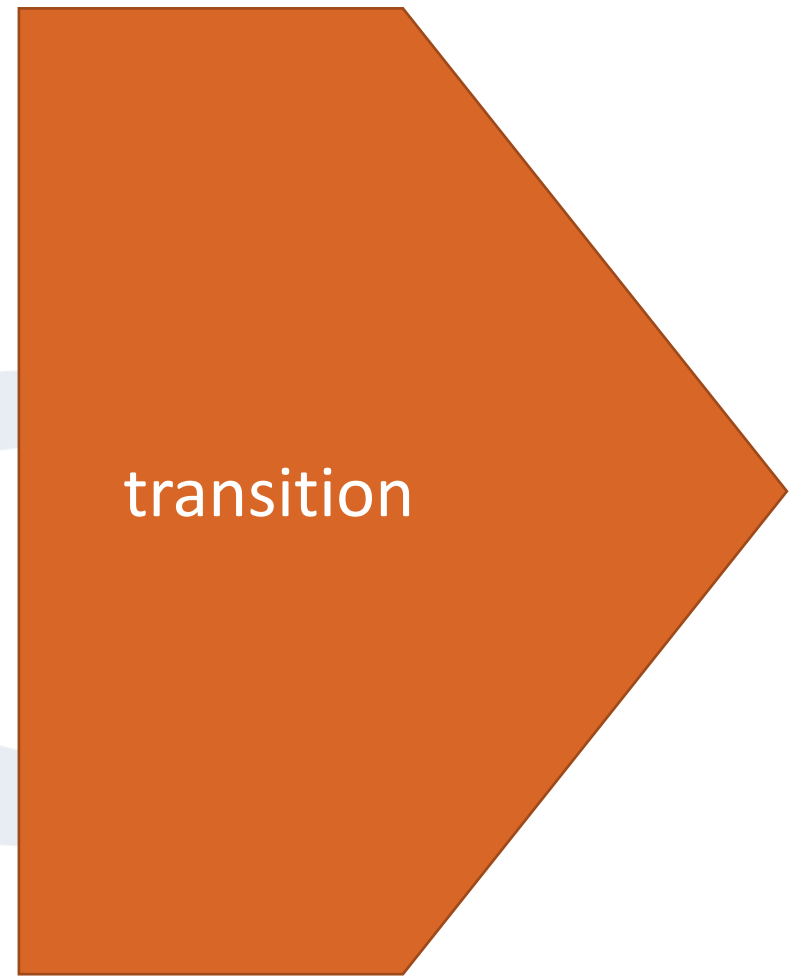
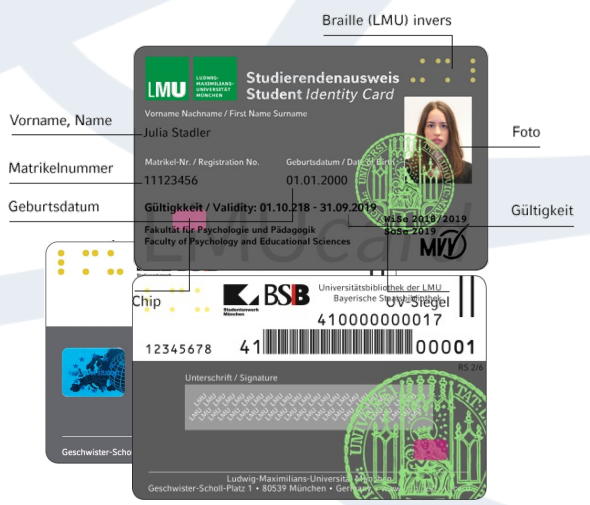
Demo → Download an eduTAP created pass



<https://checkin.eduTAP.eu/sms2024>



Transition of credentials into the Smartphone Wallets



eduTAP Deliverables

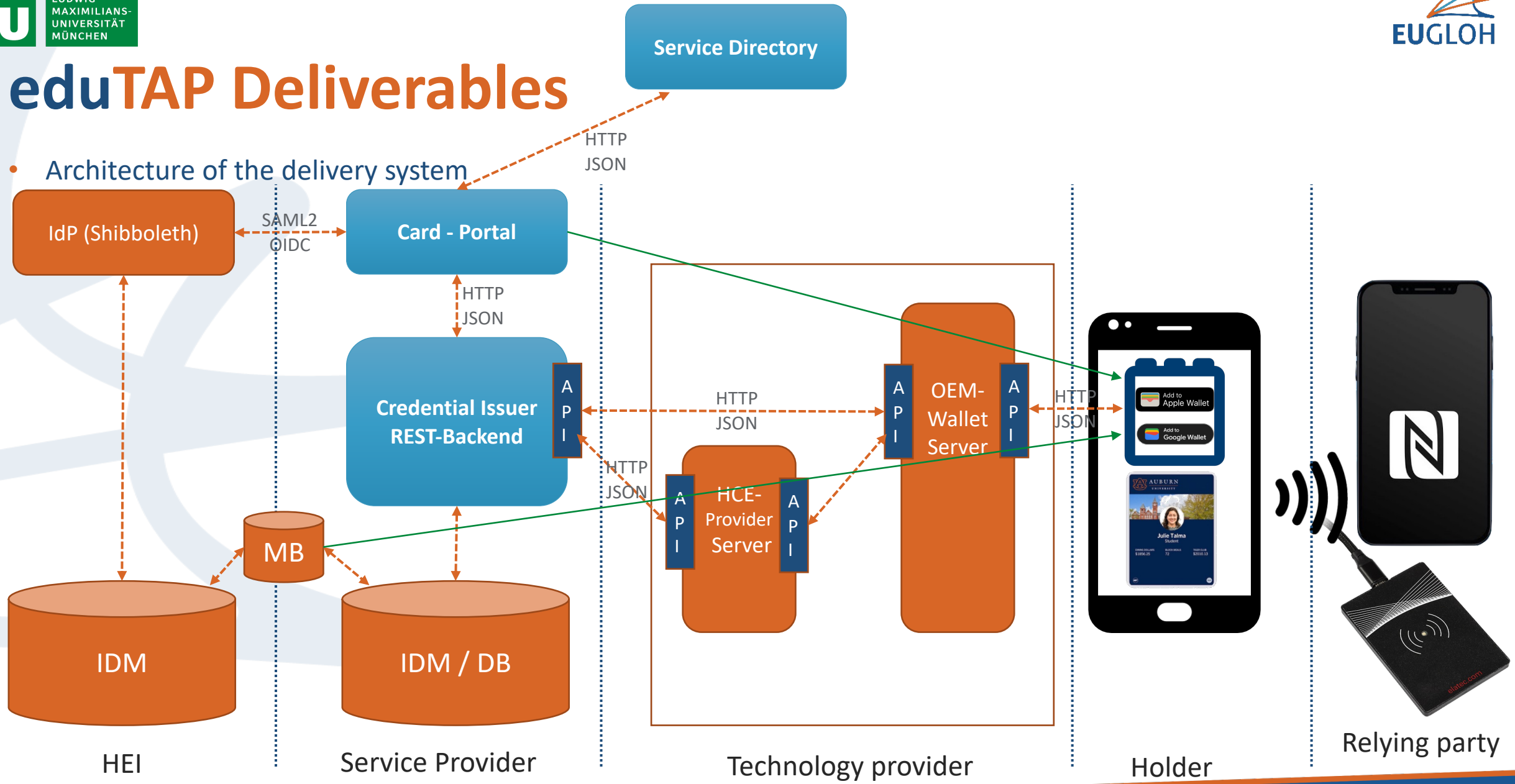
- eduTAP core → generic libraries and tools; everything to create and issue passes in the wallets
- eduTAP libs → generic libraries and tools; everything to read and process data from a wallet pass
- eduTAP docs → Information about eduTAP and Wallets
- Central Service Directory → find service and obtain a service pass if necessary
- Infrastructure and Deployment helpers
- Mandant Specific Applications (MasA) → eduTAP@institution implementation

eduTAP is community open source

More Information's → <https://eduTAP.eu> • <https://docs.eduTAP.eu> & <https://github.com/edutap-eu>

eduTAP Deliverables

- Architecture of the delivery system



What is eduTAP

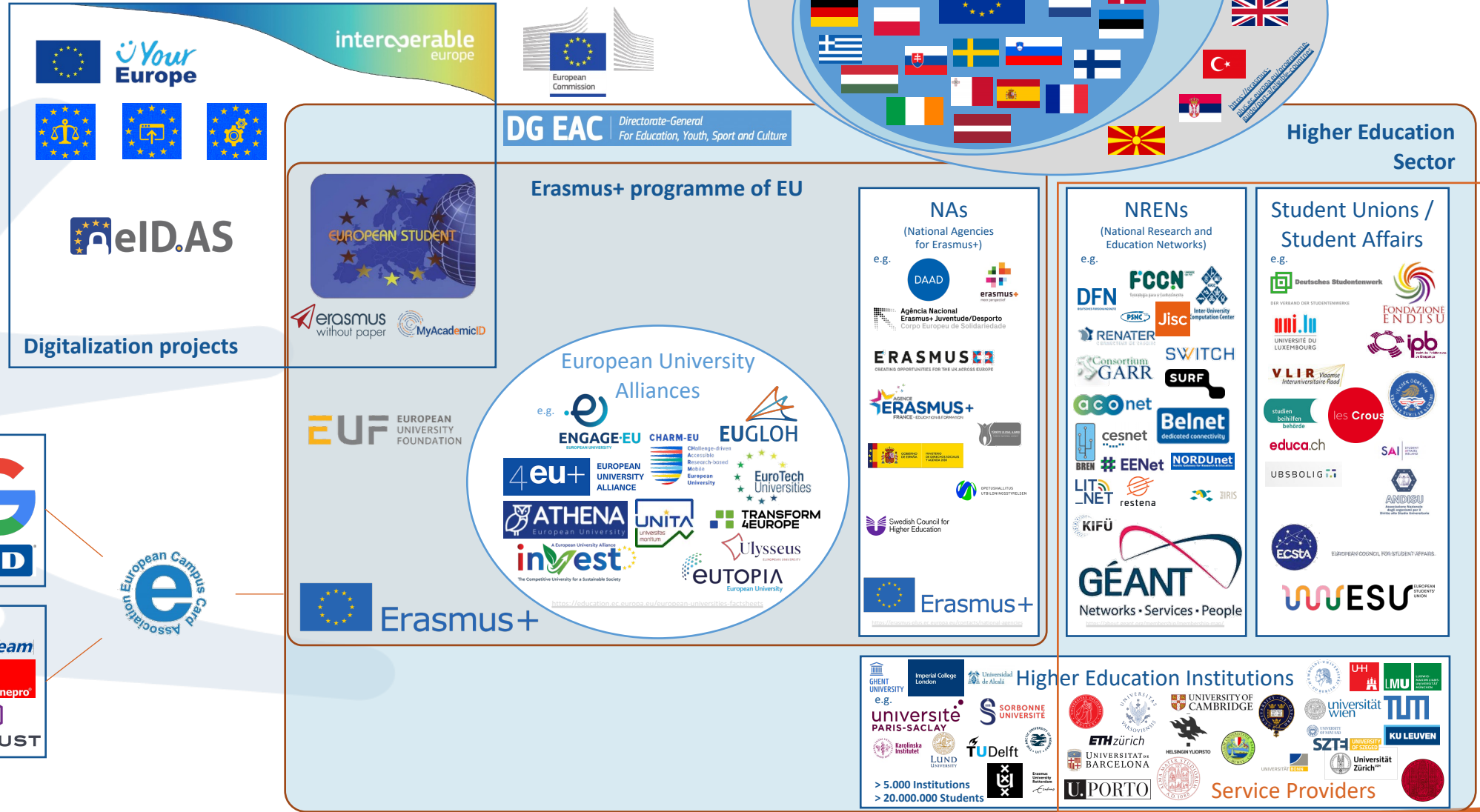
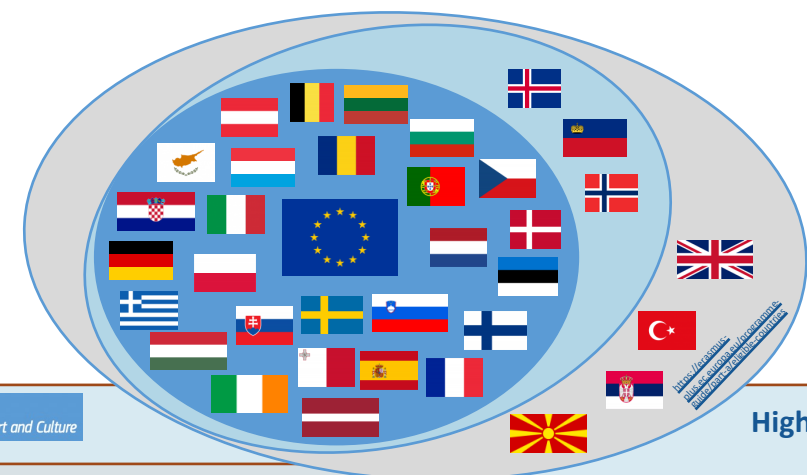
- Fulfill the interoperability vision of the **European Student Card**
- By being compliant, secure and trustworthy by design, but respecting legacy systems in the field
- Having a decentralized, scalable, secure and state-of-the-art system, without reinventing the wheel

→ for Europe and the world
edu**GAIN** online – edu**TAP** on-site

→ Make it work by a **change of perspective**

- Perspective of multiple different Higher Education Institutions and their audience, services and current situation
→ **user centric** (*Digitalization with focus on the user*) implementation

The Stakeholder-Landscape



public transport providers. - cultural institutions (libraries, museums, theaters, cinemas). - shops



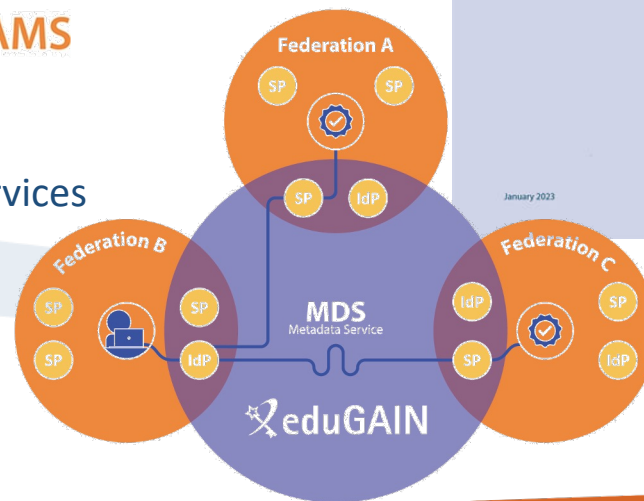
GÉANT – The IT provider for Higher Education in Europe

The GÉANT Association is the collaboration of European National Research and Education Networks (NRENs)

- Non-Profit Organization
- Service-Provider for IT / e-infrastructure services for the European Higher Education Sector
- Key Services:
 - GÉANT Trust & Identity Services



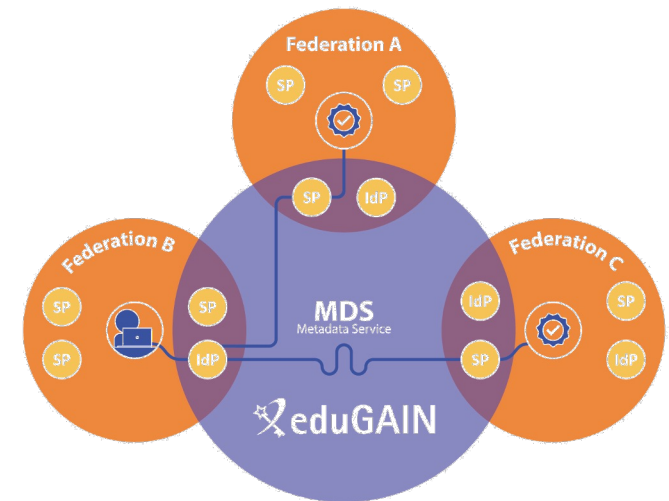
- GÉANT Network and Connectivity Services
- GÉANT Security Services
- GÉANT Cloud Services
- Procurement Agency for EU-HEIs



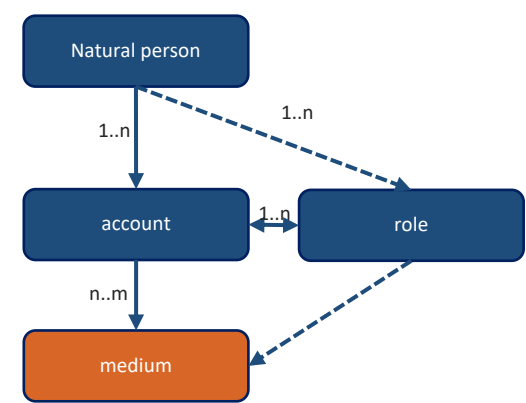
technology and information for Identification

User and Role bind services → Identity Management

- Existing technologies:
 - Directory Services → LDAP (Protocol and Schema definitions)
- LDAP-Schema for Higher Education
 - eduPerson (V4.3 from 30. November 2021; V1.0 from December 2007)
 - SCHAC – SCHEMA for ACademia (V1.6.0-proposed from 24. March 2022 / V1.5.0 from 15. April 2015; V1.0 from May 2006)
 - SAML – Security Assertion Markup Language
- Essential **LDAP-Schema Attributes**:
 - eduPersonAffiliation / eduPersonScopedAffiliation → Roles
 - eduPersonEntitlement → Mapped Entitlements ← **Services provided**
 - eduPersonAssurance → **Assurance Class / Level of Data**
 - schacHomeOrganization
 - schacPersonalUniqueCode → **European Student Identifier**
→ additional Identifiers necessary
 - Pairwise Id → Pseudonym
 - Subject Id → Unique Person Identifier



From eduGAIN & eduroam to eduTAP

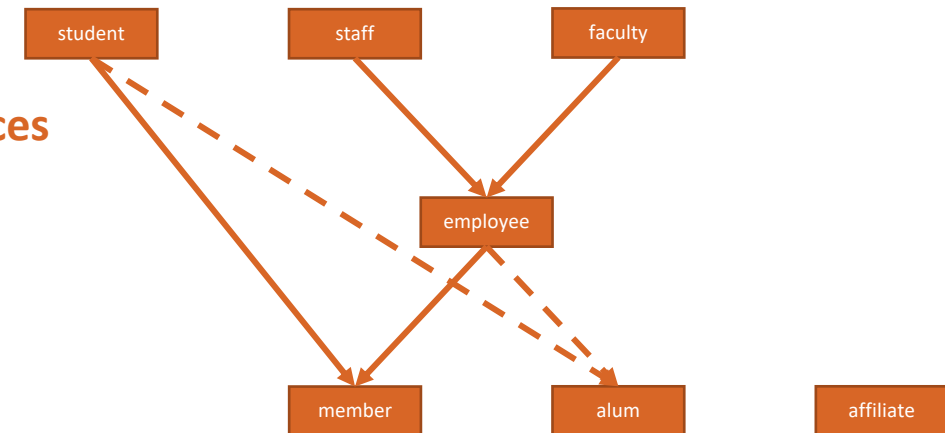


- eduGAIN is an **inter-federation of identity-federations** in Higher Education
 - Each Member of a Higher Education Institution (HEI) should have a **user-account** that allows him to **access online-services**
 - eduGAIN uses **Shibboleth** (federated SAML2 or OIDC) and is an **“Authentication and Authorization Infrastructure” (AAI)**
 - All HEIs Identity Management Systems uses the same common set of LDAP-Schema (eduPerson & SCHAC + SAML)
 - shared set of Attributes and understanding of those Attributes
- eduroam (educational roaming) gives all HEI members **access** to a **WLAN service** with SSID eduroam
 - WPA2/3-Enterprise with a Radius Authentication Service (based on the eduGAIN user-account - login)
 - A common WLAN at almost all HEIs world-wide and public spots

→ It is all about **accessing services**

→ eduTAP

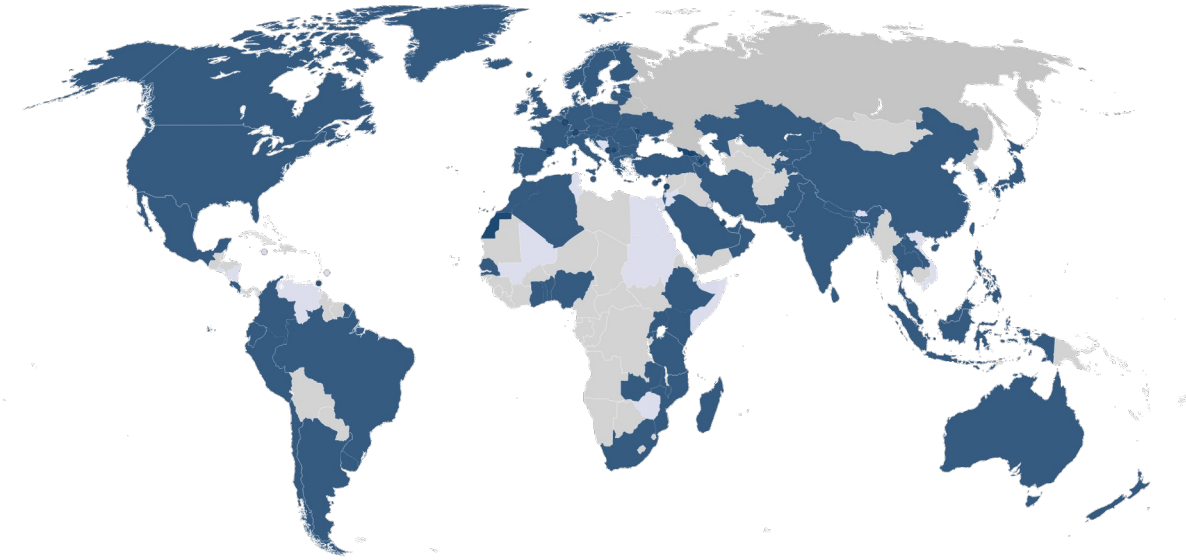
- identification / authentication / authorization to **access services on-site**
- uses eduGAIN and legacy system attributes for service access



eduGAIN & eduroam Member Countries

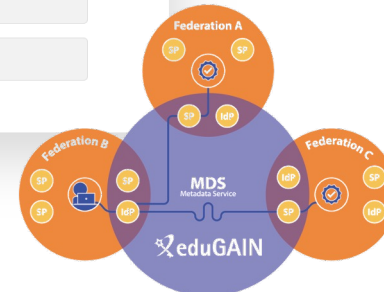
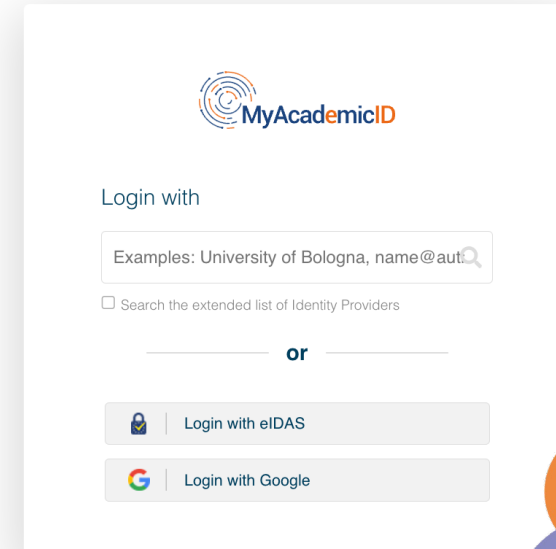
→ eduGAIN Federation Members

→ eduroam Service Providers



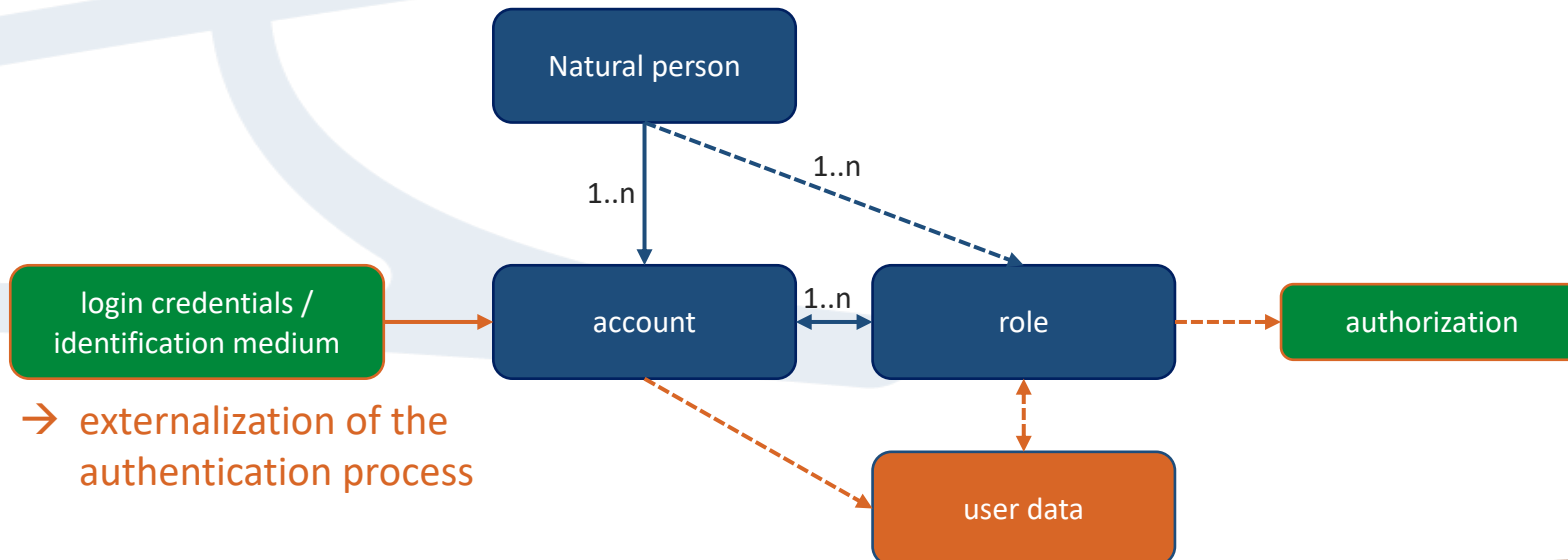
Identity Linking → reduced amount of logins

- Utilization of decentralized / federated Authentication and Authorization Infrastructure
 - Less login credentials – higher assurance levels
 - Data flow
- Example application fields (at LMU):
 - Initial account creation for application / enrollment process (SDG / OZG / BayEGovG)
 - Issuing of Library IDs (OZG)
 - Mobility and cooperation processes → Zweithörer Status (HIG)

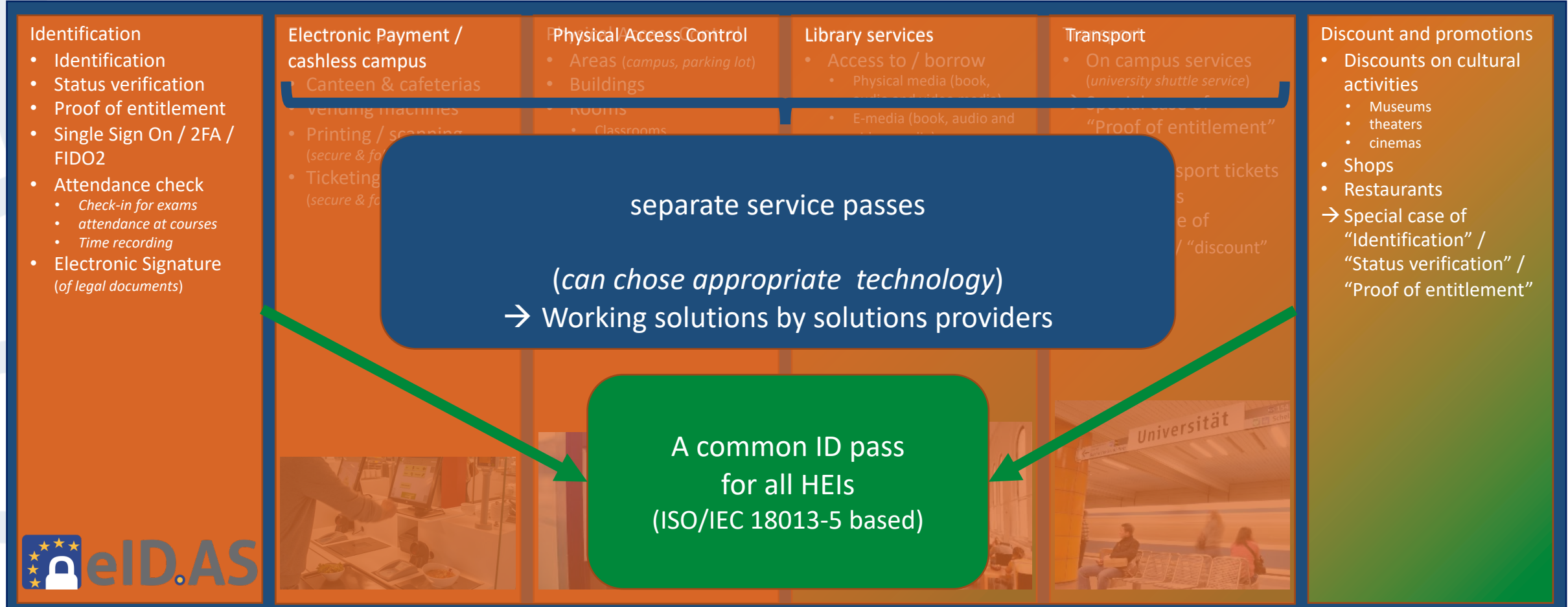


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Path to an interoperable campus card

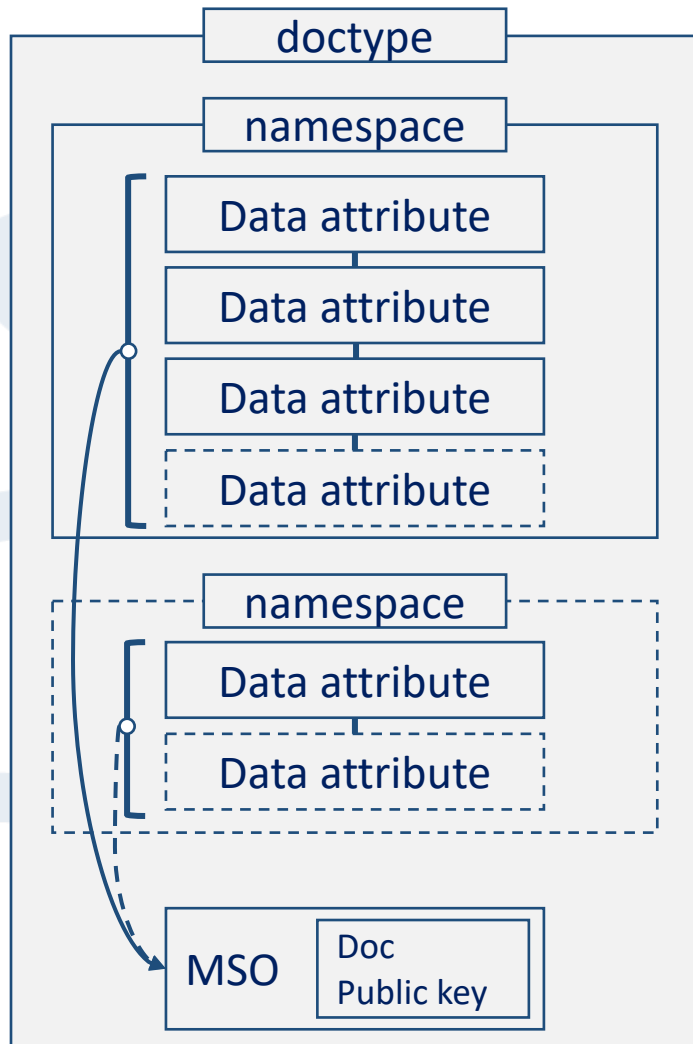


providing service → create benefits

Common Identification pass using ISO/IEC 18013-5 model

- The “ISO/IEC 18013-5 Personal Identification” model is designed to support
 - A protocol for two devices to establish a **secure wireless communication** channel and exchange structured request and response message
 - **Identification** of the credential holder (**user binding**)
 - **Selective release of data elements** by the credential holder (**data minimization / consent**)
 - A protocol to retrieve credential data directly from the mobile device of the holder, **purely offline**, facilitating **availability** and **non-traceability**
 - An **optional** protocol to **retrieve additional data** from the issuing authority
 - A mechanism to establish **integrity** and **authenticity** of the credential data
 - A mechanism to confirm **device binding** (signing at transaction time)
 - Multi document and **multi namespace aware** ← extendable for other use cases
- Established governmental credential format that is already in use → mobile driving licence
- Already supported by the OEM-Smartphone-Manufactures (Apple and Google (see: <https://android-developers.googleblog.com/2020/11/privacy-preserving-features-in-mobile.html>))
- No additional infrastructure costs

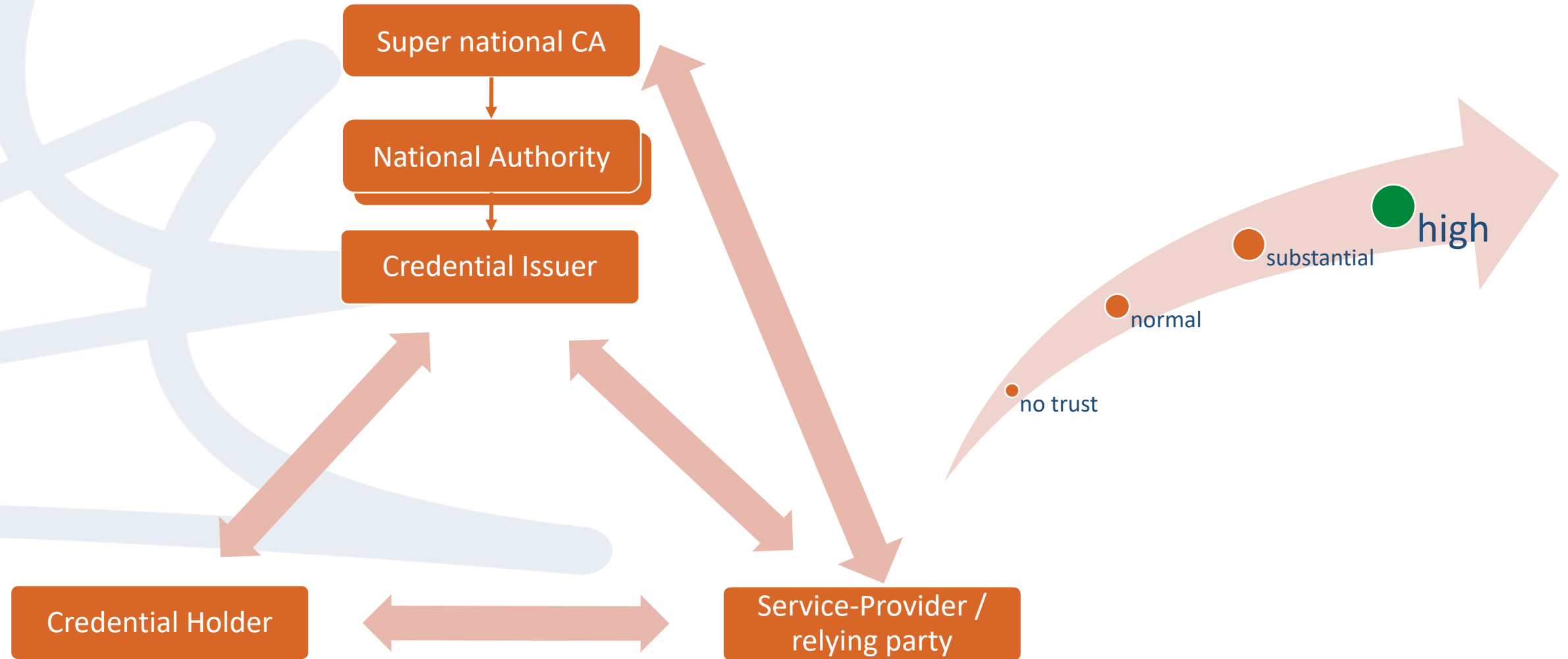
ISO/IEC 18013-5 Data model



Reuse of directory Data:

- givenNames
- sn
- eduPersonAffiliation / eduPersonScopedAffiliation
- eduPersonEntitlement
- eduPersonAssurance
- schacHomeOrganization
- schacPersonalUniqueCode
- schacDateOfBirth
- schacYearOfBirth
- schacPlaceOfBirth
- schacExpiryDate

Chain of Trust & Trust level



Progress is only possible with the will and the right partners



EUGLOH

Thank you
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We'd love to hear from you!

Get in touch:

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EUGLOH ESC Working Group (IT people):

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- José Filipe Alves (UPorto)
- Morgan Persson (LU)
- Pierre Gabrielle (Université Paris-Saclay)

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