



Digitale Nachweise in der Bildung

Alexander Mühle
Hasso-Plattner-Institute (HPI),
Potsdam, Germany

Motivation für Digitale Nachweise

Onlinezugangsgesetz

Gesetz zur Verbesserung des Onlinezugangs zu Verwaltungsleistungen (Onlinezugangsgesetz - OZG)

OZG

Ausfertigungsdatum: 14.08.2017

Vollzitat:

"Onlinezugangsgesetz vom 14. August 2017 (BGBl. I S. 3122, 3138), das zuletzt durch Artikel 16 des Gesetzes vom 28. Juni 2021 (BGBl. I S. 2250; 2023 I Nr. 230) geändert worden ist"

§ 1 Portalverbund für digitale Verwaltungsleistungen

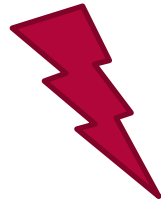
(1) Bund und Länder sind verpflichtet, bis spätestens zum Ablauf des fünften auf die Verkündung dieses Gesetzes folgenden Kalenderjahres ihre Verwaltungsleistungen auch elektronisch über Verwaltungsportale anzubieten.



Motivation für Digitale Nachweise

Status Quo

Ausstellung analog



Bewerbung digital

EDIT ACCOUNT DATA
BASIC QUESTIONS
SEARCH STUDY OFFERS
APPLICATION
UPLOAD AND MANAGE FILES
TESTAS
CONTACT
TERMS AND CONDITIONS

USERNAME
XXXXXXXX
uni-assist applicant number
XXXXXXXX
Logout

SUBMIT APPLICATION ONLINE **uni-assist**

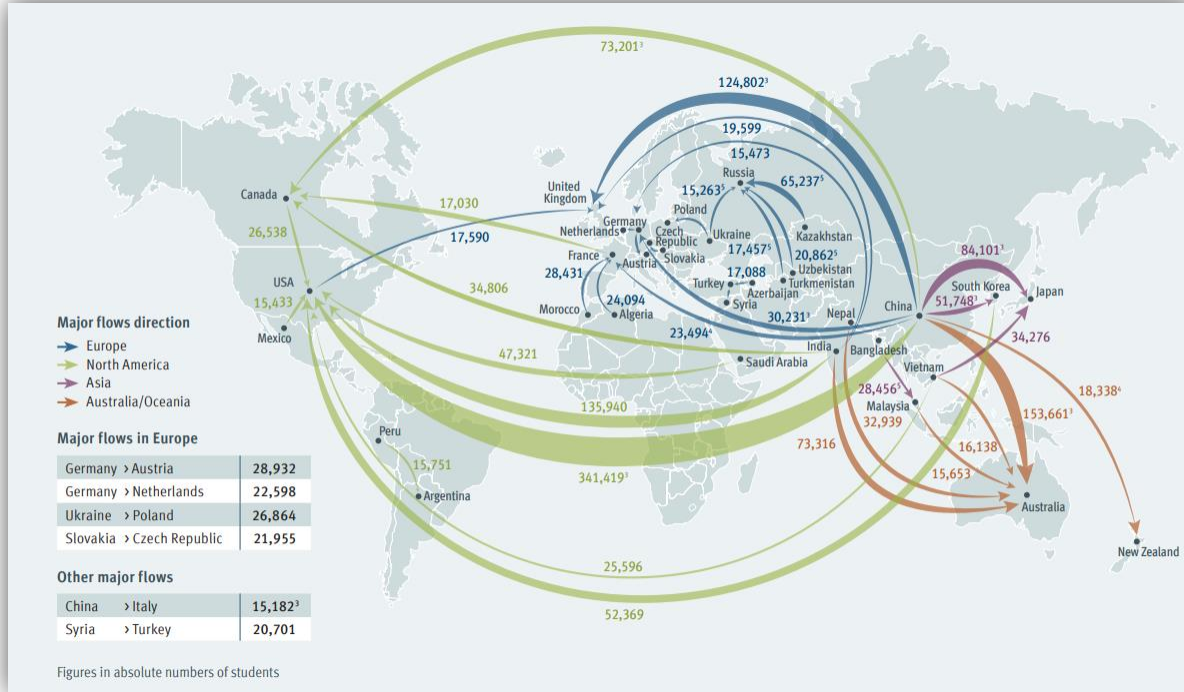
winter semester 2017 (beginning of studies in september/october 2017) - Kassel, Universität Kassel - Master - Functional Safety Engineering - keine

Edit application data → General questions (0/0) → Allocate files → Submit online → Print application form

Important notice:
A online application on its own is not sufficient in most cases. You also need to send a copy in paper form. If you are not sure of what to do, please ask your chosen university if you need to send a paper copy as well.
How do I proceed?
For each study course that you wish to apply for, please send a printed and personally signed application together with all required documents to uni-assist by post. Please contact the university for information on the format and range of documents required.
If any universities ask for officially authenticated copies, then a simple file upload is not sufficient. All uploads - including uploads of authenticated copies - will be treated as simple colour copies. The seal of authentication must be sent to uni-assist in its original form!
The signed application and all required paper documents must reach uni-assist by the end of the application deadline. Write the name of the university you are applying for in the top line and below the address:
uni-assist e.V.
11507 Berlin
GERMANY

Motivation für Digitale Nachweise

Studierenden Mobilität



Motivation für Digitale Nachweise

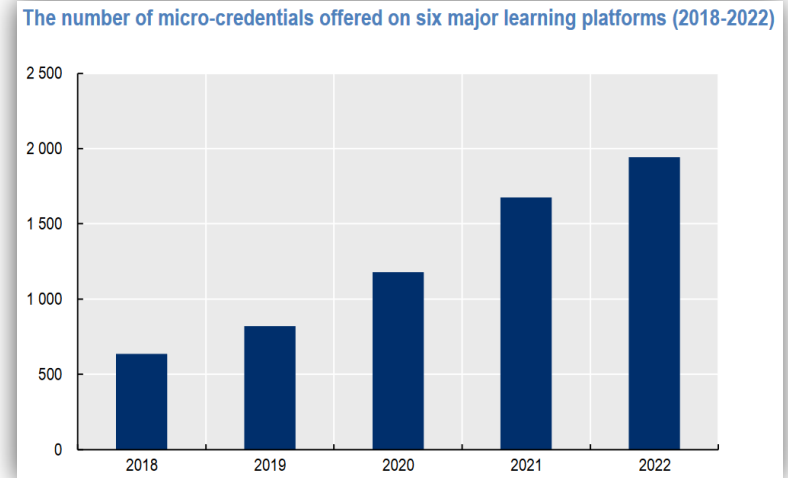
Probleme

- Manuelle Prozesse erforderlich
 - Aufwand und Kosten
- Vertrauensprobleme
 - Hohe Fälschungsrate
 - Aufwendige Beglaubigungsprozesse
- Interoperabilität
 - Aufwendige Übersetzungsprozesse
 - Anerkennungsprüfung

Motivation für Digitale Nachweise

MicroCredentials

- Zuwachs an MicroCredentials
 - Kleinteilige Bestätigung von Lernerfolgen
 - Flexiblere Bildungswege
 - Lifelong Learning
- Zuwachs an “alternativen Credentials”
 - Informelles Lernen
 - Wertvoll im Arbeitsmarkt



Motivation für Self-Sovereign Identity

Warum nicht anders?



University of Potsdam - Division of Student Affairs
Am Neuen Palais 10 - 14469 Potsdam - Germany

Katja Assaf
Berlin

Division of Student Affairs
German and EU Students:
writing to the first letter of student's last name
at: +49 30 977 2361 - 1707
fax: +49 30 977 2361 - 1670
for: +49 30 977 2361 - 1669
International Students from EU:
tel: +49 30 977 2476

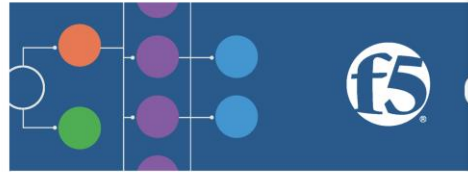
Date: January 05, 2023

Certificate of Enrollment for the Winter Semester 2022/23
Validity: October 01, 2022 - March 31, 2023
Family name, given name: Assaf, Katja
Date/place of birth: July 19, 19 in
is properly enrolled at the University of Potsdam as a full-time student and is not on leave.
Registration number: Current semester of university study:
Expected degree: Doctorate, standard period of study: 12 semester

Subject/s of Study	Major/Minor	Current Semester in the Program
IT-Systems Engineering	Major	2

Optional selection:
First semester of enrollment at an institution of higher education:
Semester:

Verification Key: RPTA - K2F5 - 89HM
To verify this certificate, please visit the following website: <https://puls.uni-potsdam.de>
This certification was generated automatically. It is valid without signature and seal. - Issued January 05, 2023
University of Potsdam - Division of Student Affairs - Am Neuen Palais 10 - 14469 Potsdam - Germany



Verification Key: LSVS - RXPk - HRKY
To verify this certificate, please visit the following website: <https://puls.uni-potsdam.de>
This certification was generated automatically. It is valid without signature and seal. - Issued January 05, 2023
University of Potsdam - Division of Student Affairs - Am Neuen Palais 10 - 14469 Potsdam - Germany

wisenet™
CERTIFICATE

This is to certify that
JANE SMITH
has fulfilled the requirements for
DIPLOMA OF BUSINESS
BSB50215

Dated: 31 December 2018
Credential Number: STD0001256

Signature
Authorised Signatory

The qualification is recognized within the Australian Qualifications Framework.
A summary of the employability skills developed through this qualification can be downloaded from <http://employabilityskills.training.com.au>

Francis Lokofo-Donou
Francis Lokofo-Donou
President and CEO

Dr. J. M. Salchow, Jr., DBA
Dr. J. M. Salchow, Jr., DBA
Sr. Manager, Professional Certification

Date Issued: 2021-Aug-01
Verification Code: 22XQWIKL3F41DVB
Verify at: www.cermetrics.com/FS Certified/public/verification.aspx

Anforderungen für Digital Credentials

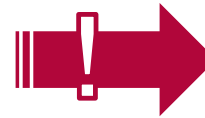
Systematischer Review

- Verwendung von verschiedenen Datenbanken und Schlagworten
- 96 relevante initiale Ergebnisse → 51 relevante gefilterte Ergebnisse
 - Entfernen von Duplikaten, Objekte ohne englische/deutsche Beschreibung oder anderweitig nicht nutzbare Objekte
- 54 relevante *backward search* Ergebnisse
- 24 relevante Objekte aus bestehendem Expertenwissen

Keywords / Query	Google Scholar	DuckDuckGo	Github	
			Repos	Wikis
Digital Education Credentials	160	180	3	33
Education Credential System	300	200	1	114
Education Certificate System	250	270	25	603
Education Badge System	250	275	3	132

TABLE I

OVERVIEW OF THE KEYWORDS USED IN OUR INITIAL SEARCH AND THE NUMBER OF UNPROCESSED RESULTS



129 Objekte

Anforderungen für Digital Credentials

Systematischer Review

- Finales Ergebnis der iterativen Frameworkentwicklung
 - 7 Dimensionen
 - 31 Anforderungen

Category	Requirement					
Functionality	Issue	Present	Verify		Revoke	
Controllability	Request Credential	Issuance Consent	Sharing Consent	Verifier Restrictions	User Notification	Deletion
Privacy	Pseudonymity	No Tracking	Data Minimisation		Selective Disclosure	
Usability	Accessibility	Portability	Recovery		Visual Representation	
Security	Tamper Evident	Verify Learner	Verify Issuer	No Single Point of Failure	Data Protection	
Trust	No Trusted Third-Party	Non-Proprietary	Root of Trust		Auditability	
Deployability	Scalability	Longevity	Integration		Interoperability	

Anforderungen für Digital Credentials

Frage der Perspektive

- Die Funktionalitäten *present* und *revoke* sind deutlich seltener erwähnt
 - Reflektiert den status quo in Universitäten
- Die Anforderungen, die mit den institutionellen Rollen wie Issuer oder Relying Party verbunden sind, werden im Allgemeinen häufiger genannt als die Anforderungen, die mit dem Benutzer verbunden sind.

Category	Requirement							
Functionality	Issue (94)		Present (74)		Verify (95)		Revoke (30)	
Controllability	Request Credential (14)	Issuance Consent (20)	Sharing Consent (53)	Verifier Restrictions (8)	User Notification (37)	Deletion (14)		
Privacy	Pseudonimity (27)	No Tracking (15)	Data Minimisation (22)			Selective Disclosure (37)		
Usability	Accessibility (20)	Portability (52)	Recovery (20)			Visual Representation (16)		
Security	Tamper Evident (67)	Verify Learner (38)	Verify Issuer (37)	No Single Point of Failure (23)		Data Protection (27)		
Trust	No Trusted Third-Party (40)	Non-Proprietary (12)	Root of Trust (24)			Auditability (47)		
Deployability	Scalability (35)	Longevity (32)	Integration (23)			Interoperability (61)		

Anforderungen für Digital Credentials

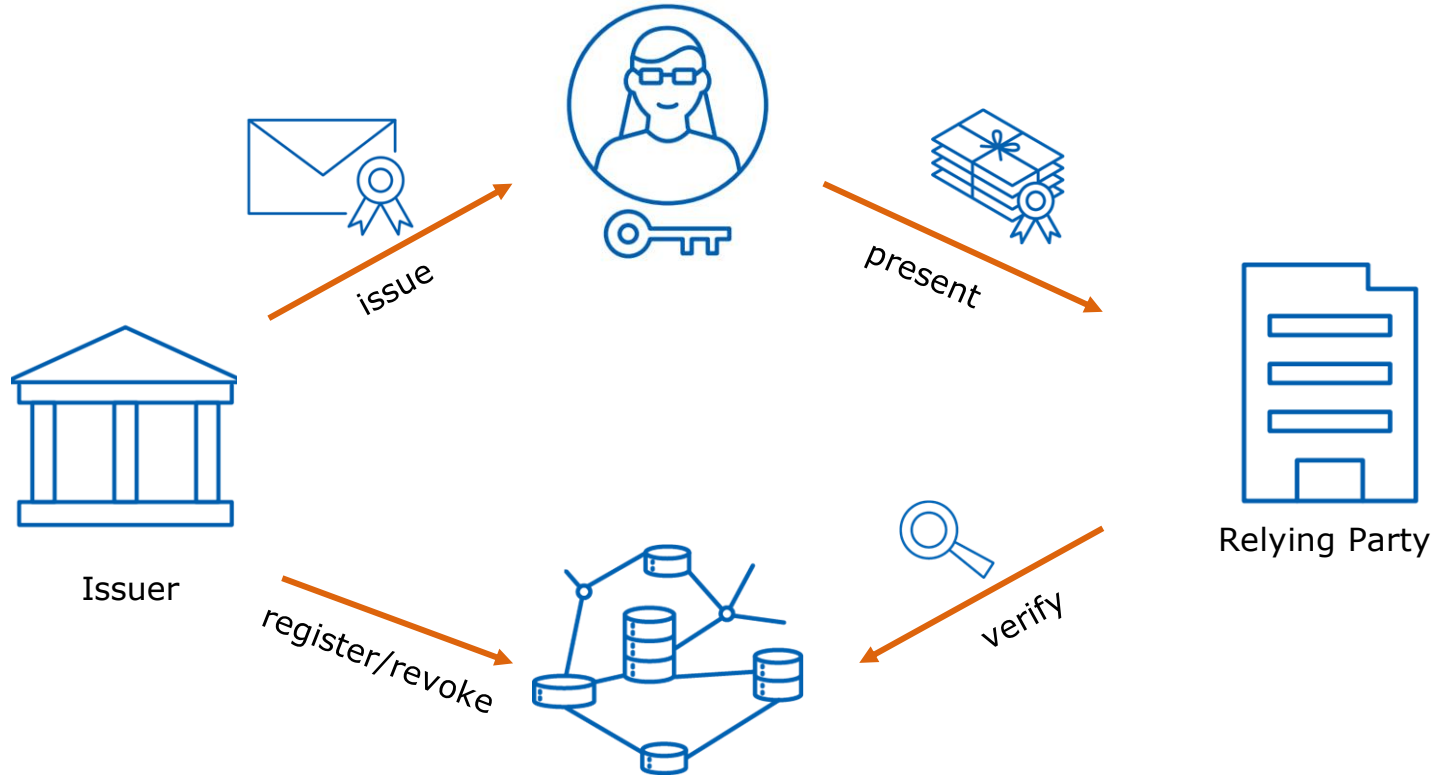
Frage des Hype

- Viele der Anforderungen in der Kategorie *Controllability* und *Privacy* wurden von den Designprinzipien der Self-Sovereign Identity beeinflusst
- Sicherheitsthemen werden als Begründung für die Entscheidung zur Verwendung von Blockchain verwendet

Category	Requirement					
Functionality	Issue (94)	Present (74)	Verify (95)		Revoke (30)	
Controllability	Request Credential (14)	Issuance Consent (20)	Sharing Consent (53)	Verifier Restrictions (8)	User Notification (37)	Deletion (14)
Privacy	Pseudonymity (27)	No Tracking (15)	Data Minimisation (22)		Selective Disclosure (37)	
Usability	Accessibility (20)	Portability (52)	Recovery (20)		Visual Representation (16)	
Security	Tamper Evident (67)	Verify Learner (38)	Verify Issuer (37)	No Single Point of Failure (23)	Data Protection (27)	
Trust	No Trusted Third-Party (40)	Non-Proprietary (12)	Root of Trust (24)		Auditability (47)	
Deployability	Scalability (35)	Longevity (32)	Integration (23)		Interoperability (61)	

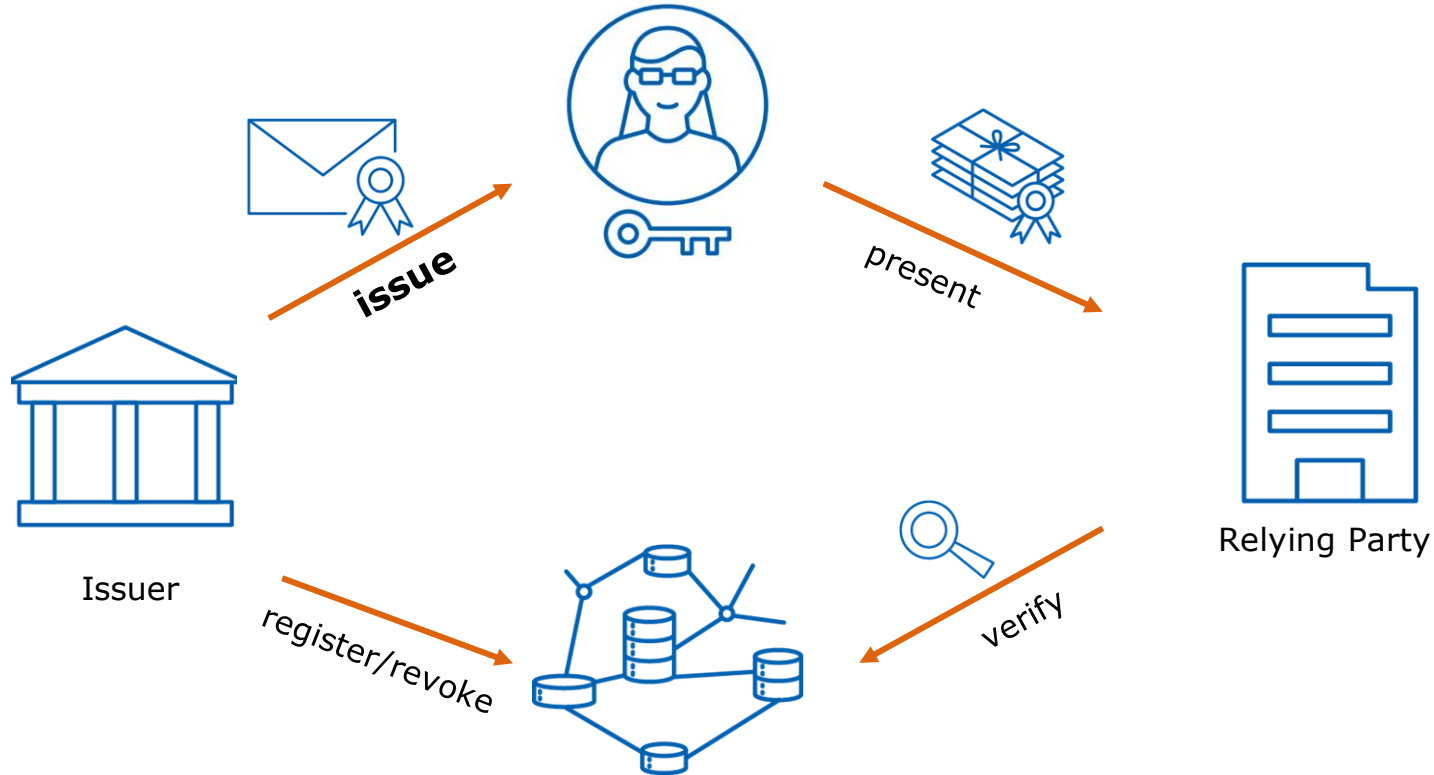
Self-Sovereign Identity in der Bildung

Systemüberblick



Self-Sovereign Identity in der Bildung

Systemüberblick



Self-Sovereign Identity in der Bildung

Was stellen wir aus?

- Primäres Ziel einer Bildungseinrichtung
 - Zeugnisse, Records of Achievement, MicroCredentials



- Verifiable Credential eines Lernerfolgs
- In etablierten Standards wie ELM

- Sekundäres Ziel, benötigt um primäres Ziel zu ermöglichen
 - Identität des Lernenden

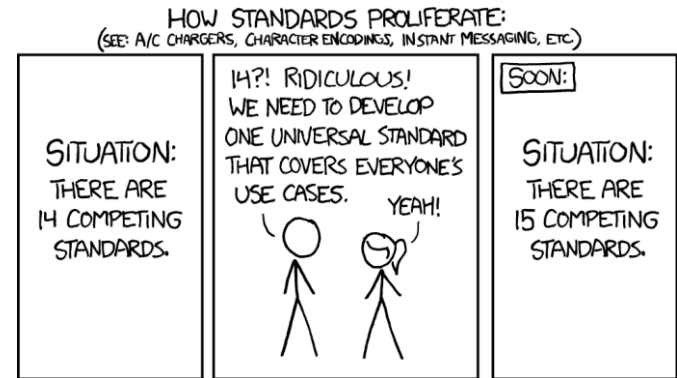


- Verifiable Credential einer ID
- Name, Geburtstag, ...

Self-Sovereign Identity in der Bildung

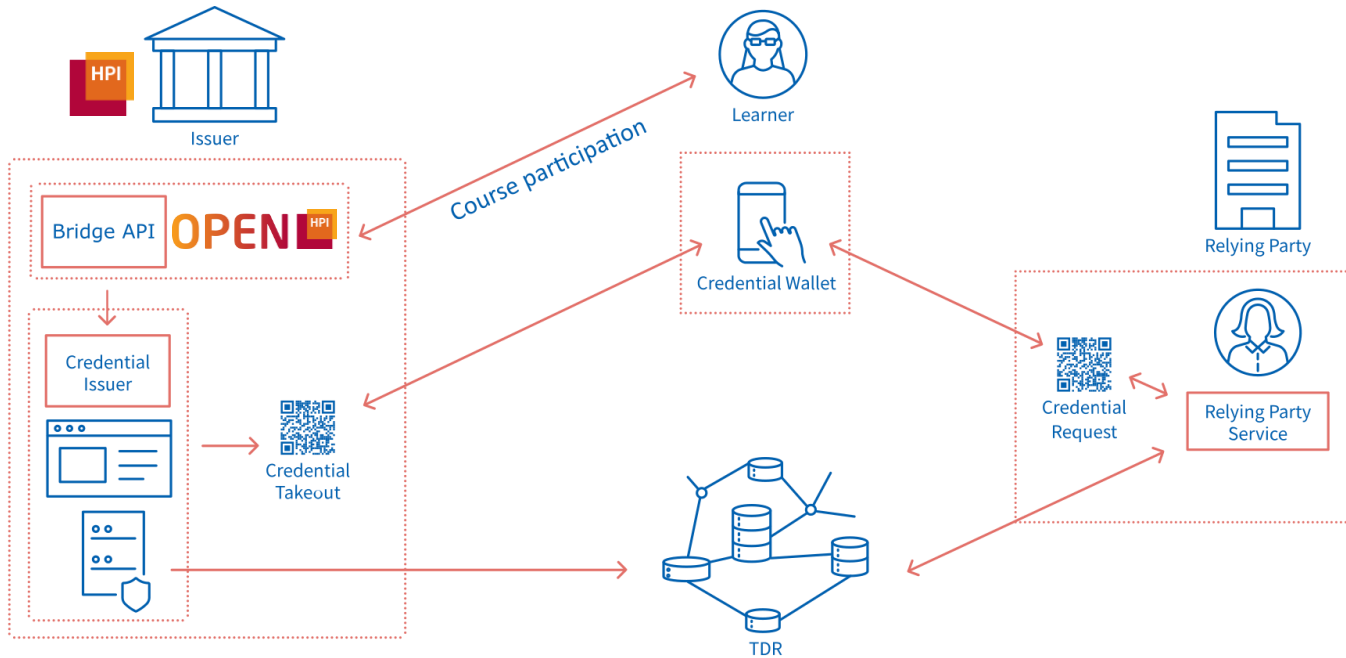
Wie stellen wir aus?

- Etablierte Standards verwenden?
- N+1 Standards
- x-to-VC Middleware
 - Generalisierte API für VC Issuer (VC-API)
 - Anbindung verschiedener Standards



Self-Sovereign Identity in der Bildung

Wie stellen wir uns?



Self-Sovereign Identity in der Bildung

Aushändigung an den Lernenden

HPI Create DID luis.learner Sign Out

Provide your DID and any necessary identity credentials

did:key:z6MkuTu5Zj8JWFPNi37NNkadDFxWmWjFRqRvxxkXjEB5GKT

Connect Wallet



Select your credential source

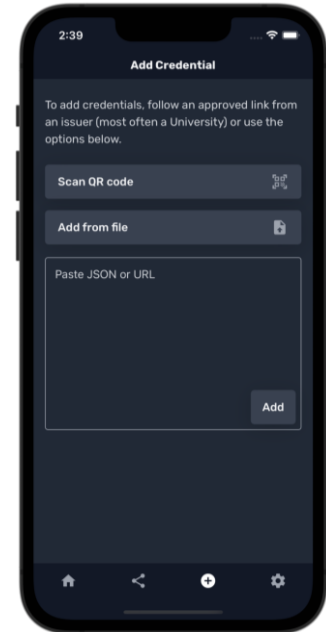
OPEN HPI Hasso Plattner Institut | eGovCAMPUS | AI Campus BETA | HPI OpenID

Copy Download

```
},
"proof": {
  "type": "Ed25519Signature2020",
  "created": "2022-11-28T17:25:33.966Z",
  "verificationMethod": "did:web:dibiho.org:HPI",
  "proofPurpose": "assertionMethod",
  "proofValue": "z4FynkwCu2xnQajMoKUJ1ysXpavXVm9KhHUY1em2DnDDGUHRG62g9whhgpsG"
}
```

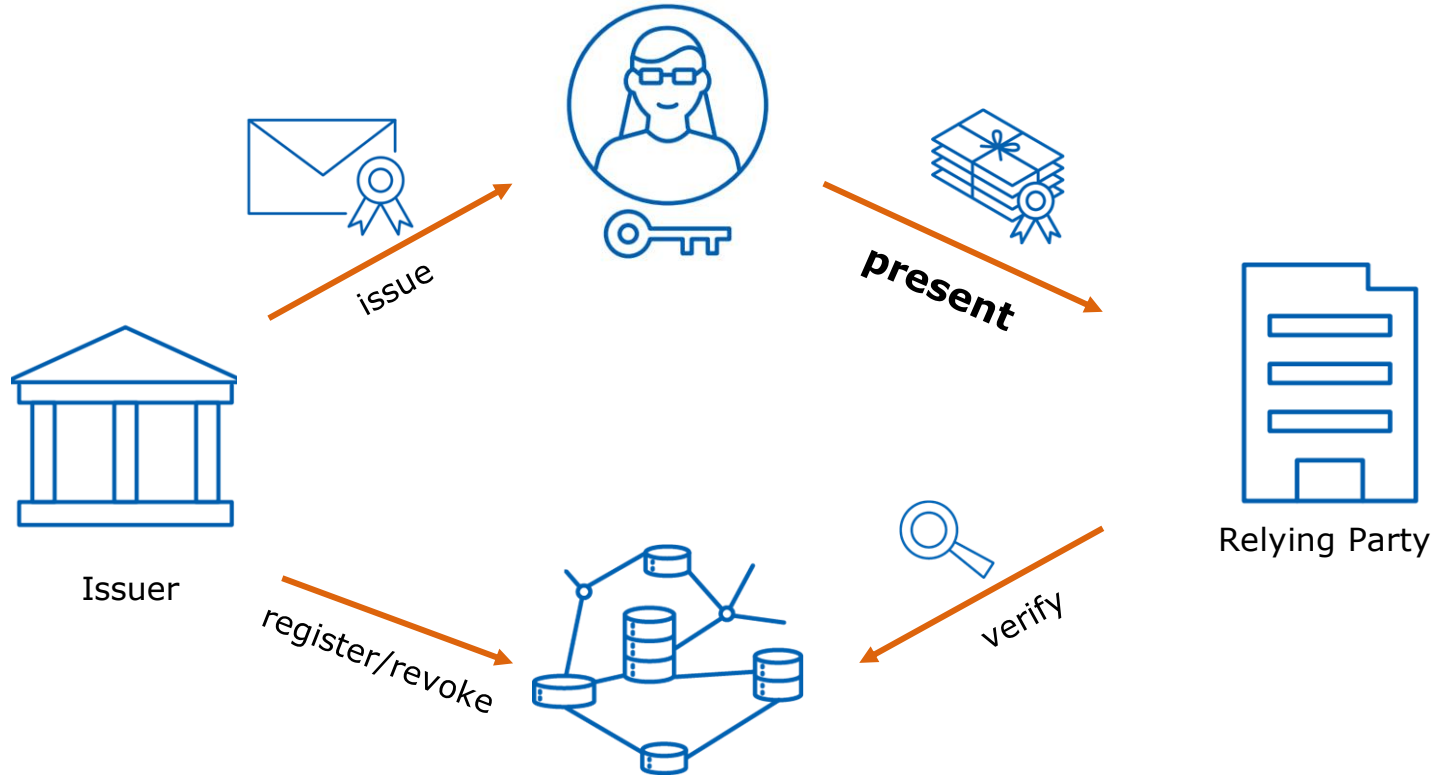
Continue





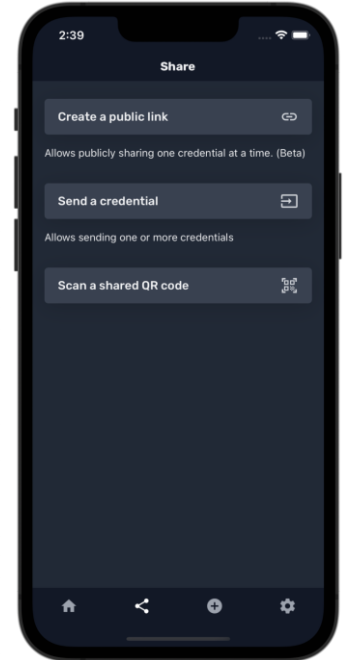
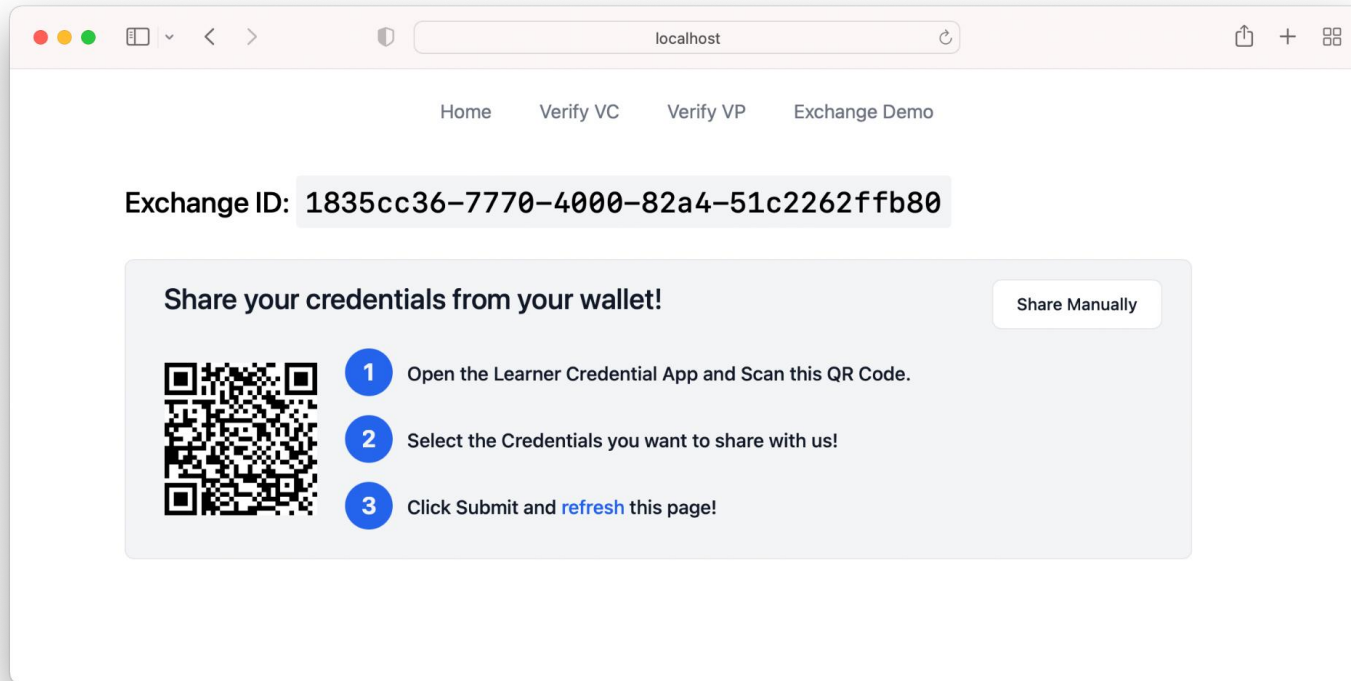
Self-Sovereign Identity in der Bildung

Systemüberblick



Self-Sovereign Identity in der Bildung

Präsentation der digitalen Nachweise




Self-Sovereign Identity in der Bildung

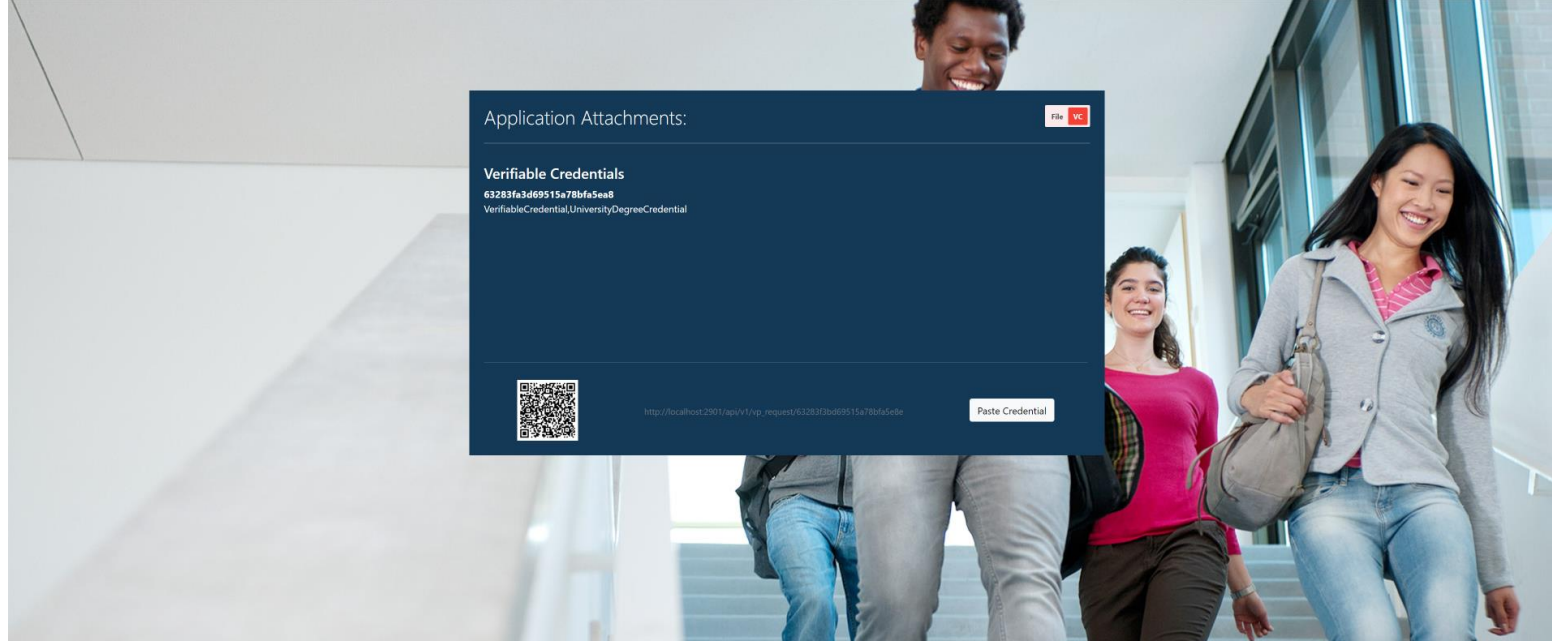
Präsentation der digitalen Nachweise

MenDAAD Overview Application Application Status @xena.quispe@mail.brazil

Application Attachments: file VC

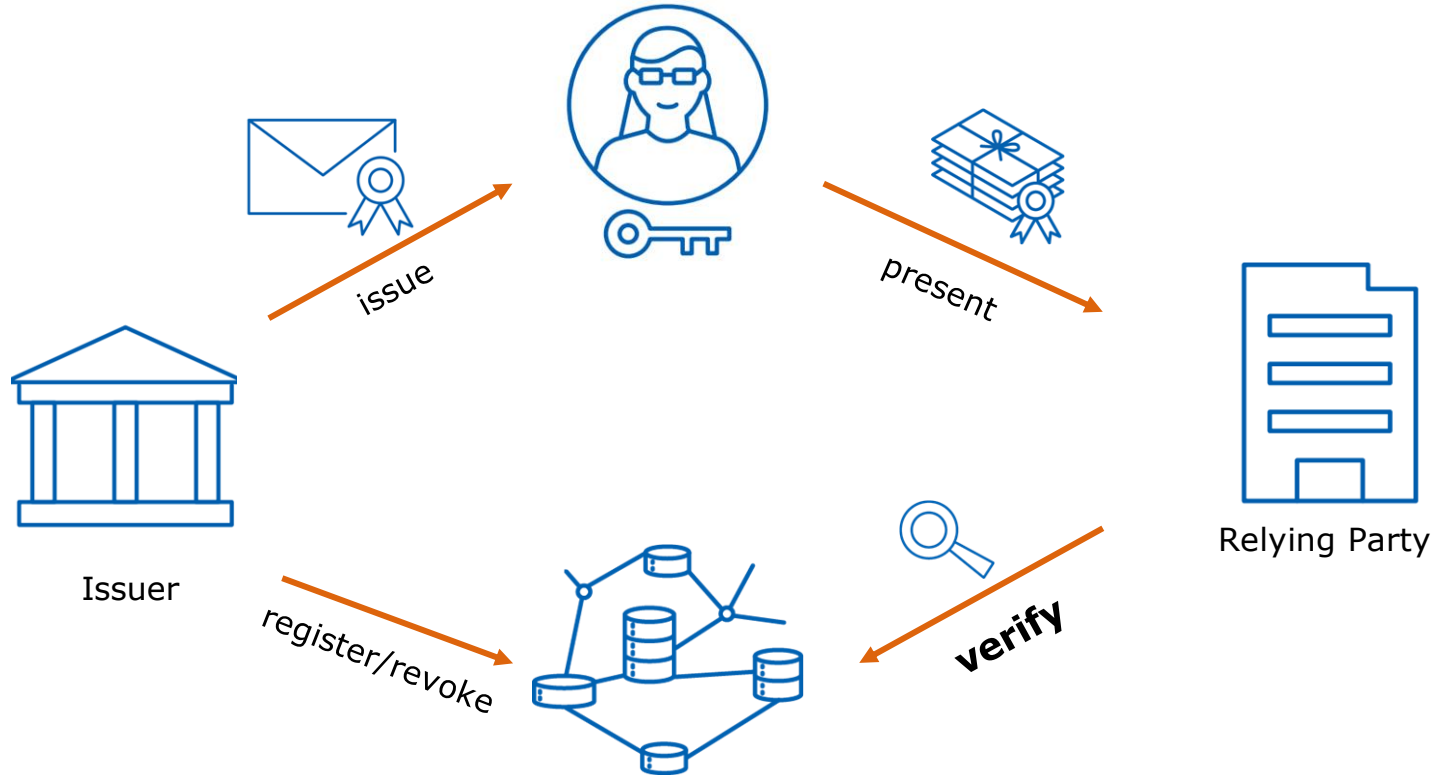
Verifiable Credentials
63283fa3d69515a78bfa5ea8
VerifiableCredential,UniversityDegreeCredential

 http://localhost:2901/api/v1/vp_request/63283fa3d69515a78bfa5ea8 Paste Credential



Self-Sovereign Identity in der Bildung

Systemüberblick



Self-Sovereign Identity in der Bildung

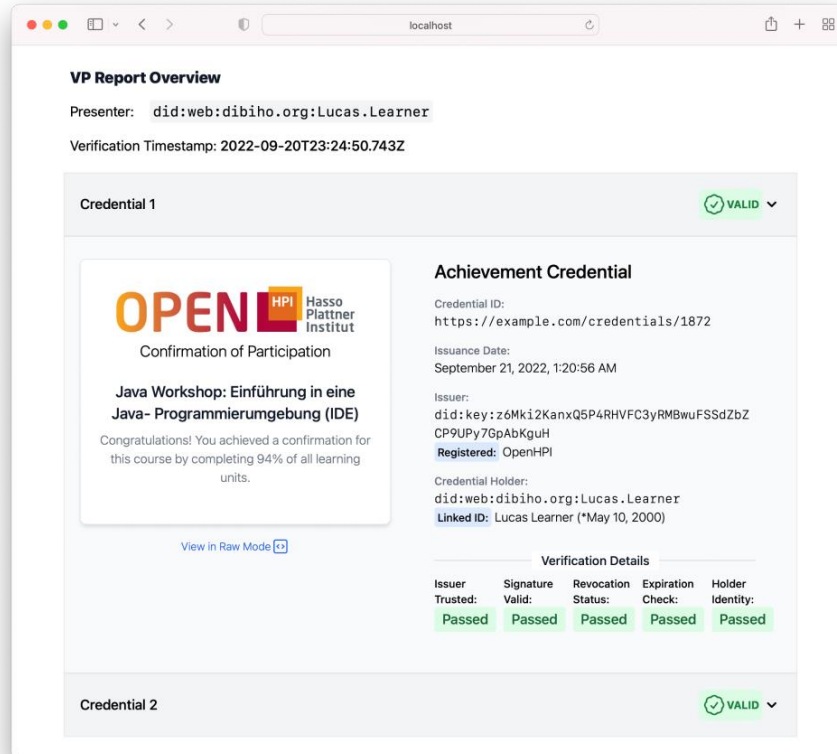
Verifikation der digitalen Nachweise

The screenshot shows a web browser window displaying the DiBiHo: Verify VP interface. The browser's address bar shows 'localhost'. The page has a navigation menu with 'Home', 'Verify VC', 'Verify VP', and 'Exchange Demo'. The main heading is 'DiBiHo: Verify VP'. Below the heading is a dashed box containing an upload icon and the text: 'Upload a file to verify. (or: enter manually) Only .dibiho-files allowed.' Below this is a section titled 'VP Report Overview' with the following details: 'Presenter: did:web:dibiho.org:Lucas.Learner' and 'Verification Timestamp: 2022-09-20T20:40:15.747Z'. A table below shows the verification results for three credentials.

Credential	Status
Credential 1	VALID
Credential 2	VALID
Credential 3	INVALID

Self-Sovereign Identity in der Bildung

Verifikation der digitalen Nachweise




VP Report Overview

Presenter: `did:web:dibiho.org:Lucas.Learner`

Verification Timestamp: 2022-09-20T23:24:50.743Z

Credential 1 VALID



OPEN HPI Hasso Plattner Institut

Confirmation of Participation

Java Workshop: Einführung in eine Java- Programmierumgebung (IDE)

Congratulations! You achieved a confirmation for this course by completing 94% of all learning units.

[View in Raw Mode](#)

Achievement Credential

Credential ID: `https://example.com/credentials/1872`

Issuance Date: September 21, 2022, 1:20:56 AM

Issuer: `did:key:z6Mki2KaxQ5P4RHVFC3yRMBwuFSSdZbZCP9UPy7GpAbKguH`

Registered: OpenHPI

Credential Holder: `did:web:dibiho.org:Lucas.Learner`

Linked ID: Lucas Learner (*May 10, 2000)

Verification Details

Issuer Trusted:	Signature Valid:	Revocation Status:	Expiration Check:	Holder Identity:
Passed	Passed	Passed	Passed	Passed

Credential 2 VALID