Design and Architecture Framework for Education Ecosystem Registry

National Educational Technology Forum (NETF)

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MESSAGE

The National Education Policy (NEP 2020) is a game changer in more than one ways. First and foremost, it has come into being after 34 years, first one in the 21st century, has come through one of the largest consultation process in the world. The policy has clearly laid out a roadmap for making India self-reliant and prosperous. There are several features such as multi-disciplinarily research universities, online and digital education, skilling at all levels, multiple entry and exit, academic bank of credits, ease of learning, accreditation, learning in mother tongue (Indian languages) among many others empowering our youth. It is in this context, that a forum of National Educational Technology Forum (NETF) was suggested by NEP 2020 which has been set up. To take this forward and have engagement with all stakeholders in education sector, be it state governments, school boards, universities both public and private, institutes of national importance and eminence, ed-tech companies, there are several activities which are envisaged for the successful implementation of NEP 2020 through this platform.

One such activity which will play a significant role is creation of registries of students, teachers, faculty, educational institutes, skill providers, ed-tech companies. The registries thus created shall be federated but unified through Application Programming Interfaces (APIs). These will be useful in not only accessing reliable, truthful data of not only all stakeholders but their progress in terms of learning outcomes, planning for improving quality of content, its delivery, assessments, skilling, employability and supporting entrepreneurship.

This document gives an insight into all these different aspects of education ecosystem. I wish all the success for transforming this document into actionable points towards achieving the desired goals as visualised by the NEP 2020.

(Dharmendra Pradhan)

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Foreword

The National Education Policy (NEP2020) has galvanized the nation and the entire world is appreciating several features of NEP such as multidisciplinary research universities, online and digital education, skilling at all levels, multiple entry and exit, academic bank of credits, use of technology and ease of learning, learning in mother tongue (Indian languages), support for innovation, research, and startups leading to quality assurance and validation through accreditation. This is easier said than done.

NEP2020 had suggested to create a National Educational Technology Forum where all stakeholders in education sector shall have a platform for interactions, exchange of ideas, share best practices, test the edtech products in a sandbox environment, and recommend to the central and state governments, school boards, universities both public and private, institutes of national importance and eminence, ed-tech companies about what could be used where and in what measure so that the learner centric approach is ensured.

It is in this context that creation of registries of students, faculty, educational institutes, skill providers, edtech companies was felt necessary. There were several rounds of meetings with the Union Minister of Education, Skill Development and Entrepreneurship and MoS. A task force was formed comprising officers from school education, skill education, higher education, NIC, MyGov, DIC, Ekstep etc and a draft document for Education Ecosystem Registry prepared. The basis of registries was NDEAR and InDEA 2.0 architecture and respect for privacy. The registries shall be federated but unified through APIs. These will be useful in not only accessing reliable, truthful data of not only all stakeholders but their progress in terms of learning outcomes, planning for improving quality of content, its delivery, assessments, skilling, employability and supporting entrepreneurship. The document was revised several times before placing it in public domain inviting suggestions.

I hope this REGISTRY project will open a new chapter in the education sector similar to UPI in the finance sector.

Sd/-
Anil Sahasrabudhe

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Executive Summary

India has been successful in enabling access and inclusion through leveraging technology across diverse sectors, particularly with developing Digital Public Infrastructure (DPI). The need for a similar digital infrastructure and support system is urgently being felt in the area of education and skilling in order to provide solutions to various challenges faced, across diverse stakeholders and their needs. National Digital Education Architecture (NDEAR) provides the underlying blueprint for the DPI approach in education and skilling domain.

The National Education Policy (NEP) 2020 also emphasizes on achievement of "universal participation in school by carefully tracking students, as well as their learning levels, in order to ensure that they (a) are enrolled in and attending school and (b) have suitable opportunities to catch up and re-enter school in case they have fallen behind or dropped out."

Hence, there is a need to identify and credential individuals and entities (Student /Teacher /Institutes: both Govt. & Pvt.) in the education/skilling ecosystem, to ensure universal access to affordable high quality education, and ensure that benefits reach right individuals and observe their progress at all levels (individual, institution, geographic location, region, state/UTs, autonomous body, etc).

Education Ecosystem Registries (EER) as described in this document will enable ease of access and use for consented stakeholders/partners to enroll and avail various services and benefits in 1-click vs the significant time & effort that it takes today (e.g. Entrance tests, Admissions, Scholarship disbursement, Transfers, Evaluation, Accreditation, Certification, Issue awards, recognition etc. for students, teachers and other users, etc.). The registries will enable it by allowing users and entities to manage and establish their credentials (ID, skills, entitlements, etc.); creating high trust, low cost infrastructure. The ability for the user to access their data and credentials; and request correction if required is extremely powerful - avoiding their exclusion from benefits and services due to credentials mismatch. In addition, having verified data within various registries with open APIs (for consented access and sharing) allows other systems to onboard users with ease and at low cost by eliminating repeated data collection and validation.

When data is exchanged between systems, with user consent as appropriate, trust of that data is established by ensuring the entire record itself is digitally signed and the fact that registry record comes with attestations along with the data. Personal data sharing can be carried out only with user consent based on DEPA and complying to data protection bill (2022). Compliance with data protection and privacy laws as applicable is mandatory.

In the absence of federated interoperable registries and with the current systems working in silos, there is a difficulty in observing whether the student is the intended beneficiary for a particular benefit or not and if yes, then whether the

benefit has reached the right individual or not. Similarly, it is difficult for an administrator to derive insights and draw actions based on data due to lack of visibility.

Traditionally such data is owned and maintained within standalone siloed systems and periodically updated. Due to its changing nature, such data often goes stale , thus increasing the cost of collection and maintenance. For example, information about schools and teachers, their contact details, etc. get outdated, forcing departments to redo data collection every few years, and digitize, through time consuming processes. Even if such data is maintained by one system, it is not available to be reused by other systems forcing every department needing such data to repeat data collection and maintenance.

Student and Teacher registries must be deployed in a federated fashion: Student and Teacher registries will be held at the school level, school management level and state level, as appropriate. Student and Teacher registries will not be held at the national level. These federated registries will allow students/teachers to access their Digital ID cards via Edulocker (within Digilocker). These ID credentials will be based on a standard specification prescribed by NETF with common minimum fields. This Digital ID card will also have machine readable data embedded within a digitally signed QR code making this Digital ID a verifiable credential as per international standards. Student Registry shall also be extended to skilling and certifications acquired in addition to standard course curriculum and will be integrated to Edulocker. These verifiable credentials allow students/teachers to use these across both public and private systems to do 1-click onboarding, access benefits, discounts, scholarships, and explore other opportunities. Imagine a student being able to get 1-click concession for bus/train tickets or apply for scholarships or college admissions in 1-click using their Digital ID card. In the near future, it can become ubiquitous in the country like the UPI movement and significantly change the way benefits & services are delivered in education & skilling.

All open data (anonymized) emitted from registries and transaction systems will flow into Vidya Samiksha Kendra (VSK) systems for enabling data driven observability and actioning towards NEP goals.

In summary, registries can be a powerful force multiplier for the existing systems and not a replacement. It enables users to view and ensure correctness of their data in Govt systems and share equal responsibility with the Government to maintain it. It creates a leapfrogging potential to digitally transform the country from a low-trust, high-cost to high-trust, low-cost environment, by creating student/teacher owned digital credentials that are trustworthy, useful, easily usable and discoverable by those the student/teacher wishes to (based on their consent). This will benefit millions of students/teachers repeatedly, as they participate in many public/private transactions, over their learning lifetime.

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Need for Education Registries

India is a diverse country made up of numerous regional and local languages, mosaic of customs, traditions and ways of life. Hence understanding the context and relationships across learning journeys which are quite distinct from one another and unique is important. All the diverse groups with diverse needs have equal rights to co-exist and flourish and hence need to be supported and empowered.

India has been successful in enabling access and inclusion through leveraging technology across diverse sectors, particularly with developing digital infrastructure. However, various stakeholders (students, parents, teachers, administrators, private/public service providers, etc.) in the education ecosystem still face certain challenges related to ease of access to information, repetitive and cumbersome processes of filling same information, maintaining continuity in learning, maintaining and sharing learning history, sharing relevant credits and credentials wherever applicable in an easy and efficient manner through a trusted and verifiable system across Govt. and private sector.

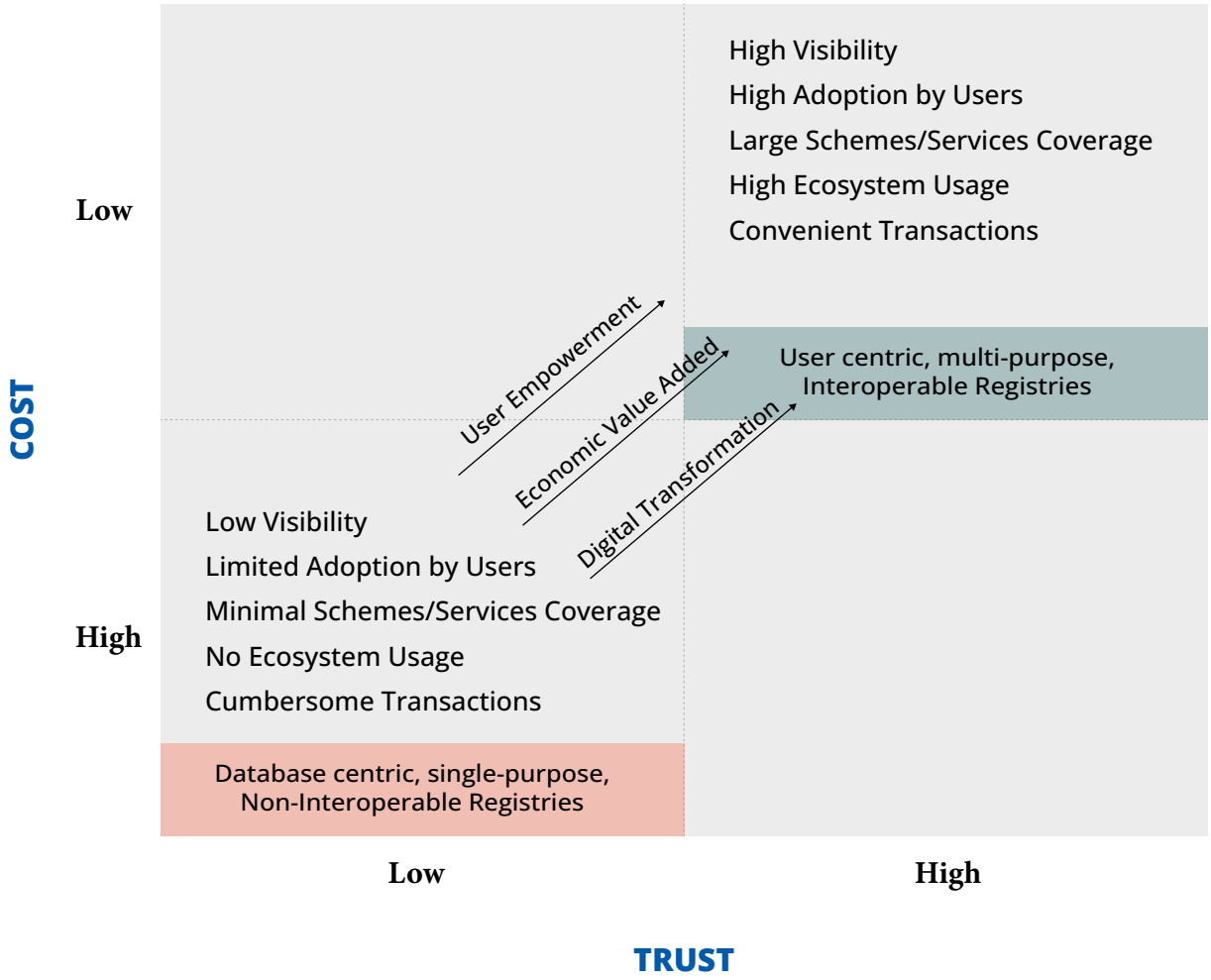
In this context, while the critical pieces of digital infrastructure is expanding and growing in the country, empowering the individuals in good governance, health and finance sectors, in ease of doing business, etc. the need for a similar digital infrastructure and support system is urgently being felt in the area of education in order to provide solutions to various challenges faced, across diverse stakeholders and their needs. These support systems may further help in curtailing dropout rates, bridging the social gap and ensuring universal access to affordable high quality education, while empowering and protecting individuals.

The National Education Policy (NEP) 2020 also emphasizes on (ref Para 3.3) achievement of "universal participation in school by carefully tracking students, as well as their learning levels, in order to ensure that they (a) are enrolled in and attending school and (b) have suitable opportunities to catch up and re-enter school in case they have fallen behind or dropped out." Hence, there is a need to identify and

credential individuals and entities (Student /Teacher /Institutes: both Govt. & Pvt.) in the education/skilling ecosystem, to ensure universal access to affordable high quality education, and ensure that benefits reach right individuals and observe their progress at all levels (individual, institution, geographic location, region, state/UTs, autonomous body, etc.)

Registries are one of the most important elements of a system that collect, store, disseminate and establish credentials (ID, skills, entitlements, etc.) of subjects (people/entities/things represented within each registry) in data or property represented by that data to create high trust, low cost systems. Within NDEAR, the importance and use of registry cuts across all 5 personas (Student/Learner, Teacher, Parent, Administrator and Community member) and caters to all 3 broad scenarios (Learn, Help Learn and Manage Learn) and 2 interactions (Learning and Administration).

The correct use and management of these registries can translate to substantial economic as well as administrative benefits.



Registries enable ease of access and use for consented stakeholders/partners to enroll and avail various services and benefits (e.g. Entrance tests, Admissions, Scholarship disbursement, Transfers, Evaluation, Accreditation, Certification, Issue awards, recognition etc. for students, teachers and other users, etc.). In addition, having verified data within various registries with open APIs (for consented access and sharing) allows other systems to onboard users with ease and at low cost by eliminating repeated data collection and validation.

In the absence of federated interoperable registries and with the current systems working in silos, there is a difficulty in observing whether the student is the intended beneficiary for a particular benefit or not and if yes, then whether the benefit has reached the right individual or not. Similarly, it is difficult for an administrator to derive insights and draw actions based on data due to lack of visibility.

Some of the challenges / problem statements, faced by various personas, which may be resolved by presence of federated interoperable electronic registry system are as follows:

- **Inconsistency in information:** Student's basic information (like Name, DOB/Age, Gender, Parent Names etc.) are not consistent throughout their academic journey. This poses challenges at later stages while applying for higher education jobs and passports etc.

- **Physical Possession of Documents:** Currently, physical possession of original educational records is being asked by various institutes / organizations for verification purposes. Once submitted, students are not able to apply for other institutes / jobs. Also, physical paper based academic records are not convenient for on the move students.

- **Authenticity & Verification:** Tedious, time-consuming and repeated verification process of student data and credentials (Degree, Certifications, Courses etc.). There are high chances of forged documents passing through the verification process.

- **Retrieval of Information:** In case of loss of physical certificate, reissuance of certificates is a cumbersome process and when retrieved, it usually comes with a disclaimer stamp as "Duplicate".

- **Duplicacy & Righteous transfer of Benefit:** In many cases, where students are supposed to receive benefits once only, some may try to take additional benefits impersonating a different student owing to which the right candidate may get deprived of actual benefit.

- **Lack of Visibility:** Administrators are not able to make informed decisions due to lack of visibility on whether benefit reached the right students or not. If yes, whether reached on time or not and what more actions need to be taken to improve the learning conditions.

- **Informed Decisions based on Data:** There is no system in place which talks to various systems working in silos, where systems emit data and lead to informed decisions and policy making based on data.

- **Correlation of data:** There is no system in place to bring out a unified view across systems which assists administrators in deriving insights on which geographic areas / entities / administrative units are doing well against key metrics and which entities / areas require specific intervention / support.

- **Other challenges include:**
  - Non availability of "Learning History of Students"
  - Tracking of Benefit Disbursement
  - Cumbersome process for transfer (inter / intra state)
  - Increase in Out of School children / dropout ratio

How do people enroll in a specific program / institution? How is the user experience in the physical world across various milestones / events and how can it be simplified in the interoperable digital ecosystem? How are their needs observed to determine and support policy making backed by data? These are some of the questions that may be answered through interoperable electronic registries at various stages (enroll, learn, get assessed, gain skills, get certification and awards, job applications and so on) so as to establish a seamless journey and drive continuous improvements.

The journey and user experience (based on each persona) and broad expectations versus actual scenarios across the journey in the education ecosystem are given in Annexure-A.

As India becomes data rich, it is essential that various data about people, entities, geographies, resources, assets, etc., are made available in electronic registries with Open APIs for other applications to seamlessly validate and use attested and authenticated data. This becomes even more critical when it comes to people and entities where various claims can be electronically validated against such registries via open APIs avoiding paper based validations, thus unlocking significant value for the larger population by increasing trust while decreasing cost of validation.

Education is no different. A set of interoperable registries for schools, colleges, universities, teachers, education administrators, etc need to be enabled. Traditionally such data is owned and maintained within standalone siloed systems and periodically updated. But, there are three big issues that are very common among most of these systems;

LIVE: Due to its changing nature, such data often goes stale (not up-to-date), thus increasing the cost of collection and maintenance. For example, information about schools and teachers, their contact details, etc. get outdated, forcing departments to redo data collection every few years, and digitize, through time consuming processes.

REUSEABLE: Even if such data is maintained by one system, it is not available to be reused by other systems forcing every department needing such data to repeat data collection and maintenance.

TRUSTWORTHY: When data is exchanged between systems, with user consent as appropriate, trust of that data is established by ensuring the entire record itself is digitally signed and the fact that registry record comes with attestations along with the data. For example, a list of schools downloaded as a CSV file from a portal cannot be trusted by other systems since there is no guarantee that it is authentic and has not been edited subsequently.

4th generation electronic registries allow data to be kept up to date, offering open APIs for consented access, providing data in digitally signed fashion.

With time, the registries have evolved. The 1st generation of registries was purely a paper-based list maintained in registers. As part of early computerization, such lists got digitized giving birth to the 2nd generation of registries; wherein data was digitized, but typically maintained in an internal database. With the advent of the internet and smartphones, as more systems went online, data also migrated to 3rd generation portal based systems. These systems partially addressed challenges of 'liveness' and reusability.

4th generation electronic registries solve the three core issues via a set of standardized open APIs implemented in a federated fashion across various systems through which digitally signed data is made available for read, search, and subsequent usage. Open APIs allow automated access by external systems, making data use scalable and cost efficient. 4th generation electronic registries allow data to be kept up to date, offering open APIs for consented access, and providing data in digitally signed fashion.

EER Open APIs, implemented across a set of federated systems, shall enable the interoperability and reusability of core federated registries of Student, Teacher/Faculty & HEI and Schools thereby fulfilling the NDEAR requirements of establishing 'Registry-as-a-Service through Open APIs'.

In summary, registries can be a powerful force multiplier for the existing systems and not a replacement. It creates a leapfrogging potential to digitally transform the country from a low-trust, high-cost to high-trust, low-cost environment, by creating student/teacher owned digital credentials that are trustworthy, useful, easily usable and discoverable by those the student/teacher wishes to (based on their consent). This will benefit millions of students/teachers repeatedly, as they participate in many public/private transactions, over their learning lifetime.

The later sections of this document capture how the lives of various stakeholders can change if registry systems are implemented in the right manner in the country.

1.1 Policy Purview - Education Ecosystem Registry

The following are the key non-negotiable policy elements to be adhered to, by any entity considering creation, implementation, hosting as well as usage of Registries. These are quoted from the NDEAR report as well as the InDEA 2.0 policy framework laid out by MeitY, and make for critical consideration - as the entities hosting, managing and processing the data in the Registry will be held accountable for data protection obligations and relevant compliance requirements as stated by applicable laws.

Student and Teacher registries must be deployed in a federated fashion.

Student and Teacher registries will be held at the school level, school management level and state level, as appropriate. Student and Teacher registries will not be held at the national level.Non-PII (Non Personally identifiable information) metadata can be stored at the national level for analytics and open data purposes.

NDEAR Main Report, 2.4.1 -
Federated Architecture Principles, Page 50

Institute Registries may be hosted centrally, but will have to be attested in a decentralized fashion.

School/College/Institute/University ID shall be generated as part of the national registry but the control of data and attributes will be decentralized to State or district or school levels, as appropriate.

NDEAR Main Report, 2.4.1 -
Federated Architecture Principles, Page 50

Data sharing can be carried out only with user consent based on DEPA (Data Empowerment and Protection Architecture) and complying to Data Protection Bill (2022)

Granular consent shall be required for data sharing, following the principle of purpose limitation. Parental consent shall be adopted for minors. Access to any personal data (data containing PII) enabled through NDEAR services will only be possible via electronic consents.

NDEAR Main Report, 2.4.1 - Federated Architecture Principles, Page 50

Compliance with data protection and privacy laws as applicable is mandatory.

The data fiduciary managing the data and the data processor holding and processing the same shall be responsible for the data protection obligations and compliances under the applicable laws.

NDEAR Main Report, 2.4.1 - Federated Architecture Principles, Page 50

In addition following needs to be taken into consideration during design:

- Special attention must be paid to protection of data of children and respect for digital rights of children. This has been articulated in the National Education Policy and the National Curriculum Framework for the Foundational Stage.
- NDEAR states the importance of promoting and implementing data protection, privacy and security; collection of data for clear end-use and purpose; developing and following consent architecture; data access protocols that respect and protect individuals against undue oversight and monitoring. To particularly secure the digital rights, privacy and protection of children against tracking, tracing and monitoring, that could result in harm and discrimination.
- NDEAR recognises the digital rights of children and evolve best practices to ensure safety, security and protection from untoward exposure, harm and tracking.
- National Curriculum Framework - Foundational Stage specifically states the need for respecting digital rights of children and refers to the need to protect children from harm, tracking and scrutiny and reputational damage.
- Strict protocols must be followed to secure informed consent in collection and sharing of data. Best practices must be considered and followed in framing policies implementing the design of technology and solutions based on - but not limited to Personal Data Protection Bill.

Reuse of existing systems and simplification of usage for end users via existing and familiar national digital IDs.

Reuse of Registries to eliminate repeated verification processes, and avoid inconvenience to citizens.

InDEA 2.0, 4.2.5 - Federated Registries, page 33

Compliance with data protection and privacy laws as applicable is mandatory.

While domain specific platforms are popular, it is important to leverage the JAM (Jan Dhan-Aadhaar-Mobile) identities as the universal IDs that are already used by almost everyone in India.

InDEA 2.0, 4.2.2, PDF page 41, doc page 31

A Digital ID by itself does not independently exist nor has any stand-alone benefit unless accompanied by appropriate trust levels and used by other systems using authentication and consented profile sharing (KYC) service.

A digital identifier, therefore, is the 'key' to a registry where the subject (ID holder) is present who, in turn, is empowered to control her/his ID, manage the registry record (her/his profile in that registry), choose to use it for availing other 3rd party services through authentication and consented eKYC (digitally signed profile sharing).

In every registry it is necessary that the subjects in that registry are "identified" in a unique and trusted fashion. These identifiers may be purely numeric (e.g. Aadhaar number, mobile number, health ID within ABDM, etc.) or alpha-numeric (e.g. PAN number, GSTN, Vehicle number, email address, UPI Address, etc.) with or without any logic attached in generating the identifier itself (random vs logic based identifier).

Depending on the policy, uniqueness can be either "user controlled" (user may have more than one ID within the same registry, say, using two different mobile numbers) or "state controlled".

Custodians of such registries should ensure appropriate policy is applied to either allow user controlled uniqueness or state controlled uniqueness. In addition, the fields in the record of that subject are to be verified/attested or marked as self-declared. When registering, people must be given an option to use their existing digital IDs".

Section 4.2.4, PDF page 41/42, doc page 31/32

The following are the some of the guidelines and recommendations from the InDEA 2.0 framework on building Registries at scale for delivering value:

1. *Under the federated architecture approach of InDEA 2.0, it is important to create a "federated set of registries", each of which is meant for a "specific purpose" rather than a universal, all inclusive registry.*

    a. *Given the federated nature of service delivery and Government systems, it is essential that each registry be maintained in an autonomous way with its own workflows, purposes, rules of participation, etc.*

    b. *Any registry provider/custodian must design the registry with the subject (person) in the centre and ensure convenience, inclusion, data empowerment, and meaningful choice for them to control and manage their own record within the registry.*

    c. *All registry providers/custodians must ensure personal data protection and consented access fully and ensure appropriate security and privacy measures to protect the data within the registry.*

2. *Authentication, eKYC, and SSO:*

    a. *All registries should be built as a "building block" to be "reused" as "sources of truth" in a paperless and trusted manner for the sake of simplifying citizen service delivery process and reducing costs.*

    b. *All registries should offer authentication/Single-Sign-On along with eKYC (consented digitally signed profile sharing) capabilities using the primary ID of that registry.*

    c. *The SSO should cater to cross-domain and should facilitate identity management among multiple SSO providers. SSO mechanisms should be resilient enough to handle multiple points of failure. Also, it should identify and address security breaches in SSO in a proactive and reactive manner systematically.*

    d. *All registries should accept and allow citizens to enroll and sign-in with other available digital IDs (white listed as per their policies) to provide 1-click enrolment and sign-in for citizens.*

    e. *Items b & c above ensure that the registries are not siloed and stand-alone systems, but a true digital building block for other systems, providing citizen convenience and eliminating repeated data capture and verification complying with appropriate policies/laws.*

Section 4.3, PDF page 43/44, doc page 33/34

1.2 Consultations and Decisions on Registry Systems

Various steps have already been taken to make concrete progress in the direction of building Education Ecosystem Registries (Student, Teacher and Institute Registries). The following is a brief outline of different stages in the ideation and design process, and the different discussions that have happened in this context:

- Establishing Registry usage precedents: The usage of large scale electronic Registries for a wide variety of use cases that deliver value to the citizens of the nation has been established by the implementation of systems such as PAN, Aadhaar, etc. - These are credible examples of registries with Open APIs for authentication and consented usage.

- The NDEAR report clearly calls out the need for learner, teacher, institute registries that are built in a federated and interoperable manner with Open APIs.

- The InDEA 2.0 report from MeitY defines Registries and IDs, and lays out the principles for building electronic registries.

- Working Group consultations and deliberations

  - WCD, MSDE, UIDAI, MeitY, States

  - Draft design and specs for Registries

  - Teacher Registry PoC conducted by NIC in KV, JNV - Delhi (July 2021)

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  - Student Registry PoC conducted by NETF (Dec 2022)

- Employing the PPP-R framework to arrive at the principles and the approach for Registry design - as laid out in the 'Registry guardrails - Principles framework' document (refer Annexure B). This was used to derive the principles based on which Registries that deliver value to the end users can be developed.

- A meeting was Chaired by Hon'ble MoS (MeitY and MSDE) on 8th October, 2022, following decisions were taken

    - NIC may be appointed as Project Manager for Student and Teacher / Faculty Registry project.
    - A steering committee will be established under chairmanship of Prof. Anil Sahasrabudhe, Chairman, NETF with representatives drawn from DoSEL, DoHE, MoSDE, MeitY (NIC, UIDAI) and other relevant Stakeholders to implement the Student & Teacher / Faculty Registry project.

Based on the discussions held by the core team, presentation was made in a meeting Chaired by Hon'ble Minister of Education, Shri Dharmendra Pradhan for Unique Student ID Registration and other related activities on 11th January 2023.

Based on the discussions so far, following decisions are taken:

Implementation Phase I:

- Implementation of Student and Teacher/Faculty Registry shall be taken up in the first phase of rollout of the Education Ecosystem Registry enabling exercise.

- These Registries shall be characterized as Decentralized Hosting and Decentralized Management while ensuring interoperability and communication between federated registries through minimum data model specifications.

- Students/Teachers enrolling into one of the registries (via the institution she studies/teaches in) shall obtain a student/teacher ID generated within that registry which is also linked with a Common Unique Identifier using Aadhaar and/or using Digilocker (ABC/Edulocker) to ensure students/teacher can move and use their profile, credentials, and data across many registries/systems during the lifetime.

All EER compliant registry implementations shall adhere to NDEAR and InDEA 2.0 recommendations. This makes various federated systems pertaining to School and Higher Education interoperable through a set of Open API specifications and standards as provided by NETF under the EER framework with Common Unique Identifier serving the role of the common identifier between federated registries.

- DIC will offer authentication and SSO capabilities via Digilocker for any registry provider to allow students/teachers to sign in using a common login credential. All EER compliant registry implementations will thus support 3 ways to login (or manage account, manage account recovery, etc) - "Login with Digilocker", "Login with Aadhaar", and any other 2-FA (such as Password and OTP) provided as part of the registry implementation. While first two options allows common and permanent way to manage any registry account by the student/teacher, last option allows existing systems (such as State/CBSE registries) to work as is making EER adoption faster.

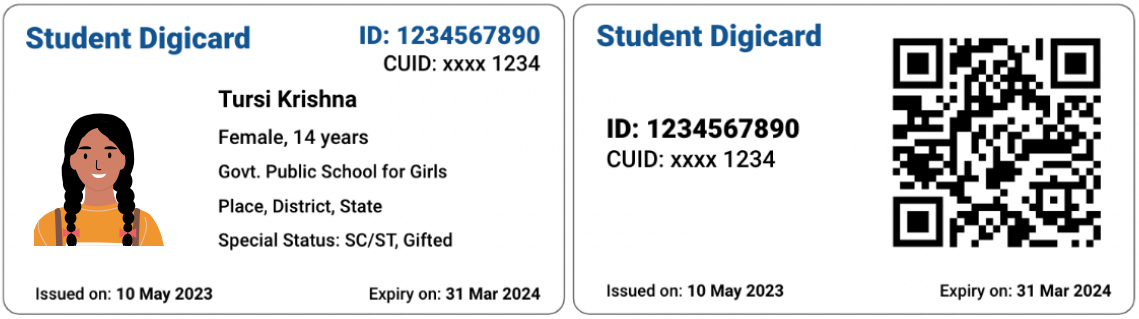
- DIC will also support creation of Edulocker (with learner passport and digital resume capabilities) within Digilocker. A dedicated space for Edulocker allows users to manage all their Digital IDs, certificates/credentials, admission cards, etc in an organized fashion.

- All student/teacher records within various federated instances of the registry will be linked to Common Unique Identifier via Authentication. This shall allow students to leverage and retain existing common nationally portable digital IDs while enabling interoperability between systems.

  - All EER compliant registry instances will generate a Student/Teacher Enrollment ID/Number that is unique within the registry while linking to the Common Unique Identifier. This also allows existing registries (e.g. CBSE having their Student Roll Number) to use their existing ID mechanism as they upgrade to make it EER compliant making the upgrade easier with minimal changes to existing processes.

  - All school student/teacher records will be linked to their institution ID via linking with Institution registries (school ID based on UDISE+ school ID). For Higher Education Students in addition to the above mechanism, Institute AISHE Code shall be mapped to the student/teacher record.

  - All EER compliant registry implementations will allow students/teachers to download a Student/Teacher Digital ID Card via the registry user interface as well as via Digilocker (Edulocker).



Illustrative Student Digicard - Nationally Usable

- This Digital ID card will be based on a standard specification prescribed by NETF with common minimum fields (name of student/teacher, gender, class/course/program enrolled in, name of institution, place/state, whether the individual is a student/teacher with special needs, date of issuance, date of expiry).

- This Digital ID card will also have a machine readable data embedded within a digitally signed QR code (as in Co-Win certificate) making this Digital ID a verifiable credential as per international standards.

- The building blocks in NDEAR Architecture shall be leveraged in creating and using these Registries for a variety of purposes. Eg. Digilocker shall bring together an EduLocker that unifies Academic Bank of Credits (ABCs), National Academic Depository (NAD) and all education/skill related credentials.

- EER Open APIs will allow interoperability across registries and other systems, and will also allow students/teachers/institutes to exchange their data with consent in digital fashion.

- Student Registry shall also be extended to skilling and certifications acquired in addition to standard course curriculum and will be integrated to Edulocker. This shall enable visibility into holistic student progress and drive policy interventions that ensure long term expansion of competencies and capabilities.

- For Institutions (Schools & HEIs), Registry shall be operated such that hosting is centralized in order to ensure control over quality of data reporting and oversight of sanctity of data, while the management of the registry shall be decentralized by existing entities (CBSE, State Boards etc.) .

- PAN shall be used as a national link ID for for linking with the existing UIDSE+ School ID, AISHE Institution ID and GSTN federated registries in order to create unified view.

- A VSK instance will be created within NETF as well to monitor and observe the progress of the overall EER adoption. In addition to having their own dashboard, each EER compliant registry instance (federated) will “emit” anonymized aggregate open data stream via EER Open Data APIs (public APIs) on a daily basis for VSK to consume, ingest, and display within its dashboard. This is essential to ensure “data driven” decision making and progress monitoring across the country.

- An open source reference implementation of registry software along with production hosting and implementation services offered by NIC shall also be planned to make the adoption by federated ecosystem faster and cheaper. NIC offering hosted models allows many states and entities in the ecosystem to rapidly adopt EER.

During initial phase two or three registry adopters (preferably one State, one national board, etc) will be onboarded for rolling out registry system and Digicard issuance with integration to Edulocker and VSK.

Implementation Phase II:

- Integration shall be done with NCERT of DoSE&L for tracking National Achievement Survey (NAS – Grade III, V, VIII, X) for visibility into big data of long term learning outcomes in accordance with vision of NEP 2020.

- Other players and stakeholders in the education ecosystem such as Skill providers, Edutech companies and Startups shall be onboarded into various registries with open APIs (NETF will work with existing ecosystem entities to upgrade their registries to make it compliant to EER architecture); PAN/GSTN-ID shall be leveraged in order to uniquely identify these players in the ecosystem. The appropriate policy review will be required as some of these entities as they might not be accredited by any body in particular.

- API Integrations with Vidya Samiksha Kendra (VSK) to allow for user anonymized data stream shall be done to enable high level analytics and dashboard reporting to support policy decision making. The data shall be hosted in decentralized fashion but shall be aggregated centrally in order to derive data driven insights.

- It is essential that rollout of EER is aligned with usage of registries and Digicard across various public/private transaction systems such as National Scholarship, Admissions, Govt benefit delivery, student discounts, etc. A focused effort need to be facilitated to bring out various usage, increase adoption so that individuals start deriving value creating natural "pull" for scale and sustenance of EER.

EER specifications, open source reference registry implementation, NIC hosting option, initial VSK for NETF, initial Digilocker SSO and Edulocker capabilities, and a standard Digicard specifications shall be designed and implementation of initiative/scheme shall be achieved by August 2023

2

Understanding Electronic Registries

A federated registry system is envisioned for education, connected via open APIs along with a secure, privacy preserving, user-controlled, unified view for students and teachers (and institutions) and having consented enrollment, credentialing, update, and usage; while connecting existing public/private systems and enabling national interoperability, portability, increased convenience, efficiency, and triggering public/private innovation.

2.1 Existing Registries

The scale and nature of registry implementation in terms of hosting (central versus federated), registration and attestation may vary on a use case to use case basis. Some of the existing registries in the country includes the following (details of same can be seen at respective websites, indicative list but not exhaustive list):

Aadhaar: Aadhaar, as the most trusted ID, has given India a reliable perspective of identification to empower the entire populace individually in such a manner that no one is left behind on the path of development. It is the most appropriate technology for transparent and targeted deliveries of services, benefits and subsidies with limited available resources sans middlemen. Aadhaar – the 12 digit unique identification number – has tremendous potential to bring transformation by empowering people in numerous ways. This ID acts as a lifelong digitally verifiable credential. With this ID, a sense of enhanced security and trust prevails in the life of people as it brings in ease of living and ease of doing business.

Taxpayer Registry: The PAN is a ten-character alphanumeric identifier, issued to all the taxpayers of the country by the Income Tax Department, The primary purpose of the PAN is to bring a universal identification to all financial transactions and to prevent tax evasion by keeping track of monetary transactions across taxpayers. It is one of such registries which is hosted centrally, and also managed in a centralized manner.

Goods and Service Tax Network (GSTN): GST provides IT infrastructure and services to the Central and State Governments, taxpayers and other stakeholders for implementation of the Goods and Services Tax (GST) in India. The GST System Project provides a uniform interface for the taxpayer under indirect taxes through a common and shared IT infrastructure between the Centre and States. GSTN provides a strong IT Infrastructure and Service backbone which enables capture, processing and exchange of information amongst the stakeholders (including taxpayers, States and Central Governments, Accounting Offices, Banks and RBI). It is one of such registries which is hosted centrally, while managed in a decentralized manner.

There are similar other Registries such as Healthcare Professionals Registry (HPR), Health Facility Registry (HFR), Voter Registry, VAHAN which are hosted centrally, while managed in a decentralized manner.

Public Distribution System (PDS) and Land Records present examples where both hosting as well as management is fulfilled in a decentralized manner.

Registry of Corporates (Under MCA) is one of such registries which is hosted centrally, and managed in a centralized manner as well.

Based on some of the above registries, *it is pertinent to mention that most of these registries follows one of the following models: 2 by 2 Quadrant:

Figure: 2by 2quadrant showcasing trend of hosting and attestation across registries

1 **1st Quadrant -** Decentralized Hosting, Decentralized Management

2 **2nd Quadrant -** Centralized Hosting, Decentralized Management

3 **3rd Quadrant -** Centralized Hosting, Centralized Management

4 **4th Quadrant -** Decentralized Hosting, Centralized Management

Based on the study of above existing registries and their nature / use cases handled, It is proposed to build Education Ecosystem Registries in such a manner that:

- **Student / Teacher registry is proposed to be of 1st quadrant (Decentralized hosting, Decentralized Management)**
- **Institute registry is proposed to be of 2nd quadrant (Centralized hosting, Decentralized Management)**

The above placement is also in alignment with guidance from existing reports as follows:

*As per NDEAR "In the education domain, it is essential that data about schools, teachers, students, administrative officials, subjects, textbooks, etc. are maintained through a set of federated 4th generation registries (not kept central, but kept within various State/ Centre/ department systems which are the primary keeper of that data)." - Refer subsection c. Electronic Registries of Section 3. Registries and Reference Data, page 59 of NDEAR Report.

NDEAR report page 50, point e clearly states "Student and Teacher registries will be held at the school level, school management level and state level, as appropriate. Student and Teacher registries will not be held at the national level."

A few key registries that can be enabled within NDEAR are - Student Registry, Teacher Registry and Institute Registry. By leveraging the aforementioned registries and their services, multiple use-cases can be enabled. NDEAR formal report refers to various use cases (A few of them are listed below):

2.2 Indicative Use Cases - Student, Teacher and Institute Registries

Listed below are few of the initial envisioned use cases for federated interoperable registries in the education and skilling ecosystem across school, higher education and skilling domains in the country.

A. Visibility of academic progress, learning outcomes and enabling targeted decision-making

Para 3.3 of NEP 2020 requires achievement of *"universal participation in school by carefully tracking students, as well as their learning levels, in order to ensure that they (a) are enrolled in and attending school and (b) have suitable opportunities to catch up and re-enter school in case they have fallen behind or dropped out."* The federated registries will be used to help map and facilitate the entire journey of a student spanning across different stages of scholarly life. It will ensure that the education credentials for a student can be issued to the correct individual, they are in the control of the student/ parent, and can be shared/ used using consented access. It will enable a learning and credentials profile of the students and will help the teachers to craft a learning journey for their students.

The data analytics services enabled through Vidya Samiksha Kendra (VSK) will also allow the teachers as well the administrators to track the achievement of Learning Outcomes (LOs) and drive interventions accordingly in order to achieve the same (Ref. Case Study-E., Chapter-3, Part-A of NDEAR Report). This shall be enabled by emitting an anonymized data stream on request through Open APIs to VSK in order to generate high level data driven insights. Data shall remain within federated registries and shall only be aggregated centrally for producing data analytics.

B. Easy access to Education and Skilling credentials for beneficiaries

Leveraging and using education and skilling credentials is required by beneficiaries for easy access to various benefits, schemes and also for transfers and admissions. Federated Registries with appropriate verifiable digital credentials will enable this. Unified Learner Passport (ULP) allows them to have visibility and use of their credentials, updated against their unique identity throughout the learning journey in a verifiable manner and easily accessible by the ecosystem.

The National Academic Depository (NAD) and Academic Bank of Credits (ABC), initiatives of MoE, enables 24x7 online depository for academic institutions to publish student's academic credits and credentials. Both the initiatives are implemented by Digilocker ensuring easy access and use of academic credits and credentials. Unified Learner's Passport (ULP) within Education Locker can be enabled and integrated with NAD and ABC.

C. Transfers and Migration

Students have multiple entry and exit points in the academic journey. They also undergo transfer and migration from one location to another - both intra-state and inter-state. This requires finding a school in the new location, getting all necessary paperwork from the old school, giving it to the new school, finding financial support, exploring additional skilling opportunities etc. All these, while parents and students settle into the new place. A dynamic and federated registry at all administrative levels will help ease out the entire process for students, parents and administration. Digital records and credentials will enable access to the academic credits obtained by students, grade level competency achieved by the students, transfer and migration certificate records from previous institutions etc, across systems in a trusted fashion, eliminating the need for any cumbersome, expensive and time-consuming paperwork (Ref. Case Study-B, Chapter-3, Part-A of NDEAR Report)

D. Admissions leveraging Verifiable Credentials

The government, academic, industry, and other ecosystem actors today issue many certificates (government and non-government issued), licenses, authorization letters, etc. Unfortunately having all these in paper form creates issues of low trust, information asymmetry, costly verification procedures, and non-portability amongst many others. In addition, authenticity of such documents is not easily verifiable giving rise to fake certificates and fraud.

Establishing a system of standardized VC (Verifiable Credentials) documents enables an individual to easily share credentials in a trusted manner anywhere and thereby open up possibilities to access various opportunities and services.

Given India's successful Digilocker implementation, it is time for other ecosystems like education and skill development to ensure all certificates/credentials are issued digitally while allowing printability and inclusive usage.

Credentials (various certificates in digitally verifiable form) empower people and entities to make claims about themselves (e.g., claims about academic degree or work experience) for availing services and ensure the service provider has the ability to verify those claims in a paperless and trusted manner.

InDEA 2.0 proposes to adopt a common electronic, machine-readable specification to represent various credentials/certificates across the ecosystem. For verifiable credentials, InDEA 2.0 will leverage internationally acceptable specification W3C for vetting all digital verifiable credentialing. On top of W3C VC, to ensure domain interoperability, it is highly recommended that various domains create standardized schemas by aligning and adopting existing open source schema efforts.

E. Scholarships and Benefits

Based on the demographic details and academic performance of a student, students are eligible for merit scholarships by the government or any other civil society organizations. It becomes difficult for administrators to track potential beneficiaries. Also, the beneficiaries have to ensure safekeeping of the credentials earned over the lifetime. A Registry can enable Centre, States/UTs, Boards, and ecosystem partners to provide benefits for learners and teachers in a trustworthy fashion, based on verifiable credentials that are produced by claimants. Registries at various administrative levels can provide a holistic view of benefits available versus benefits actually claimed by the end beneficiary and will enable administrators to design targeted interventions and also help plug the gaps, if any.

Some of the key benefits envisaged using the registries in education domain covers (but is not limited to):

- **Ease in onboarding /enrolment process:** The learner shall be able to onboard across multiple platforms / registries in an efficient manner. One shall not have to provide the same basic information again and again across various platforms. This will help learners to fill their profile information as and when required to be filled for various exams / competitions, etc. Registry capabilities such as one-click onboarding allow users to share their profile across multiple systems in a trusted fashion.

- **Consistency in information:** The information provided by the learner shall become consistent across all platforms.

- **Maintenance of Learner History:** The journey of the learner shall be available in the form of the digital education locker / wallet where all the academic and extracurricular records are stored in digital format. The teacher shall be able to support learners as per their learning needs based on the learning history of the learner.

- **Ensure Continuity of learning**: The data emitted between federated interoperable systems shall help administrators observe the aggregated enrolments, assessments, transfers, and drop outs and help take informed decisions to ensure continuity and improved learning.

- **Ensure convenience via increased trust and reduced cost:** All the digital credentials earned by an individual will be verifiable from originating source / issuer in a seamless manner allowing various systems to accept and process certificates/docs in a convenient, digital, and paperless manner, thus increasing trust and reducing cost.

- **Data Governance:** The anonymized data emitted by various systems shall help administrators in designing policies and help and manage learning.

- **Easy access to eligible benefits:** Beneficiaries may be able to access various schemes based on their profile. Similarly, benefit providers shall easily verify the desired candidates by accessing their consented profile information.

- **Visibility to progress to all stakeholders:** Different types of progress data / abstraction shall be available to stakeholders as per their need.

3

Design Principles for Registry

1. **Purpose driven, Federated design:**
   Creation of a "federated set of registries", each of which is meant for a "specific purpose" rather than a universal, all inclusive registry. Such registries may get interlinked via registry IDs depending on the policies that allow such linking. Interlinked registries are required to provide an unified view of benefits delivery.

2. **Digital identifier as key to Registry, with usage of familiar, existing IDs for end users:**
   All registries should have a digital identifier to uniquely identify a record. When registering, end users must be given an option to use their existing and familiar digital IDs (such as Aadhaar, mobile, GSTN etc.). This will ensure users to remember only a minimal set of key/ familiar Digital IDs, and can use the same to access their record across multiple Registry systems and are not burdened with the task of recalling multiple ids.

3. **Purpose driven Uniqueness:**
   Actions such as de-duplication of a record within a Registry may be considered only when the use case for the Registry demands it. Existing systems such as Aadhaar have already carried out such an exercise for the populace of the nation, and must be leveraged when necessary, to carry out such checks, instead of attempting to repeat the entire exercise again within each system.

4. **Trustability of data:**
   Registries should support user led self-declaration of data as well as attestation of data as a means to ensure non-repudiation of credentials and facts as an embedded feature using user authentication and digital signatures. Credentials should, by design, ensure verifiability, portability, permanence and inclusivity, while incorporating consent based and self-describing properties.

5. **Empowerment:**
   Empowering data owners by giving them the ability to view, initiate correction and control their information, and how their information is accessed and used, by giving them the ability to give and withdraw consent at the attribute level (consent-based architecture). Credentials (various certificates in digitally verifiable form) enable people and entities to make claims about them (e.g., claims about academic degree or work experience) for availing services and allow service providers to verify those claims in a paperless and trusted manner.

6. **Security:**
   Ensuring that data is exchanged in a secure and user consented manner with well-defined privacy rules and in alignment with access allowed by data owner and issuer. This is in alignment with NDEAR and Data Protection Bill 2022.

7. **Universal Access and Interoperability via open specifications:**
   Enable secure digital access and interoperable communication across systems using standardized schema and API specifications to ensure seamless integration across diverse systems - allowing them to communicate in a trusted fashion. Open specifications allow interoperability and cross system visibility without having to centralize data and sacrificing privacy.

8. **Use case centric design:**
   Registry design needs to be user-centric, rooted in use cases that will ensure active usage of the Registry. Likewise, registry adoption must be driven via use cases that deliver concrete value to the end user, and incentivize them to take consented control of their data.

9. **Minimal data models:**
   The unified data model for the Registry must be minimal, and evolved based on the needs for which the Registry is being built - it should be kept to a minimum so as to enable envisioned use-cases, and not be allowed to grow unchecked.

4

Proposed Architecture for Education Ecosystem Registry

Building Registry Systems for the education and skilling domain in India:

- Federated, interoperable Registries to empower individuals and institutions with their own digitally verifiable profile and credentials.
- Transaction Systems that enable functional use cases leveraging EER with user consent.
- Digilocker based Education Locker with integrated Learner Passport for Students and Teachers, for providing a unified view of their credentials, aligned with NAD and ABC.
- VSK - open data driven and AI powered Key performance Indicators providing Dynamic & Drilldown reporting and enabling Data Driven Policy decision making integrated within VSK systems.

Proposed Technical Architecture Building Blocks for Registry

3rd party apps leveraging registry system APIs

(Offering benifits access, convenient and paperless transsaction, easy admission, digital resume and job applications, financial support apps, etc.)

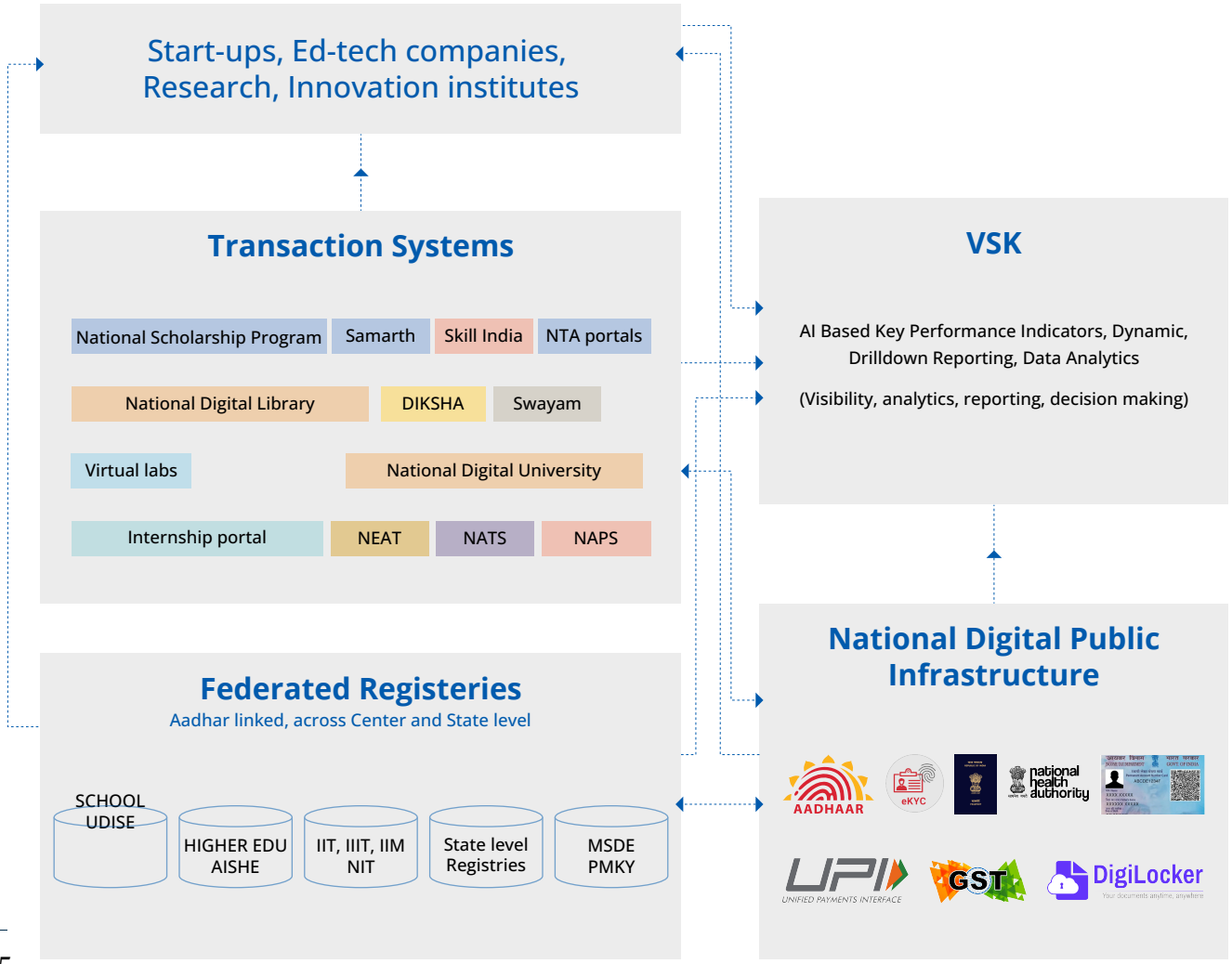
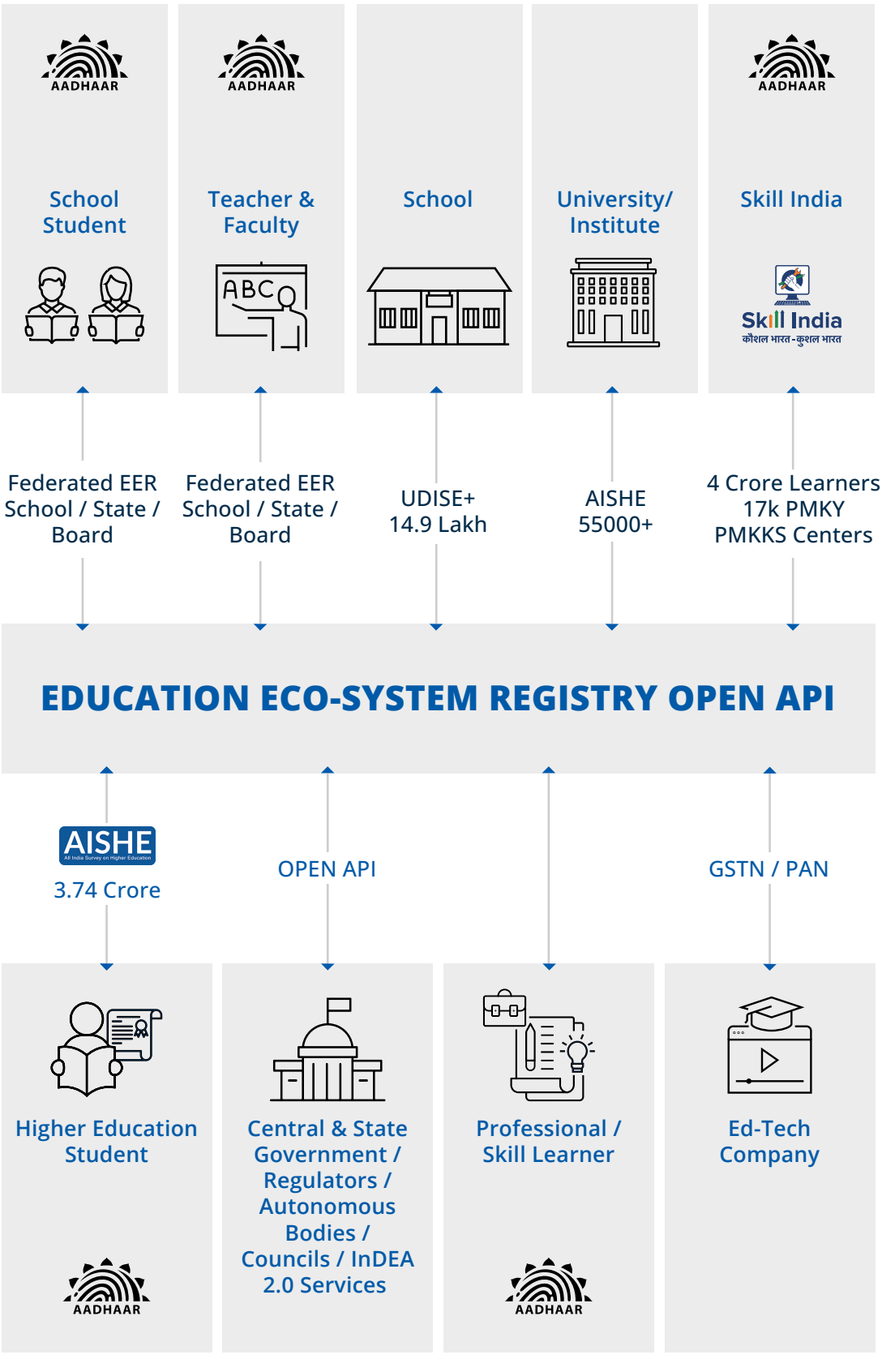


Figure: Showing different systems & their interactions (Registries, Transaction systems)

Person & Entities Flow



4.1 Student Registry

Decentralized Hosting, Decentralized Management (registration and verification/attestation)

Student Registries are federated by nature, given the prevalence of multiple education and skilling boards and departments across the country. Each such entity (CBSE, State Boards, Skilling Dept. etc.) will maintain Registries to manage their master Student/Learner, Teacher data, as well as transaction systems to manage various workflows and lifecycles. Student Registries, as per the guidelines laid down by NDEAR and InDEA 2.0 (referred to, in relevant sections in this document) have to be hosted, as well as managed in a decentralized fashion.

However despite the decentralized nature of the registries, EER intend to help unify entire academic journey of students spanning user consented data pertaining to ECCE, School, Vocational Education, and Higher Education and Skilling by making the otherwise standalone systems interoperable.

As recommended in the NDEAR report, all Registries and Transaction systems will 'emit' anonymized standardized datasets that can be used by AI based dynamic, customized, KPI based data analytics and analysis system reporting systems. The emission of data from transaction systems will happen in a decentralized fashion, while collection and analysis of data can happen across various VSK systems at states or autonomous body level and also a country level VSK at central level with appropriate aggregations built in.

Registries, Transaction Systems, Linked student records and Credentialing

Transaction systems as well as Registries enable credentialing

- such credentials that are generated can then get stored in systems such as Edulocker (a well organized space within Digilocker with NAD/ABC integrated) so as to enable users to use and share them as needed.

Students may move across several learning systems, as well as earn credentials from multiple systems in the course of their learning journey. Each system may maintain a unique internal identifier for the learner. Such digital identifiers need not be exposed to the learners.

When required, **movement and integration across systems by the student across various Registries will be achieved by means of Common Unique Identifier.** This design eliminates the need for a new national student ID, allows students to still seamlessly move their profile from one registry to another, ensure students can collect all their lifelong credentials via Edulocker (within Digilocker), and allows existing systems to upgrade to a compliant EER rapidly.

There are several instances of students generating key credentials such as the Board certificate by employing a prepaid mobile number that is in use at that point. Later, if they lose access to the certificate, they are unable to reissue it from the Board (Centre/ state) if they don't have access to the mobile number. Enabling Common Unique Identifier based interoperability will also ensure such problems do not arise, and records across multiple systems are linked seamlessly with a strong and immutable ID, and also enable privacy-preserving observability for administrative purposes.

This also allows various states/boards/etc. managing these registries and issuing credentials/certificates to continue to use their existing ID schemes as the student ID (CBSE roll number for example) and credential/certificate issuance flows within their registries and/or transaction systems in addition to connecting to Common Unique Identifier allowing easy adoption without having to reengineer existing systems/processes.

Profile portability and onboarding

Authenticated profile sharing between Registries:
Registries should have the capability to allow for porting of the common fields from Aadhaar onto the recipient system, thereby removing the chances for errors creeping into these fields by means of the user creating a fresh entry. As the student moves from one system to another in the course of their learning journey, they can carry out simple one-click onboarding onto other systems using their Student profiles in existing registry systems. This will ensure continuity for the learner across various systems that they encounter in the course of their journey.

Creating and Maintaining Student Registries
Student registries should ideally be hosted and managed at the Institute level. However, every school having to invest in infrastructure/ portals to enable student

registrations will become an expensive proposition. Hence, **it is recommended that student registries be hosted at the regulator/board/state level.** Management of such registries can continue to remain at the Institute level.

Various transaction systems will be required to work in tandem with such Registry systems to enable different transactions capabilities and workflows for the Students. Transaction systems may require a subset of the learners' data, which can be shared by the student, based on their consent. These interoperable electronic registries will be enabled based on a common registry schema (in alignment with recommendation from NDEAR, ref page 50).

Credentials and Data

Long term storage of credentials and provision of a unified view for the learner will be enabled via the Digilocker infrastructure (ULP/Edulocker). Digitally signed verifiable credentials, as recommended in InDEA 2.0 report, of the user will be stored by the Edulocker from various systems. The credentials will thus be 'owned' by the user in the long run.

Both transactions as well as Registry systems should issue credentials using standard VC schemas (ID/Transaction credentials). Likewise, both types of systems should also emit anonymized datasets for unified analytics and decision making that can be integrated within VSK systems.

Key enablers while employing Registries and Digital Credentials:

Boards/entities will have to enable digitization of underlying systems and data in order to enable envisioned functionality and capabilities. Both Registries as well as transaction systems will have to move to issuance of digital credentials in order to leverage the benefits of such infrastructure. While entire end to end workflows may not necessarily have to be digitized to begin with, issuance of digital credentials will be the bare minimum that will have to be enabled. Portability of existing data in Registries will require creation of proper citizen interfaces and Open API Integration.

5 Key capabilities that should be enabled while deploying Student Registries are:

1. Creation of a student profile that employs the common minimal data fields (Full Name, DOB, Gender, Father/Mother/Guardian Name, Address, Mobile Number and Email, Common Unique Identifier etc.) as per NDEAR registry schema specifications, along with digital authentication.

    EER registry implementations (multiple federated instances as described earlier in this document) shall enable capabilities such as

creation/management/download/consented-sharing of a Digital Student ID card with digitally signed QR Code, thus used for establishing the user as a student and claiming other benefits.

2. Each of the EER registry instance should provide common APIs (using standard API specifications) and enable Single Sign On (SSO) as well as consented and authenticated profile sharing by its users (for usage across other NDEAR systems).

   This allows users to share their verified profile from a system they're already part of, to another system they enter. This will ensure consistent and clean data across systems, while making access and usage easier for end users.

3. Each of the EER registry instance should offer onboarding API support for single-click onboarding from one Registry system to another.

   - This will allow users who are registering/accessing a new system to pick their profile from another system they're already registered with. Capabilities #3 and #4 together will ensure consented and authenticated profile sharing to further ease of use. This also eliminates data errors and repeated data verification overheads.
   - Each of the EER registry instance should also offer login via Digilocker SSO (via MeriPehchaan) or using Aadhaar in addition their own 2-fa mechanisms. This allows users with easy account management, account recovery, account migration, etc.

4. Creation of a student profile that employs the common minimal data fields (Full Name, DOB, Gender, Father/Mother/Guardian Name, Address, Mobile Number and Email, Common Unique Identifier etc.) as per NDEAR registry schema specifications, along with digital authentication.

   Capabilities to empower users by providing ownership to data - this will allow users to update/ manage their profiles and keep it current.

5. APIs that enable the ability for Students to link their Registry records to Common Unique identifier (as part of NDEAR Digital Registry compliance).

   - Common Digital Identifier usage will allow users to assert a strong, verified identity over their records which can help with claims they may need to make. It will also enable unification of data for administrative and analysis purposes.
   - Common Digital Identifier linkage also allows users to easily recover, in a secure manner, their credentials/certificates in scenarios where they are lost and/or when they forget login details to various systems.

4.2 Student Registry

Teacher Registry shall have an approach similar to the Student Registry considering the various use cases for the teachers.

Teachers/Faculty like students also have a lifecycle which generates various data points owing to multiple entry and exit points such as their academic qualifications, research and innovation collaborations, their areas of specialization, research papers published, their certifications, change of jobs etc. The EER Teacher Registry hence similarly shall be enabled as a set of federated teacher registries with Common Unique Identifier (as in the case of students) linkage in order to account for teaching history and mobility between different institutions.

Each registry will maintain their own teacher ID/profile (mapped to Common Unique Identifier for easy portability and lifelong management) and mapped to their current institution via institute registries in order to enable the portability and mobility throughout their teaching career.

DIC with assistance of NETF shall offer a national Digilocker SSO (Meripehchaan may be leveraged) and offer that to various teacher registry instances. Each teacher registry will utilize EER institute registries to link teachers to their institutions and allow consented profile sharing and one-click onboarding (as in the case of student registries). Teacher credentials (competencies, expertise, etc) will serve as a barometer of teaching resources to improve. Registry emitted anonymized analytics data integrated with VSK will help identify gaps in provision of adequate quantity and quality of education delivery. These national statistics

transaction/learning systems shall help address the supply side issues in delivering holistic quality education aligned with NEP objectives. Additionally, Teacher/Faculty credential integration with NAD Edulocker will also help policymakers to plan long term career growth and targeted skilling initiatives in order to plug any gaps in education delivery. Additionally, this registry shall help internationalization of the country's academic capabilities helping establish a global footprint for expertise in higher education.

4.3 Institute Registry

The Institute Registry will be rooted in the same architecture principles as articulated for the student registry but with a difference that it would be hosted centrally but managed in a decentralized manner.

Unique identification of School and HEIs shall leverage existing systems such as UDISE+ and AISHE with data being hosted centrally however with the control of data and attributes being decentralized to State / district / school/college/university levels, as appropriate according to the reporting requirements of different entities. Central hosting and aggregation of Institute Registry data based on unique Institute IDs shall enable bringing higher levels of trust, transparency, and master data interoperability between federated registries.

Further the central EER hosting of School and Institute data shall fulfill the current gap and need for a master registry to facilitate institution controlled transparent creation and updation operations to data. Decentralized management of the federated registries for Institutes shall ensure that approvals and existing management workflows are adhered to locally. Hosting this data centrally shall allow establishing a single authentic source of truth that can be dependent on other actors in the ecosystem.

Design & Architecture

Unlike the student registry, the institute registry shall be hosted centrally, in view of concrete benefits that can be enabled by doing so.

- Centrally hosted (central registration)
    - Create and manage the central 'core profile' of the institute
    - This will create a 'unified view' of Institutes for individuals that can enable easy discovery of trustworthy institutions
    - If an entity/ state chooses to manage its records within its own system/ Registry, records from such Registries can be made 'read-only' in the central unified view. Clicking on the record will take the user to the State system/ Registry which will then allow for management of the record.
- Decentralized approvals and attestations
    - Integrate with approval and attestation flows of various entities who authorize these institutes.

Assumptions

The only available unique national IDs that can be used to link institutions as of today are PAN (and GSTN-ID for establishments within each PAN). These are to be used as establishment/ entity IDs in order to enable linking of the entity records across multiple registries/systems, and to allow for creation of a unified view of schools/institutes across education/skill sectors. It is recommended that PAN be used as the consistent entity identifier.

4.4 How registry system will enable various use cases

A few use cases of Student's movement from school to school, school to skilling system, school to higher education system etc. are given in Annexure A.

5

Implementation Plan

5.1 Key Stakeholders

- National Education Technology Forum (NETF)
- Ministry of Education (MoE)
- Ministry of Electronics and Information Technology (MeitY)
- Department of School Education and Literacy, MoE
- Department of Higher Education, MoE
- Ministry of Skill Development and Entrepreneurship (MoSDE)
- Unique Identification Authority of India (UIDAI)
- National Informatics Centre (NIC)
- Digital India Corporation (DIC)
- University Grants Commission (UGC)
- State Education Boards
- Autonomous Bodies (e.g. NCERT)
- Schools
- Institutes of Higher Education
- Ministry of Women and Child Development
- Ministry of Tribal Affairs
- Ministry of Social Justice and Empowerment
- Department of Income Tax
- Ministry of Company Affairs
- Students / Parents / Teachers
- Edutech/startups
- Private sector service providers
- Institutes and bodies that run competitions and events to identity gifted children
- Organizations that may benefit from seva or community service of the students
- Future employers

5.2 Suggested Policy Changes

- Allow the full use of Aadhaar across Registries in the education and skilling domains to allow learners to connect their records across systems for creation of unified views and privacy-preserving analytics capabilities. The same is applicable for the Teacher registry as well.
- Review participation of non-accredited education/skilling institutes in EER.
- Use of PAN/GSTN-ID along with UDISE / AISHE ID as the **common unique entity ID** for identifying Institutes, Edutech companies and startups.
- Some of the boards like CBSE recognizes students only from high school. For lifelong usage of EER, Student registry under those board as soon as the student enters the system.
- Mandating a minimal set of fields and adherence to NDEAR registry specifications that form the core profile and open APIs to be agreed upon.

5.3 Dependencies

- Approval of Design Document
- Stakeholder Alignment : Awareness workshops/ Seminars
- Preparedness of DIC to undertake the SSO offering for various EER implementations
- Preparedness of DIC to create Edulocker (integrating ABC and various education/skilling credentials) within Digilocker.
- Availability / revamping / development of federated registries complying with NDEAR Principles
- Preparedness for NIC and others to offer a compliant reference implementation as software as well as hosted offering if various states/entities who will be hosting registry instances wishes to use. This is necessary to accelerate rollout and adoption. When it comes to Aadhaar usage, use of central AUA/Sub-AUA based Aadhaar authentication/eKYC gateway for onboarding users to various NDEAR compliant registries across education/skilling sector.
- Data Protection Law to ensure student/children/teacher data is protected under the national data protection law.

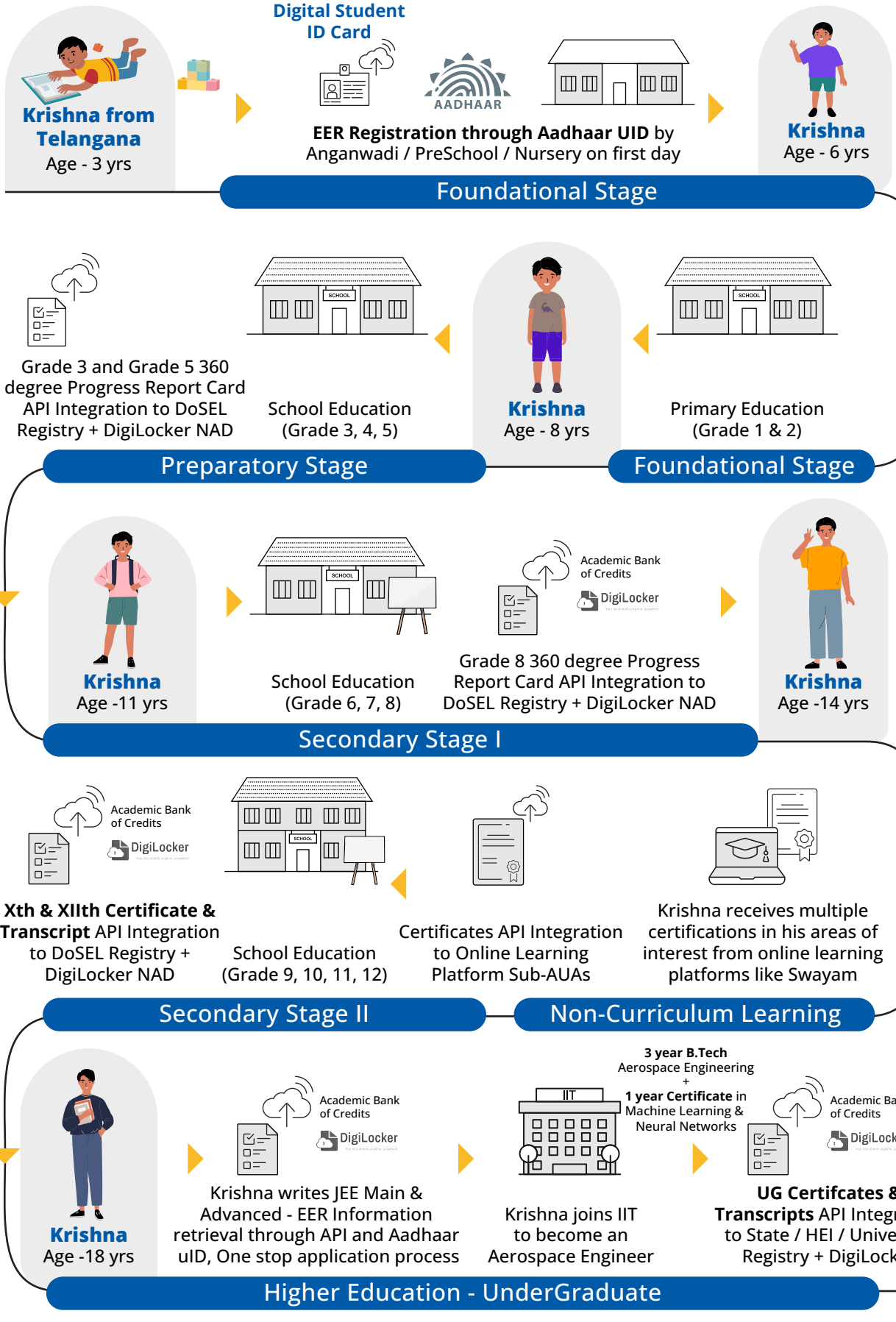
5.4 Potential Risks Envisaged & Mitigations

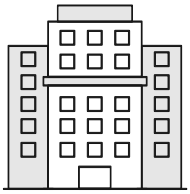
#	RISKS	MITIGATION
1	Privacy and data security risks	Keeping it voluntary, decentralized and ensuring the unified account data model to be minimal and integrating various current systems via secure APIs instead of bring all data centrally
2	Pushback by States, boards, private educational institution	Letting existing systems to integrate as per NDEAR principles while "unifying" them using open registry APIs into a minimal, user controlled view (voluntarily Aadhaar linked, except when it comes to Govt benefit purposes for which Aadhaar can be mandated)
3	Risk of adoption	Working on adoption strategy as part of whitepaper, creating multiple models for rapid adoption (reference software, hosted offering by NIC, build your own, private ecosystem participation), identification of "user centric" use cases, having budget and plans for campaigns across the ecosystem, and closely monitoring "adoption metrics" via NETF VSK.
4	Unavailability of NDEAR Compliant registries and related transaction systems	NETF will provide the reference solution to the states / U.T.s which will be NDEAR compliant offering for states / U.T.s to adopt
5	Risk of Implementation	Creating an EER accelerator package (specs, policy, funds, reference software, implementation guides, etc), holding consultations and workshops to explain the design. This includes placing this document in the public domain for feedback.

Annexure A: Use Cases

User Story: New Student

New Student entering Education System





Krishna pursues his M. Tech (Aerospace Engineering)

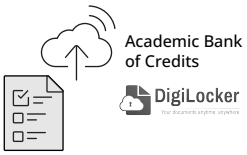
Krishna writes GATE to secure seat for Masters: EER Information retrieval through API and Aadhaar uID; One stop application process

Krishna
Age - 22 yrs

Internship Certificate API Integration to Internship Portal Registry + DigiLocker

Krishna completes **Internship** at premier aerospace company

Higher Education - Graduate | **Higher Education - Internship**



M. Tech Certificates & Transcripts API Integration to State / University Registry + DigiLocker

Krishna's M. Tech. Research Project on AI modelling in Aerospace is published and API Integration to Digilocker

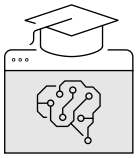
Krishna
Age - 24 yrs

Krishna's ERR Record is shared with placement companies with his consent

Higher Education - Graduate | **Professional Career**

Krishna
Age - 28 yrs

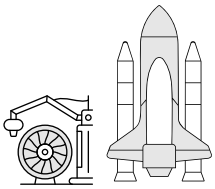
Skilling Certificate API Integration to Online Learning Platform Sub-AUAs



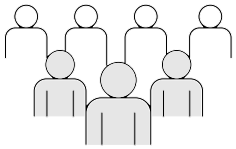
Krishna completes advanced Deep AI modelling course sponsored by his company

Krishna is placed at a premier Aerospace Company as Sr. Engineer

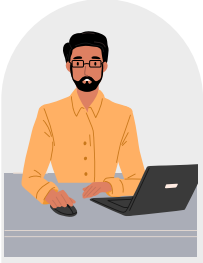
Professional Career - Salaried + Lifelong Learner



Krishna quits his job and starts his own **aerospace startup** manufacturing high end components



Krishna is no longer a Job Seeker but a Job Provider with a workforce of 1,000 employees



Krishna
Age - 35 yrs

Professional Career - Entrepreneur / Startup + Lifelong Learner

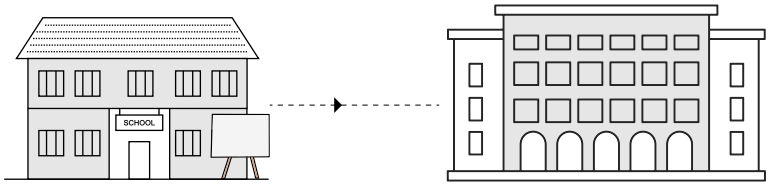
User Story: Existing Student

Existing Student who is already part of the education system

Tursi from Jharkhand

Tursi is already enrolled in Grade 8 at a Government Public School in Jharkhand (Age - 13 yrs)

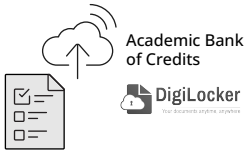
Visibility of STUDENT MIGRATION between Jharkhand State to New Delhi State enabled through Custom EER APIs ensuring information exchange between respective databases / platforms



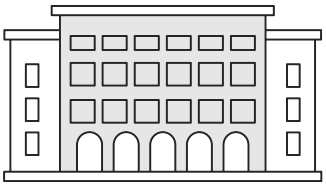
Tursi's father is posted to Delhi owing to which Tursi joins 9th Grade at DPS Vasant Kunj, Delhi

Digital Student ID Card

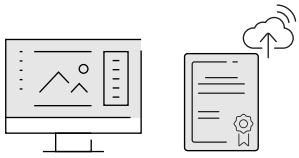
EER Registration through Aadhaar UID created by the school using bulk upload facility for existing students



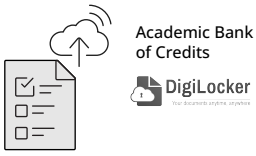
Grade 8 360 degree Progress Report Card API Integration to DoSEL Registry + DigiLocker NAD



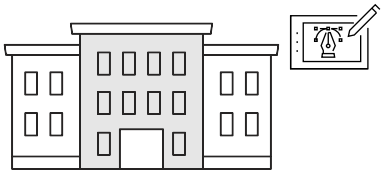
School Education (Grade 9, 10, 11, 12)



Tursi completes **vocational courses in Graphic Design** along with her school curriculum. These skills are updated on EER through API Integration with online learning platforms registries



Xth & XIIth Certificate & Transcript API Integration to DoSEL Registry + DigiLocker NAD



Tursi completes 2 year Diploma in Graphic Design from an accredited private institution; updated through API Integration with Diploma Registry DoHE

Tursi
Age - 22 yrs

Tursi is now a freelancer Graphic Designer and has benefited from having her entire education and professional portfolio accessible through the convenience of Aadhaar interoperability and the EER Education Ecosystem

User Story: Lifelong Learner

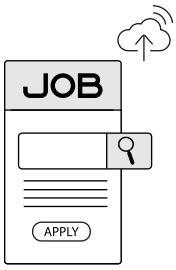
Professional

Ama Bengia from Arunachal Pradesh
(Age - 32 yrs) is a finance executive already working at a big MNC after completing his MBA

Digital Student ID Card

Ama Bengia completes EER Registration through Aadhaar UID. This links past available education profile through API Integration with existing systems

The Job Skill Certifications in Financial Data Modelling is linked through APIs to Ama Bengia's EER record



Ama Bengia's EER record provides a credible, authenticated and convenient for him to apply for jobs / freelance and utilize his skills for creating value in the economy

User Story: Lifelong Learner

School or College Dropout

Chiyaan Vikraman from Tamil Nadu

(Age - 12 yrs) had to drop out of school in order to support his family on the farm

Vikraman

(Age - 28 yrs) decides to re-enter the education and skilling system and enrolls for a **Vocational Course in Organic Farming**

For enrolling in the course, Vikraman completes EER Registration through Aadhaar UID and his past education profile and vocational course certificate is linked through API to his ERR record

Digital Student ID Card

AADHAAR

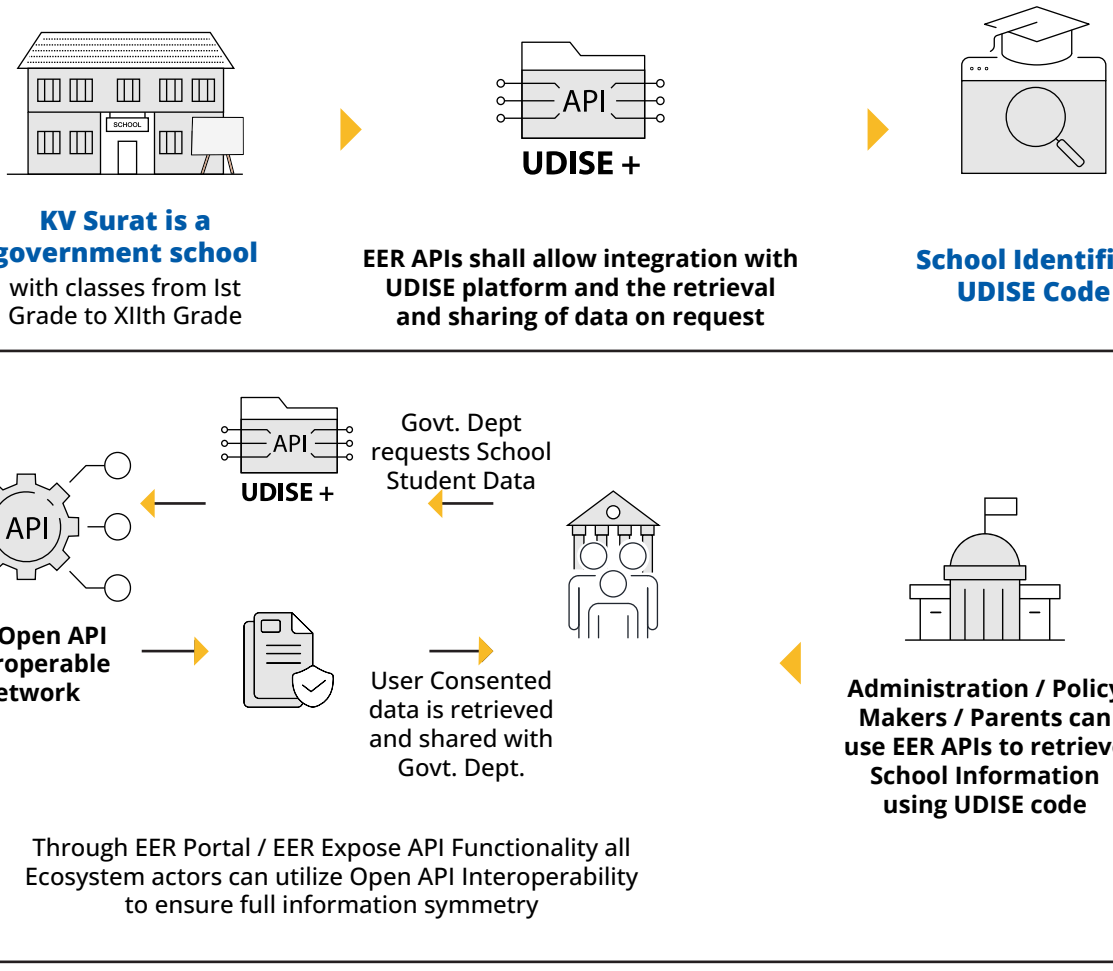
Vikraman

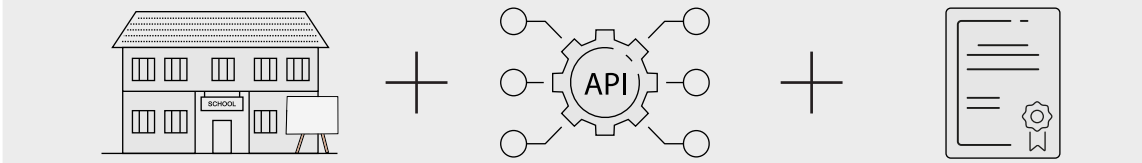
(Age - 30 yrs) has to setup his own organic farming practice and intends to gain more knowledge in Agri produce marketing and distribution

Vikraman's EER record provided him with a second chance at upskilling himself with skills and expertise that is necessary for the 21st century.

The universality, uniqueness and interoperability of Aadhaar and its integration with EER Education Ecosystem allows him to apply for scholarships, discounts, and access online eucational content; enabling Vikraman to be optimistic of his dream of transforming agriculture in India.

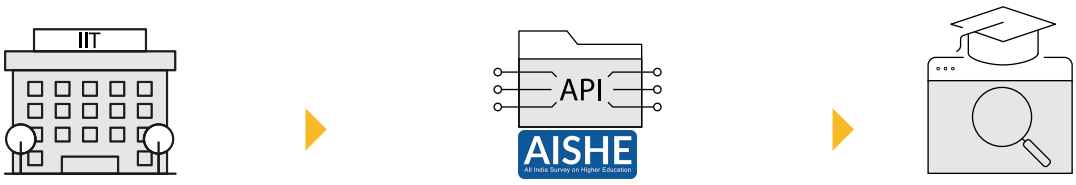
User Story: School





- **EER APIs ensures the single comprehensive profile of the school contain data fields that are auto verified / attested in two or more communicating (existing) Education and Skilling Ecosystem Registries**
- **Bulk Upload Option will allow Schools to update Student / Faculty lists through EER APIs to ensure single updated source of truth for planning & monitoring**

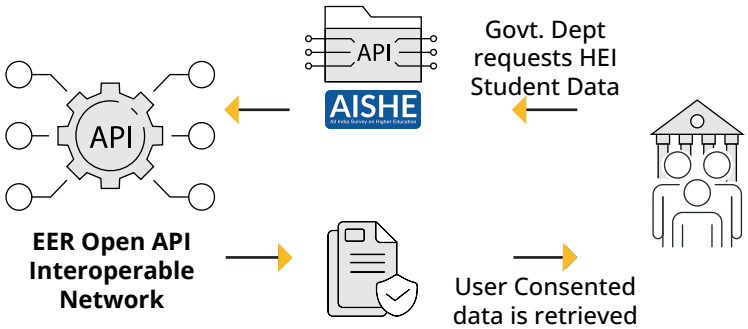
User Story: Higher Education Institution



IIT / NIT / Universities / Govt & Private Colleges

EER APIs shall allow integration with AISHE platform and the retrieval and sharing of data on request

HEI Identifier: AISHE Code



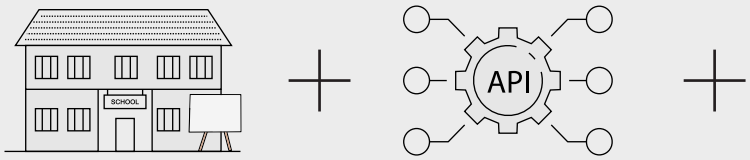
Govt. Dept requests HEI Student Data

EER Open API Interoperable Network

User Consented data is retrieved and shared with Govt. Dept.

Administration / Policy Makers / Parents can use EER APIs to retrieve HEI Information using AISHE code

Through EER Portal / EER Expose API Functionality all Ecosystem actors can utilize Open API Interoperability to ensure full information symmetry



Higher Education Supply

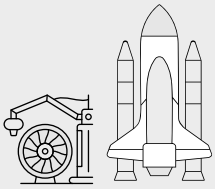
AISHE

EER Open API Backbone

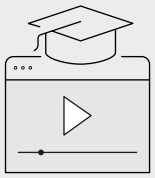
Education Ecosystem Standalone Education & Skilling Platforms

- **EER APIs ensures the single comprehensive profile of HEI contain data fields that are auto verified / attested in two or more communicating (existing) Education and Skilling Ecosystem Registries**
- **Bulk Upload Option will allow HEIs to update Student / Faculty lists through EER APIs to ensure single updated source of truth for planning & monitoring**

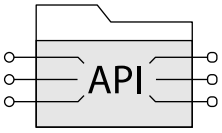
User Story: EdTech Company & Startups



Aerospace startup, XYZ
is a market leader and is looking to hire fresh talent and enhance their brand awareness amongst students

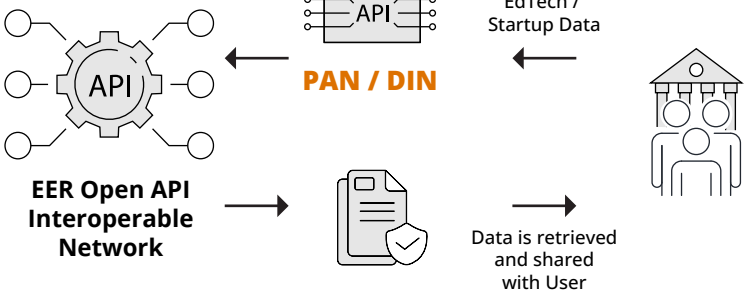


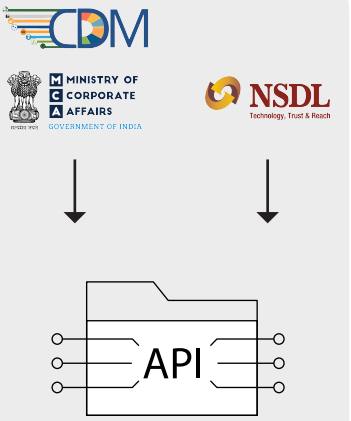
EdTech Company, XYZ
is a popular online learning service provider



Identifier:
GSTN / PAN / DIN

EER API integration with NSDL PAN APIs and MCA Data APIs (DIN/CIN) and MCA CDM Integration allows the retrieval and sharing of data on request





Through EER Portal / EER Expose API Functionality all Ecosystem actors can utilize Open API Interoperability to ensure full information symmetry

Annexure B

Framework for implementing NDEAR-Registries

Implementing a Registry system is complex since it involves addressing various aspects across policy, administrative & operational implementation, user behavior and technology. This needs a seamless approach involving key stakeholders and use of a framework to guide better decisions and drive the right actions while mitigating any anticipated risks. The PPP-R framework (Policy, Precedence, Principles - Risks framework) enables this and has precedence of being used in Mission KarmaYogi by the Government of India. This document highlights how the PPP-R framework can be used while implementing NDEAR Registries.

Designing and Implementing Purpose-driven Registry Systems

It is recommended to use the PPP-R (Policy-Precedence-Principles-Risk) framework for designing and implementing purpose-driven electronic registry systems.

The PPP-R framework was developed and used in the operationalization of the iGOT platform, helping to ensure that the work being done is in full compliance with the vision, goal and objectives of the program. It will help to apply learnings from similar government initiatives and ensure the compliance and adoption of relevant policies in a structured way.

The PPP-R framework involves application of first principles to leverage existing policies and learnings from relevant initiatives and define guiding Principles for the initiative; which in turn can be applied to systematically arrive at structured conclusions for design and implementation decisions.

Following this framework to develop programs, new initiatives -

- Are able to leverage any work that has already been done,
- Are compliant with existing government policies,
- Are in line with other programs rolled out earlier that have set a precedent
- Are able to arrive at concrete, compliant principles for program roll-out, and
- Can develop a comprehensive strategy to assess and mitigate risks based on informed decisions taken by the required authorities.

PPP-R framework for purpose-driven registry system

The section below defines the PPP-R framework for the NDEAR initiative to enable a benefit-led lifelong (KG to PG & skilling) registry system and unified view for students, teachers and institutions. The framework can be used to arrive at structured conclusions for design and implementation decisions.

Policy:

The following policies have been looked at, in the context of enabling purpose-driven Digital Identities for education and skilling:

1. The NDEAR report talks about the need for student, teacher and institute registries to be federated (not in a central datastore both administratively and technically), consent driven, live, reusable and trustworthy - decreasing cost of validation; made interoperable via common standards and APIs.

2. MeitY's InDEA 2.0 committee report lays out the definitions for registries, credentialing; best practices, architecture principles and clear recommendations for implementation. It calls out the need to create purpose driven interlinked federated registries using existing IDs; storing attested facts and credentials about people and entities; allowing individuals and entities to avail various services with registries electronically validating their claims via Open APIs. It recognizes enabling federated registries as the core building block for ensuring inclusive development as part of digitization effort in any domain. Registries are not mere databases, they need careful user-centric design giving users the control while authorities/systems can attest & validate data attributes. Ability to use an existing registry data (under appropriate policy with the consent of the user) is critical to eliminate today's repeated data collection & validation process that is costly, error prone, and most importantly inconvenient to citizens. In every registry it is necessary that the subjects in that registry are identified in a unique & trusted fashion.

3. The NDEAR student registry committee deliberations, and Working Group notes - delving on the initial design and roll out strategy of Student digital IDs and registries in alignment with NDEAR report.

4. The Digital Personal Data Protection Bill, 2022 recognizes the importance of user consent in the context of data, the right of individuals to protect their personal data, and the need to process personal data for lawful purposes.

Precedents :

1. Large scale electronic registries including AADHAAR for residents, Property registries, Vehicle registries, etc.

2. The National Health Authority, as part of its Unified Health Interface project intends to create an open interoperable platform connecting digital health solutions. Systems being built as part of this effort include registries of doctors and health facilities, electronic health record, ABHA account etc.

Principles: (That are key in order to be able to deliver benefits)

1. **Purpose driven, Federated design:** It is important to create a "federated set of registries", each of which is meant for a "specific purpose" rather than a universal, all inclusive registry. Given the federated nature of service delivery and Government systems, it is essential that each registry be maintained in an autonomous way with its own workflows, purposes and rules of participation. These registries may get interlinked via registry IDs depending on the policies that allow such linking. Interlinked registries may be required to provide an unified view of benefits delivery.

2. **Digital identifier as key to Registry, Use existing IDs:** All such registries should have a digital identifier to uniquely identify a record. When registering, people must be given an option to use their existing digital IDs such as AADHAAR / PAN / GSTN mobile, etc as appropriately to fit the purpose of that registry and also allow people to control, update, manage their record using the common IDs such as Aadhaar, mobile, etc.

3. **Purpose driven Uniqueness:** When global state-controlled uniqueness is necessary for Govt benefit schemes, allow users to use their Aadhaar or any Aadhaar linked IDs to achieve it. If not, then allow common identifiers such as Digilocker to be used while still allowing users to voluntarily use their Aadhaar.

4. **Trustability:** Complexity is an inherent characteristic of large-scale ecosystems, and solutions cannot be trusted and sustained if the authenticity of the authorship and validity of credentials can be repudiated. Registries should support self-declaration as well as attestation of data as a means to ensure non-repudiation of credentials and facts as an embedded feature using user authentication and digital signatures. Credentials should, by design, ensure verifiability, portability, permanence and inclusivity, while incorporating consent based and self-describing properties.

5. **Empowerment:** Empowering data owners by giving them the ability to view, initiate correction and control how their information is accessed and used, by giving them the ability to give and withdraw consent at the attribute level (consent-based architecture). InDEA 2.0 is also focused on empowering individuals and entities - it recommends bringing together identities, assets

and transactions - referencing verifiable credentials, open networks and protocols to help systems achieve user benefits. Credentials (various certificates in digitally verifiable form) enable people and entities to make claims about them (e.g., claims about academic degree or work experience) for availing services and the service provider having the ability to verify those claims in a paperless and trusted manner. As per InDEA 2.0, implementers must necessarily be cognizant of all the three aspects of Digital Empowerment and therefore not only implement federated digital IDs, but also address the aspects of data & credential, and when possible facilitate and enable an open interoperable network within their domain. Any registry provider/custodian must design the registry with the subject (person) in the center and ensure convenience, inclusion, data empowerment, and meaningful choice for them to control and manage their own record within the registry.

6. **Security:** Ensuring that data is exchanged in a secured manner with well-defined privacy rules and in alignment with access allowed by data owner and issuer - application of consent mechanisms within systems to ensure data is used only with the knowledge and consent of the owner is also specifically called out both in the InDEA 2.0 as well as NDEAR committee reports.

7. **Universal Access and Interoperability:** Enable secure digital access and interoperable communication across systems using secure APIs to ensure seamless integration across diverse systems - allowing them to communicate in a trusted fashion.

8. **Use case centric design -** Registry design needs to be user-centric, rooted in use cases that will ensure active usage of the Registry. Likewise, registry adoption must be driven via use cases that deliver concrete value to the end user, and incentivize them to take consented control of their data.

    - **Minimal data models:** The unified data model for the Registry must be minimal, and evolved based on the needs for which the Registry is being built - it should be kept to a minimum so as to enable envisioned use-cases, and not be allowed to grow unchecked.

Risks & Mitigation :

- **Data Security & Data Model Design and Privacy Checks::** The data model for the Registry should be envisioned in the context of the use-cases that it is built for. It is critical to keep the unified account data model to a minimum, and integrate existing systems via secure APIs instead of bringing all data centrally. This will also help keep data privacy concerns in check.

- **Push back to Registry usage/ integration::** The intent should not be to make existing systems redundant, but to leverage them, and allow them to integrate with each other using Open APIs as per the NDEAR guidelines that have been laid out.

- **Registry adoption risks::** Aiding adoption and ensuring registry usage should be driven by strong adoption strategies that involve user-centric use cases, plans and budget for adoption drives, as well as close monitoring of adoption metrics.

- **Privacy & Uniqueness of identities::** The Supreme Court of India clearly articulated the need to have privacy as a fundamental right, while allowing Government systems to enforce the uniqueness of ID for specific usage, where it is appropriate and necessary. Government systems as well as service delivery, by nature, are federated. Chapter 4 of InDEA 2.0 covers the architecture and the recommendations for digital IDs and dwells on the need for linked, federated registries. Government systems in India must support diversity and be inclusive in nature - and incorporate design that is privacy-respecting, and allow choice for citizens to be able to use a few of their preferred IDs for various purposes, instead of attempting to burden the user with more IDs than necessary.

- **Repeated data collection** across disparate systems leads to information that is inconsistent, out-of-date and unusable. Allowing for re-use of existing data and systems, rather than having to collect/ build ground-up once again can simplify systems and processes, by eliminating the need for every system to repeatedly capture, validate and manage the data. Paperless and trusted data verification via Registries and verifiable credentials leveraging data via APIs and user consent allows for express 'one-click onboarding' as well as enabling ecosystem innovation with trusted access to data.

- **Pushback by States, Boards, Private institutions ::** Letting existing systems to integrate as per NDEAR principles while "unifying" them using open Registry APIs into a minimal, user-controlled view (voluntarily Aadhaar linked, except when it comes to Govt. benefit purposes for which Aadhaar can be mandated)

Annexure C
FAQ

1. **What is Registry? For whom is it? What does it do? and how it benefits me?**
   Registries are one of the most important elements of systems that collect, store, disseminate and establish rights of subjects (people/entities/things represented within each registry) in data or property represented by that data allowing the subjects to unlock value through its usage by them. The correct use and management of these registries can translate to substantial economic as well as administrative benefits.

   Within NDEAR, the importance and use of registry cuts across all 5 personas (Student/Learner, Teacher, Parent, Administrator and Community member) and caters to all 3 broad scenarios (Learn, Help Learn and Manage Learn) and 2 interactions (Learning and Administration).

   Registry enables ease of access and use for consented subjects/actors to enroll and avail various services and benefits and enables multiple use cases e.g. Entrance tests, Admissions, Scholarship disbursement, Evaluation, Certification, Issue awards, recognition etc. for students, teachers and other users, Holistic access to education related credentials for students, school / institute / skill provider accreditation etc. In addition, having verified data within various registries with open APIs (for consented access and sharing) allows other systems to onboard users with ease and at low cost by eliminating repeated data collection and validation.

2. **Will the registry system issue a new Id?**
   Existing id shall be utilized and no new id will be issued.

3. **Will the registry system be centralized or decentralized?**
   Student and Teacher Registries are federated by nature, given the prevalence of multiple education and skilling boards and departments across the country. Each such entity (CBSE, State Boards, Skilling Dept. / Colleges/ Institutes/ Universities etc.) will maintain Registries to manage their Student/ Teacher and Institute data, as well as transaction systems to manage various workflows and lifecycles. No central registry of all students will be created under EER as per the guidelines laid down by NDEAR and InDEA 2.0 have to be hosted, as well as managed in a decentralized fashion.

4. **My platform contains a lot more data than is necessary for the registry. Why should I construct or update a new registry system?**
   Constructing or updating to a new registry system shall enable Interoperable digital ecosystems. It will enable ease of access and use for consented subjects/actors to enroll and avail various services and benefits and enables

multiple use cases e.g. Scholarship disbursement, issue awards, recognition etc. for students, teachers and other users, Holistic access to education related credentials for students, school accreditation etc. In addition, having verified data within various registries with open APIs (for consented access and sharing) allows other systems to onboard users with ease and at low cost by eliminating repeated data collection and validation.

5. **My platform does not have minimal attributes as required by the registry. How do I fulfill the registry blueprint mandate?**
   Platform employs the common minimal data fields (Name, DOB, Gender, Father Name, Mother Name, Address, Mobile Number, Email IDs etc.) as per NDEAR registry schema specifications. Existing platform can upgrade and incorporate the common minimal attributes in the existing platform.

6. **My registry system is not compliant to NDEAR EER? What should I do?**
   Registry system is to be upgraded to enable the registry capabilities as per NDEAR specifications and guidelines.

7. **My platform contains a lot more data than is necessary for the registry. Why is it not a registry?**
   While your platform needs to be compliant with overall data protection regulations, if Platform enables the key capabilities of a EER registry system, then it is qualified. Following 5 Key capabilities that should be enabled while deploying Student Registries:

   a) **Creation of Registry with common minimal data fields for persona** (Full Name, DOB /, Gender, Father Name, Mother Name, Address, Mobile Number, Email, Aaadhar/PAN, /state uni/School ID, Digilocker ID, ABC Id, Passport ID etc.) maintained in distributed manner

   b) For entities: Name, Date of registration of establishment, Address, Mobile Number, Email, PAN/Aadhaar/GSTN maintained centrally by NETF/NIC.

   c) Registries should provide for **common APIs (using standard API specifications) that enable Single sign on (SSO) as well as consented and authenticated profile sharing** by its users

   d) Registries should offer **API support for single-click onboarding** from one Registry system to another

   e) Provision for **persona** to **view, edit and manage their Registry profiles** (user edited records can be marked as 'self-declared', and post attestation/verification by school/institute/authority, the records can be marked as **'verified'**) based on current workflows laid out by the Registry custodian, and their policies.

8. **How can I find out if my system complies with the requirements of the NDEAR EER Registry?**
   NDEAR specification and compliance checklist shall be made available on NDEAR portal / NETF portal and other Govt portals.

9. **As a student or teacher, how can I update my name, mobile etc. in the registry?**
   All EER compliant registries shall provide provision for end users (students) to view, edit and manage their Registry profiles (user edited records can be marked as 'self-declared', and post attestation/verification by school/institute/authority, the records can be marked as 'verified') based on current workflows laid out by the Registry custodian, and their policies.

10. **How can I provide my consent for data sharing?**
    Registries shall provide for common APIs (using standard API specifications) that enable consented and authenticated profile sharing by its users (for usage across other NDEAR related Education and Skilling ecosystems)

11. **How can I remove / update my consent for data sharing?**
    Registries shall provide for common APIs (using standard API specifications) to remove / update the consent.

Annexure D

References

1. **DEPA (**Data Empowerment and Protection Architecture) : https://www.niti.gov.in/sites/default/files/2020-09/DEPA-Book.pdf

2. **JAM** (Jan Dhan-Aadhaar-Mobile) : https://www.pmindia.gov.in/en/government_tr_rec/leveraging-the-power-of-jam-jan-dhan-aadhar-and-mobile/

3. **NDEAR (**National Digital Education Architecture): ndear.gov.in

4. **InDEA 2.0 :** https://www.meity.gov.in/writereaddata/files/InDEA%202_0%20Report%20Draft%20V6%2024%20Jan%2022_Rev.pdf