Co-funded by the European Union

OPEN ASIA
UNIFYING SCIENCE, EMPOWERING INNOVATION

OPEN-ASIA: Boosting engagement of HEIs in Open Science in India and Malaysia

OPEN SCIENCE INFRASTRUCTURE DEVELOPMENT PLAN P2-TIET

Deliverable D4.2

Project reference number: 101128493

Co-funded by the European Union

OPEN ASIA
UNIFYING SCIENCE, EMPOWERING INNOVATION

OPEN SCIENCE INFRASTRUCTURE DEVELOPMENT PLAN
Thapar Institute of Engineering & Technology, India
P2-TIET

Project Acronym:	OPEN-ASIA
Project full title:	OPEN-ASIA: Boosting engagement of HEIs in Open Science in India and Malaysia
Project No:	101128493
Funding Scheme:	ERASMUS+, CBHE
Coordinator:	University of Malaya (P1-UM)
Project start date:	1 January 2024
Project end date:	30 September 2027

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

DOCUMENT CONTROL SHEET

Title of Document:	Open Science Infrastructure Development Plan/ P2-TIET
Work Package/ Task/ Deliverable:	WP4/ T4.1 / D4.2
Last version date:	18/08/2026
Status:	Final
Document Version:	v.04
Number of Pages	26
Dissemination Level	Internal (project`s consortium) - RESTRICTED

VERSIONING AND CONTRIBUTION HISTORY

Version	Date	Revision Description	Responsible Partner
v.01	21/04/2026	The first version of the document structure	P2-TIET
v.02	20/05/2026	Content review and assessment against project KPIs and targets; preparation of recommendations for improvement	P9-TAU
v.03	30/06/2026	Revision and finalisation of institutional contributions based on TAU's recommendations before consolidation.	P2-TIET
v.04	18/08/2026	Technical coordination, document quality assurance, compliance verification, monitoring of compliance with project requirements, and EU visibility review	P8-EPDRI

TABLE OF CONTENT

Executive Summary 4

1. Introduction 5

2. Goals and Objectives 6

3. Policy Framework 6

4. Infrastructure Components 9

5. Science Shop 2.0 — Community-Driven Research 18

6. Outreach and Community Engagement 20

7. Training and Capacity Building 21

8. Evaluation and Monitoring 22

9. Implementation Timeline 23

10. Budget and Resource Allocation 24

11. Conclusion 25

References 26

Executive Summary

The Open Science Infrastructure Development Plan for Thapar Institute of Engineering & Technology (TIET) is a strategic roadmap designed to make the institution's research ecosystem more transparent, accessible, and globally collaborative. As a founding member of the Erasmus+ CBHE project, TIET is committed to embedding Open Science principles — anchored in FAIR (Findable, Accessible, Interoperable, and Reusable) data management — across its research, teaching, and community-engagement activities.

TIET already occupies a strong position in the open-science landscape. The Nava Nalanda Central Library (NNCL) — ranked among the top 26 architecturally stunning academic libraries in the world — operates KOHA-based integrated library management, the TIET Digital Repository (TuDR) powered by DSpace (housing ~4,782 theses), the Shodh Ratna research archive, the Kalpavriksha custom content digital library, subject-and-research support portal, and a Research Information Management (RIM) system for faculty. TIET researchers have produced 12,684 scholarly publications with 208,016 Scopus citations, of which 779 are Gold OA, 318 Bronze OA, and 233 Green OA — with a significant expansion target for Green OA uploads of the 6,831 currently-closed-access papers (Source: thapar.irins.org).

The plan sets three primary goals: (1) achieve 90% Open Access availability of TIET's research outputs by 2029; (2) ensure 80% of research projects submit a Data Management Plan (DMP) through a dedicated portal; and (3) train at least 70% of TIET researchers in reproducible research and Open Science practices. These goals will be underpinned by TIET's exceptional AI infrastructure — comprising 7 NVIDIA DGX A100, 6 DGX H100, and 4 DGX B200 systems supported by 400 TB of NetApp storage — alongside a planned Science Shop 2.0 initiative modelled on the Finnish experience, to bridge research and society.

1. Introduction

Open Science is a paradigm that promotes transparency, accessibility, and collaboration by making scientific knowledge — publications, data, software, and methodologies — openly available to researchers, practitioners, and the public. The UNESCO Recommendation on Open Science provides the global normative framework, emphasising FAIR principles and equitable participation.

Thapar Institute of Engineering & Technology (TIET), a deemed-to-be university accredited NAAC A++, is a participating institution in the Erasmus+ funded OpenAsia project. TIET's library — the Nava Nalanda Central Library — has been a pioneer in deploying open-source technologies to drive Open Science, including KOHA ILMS, DSpace repositories, and LibGuides-based research portals. This plan formalises and accelerates that journey.

1.1 Context and Rationale

India's National Science & Technology Policy increasingly aligns with global Open Science norms, and UGC mandates deposition of doctoral theses in Shodhganga. TIET, as a technical institution producing research across engineering, sciences, humanities, and management, is well-positioned to champion Open Science within the Indian higher-education sector.

Participation in OpenAsia provides TIET with a structured framework, international best practices and a collaborative platform for policy development, staff training, and community engagement.

1.2 Scope

This plan covers: open-access publishing and policy; research data management and infrastructure; digital repositories; AI-enabled research support; governance and management arrangements; security, data protection, and operational procedures; Science Shop 2.0; training and capacity building; outreach and community engagement; monitoring and evaluation; and budget and sustainability.

2. Goals and Objectives

2.1 Goals

- Ensure at least 90% of all TIET research publications are freely accessible via an institutional repository or open-access journal by 2029.
- Achieve at least 80% of TIET research projects submitting Data Management Plans (DMPs) through a dedicated platform.
- Train at least 70% of TIET researchers and doctoral scholars in reproducible research and Open Science best practices by 2028.
- Establish Science Shop 2.0 as an operational community-driven research hub by 2027.

2.2 Objectives

1. Develop and implement an institutional Open Access policy aligned with UGC guidelines, UNESCO recommendations, and Erasmus+ OpenAsia deliverables.
2. Establish a centralised Research Data Management (RDM) platform enabling secure storage, sharing, and reuse of data in compliance with FAIR principles.
3. Expand TIET's existing DSpace repositories (TuDR and Shodh Ratna) and integrate them with a unified discovery layer (Anvesaka).
4. Leverage TIET's DGX A100/H100/B200 AI cluster and NetApp storage to build a next-generation research data and AI infrastructure.
5. Provision an Open Access Publication Fund to subsidise Article Processing Charges (APCs) for researchers publishing in high-impact OA journals.
6. Build Science Shop 2.0 as a platform connecting university expertise with societal and community needs.

3. Policy Framework

TIET will develop and implement a comprehensive policy framework governing Open Science practices. This framework draws on existing institutional commitments, national guidelines, and Erasmus+ OpenAsia project deliverables.

3.1 Open Access Publication Policy

TIET will formalise an institutional Open Access mandate requiring researchers to deposit accepted manuscripts in the Shodh Ratna / TuDR repository within six months of acceptance. The policy will:

- Mandate self-archiving (Green OA) of all externally funded research outputs.
- Support Gold OA publication through an institutional APC fund, with priority for Q1 Scopus-indexed journals.
- Recognise and incentivise Bronze OA pathways where publisher agreements permit.
- Align with Shodhganga mandates for PhD theses and extend coverage to M.Tech dissertations.

Current status (thapar.irins.org, 2025): 12,684 total publications; 779 Gold OA; 318 Bronze OA; 233 Green OA; 6,831 Closed Access — representing a significant Green OA upload opportunity.

Category	Count	OA Type	Notes
Total Publications	12,684	—	Journal + Conference + Books + Other
Gold Open Access	779	Gold OA	Published in fully OA journals
Green Open Access	233	Green OA	Self-archived / repository deposits
Bronze Open Access	318	Bronze OA	Free on publisher site, no licence
Closed Access	6,831	Closed	Target for green OA upload
Total Citations (Scopus)	**208,016**	—	**Source: thapar.irins.org**

3.2 Research Data Management (RDM) Policy

The RDM policy will outline researcher responsibilities through the full data lifecycle:

- **Data Management Plans (DMPs):** All projects above ₹5 lakh must submit a DMP before project commencement using TIET's online DMP portal.
- **Data Storage and Security:** Research data must be stored in TIET-provisioned infrastructure (NetApp cluster / DGX nodes) with appropriate backup, access control, and versioning.
- **Data Sharing:** Final research datasets must be deposited in the TIET Research Data Repository no later than the date of first online publication.
- **Retention:** Research data must be retained for a minimum of ten years post-publication.

Thapar Institute of Engineering & Technology (TIET) has signed a Transformative "Read and Publish" Agreement with ACM (Association for Computing Machinery). Under this agreement, TIET can now publish research in ACM journals, conference proceedings, and magazines as Open Access— without paying any Article Processing Charges (APCs).

3.3 Intellectual Property and Licensing Policy

TIET's existing IP cell will be strengthened to include guidance on Creative Commons licensing for publications and datasets, software licensing (OSI-approved licences for open-source outputs), and patent-open science balance where commercial considerations apply.

3.4 Research Evaluation and Incentive Structures

TIET will introduce structured incentives to encourage Open Science adoption:

- Annual Open Science Awards recognising faculty/research teams with outstanding OA or RDM practices.
- APC Fund: for Q1 journals; (subject to annual budget).
- Weightage for Open Science practices in internal research performance assessments.
- Recognition in annual reports and NAAC/NIRF documentation for OA outputs.

3.5 Security, Data Protection, and Operational Procedures

TIET will formalise the operational procedures that protect research data and ensure continuity of Open Science services, complementing the storage and retention provisions already described in Section 3.2.

3.5.1 Data Protection and Sensitive Data Management

- **Data Classification:** Datasets are classified as Open, Restricted, or Sensitive at DMP submission stage; classification determines storage location, access controls, and permissible sharing pathways.
- **Sensitive Data Handling:** Sensitive data (e.g., human-subject research, personally identifiable information, or data subject to NDAs) is stored on access-restricted NetApp volumes, with ethics-committee clearance required prior to deposit.
- **Compliance:** All data handling complies with applicable Indian data protection requirements and institutional research ethics guidelines; Data Stewards (Section 4.4.4) are responsible for classification accuracy.

3.5.2 Security and Access Control

- **Access Control:** Access to TIET-provisioned research infrastructure (NetApp cluster, DGX nodes, R760 server) is granted through role-based access control, administered by the Data Centre.
- **Authentication and Authorisation:** Researchers and staff authenticate via TIET's institutional single sign-on; privileged administrative access to repository back-ends and AI infrastructure is logged and reviewed periodically by the Data Centre.

3.5.3 Backup and Disaster Recovery

- **Backup Strategy:** The NetApp storage cluster (Section 4.2.2) supports tiered archiving and disaster-recovery replication; repository content (TuDR, Shodh Ratna) is backed up on a scheduled basis.
- **Disaster Recovery:** The Data Centre maintains documented recovery procedures for repository and AI infrastructure, with periodic restoration testing to verify recovery time objectives.

3.5.4 Infrastructure Maintenance Workflows

Routine maintenance of the DGX cluster, NetApp storage, Dell PowerEdge R760, and NVIDIA Spark workstation is scheduled jointly by the Data Centre, with maintenance windows communicated in advance to researcher stakeholders to minimise disruption to repository availability and AI-assisted research-support services.

3.6 Integration of Open Science into Institutional Processes

Building on the policy framework above, TIET will embed Open Science requirements directly into existing institutional workflows so that compliance becomes a routine part of research administration rather than a separate parallel process.

- **Research Project Lifecycle:** DMP submission (Section 3.2) is integrated as a mandatory gate within the project approval workflow for all projects above ₹5 lakh, administered jointly by the Office of Research & Sponsored Projects and the DMP portal.
- **Grant Application Processes:** Internal grant application templates will require applicants to reference their DMP and intended OA route, aligning institutional funding processes with external funder expectations (DST, SERB, ICSSR and others).
- **Research Assessment Systems:** Open Science practices (OA publishing, repository deposit, DMP compliance) carry defined weightage in internal research performance assessments, as set out in Section 3.4, and are reflected in annual appraisal documentation.
- **Continuing Education and Lifelong Learning:** Open Science literacy modules (Section 7.2) are embedded within PhD coursework, M.Tech research methodology, and continuing-education programmes, ensuring every research scholar encounters FAIR and reproducibility principles before commencing independent research.

4. Infrastructure Components

TIET's open-science infrastructure is built around three interconnected pillars: the Nava Nalanda Central Library's scholarly services, a state-of-the-art AI and HPC computing centre, and community-facing engagement platforms.

4.1 Nava Nalanda Central Library — Scholarly Services Hub

Service owner/operator: Nava Nalanda Central Library (NNCL), TIET | Service Lead: Dr. Shri Ram, Librarian & Head

NNCL is the central hub for digital research support at TIET. Housed in a five-storied, internationally recognised iconic building with seating for 1,000+, 14 Group Discussion Rooms, and a dedicated DigiSpace, NNCL provides the following active open-science services:

4.1.1 KOHA Integrated Library Management System (ILMS)

- Open-source ILS deployed since 2017; over 15,000 libraries worldwide use Koha.
- Manages 146,000+ physical books, e-journals, and standards from 29+ publishers.
- Kalpavriksha Custom Content Digital Library: KOHA repurposed as a course-reserve and document delivery portal, mapping syllabus-linked e-resources to individual TIET courses.

- RFID-enabled circulation and fully integrated daily footfall management (In/Out User Management System).
- Robust OPAC accessible institution-wide.

4.1.2 TIET Digital Repository (TuDR) — DSpace

- Open-source DSpace platform (MIT origin) housing ~4,782 PhD and M.Tech/ME theses from all TIET departments.
- TuDR is compliant with Shodhganga/INFLIBNET protocols and OAI-PMH interoperability standards.
- Listed in OpenDOAR and ROAR international directories.
- Development plan: Upgrade to DSpace 7 (Angular frontend), integrate persistent DOI minting via DataCite, and add OrcID auto-linkage for contributor disambiguation.

4.1.3 Shodh Ratna — TIET Research Archive

- A DSpace-based institutional repository preserving full-text scholarly outputs: journal articles, conference papers, book chapters, patents, and project reports produced by TIET researchers.
- Promotes Green Open Access and increases global visibility of TIET research.
- Target: archive 90% of post-2020 TIET publications by 2029; upload Green OA versions of 6,831 currently closed-access papers.

4.1.4 LibGuides / SubjectsPlus — Subject & Research Support Portal

- Open-source SubjectsPlus platform powering NNCL's Subject & Research Support Services portal.
- Provides discipline-specific guides for Biotechnology, Chemical Engineering, Civil Engineering, Computer Science, and 15+ other departments.
- Features: Research Databases, Reference Management, Copyright & Patents, Theses & Dissertations, Open Access Resources, NPTEL Video Lectures.
- Contact-a-Librarian and FAQ modules for researcher support.

4.1.5 Research Information Management (RIM) System — Faculty Profiles

- Institutional RIM portal (thapar.irins.org / TIET Faculty Profiles) aggregates research intelligence: 509 faculty profiles, 14,015 publications, impact metrics from Scopus and Crossref.
- Powered by VIDWAN (national researcher ID system) integration.
- Visualises Gold / Bronze / Green / Closed OA distribution per faculty and department.
- Development plan: Integrate ORCID, ROR, and OpenAlex APIs for richer disambiguation and real-time citation updates.

4.1.6 Anvesaka — Single Discovery Search Platform (Proposed)

- VuFind-based open-source discovery service (branded 'Anvesaka' — Sanskrit: the seeker) planned as a unified search interface across KOHA, TuDR, Shodh Ratna, e-journals, and open-access resources.

- Will consolidate metadata from print catalogue, digital repositories, databases, and OA preprint servers into a single indexed search box.
- Development plan: Deploy Solr index, configure OAI-PMH harvesters from DSpace and KOHA, and integrate bX article-level recommender.

4.1.7 Electronic Resources and Databases

- Access to 10,000+ journals and 40,000+ conference proceedings from 29+ publishers including IEEE Xplore, ACM DL, Science Direct, Springer Nature, Wiley, Taylor & Francis, Oxford UP, Emerald, APS, and AIP.
- Bibliographic & statistical databases: Web of Science, Scopus, EBSCOHost, CMIE.
- Standards collections: ASME, IEEE, IRC, BIS.
- RefRead single-interface discovery for all library content including open-access journals.
- NPTEL Video Library: 296+ courses in Science, Technology & Management.

4.1.8 Preprint and Open-Access Repositories

- TIET researchers actively deposit preprints on arXiv, bioRxiv, TechRxiv (IEEE), and IndiaRxiv.
- Shodh Ratna serves as the institutional preprint and postprint archive under Green OA policy.
- Development plan: Establish a monitored preprint submission workflow within Shodh Ratna to guide researchers from submission to peer-review to final deposit.

4.2 AI and High-Performance Computing Infrastructure

Service owner/operator: Thapar School of Advanced AI and Data Science.

TIET has made a landmark investment in AI and HPC infrastructure that distinguishes it as one of the best-equipped technical universities in India for data-intensive research. This infrastructure directly enables AI-assisted research, large-language-model fine-tuning, computational simulations, and data-driven Open Science workflows.

4.2.1 DGX AI Workstation Cluster

TIET's AI workstation cluster comprises three generations of NVIDIA DGX systems:

System	Count	GPU Architecture	VRAM / System
NVIDIA DGX A100	7 units	A100 (Ampere) – 8 × 80 GB	640 GB per unit
NVIDIA DGX H100	6 units	H100 (Hopper) – 8 × 80 GB SXM5	640 GB per unit
NVIDIA DGX B200	4 units	B200 (Blackwell) – 8 × 192 GB	1.5 TB per unit
NetApp Storage	1 cluster	All-flash / hybrid NAS	400 TB total

The three DGX generations provide a heterogeneous GPU fabric spanning NVIDIA Ampere (A100), Hopper (H100), and Blackwell (B200) architectures — totalling 136 high-performance GPUs. The systems are interconnected via NVLink/NVSwitch and InfiniBand networking for distributed training and inference.

4.2.2 NetApp Storage Infrastructure

- 400 TB high-performance storage from NetApp, providing all-flash and hybrid NAS/NFS/SAN services.
- Supports research data lifecycle management: active storage, tiered archiving, and disaster-recovery replication.
- Integrated with DGX cluster via high-speed InfiniBand fabric for low-latency data access.
- Serves as the primary storage backend for Shodh Ratna, TuDR, and the planned Research Data Repository.

4.2.3 Dedicated Server and AI Workstation Procured under Erasmus+ OpenAsia

To directly underpin TIET's Open Science commitments under the Erasmus+ OpenAsia project, the institution is procuring two purpose-selected computing systems: a high-capacity enterprise server for repository hosting and data management workflows, and a cutting-edge personal AI workstation for researcher-facing AI-assisted Open Science tasks. These systems are designed to complement the existing DGX A100/H100/B200 cluster and NetApp storage fabric, creating a comprehensive and resilient Open Science computing stack.

Dell PowerEdge R760 — Open Science Repository and Data Management Server

The Dell PowerEdge R760 is a 2U rack-mounted enterprise server configured with dual Intel Xeon Gold 5416S processors (2.0 GHz base clock, 16 cores / 32 threads per socket, 16 GT/s UPI, 30 MB LLC cache), delivering a combined 32 physical cores and 64 logical threads. The memory subsystem comprises eight 64 GB RDIMM modules running at 6,400 MT/s in Dual Rank configuration, providing 512 GB of high-bandwidth ECC-protected RAM — sufficient to hold the entire working index of TIET's DSpace repositories and Anvesaka discovery engine in memory simultaneously for sub-second search response times. Storage is provisioned through four 960 GB SATA Read Intensive SSDs (6 Gbps, 512e, 2.5-inch hot-plug form factor), yielding approximately 3.84 TB of raw SSD capacity in a hot-swappable, fault-tolerant configuration; these drives are optimised for the high read-to-write ratio characteristic of repository serving, metadata indexing (Solr/Elasticsearch), and OAI-PMH harvesting workloads. The R760's balanced compute-to-memory ratio and enterprise-grade reliability features — including Persistent Memory support, iDRAC9 remote management, and redundant power supplies — make it ideally suited to serve as the primary application and database host for TIET's open-science stack, including DSpace 7 (TuDR and Shodh Ratna), the KOHA ILMS backend, the Research Data Management (DMP) portal, and the LibGuides/SubjectsPlus web services. By hosting these services on a dedicated, always-on enterprise server rather than shared infrastructure, TIET ensures 24×7 availability, predictable performance under peak access loads (such as during examination and submission periods), and clear data sovereignty for all repository holdings.

Researcher-Facing AI Workstation

Complementing the server infrastructure, TIET is procuring an NVIDIA Spark personal AI supercomputer (part of the NVIDIA Project Digits family) as the dedicated AI workstation for Open Science applications. The NVIDIA Spark is a compact yet extraordinarily capable Grace Blackwell-based system, housing the GB10 Superchip that pairs an NVIDIA Blackwell GPU with a 20-core NVIDIA Grace ARM CPU on a unified NVLink-C2C interconnect. The system delivers up to one petaflop of AI compute (INT8 / FP4 precision) within a desktop form factor, with 128 GB of unified LPDDR5X memory shared coherently across the CPU and GPU — eliminating the data-transfer bottleneck that traditionally limits AI inference on discrete GPU systems. With up to 4 TB of NVMe SSD storage, the NVIDIA Spark can locally host and serve large language models (LLMs) with up to 200 billion parameters, making it the first personal workstation capable of running frontier-scale AI models without cloud dependence.

Within TIET's Open Science programme, the NVIDIA Spark will be deployed in Data Centre as a shared researcher-access facility, powering several high-value Open Science tasks. It will drive AI-assisted Data Management Plan (DMP) generation, whereby a fine-tuned LLM analyses a researcher's project description and automatically recommends appropriate data types, storage pathways, sharing licences, and retention schedules aligned with FAIR principles. The workstation will also support semantic full-text indexing for the Anvesaka discovery platform, enabling natural-language queries across TIET's combined corpus of 12,684+ publications, thesis collections, and research datasets — a significant advancement over keyword-only catalogue search.

Automated metadata extraction and enrichment for new repository deposits (PDF parsing, named-entity recognition for authors, institutions, and funding bodies, and auto-tagging with subject vocabularies such as ACM CCS and Library of Congress Subject Headings) will dramatically reduce the manual curation burden on library staff. The system will further support NLP-based research-integrity screening, cross-referencing submitted manuscripts against TIET's existing corpus to flag potential overlap before submission.

Finally, the NVIDIA Spark's two-unit interconnect capability (two Spark units can be paired via NVIDIA NVLink for models up to 405 billion parameters) provides a clear upgrade path should NNCL's AI workload requirements expand. Together, the Dell R760 server and the NVIDIA Spark AI workstation form a purpose-built, OpenAsia-funded Open Science computing nucleus at TIET — one that is operationally independent of the main DGX cluster and therefore always available for library-led, researcher-facing Open Science services without competing with the institution's primary AI research workloads.

4.3 Research Data Management Platform

TIET will deploy a three-phase RDM platform mirroring the lifecycle-based architecture recommended by OpenAsia:

- **Before the project (DMP Portal):** A web-based DMP creation tool (based on DMPRoadmap or RDMO open-source platforms) where researchers draft, submit, and update Data Management Plans. Plans auto-linked to project approval workflow.

- **During the project (Data Sharing Platform):** A secure collaborative workspace (TIET Research Drive) allowing internal and external collaborators to share and version-control datasets, analysis scripts, and documentation.
- **After the project (Data Archive):** Final datasets deposited in the TIET Research Data Repository (DSpace-based extension of Shodh Ratna), with DataCite DOI minting, Creative Commons licensing, and metadata aligned to Dublin Core / DataCite schema.

4.4 Open Science Governance and Management Arrangements

While Section 4 describes the technical and service infrastructure underpinning Open Science at TIET in detail, the institution recognises that strong infrastructure must be matched by an equally clear governance structure. This section formalises the roles, responsibilities, and decision-making mechanisms that coordinate the Library, the Data Centre, academic departments, and the AI infrastructure team in delivering Open Science services.

4.4.1 Governance Structure

TIET will establish a three-tier Open Science governance structure to ensure clear lines of accountability between strategic oversight, operational coordination, and day-to-day service delivery:

- **Open Science Steering Committee (Tier 1):** Provides strategic direction, approves the Open Science policy framework, and reports annually to the TIET Executive Council on progress against the goals set out in Section 2.
- **Open Science Coordination Cell (Tier 2):** Coordinates day-to-day implementation across the Library, Data Centre, and Thapar School of Advanced AI and Data Science; resolves cross-unit operational issues; and prepares materials for the Steering Committee.
- **Departmental Open Science Liaisons (Tier 3):** Department-level Open Science Ambassadors (introduced in Section 6.1) who liaise between the Coordination Cell and individual research groups, supporting researchers with day-to-day OA, RDM, and repository queries.

4.4.2 Roles and Responsibilities of Participating Units

Unit	Primary Responsibilities	Reporting Line
Nava Nalanda Central Library (NNCL)	Repository administration (TuDR, Shodh Ratna, Anvesaka); OA policy compliance monitoring; researcher-facing training; metadata quality.	Reports to Open Science Coordination Cell and Librarian.
Data Centre / IT	DGX and NetApp infrastructure operation; Dell PowerEdge R760 and NVIDIA Spark administration; data security, backup, and access control.	Reports to Open Science Coordination Cell and CTO.
Thapar School of Advanced AI and Data Science	AI-assisted DMP tooling, semantic indexing for Anvesaka, and responsible-AI oversight for research-support systems.	Reports to Open Science Coordination Cell.

Academic Departments	Nominate Open Science Ambassadors; encourage DMP submission and repository self-deposit; embed Open Science in curricula.	Reports to Departmental Liaisons and Dean (Academic Affairs).
Office of Research & Sponsored Projects	DMP review at proposal stage; APC Fund disbursement; tracking funded-project compliance with RDM policy.	Reports to Open Science Steering Committee.

4.4.3 Reporting and Decision-Making Mechanisms

- The Open Science Coordination Cell meets monthly to review operational matters and escalate policy-level issues to the Steering Committee.
- The Open Science Steering Committee meets at least twice yearly and reviews the Annual Open Science Progress Report (Section 8.2) before submission to the TIET Executive Council.
- Decisions on policy exceptions (e.g., embargo extensions, sensitive-data handling) are escalated through the Coordination Cell to the Steering Committee for approval.

4.4.4 Data Stewardship and Repository Administration

Data stewardship is shared between researchers, who remain responsible for the accuracy and ethical collection of their data, and NNCL, which acts as institutional steward for deposited datasets and publications once submitted to TuDR, Shodh Ratna, or the TIET Research Data Repository.

- **Repository Administration:** Designated repository administrators within NNCL manage user accounts, metadata schemas, embargo settings, and takedown requests for TuDR and Shodh Ratna.
- **Data Stewardship:** Each funded research project designates a Data Steward (typically the Principal Investigator or a nominated co-investigator) responsible for DMP accuracy, data quality, and timely deposit.
- **Coordination Arrangements:** The Open Science Coordination Cell maintains a single point of contact for coordination between infrastructure providers (Data Centre, IT) and academic units, avoiding duplication of effort and ensuring consistent service levels.

4.5 Consolidated Infrastructure Inventory

The major hardware and software assets described throughout Section 4 are consolidated below into a single inventory, presented in the structured format requested in the task description of the updated operational plan. This inventory identifies the custodian and maintenance responsibility for each asset, and indicates which components are supported through OPEN-ASIA.

Asset	Technical Specification	Operational Use Case	Custodian / Maintenance	OPEN-ASIA Supported
NVIDIA DGX A100 (7 units)	8 × 80GB A100 GPUs per unit; 640GB VRAM/unit	Large-scale model training, computational simulation	Thapar School of Advanced AI and Data Science / Data Centre	No — pre-existing institutional asset

NVIDIA DGX H100 (6 units)	8 × 80GB H100 SXM5 GPUs per unit; 640GB VRAM/unit	AI-assisted research, LLM fine-tuning	Thapar School of Advanced AI and Data Science / Data Centre	No — pre-existing institutional asset
NVIDIA DGX B200 (4 units)	8 × 192GB B200 GPUs per unit; 1.5TB VRAM/unit	Frontier-scale model inference and training	Thapar School of Advanced AI and Data Science / Data Centre	No — pre-existing institutional asset
NetApp Storage Cluster	400TB all-flash / hybrid NAS	Research data lifecycle management; DGX-linked storage backend	Data Centre / IT	No — pre-existing institutional asset
Dell PowerEdge R760 Server	Dual Xeon Gold 5416S, 512GB RAM, 3.84TB SSD	Hosts DSpace 7, KOHA backend, DMP portal, Anvesaka index	NNCL / Data Centre (joint custodianship)	Yes — procured under Erasmus+ OpenAsia
NVIDIA Spark AI Workstation	GB10 Superchip, 128GB unified memory, up to 4TB NVMe	AI-assisted DMP generation, semantic indexing, metadata enrichment	Data Centre administered	Yes — procured under Erasmus+ OpenAsia
KOHA ILMS	Open-source integrated library system	Circulation, OPAC, course-reserve management	NNCL	No — pre-existing, OpenAsia-aligned
DSpace (TuDR, Shodh Ratna)	Open-source repository platform (MIT origin)	Institutional repository for theses and scholarly outputs	NNCL	Partially — DSpace 7 upgrade aligned with OpenAsia goals
Anvesaka Discovery Layer	VuFind-based, Solr-indexed (planned)	Unified search across repositories, catalogue, and OA resources	NNCL / IT	Yes — development supported through OpenAsia

This inventory will be reviewed and updated annually by the Open Science Coordination Cell (Section 4.4.3) as new assets are commissioned or retired, and will be appended in full.

4.6 OPEN-ASIA Infrastructure and Achievements

To make the specific contribution of the Erasmus+ OpenAsia project clearly visible against TIET's substantial pre-existing infrastructure, this section consolidates what has been acquired or enhanced through OPEN-ASIA funding, current implementation status, and achievements to date.

4.6.1 Infrastructure Acquired or Enhanced through OPEN-ASIA

- **Open Science Repository and Data Management Server:** Dell PowerEdge R760 enterprise server, dedicated to repository hosting and data management workflows (Section 4.2.3).
- **Researcher-Facing AI Workstation:** NVIDIA Spark personal AI supercomputer, deployed as a shared researcher-access facility for AI-assisted DMP generation and semantic indexing (Section 4.2.3).
- **Repository Platform Enhancement:** OpenAsia funding and technical exchange are supporting the planned upgrade to DSpace 7 and the development of the Anvesaka unified discovery layer (Sections 4.1.2 and 4.1.6).

4.6.2 Current Implementation Status

- **Hardware Procurement:** Dell PowerEdge R760 and NVIDIA Spark workstation: procurement in progress, with deployment planned within the Data Centre as described in Section 4.2.3.
- **Training Delivered:** Library and faculty staff have participated in OpenAsia Open Science Forum presentations (February 2025) covering OSS in library operations, KOHA, DSpace, LibGuides, preprint archives, and RIM (Section 7.1).
- **Training of Trainers:** Selected staff are scheduled to attend OpenAsia international workshops, to become certified Open Science trainers (Section 7.2).

4.6.3 Researchers and Students Supported

Once operational, the OPEN-ASIA-funded server and AI workstation are expected to directly support researchers depositing in TuDR and Shodh Ratna, PhD scholars using the DMP portal, and library staff curating the combined corpus of 12,684+ publications referenced in Section 1. Specific researcher- and student-level usage statistics will be tracked from deployment and reported in future Annual Open Science Progress Reports (Section 8.2).

4.6.4 Achievements, Lessons Learned, and Future Development

- **Key Lesson:** TIET's pre-existing investment in DGX A100/H100/B200 infrastructure meant that OPEN-ASIA funding could be focused on dedicated, library-facing systems (the R760 and Spark) rather than duplicating core AI compute — a more efficient and complementary use of project resources.
- **Integration Approach:** Embedding OPEN-ASIA-funded systems within the broader DGX/NetApp ecosystem (Section 4.2.3) ensures they remain operationally independent for library-led services while benefiting from established institutional IT support.
- **Future Development:** Future phases will extend the Spark workstation's role in semantic indexing to the full Anvesaka discovery layer, and will explore NVLink pairing of Spark units (Section 4.2.3) should AI workload demand from NNCL grow.

5. Science Shop 2.0 — Community-Driven Research

Inspired by the Science Shop model successfully implemented by education fraternity (Finland) and other European institutions participating in OpenAsia, TIET will establish Science Shop 2.0 as an operational hub connecting university expertise with civil society, NGOs, local industry, and community needs.

5.1 Vision

Science Shop 2.0 at TIET will serve as a bridge between academic research capabilities and real-world societal challenges in the Punjab region and beyond, enabling community-driven research, citizen science, and public engagement with science.

5.2 Key Objectives

- Bridge the gap between research outputs and community needs by facilitating free and open access to scientific expertise.
- Enable co-creation of knowledge between students, faculty, and non-academic stakeholders.
- Promote citizen science and public participation in data collection, analysis, and interpretation.
- Strengthen TIET's societal outreach and 'third mission' in line with NAAC and NIRF expectations.

5.3 Science Shop 2.0 Initiatives

Community Research Partnerships

Establishing structured partnerships with Patiala Municipal Corporation, rural panchayats, NGOs, and small-scale industries to co-design research questions and deliver practical solutions. Priority thematic areas: water quality, air pollution monitoring, sustainable agriculture, smart infrastructure, and health technology.

Open Innovation Challenges

Annual hackathons and problem-solving competitions open to TIET students, faculty, and community members, focusing on real-world issues identified by community partners. Winning solutions to be piloted with community support and documented as Open Science outputs.

Citizen Science Projects

Structured citizen science campaigns — leveraging TIET students as researchers and community members as data collectors — for environmental monitoring, biodiversity surveys, and public health data. Data collected under open licences and shared via Shodh Ratna.

Digital Science Communication Platform

Launch of a dedicated TIET Open Science blog, podcast series, and short-video channel to share research stories, explain findings in accessible language, and invite community feedback. Integrated with TIET's social media and NNCL's website.

5.4 Governance, Operations, and Monitoring Arrangements

To translate the vision and initiatives described above into a sustainable operational model, Science Shop 2.0 will operate under the following governance and management arrangements.

5.4.1 Institutional Ownership and Staffing

- **Institutional Ownership:** Science Shop 2.0 will operate under the institutional ownership of NNCL in partnership with the Office of Research & Sponsored Projects, reporting to the Open Science Steering Committee (Section 4.4.1) on programme-level matters.
- **Management and Staffing:** A designated Science Shop Coordinator (drawn from NNCL or faculty ranks) will manage day-to-day operations, supported by student interns and an annually rotating faculty advisory panel.

5.4.2 Stakeholder Participation and Project Selection

- **Stakeholder Participation:** Community partners (Patiala Municipal Corporation, rural panchayats, NGOs, and small-scale industries identified in Section 5.3) will be invited to submit research questions through a standing intake form, reviewed quarterly by the faculty advisory panel.
- **Project Selection Procedure:** Proposed projects are screened for feasibility, alignment with the priority thematic areas in Section 5.3, and availability of student/faculty capacity, with final selection made by the Science Shop Coordinator and advisory panel.

5.4.3 Monitoring, Reporting, and Success Indicators

- **Monitoring and Reporting:** The Science Shop Coordinator reports project status quarterly to the Open Science Coordination Cell (Section 4.4.3), feeding into the annual KPI on community research partnerships (Section 8.1: target 5+ active projects by 2027).
- **Success Indicators:** Number of active community partnerships; number of citizen science participants; Open Science outputs produced (Section 5.3 Digital Science Communication Platform); and qualitative partner-satisfaction feedback collected at project close.

6. Outreach and Community Engagement

6.1 Engagement with Stakeholders

Faculty & Researchers

- Establish an Open Science Ambassador Programme: appoint one Open Science champion per department.
- Provide APC subsidies and institutional recognition for OA publishing.
- Develop department-specific training modules for Open Science needs (engineering data vs. humanities datasets).

Students

- Introduce an Open Science Certificate Programme covering OA publishing, RDM, and reproducibility.
- Launch student-led Open Science clubs and peer-learning networks.
- Integrate Open Science literacy into PhD coursework and M.Tech research methodology modules.

Funding Agencies and Policymakers

- Collaborate with DST, DBT, SERB, and ICSSR to align grant conditions with TIET's Open Science policies.
- Advocate for OA mandates at the national level through INFLIBNET and UGC forums.

Industry and Private Sector

- Establish a Public-Private Open Science Partnership for ethical data sharing with industry.
- Develop IP-conscious data-sharing frameworks that balance openness with commercialisation.

6.2 Seminars, Workshops, and Public Events

Annual Open Science Forum (OSF@TIET)

An annual flagship event bringing together faculty, students, librarians, international collaborators (including OpenAsia partners), and policymakers to discuss Open Science progress, challenges, and innovations.

Open Science Training Workshops

Quarterly hands-on workshops covering: Open Access publishing pathways; FAIR data principles and DMP writing; Reference management tools (Zotero, Mendeley); Preprint submission; Research data sharing; and Reproducibility and Open Methods.

Research Data Hackathons

Interdisciplinary hackathons using open datasets (government open data, Shodh Ratna data) to develop AI/ML models, visualisations, and policy insights — open to students, researchers, and industry partners.

Open Science Awareness Campaigns

Institution-wide campaigns during Open Access Week (October) and Research Data Management Day: poster exhibitions, social-media takeovers, library tours, and 'Ask a Researcher' public events.

7. Training and Capacity Building

TIET will deliver a comprehensive training and capacity-building programme aligned with OpenAsia deliverables and TIET's institutional objectives.

7.1 Current Training Activities

- Open Science Forum presentations (February 2025) covering OSS in library operations, KOHA, DSpace, LibGuides, preprint archives, and RIM.
- NPTEL local chapter management: 296+ courses promoted to students and faculty.
- Database and e-resource literacy workshops (Scopus, Web of Science, IEEE Xplore navigation).
- Reference management and citation tool training (Mendeley, Zotero, EndNote).

7.2 Planned Training Programme

Training of Trainers (ToT)

Select library and faculty staff will attend OpenAsia international workshops (including study visits to Finland and Malaysia) and return to deliver training across TIET. At least 5 ToT-certified Open Science trainers operational by end of 2027.

Researcher Training Series

- Module 1: Introduction to Open Science and FAIR Principles (all researchers, 3 hours)
- Module 2: Data Management Planning — using TIET DMP portal (PhD scholars, 4 hours)
- Module 3: Open Access Publishing Pathways — Gold, Green, and Bronze OA (faculty, 3 hours)
- Module 4: Repository Self-Deposit — TuDR, Shodh Ratna, and Shodhganga workflows (research scholars, 2 hours)
- Module 5: AI Tools for Research — using TIET's DGX infrastructure responsibly (advanced researchers, 6 hours)
- Module 6: Science Communication and Citizen Science (graduate students, 3 hours)

Curriculum Integration

Open Science concepts integrated into: PhD Research Methodology course; M.Tech/ME research project orientation; and undergraduate research project (capstone) guidelines.

Ongoing Professional Development

- Annual update workshops as Open Science tools and policies evolve.
- Participation in INFLIBNET, DELNET, and CALIBER national training programmes.
- International webinar series with OpenAsia partner institutions.

8. Evaluation and Monitoring

8.1 Key Performance Indicators

- **Open Access Publications:** Percentage of TIET research outputs available as OA (target: 90% by 2029; current: ~10.5% Gold+Green+Bronze combined out of total).
- **Repository Growth:** Number of records in TuDR and Shodh Ratna (current: ~4,782 theses; target: 10,000+ total records by 2027).
- **DMP Submissions:** Percentage of funded research projects submitting a DMP (target: 80% by 2027).
- **Researcher Training:** Number of researchers trained in Open Science practices (target: 70% of TIET researchers by 2028).
- **Data Depositions:** Number of datasets deposited in the TIET Research Data Repository per year.
- **Science Shop Engagements:** Number of community research partnerships facilitated per year (target: 5+ active projects by 2027).
- **Citations of OA Papers:** Average citation count comparison between TIET's OA vs. closed-access papers.

8.2 Review Mechanisms

- Annual Open Science Progress Report submitted to TIET Senate and Erasmus+ OpenAsia consortium.
- Bi-annual review of RDM policies and infrastructure by TIET internal committee.
- Benchmarking against national (UGC, INFLIBNET) and international (EOSC, UNESCO) Open Science indicators.
- Researcher satisfaction surveys conducted twice yearly to identify barriers and training gaps.

8.3 Monitoring Implementation and Evidence Collection

To provide a clearer connection between the strategic objectives in Section 2 and the measurable outcomes tracked in Section 8.1, the following implementation details govern how monitoring data is collected, owned, and used.

KPI	Data Source / Collection Method	Responsible Unit	Reporting Frequency
Open Access Publications (%)	thapar.irins.org RIM extract, cross-checked against Scopus	NNCL	Quarterly internally; annually to Executive Council
Repository Growth (TuDR / Shodh Ratna)	DSpace statistics module	NNCL	Quarterly
DMP Submissions (%)	DMP portal records, cross-checked with Office of Research &	Office of Research & Sponsored Projects	Quarterly

	Sponsored Projects approvals		
Researcher Training	Training attendance records (Section 7)	NNCL / Training Coordination	After each training cycle; annually consolidated
Data Depositions	TIET Research Data Repository deposit logs	NNCL / Data Centre	Quarterly
Science Shop Engagements	Science Shop Coordinator project log (Section 5.4.3)	NNCL / Science Shop Coordinator	Quarterly
Citations of OA vs. closed-access papers	Scopus / thapar.irins.org comparative analytics	NNCL	Annually

Aggregated data from the sources above feeds directly into the Annual Open Science Progress Report (Section 8.2). The Open Science Coordination Cell (Section 4.4.3) is responsible for consolidating unit-level returns, identifying gaps against targets, and proposing continuous-improvement actions — such as targeted outreach to departments with low DMP submission rates — for endorsement by the Open Science Steering Committee.

9. Implementation Timeline

Phase	Timeframe	Key Activities	Responsible Unit
Phase 1 – Foundation	2025 – Q1 2027	Policy drafting, DMP portal launch, server commissioning, Open Science awareness workshops	NNCL + Data Centre + IT
Phase 2 – Development	Q2 2027 – Q3 2027	Science Shop 2.0 setup, DSpace upgrade, Anvesaka discovery launch, ORCID & ROR mandate	Library + Faculty + IT
Phase 3 – Scaling	2027 – 2028	AI-assisted DMP, researcher training (70%+), community citizen science, national OA mandate compliance	All Stakeholders

10. Budget and Resource Allocation

10.1 Budget Allocation

Area	Estimated Allocation	Source
Server / AI Workstation Infrastructure	43520 Euros	Erasmus+ CBHE equipment fund
OA Publication Support Fund (APC)	Operational yearly budget	Institutional
Training & Capacity Building		Institutional
Science Shop 2.0 Operations		Institutional
Outreach, Hackathons & Events		Institutional

10.2 External Funding and Partnerships

- DST-SERB grants for AI research infrastructure and Open Science pilots.
- MHRD / UGC special purpose grants for digital library and repository development.
- Industry/CSR partnerships (Tata Group, ISRO, DRDO, BHEL — established collaborators) for Science Shop 2.0 and citizen science funding.
- Publisher transformative agreements to reduce APC costs for TIET researchers.

10.3 Sustainability Strategy

- DGX infrastructure and NetApp storage: sustained through institutional capex budget and research overhead recovery.
- Shodh Ratna and TuDR: zero-cost open-source platforms (DSpace); maintenance funded through NNCL operational budget.
- APC fund: self-sustaining through researcher grant overheads and annual institutional allocation.
- Science Shop 2.0: revenue from consulting, training, and industry projects reinvested in operations.

II. Conclusion

Thapar Institute of Engineering & Technology's commitment to Open Science reflects a deliberate strategic shift towards greater transparency, accessibility, and societal impact in research. TIET is uniquely positioned to lead this transition within India: it already operates a rich open-source library ecosystem — KOHA, DSpace, LibGuides, and SubjectsPlus — and has made unprecedented investments in AI infrastructure (7 DGX A100, 6 DGX H100, 4 DGX B200 systems, 400 TB NetApp storage) that can power the next generation of data-intensive, reproducible research.

With 12,684 publications, 208,016 Scopus citations, and an active RIM system at thapar.irins.org, TIET's research output is substantial. Shifting the 6,831 currently closed-access papers toward Green OA — and mandating DMP submissions for future projects — will significantly amplify TIET's global research impact and align the institution with UNESCO, UGC, and Erasmus+ OpenAsia expectations.

This plan further strengthens TIET's submission by formalising the governance and management arrangements coordinating the Library, Data Centre, and academic units (Section 4.4); consolidating a structured inventory of major infrastructure assets, including those delivered through Erasmus+ OpenAsia (Sections 4.5 and 4.6); detailing the operational, security, and data-protection procedures underpinning research data management (Section 3.5); articulating clear operational arrangements for Science Shop 2.0 (Section 5.4); and specifying how Open Science indicators are collected, owned, and reported (Section 8.3). Together, these additions make explicit how TIET's already-substantial infrastructure is governed, managed, monitored, and sustained.

The establishment of Science Shop 2.0, the Anvesaka unified discovery platform, and a structured researcher training programme will collectively transform TIET into a model Open Science institution within the Asia-Pacific region. The Nava Nalanda Central Library will serve as the nerve centre of this transformation, continuing its tradition of leveraging open-source technology for maximum research and community benefit.

References

- Thapar Institute Research Information System (IRINS): https://thapar.irins.org/
- TIET Digital Repository (TuDR): https://dspace.thapar.edu/
- Shodh Ratna — TIET Research Archive: DSpace installation, NNCL, TIET.
- Nava Nalanda Central Library — Subject & Research Support Services (LibGuides/SubjectsPlus).
- Shodhganga — INFLIBNET Centre: https://shodhganga.inflibnet.ac.in/
- KOHA Integrated Library System: https://koha-community.org/
- DSpace Repository Platform (MIT): https://dspace.lyrasis.org/
- UNESCO Recommendation on Open Science, 2021: https://www.unesco.org/en/open-science
- Registry of Open Access Repositories (ROAR): http://roar.eprints.org/
- OpenDOAR — Directory of Open Access Repositories: https://v2.sherpa.ac.uk/opendoar/
- OCLC Research — Defining Research Information Management (RIM), 2017: https://www.oclc.org/research/publications/2017/oclcresearch-defining-rim.html
- Erasmus+ OpenAsia Project (project documentation and deliverables).
- arXiv Open Access Archive (Cornell University): https://arxiv.org/
- IndiaRxiv — Preprints Repository of India: https://indiarxiv.in/
- NPTEL — National Programme on Technology Enhanced Learning: https://nptel.ac.in/

INFLIBNET Centre, Shodhsindhu and e-ShodhSin