

MINISTRY OF INFORMATION TECHNOLOGY & TELECOM

Digital Economy Enhancement Project (DEEP) | World Bank Project No. P174402

Hiring of Individual Consultant Under DEEP Project

TERMS OF REFERENCE					
Announcement Reference no:			PK-MOITT-556881-CS-INDV		
Project		Digital Economy Enhancement Project (DEEP)			
Position Name		Lead Architect- National Open Data Ecosystem		Position ID	P174402
Vacancy	1	Type of Contract	Individual Consultancy	Duration of Contract	21 Months
BACKGROUND					
Digital Economy Enhancement Project (DEEP) is a World Bank assisted project with the objective of enhancing the Government’s capacity for digitally enabled public services delivery for citizens and businesses. Ministry of IT & Telecom (MoITT) is the Executing Agency of the project with implementation support from (i) Board of Investment (BoI), (ii) National Database and Registration Authority (NADRA), (iii) Ignite – National Technology Fund and (iv) National IT Board (NITB).					
PROJECT DESCRIPTION					
DEEP aims to develop a framework and technology to promote digital services across Pakistan, significantly transforming citizen-centric unified services nationwide. A key component under Civic Innovation is the National Open Data Ecosystem (NODE) — a flagship national initiative under the Ministry of IT & Telecommunication (MoITT), implemented by the National IT Board (NITB) PIU. NODE is designed as a modular, API-first, and interoperable open data infrastructure that underpins data-driven governance and civic innovation across Pakistan.					
NODE comprises seven architectural layers: (1) Open Data Portal, (2) Data Ingestion & Standardization Layer (ETL), (3) API Gateway, (4) Developer Sandbox, (5) AI/ML Repository of Models, (6) Metadata & Workflow Framework, and (7) Secure & Scalable Infrastructure Layer. Each layer is independently deployable, scalable, and evolvable, enabling government ministries, departments, and agencies to publish standardized public datasets and enabling startups, researchers, and innovators to consume, experiment, and build upon open government data. NODE integrates with the Digital Government Innovation Programme (DGIP) and Civic Innovation and Technology Labs (CITLs) under DEEP to form a comprehensive national open innovation ecosystem.					
OBJECTIVES OF THE ASSIGNMENT					
The Lead Architect – National Open Data Ecosystem would be the technical for the design, development, integration, and delivery of the NODE platform under DEEP. This position is responsible for translating the NODE reference architecture into a fully operational, production-grade National Open Data infrastructure, ensuring alignment with international open data standards, World Bank digital government guidelines, and Pakistan’s National Digital Governance Policy. The incumbent will serve as the primary technical interface between the technical firm and the Civic Innovation-DEEP team, technology vendors, and all NODE stakeholders.					

The responsibilities include (but are not limited to) the following:

1. Leading the development of end-to-end technical architecture, systems integration, and delivery of all seven NODE architectural layers through the technical firm.
2. Benchmark international technical standards for data ingestion, metadata management, API design, and developer sandbox provisioning.
3. Overseeing onboarding of public sector agencies and ensuring data governance compliance across all federated data sources.
4. Ensuring NODE's interoperability with DEEP's broader Digital Public Infrastructure (DPI) components including NADRA's identity systems, BoI's investment portal, and NITB's government services platform.
5. Driving adoption of the NODE Sandbox by startups, researchers, academia, and CITLs to enable AI/ML experimentation and programmatic open data access.
6. Ensuring platform security, scalability, and sovereign digital capability compliance across all infrastructure and cloud deployments.

SCOPE OF THE ASSIGNMENT

The Lead Architect – NODE will undertake the following tasks but not limited to:

A. Technical Architecture & System Design

1. Finalize and maintain the NODE Reference Architecture ensuring modular design, loose coupling, and standards-based interoperability across all seven layers.
2. Develop and maintain technical design documents, data flow diagrams, API specifications (OpenAPI/Swagger), infrastructure blueprints, and security architecture for each NODE component.
3. Define technology stack selections, cloud/on-premises infrastructure strategy, containerization approach (Docker/Kubernetes), and CI/CD pipeline design for NODE.
4. Establish and enforce data standardization protocols including metadata schemas, data cataloguing, dataset classification, and open licensing frameworks aligned with international Open Data Charter (ODC) principles.

B. ETL, API Gateway & Data Ingestion

5. Oversee the ETL & Data Ingestion layer development, supporting file-based, API-based, and direct database connector ingestion scenarios from multi-organization government data sources.
6. Supervise deployment of the secure API Gateway, including authentication, authorization, rate limiting, versioning, and developer portal integration.
7. Define and enforce data validation workflows, curation pipelines, and production storage strategies (data lake, data warehouse, or hybrid) for the NODE data repository.

C. Developer Sandbox & AI/ML Repository

8. Lead and supervise the design and deployment of the NODE Sandbox Environment, including browser-based IDE, containerized execution environment (Docker), SDK assemblies, API programmatic access, and SSH-based access for isolated developer workspaces.
9. Establish the AI/ML Model Repository, enabling fine-tuned model hosting, model versioning, and API-based inference access for startups, CITLs, and research institutions.
10. Ensure sandbox integration with CITL innovation programmes, enabling startups and innovators to test and validate solutions against live, curated government datasets.

D. Government Agency Onboarding & Data Governance

11. Lead the technical onboarding of public sector agencies to NODE, including connector configuration, data profiling, metadata alignment, and publication workflow setup.
12. Work with MoITT and all relevant stakeholders and government entities to ensure compliance against the Data Governance Policy, defining dataset selection criteria, data quality thresholds, data stewardship roles, and open licensing requirements.
13. Maintain the NODE agency onboarding tracker and data publication dashboard providing real-time visibility on dataset ingestion, curation status, and API consumption metrics.

E. Vendor & Procurement Technical Oversight

14. Serve as the technical authority during procurement processes including preparation of technical specifications for RFPs, evaluation of vendor proposals, and technical due diligence during contract negotiations.
15. Provide ongoing technical oversight of all NODE technology vendors, reviewing deliverables, enforcing SLAs, and escalating technical risks to the Project Director.

F. Interoperability & DPI Integration

16. Ensure NODE's full interoperability with DEEP's DPI components, including NADRA's ID systems, BoI's portal, MoITT's unified data layer, and NITB's digital government services platform.
17. Benchmark NODE against leading international open data portals (data.gov, data.gov.uk, data.gov.in, data.gov.sg, data.europa.eu) and adopt applicable interoperability and standards best practices.

G. Security, Infrastructure & Scalability

18. Lead the design and enforcement of the NODE security architecture including network segmentation, data encryption at rest and in transit, access control management, API key lifecycle management, and penetration testing protocols.
19. Ensure the NODE infrastructure is cloud-agnostic, sovereign-compliant, and scalable to accommodate Pakistan-wide government agency onboarding and high-volume public data consumption.

QUALIFICATION AND EXPERIENCE

Essential Qualifications:

- 1) Minimum 18 years of education (Master's or equivalent) from a HEC-recognised or internationally reputable university in Computer Science, Software Engineering, Information Technology, Data Engineering, Systems Architecture, or a closely related technical field.
- 2) Minimum 10 years of post-qualification professional experience in software architecture, enterprise systems design, data platform engineering, or digital public infrastructure development.
- 3) Demonstrated leadership experience (minimum 7 years) as a lead architect, principal engineer, or equivalent technical authority on large-scale, multi-stakeholder digital platforms or government IT projects.
- 4) Proven track record of designing and delivering open data portals, data exchange platforms, API gateways, or equivalent national-scale digital infrastructure, preferably in a government or multilateral development context.

5) Deep technical expertise in ETL pipeline design, RESTful/Graph QL API architecture, API gateway technologies (e.g., Kong, AWS API Gateway, Azure API Management, or equivalent), and data catalogue/metadata management systems. 6) Demonstrated experience with cloud infrastructure (AWS, Azure, or GCP), containerization (Docker, Kubernetes), CI/CD pipelines, and infrastructure-as-code practices (Terraform, Ansible, or equivalent). 7) Strong knowledge of data security frameworks, data encryption standards, zero-trust architecture principles, and regulatory compliance for government digital infrastructure. 8) Experience in AI/ML platform design including model repository management, inference API deployment, and integration of machine learning services into open data environments. 9) Familiarity with international open data standards including Open Data Charter (ODC) principles, DCAT metadata standards, and relevant W3C/IETF/ISO interoperability standards. 10) Demonstrated experience on World Bank or other major multilateral donor-funded ICT or digital government projects is strongly preferred. 11) Excellent written and oral communication skills in English; ability to translate complex technical concepts for non-technical government stakeholders.
ADDITIONAL SKILLS / EXPERTISE
1) Experience with developer sandbox platforms, browser-based IDEs (e.g., Gitpod, Coder, JupyterHub), and isolated container execution environments for programmatic open data access. 2) Familiarity with global open data portal benchmarks and architectures including data.gov (USA), data.gov.uk (UK), data.gov.in (India), data.gov.sg (Singapore), and data.europa.eu (EU). 3) Knowledge of Pakistan's existing open data landscape including the National Open Data Portal (NODP), provincial open data portals (KP, Punjab/PITB), and Ignite's CITL ecosystem is a strong advantage. 4) Experience in data governance policy implementation, data stewardship frameworks, open licensing (Creative Commons, OGL), and government data classification regimes. 5) Proficiency in technical project management tools (Jira, Confluence, MS Project, or equivalent) and system monitoring/observability platforms (Prometheus, Grafana, ELK stack, or equivalent). 6) Experience in designing and delivering capacity-building programmes for government IT counterparts on open data management, API usage, and data governance. 7) Understanding of Pakistan's digital economy policy landscape, the DEEP project context, and MoITT's Digital Government mandate is a strong advantage.
SCHEDULE FOR THE ASSIGNMENT
The Consultant will be appointed on a contract basis for 21 months.
REMUNERATION AND OTHER BENEFITS
1) The consultant will receive remuneration as per the scope of work defined and based on the World Bank guidelines applicable to individual consultants for this position. 2) Travel expenses as approved by the World Bank and the Government of Pakistan. 3) This is a consulting-based appointment and does not offer medical or other benefits.
REPORTING OBLIGATIONS
The Lead Architect – NODE will report directly to the Project Director-Civic Innovation, PIU-Ignite, Digital Economy Enhancement Project (DEEP), and will maintain regular technical liaison

with the MoITT PMU, DEEP Team, other stakeholders, and NODE technology vendors. The incumbent is required to: 1) Follow all rules, directives, and fiduciary guidelines of the World Bank and Government of Pakistan for successful project implementation. 2) Adhere to working days and timings as per Federal Government of Pakistan directives. 3) Report to work in official attire and maintain professional conduct at all times. 4) Refrain from working for any other party or accepting paid employment during this contract without written approval from the Competent Authority. 5) Ensure all required technical reports and deliverables for the NODE component are prepared on time and in accordance with World Bank and Government of Pakistan requirements. 6) Maintain strict confidentiality of project-related information, source code, data assets, and system credentials.
SELECTION CRITERIA
Procurement will be carried out in accordance with the Open Competitive Selection of Individual Consultants in accordance with the World Bank's "Procurement in Investment Project Financing, Goods, Works, Non-Consulting and Consulting Services, Fifth Edition, September 2023" ("Procurement Regulations").
SUBMISSION
Candidates meeting the required criteria should submit their applications at http://www.njp.gov.pk within 15 days of publication of the advertisement. No hard copy of application shall be accepted and all applications must be sent via NJP online. Shortlisted candidates who are working in Government sector are required to produce NOC at the time of interview.