FAST INDIA

FOUNDATION FOR ADVANCING SCIENCE AND TECHNOLOGY

LabStack: Easing Research for Researchers

Streamlining Research through Open Digital Standards

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Background

- The allocation and utilisation of public funds are the most important concerns for Indian researchers.[1]
- The government has enacted the Anusandhan National Research Foundation Act 2023[2] (ANRF Act) to propel India into a global research and development (R&D) leader.
- The Ease of Doing Science Index[3] 2023 (EoDS 2023) by FAST India provides insights on the causes of inefficient allocation and utilisation of public funds in the realm of academic research.
- Noteworthy concerns highlighted by the EoDS 2023 are:
  - *Lack of transparency in grant review process*
  - *Delays in timely disbursement/allocation of funds*
  - *Inefficiencies in the procurement of research equipment*

Negative feedback loop for public R&D expenditure in India

Insufficient tracking

↑ ↓

Inefficient spending

[1] Mohan, Premila, and Ramasamy Brakaspathy. "SERB Merit Review Process: Adapting to Emerging Challenges." *Current Science* 114, no. 9 (2018): 1835–39. https://www.jstor.org/stable/26495330; Aggarwal, Varun; Kaur, Harleen; Misra, Kaustubh; and Seshadri, Anjana (2023), Ease of Doing Science Index 2023

[2] A copy of the ANRF Act is available at: https://dst.gov.in/sites/default/files/NRF.pdf

[3] Aggarwal, Varun; Kaur, Harleen; Misra, Kaustubh; and Seshadri, Anjana (2023), Ease of Doing Science Index 2023

Proposal: LabStack emulating IndiaStack

We present a digital public infrastructure (DPI) approach to solve transaction issues in the research ecosystem emulating the model successfully demonstrated by India Stack.[1]

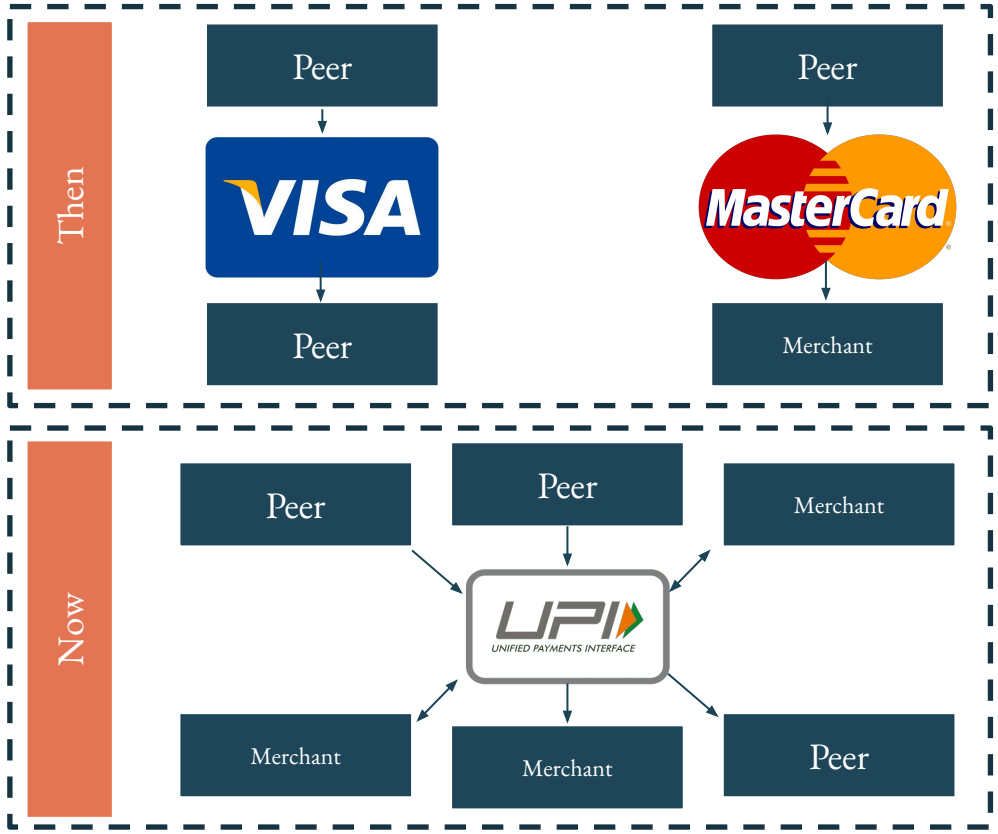


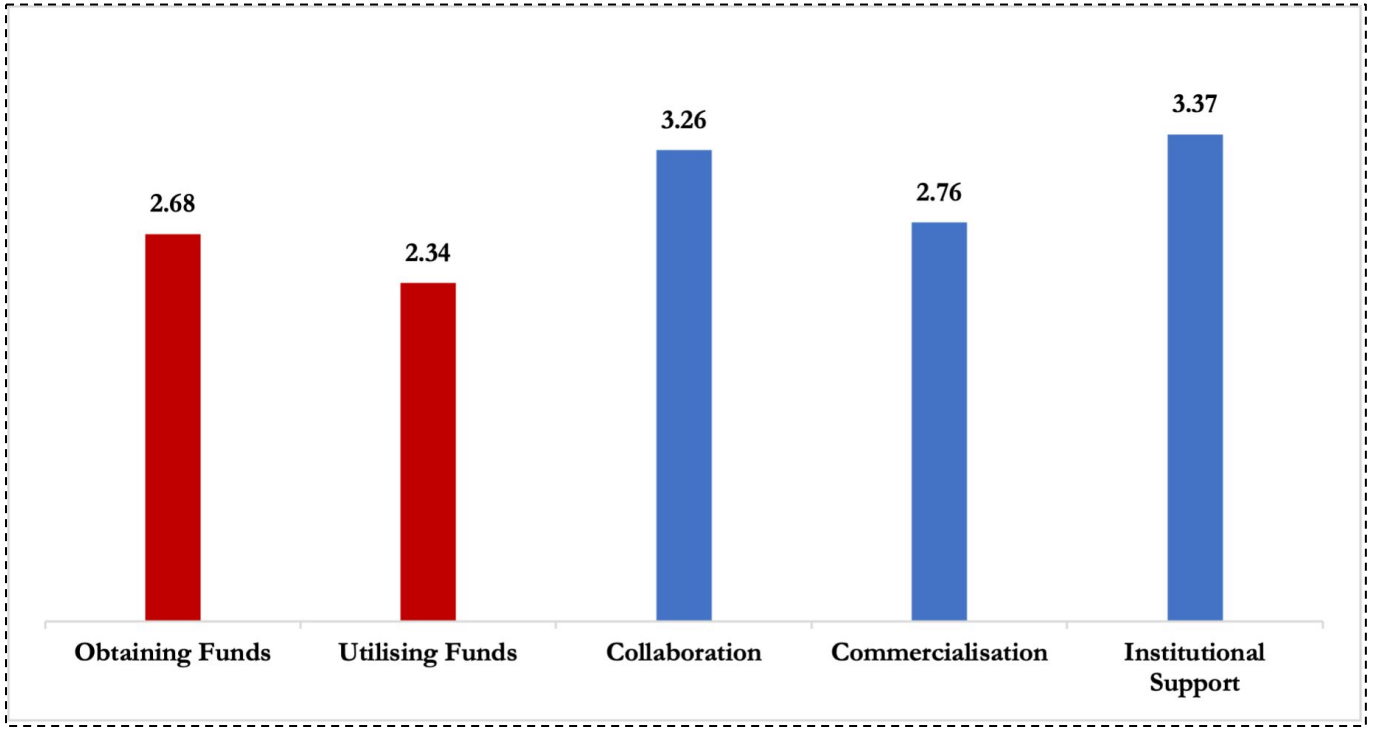
Fig. How UPI transformed the payment system

[1] For more on India Stack, please refer to https://indiastack.org/

Why LabStack? (1/2)

Researchers struggle with 'Doing Science'

FAST India surveyed 140 researchers at *NIRF top 10* institutes[1]
Revealed: challenges across inputs, processes, outputs, outcomes



Figures represent average rating on a 5-point Likert Scale
1=very poor, 5= very good

[1] Aggarwal, Varun; Kaur, Harleen; Misra, Kaustubh; and Seshadri, Anjana (2023), Ease of Doing Science Index 2023

Issues with of *Utilisation of Funds*

- **Multiplicity of rules & interpretations**
  In general, all the purchases made by an Institute are in accordance with the Institute Purchase Policy, GFR Norms and GeM Orders
- **Time-consuming cumbersome process**
  Some expensive equipment to take a year to arrive after funds earmarked for it and initiate the purchasing process
- **Bureaucratic process with high paperwork**
  Different categories of procurement amounts based due diligence basis GFR 2017

Source: Rule 149 GFR 2017; IISc's, IIT Delhi's and IIT Ropar's Procurement Manual/SOP under GeM

Why LabStack? (2/2)

Government struggles with Measuring Science Outcomes and its Returns On Investment

- Current scientific data infrastructure focuses on identifying, supporting, and maintaining high-quality research, *not on understanding its impact*.[1]
- Impact measurement possible with *precise tracking and measurement* of R&D inputs, outputs and outcomes
- Current challenges:
  - Difficulty in measuring innovation, a non-linear process
  - Non-standardised definition of R&D across government schemes and other policy instrumentalities.
  - No common transaction taxonomy across government departments

An example of measuring *Science Outcomes*

- **The STAR METRICS (Science and Technology for America's Reinvestment)**
  Developed by a consortium comprising the National Science Foundation (NSF), National Institutes of Health (NIH), etc. — A scientific data infrastructure that brings together inputs, outputs, and outcomes from a variety of sources. A major functional aim is to reduce, manual reporting by Principal Investigators (PIs) and institutions and measure scientific outcomes.

[1] Dzieżyc, M., & Kazienko, P. (2022). Effectiveness of research grants funded by European Research Council and Polish National Science Centre. *Journal of Informetrics*, *16*(1), 101243. https://doi.org/10.1016/j.joi.2021.101243

Conceptualising LabStack: Definition, Purpose, Ownership

- **LabStack** is a set of *Digital Public Goods* (facilitating R&D processes) and a collection of *Application Programming Interfaces or APIs* (collectively referred to as Protocols) that can facilitate a number of *process* innovations in the R&D ecosystem[1].
- One defining feature of the DPG is **interoperability of protocols** by virtue of being agnostic of platforms and infrastructure.

Who shall supply the LabStack?

- A concerted effort of the *State and the Private Parties should supply the DPGs* to prevent its monopolistic capture by ring-fencing it through **technical standards** and **institutional rules** while enabling **interoperability.**

What will LabStack supply?

The LabStack will supply process—

1. **Access**
2. **Diversity**
3. **Efficiency**
4. **Transparency**
5. **Information Asymmetry**

It shall ease the process of undertaking R&D management and bridge the gap between researchers (and affiliated entity), grant making authorities and the government—the participants of the proposed Stack.

Case: LabStack for ANRF

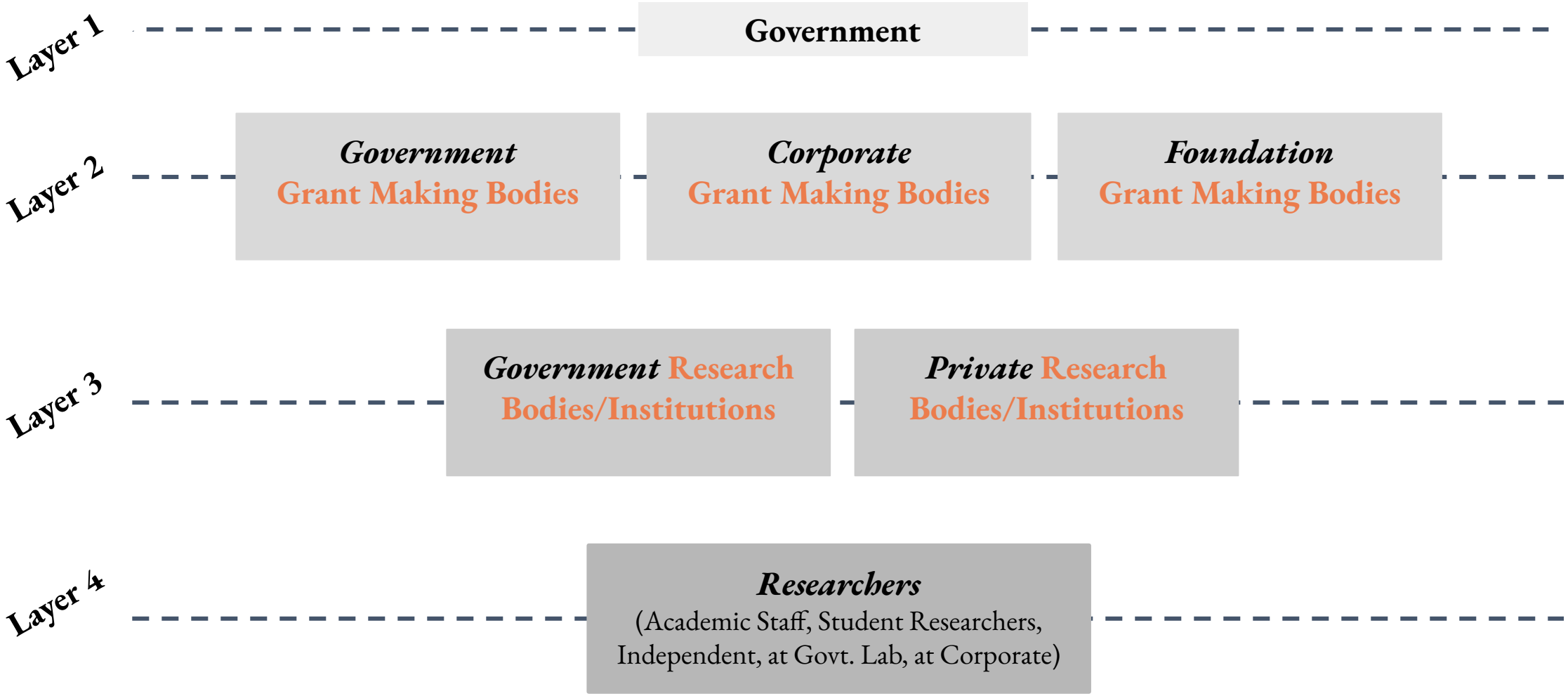
- LabStack to be hosted within the ANR Foundation ("Foundation"), which is conceptualised as a Section 8 company.
- The use and deployment of the LabStack to be regulated by the *Governing Board* of the Foundation.
- The LabStack can be built over the existing platforms (for example GeM, DigiLocker, Account Aggregator, etc.), with **APIs encoded with rules and standards performing specific functions**.
    - GeM, DigiLocker...are part of the India Stack waiting to scale/take-off—*Hon'ble Chair of PM-EAC*[2]

[1] Sukumar, Arun Mohan. 2021. "Designing Digital Public Goods and Playgrounds in India: The Need for Theoretical and Contextual Analysis." Ispirit. Retrieved October 31, 2023 (https://research.ispirt.in/articles/Designing-Digital-Public-Goods); https://indiastack.org/; https://www.npci.org.in/what-we-do/upi/product-overview; https://research.ispirt.in/articles/Standards-and-Digital-Public-Goods

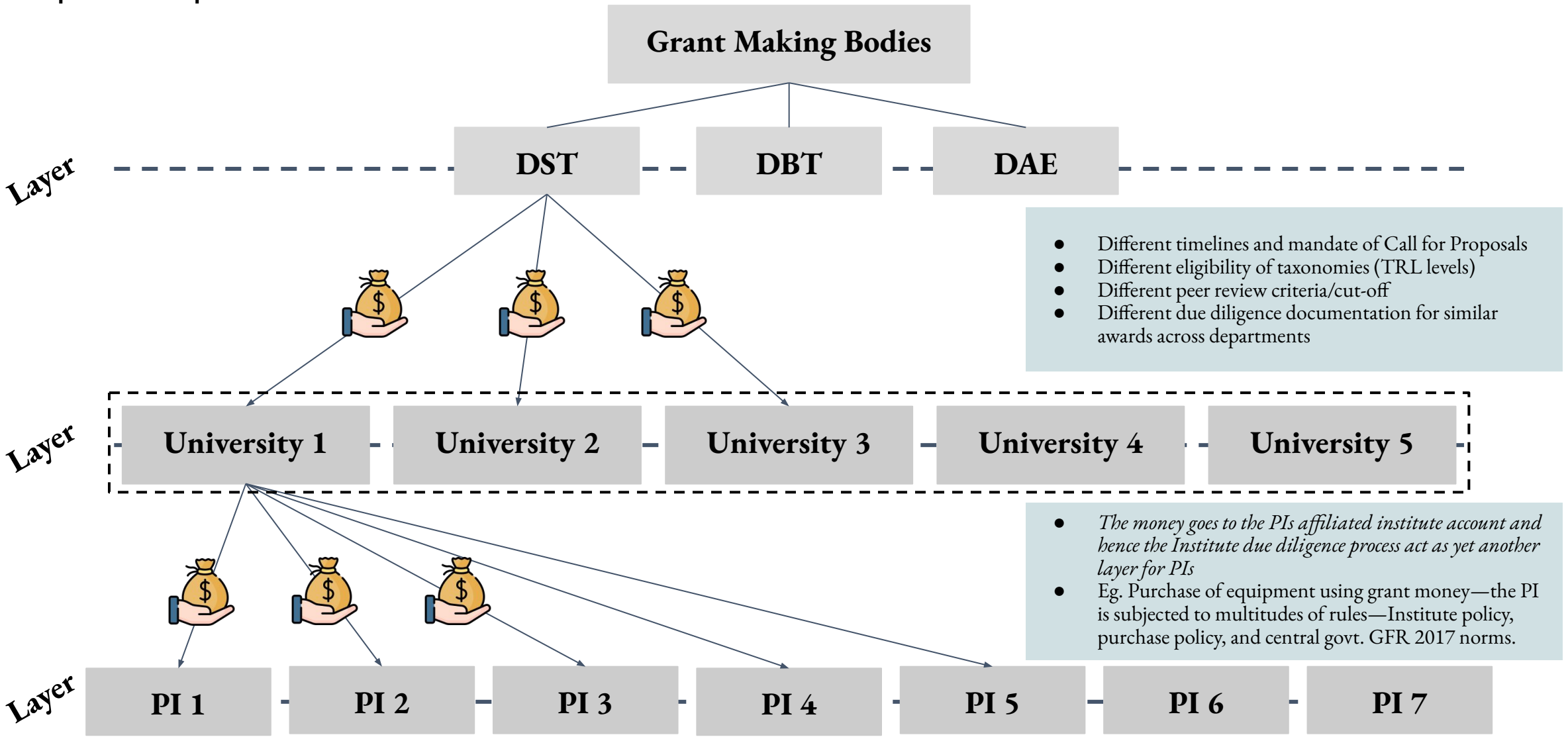
[2] Bibek Debroy. (2023, February 17). India leading the world through digital maze... Retrieved November 1, 2023, from The New Indian Express website: https://www.newindianexpress.com/opinions/2023/feb/18/india-leading-the-world-through-digital-maze-2548393.html

Four layers of primary participants in LabStack

The following are the four layers of primary stakeholders in a research ecosystem:—



Issues: Non-uniform processes and documentation across participants



- Different timelines and mandate of Call for Proposals
- Different eligibility of taxonomies (TRL levels)
- Different peer review criteria/cut-off
- Different due diligence documentation for similar awards across departments

- *The money goes to the PIs affiliated institute account and hence the Institute due diligence process act as yet another layer for PIs*
- Eg. Purchase of equipment using grant money—the PI is subjected to multitudes of rules—Institute policy, purchase policy, and central govt. GFR 2017 norms.

Current System of research processes

No common rules, structure, taxonomies and processes *across multiple actors in layers 2 and 3—> negatively affecting the layer 4, the primary actor in a research process.*

Layer 1

Government

Information Asymmetry—>No data capture—>
Ill- targeting of research with national priorities (RoI)

Layer 2

Government Grant Making Bodies

Corporate Grant Making Bodies

Foundation Grant Making Bodies

Fragmented and siloed rules & processes—>No transacting interoperability and integration

Layer 3

Government Research Bodies/Institutions

Private Research Bodies/Institutions

Fragmented and siloed rules & processes—>No transacting interoperability and integration

Layer 4

Researchers

Trickle-down of burden of compliance/due diligence to researchers

Issues with Obtaining Funds

- *Changing rules of transaction*—>General Financial Rules (GFR) 2017, Government e-Marketplace (GeM), Central Nodal Agency (CNA)—Public Finance Management System (PFMS)
- *Information asymmetry* between researchers and govt.

- *Not* receiving funds on time
- *Unclear* timelines for approval of grants
- *Different, multiple, overlapping rules* of the game and due diligence processes
- *Unavailability* of (consolidated) information about call for proposals
- *Non-standardised* feedback on grant application decision

- *Not* receiving funds on time
- *Unclear* timelines for approval of grants

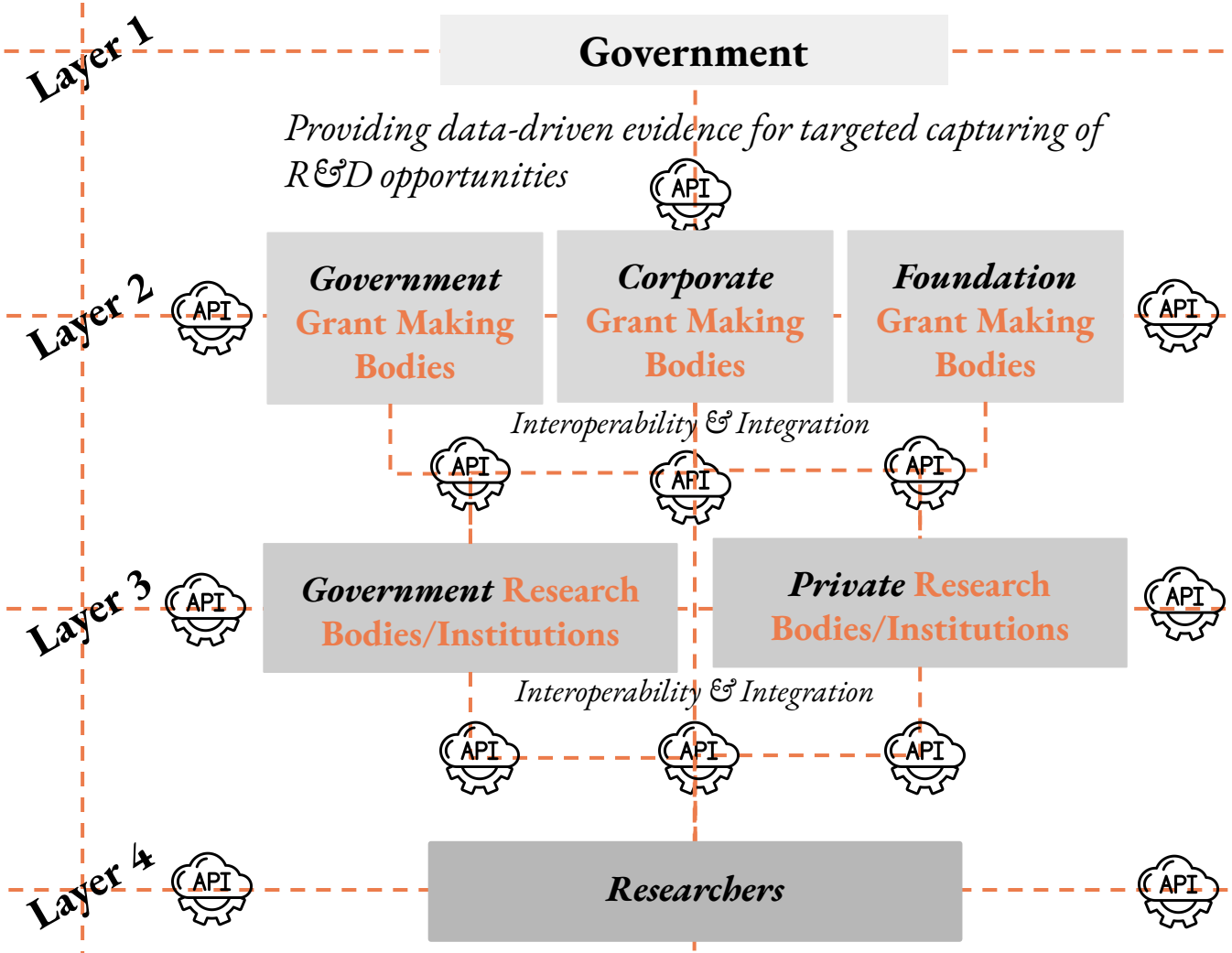
Issues with Utilisation of Funds

- *Issues* with using funds for travel/hire talent/buy equipments
- *Difficulty* in collaborating for projects

....many more.

Proposed LabStack for research processes

*The **rules and processes shall be encoded into digital standards** to be implemented by **protocols** (APIs)—>Integration of rules and processes across participants to ease 'doing research' for researchers.*



Three Building Blocks of LabStack

- Protocols and digital standards
- Existing ERP, registries, code of each participant
- IndiaStack's core DPIs (Aadhaar, UPI, DigiLocker, AA, etc.)

Easing three core steps

Discovery—>Credentials—>Funding

By enabling

- Access
- Interoperability
- Efficiency
- Transparency
- Information Symmetry

The three stages of implementation of LabStack

Current → *Envisaged*

	STAGE I	STAGE II	STAGE III
Technology	• A single govt platform, app, certificate system, database • Non-interoperable silo structure	• Shared protocols, open API • Basic digital processes, but lacking API fetch access	• High-scale interoperable networks • Multi-modal access to network • API-based access
Governance	• Few institutions with relevant mandates • Low regulatory and formal governance infrastructure	• Fragmented institutional mandates • Medium regulatory and formal governance infrastructure	• Common digital standard-setting • Clear harmonised frameworks for every aspect of ecosystem
Local Ecosystems	• High barriers and costs to entry	• Medium barriers and costs to entry	• Low barriers and costs to entry

Adapted from UNDP's DPI Approach Playbook 2023 available at: https://www.undp.org/publications/dpi-approach-playbook

A participant-wise issues identification in research lifecycle

Participants	Issues in research lifecycle	What DPGs would be solving for?
Researchers and Grant making entities	Information about available grants not available	Information symmetry, access, diversity for ease of obtaining funds
Researchers and Grant making entities	Timelines for approval of grants unclear	Transparency, information symmetry for ease of obtaining funds
Researchers and Grant making entities	Information about funding status not available	
Researchers and Grant making entities	Feedback on application decision not available in standardised manner	
Researchers and Grant making entities	Receiving funds on time	Efficiency, access for ease of utilisation of funds
Researchers, Grant making entities and Affiliated institutions	Ability to use funds to buy equipment	
Researchers, Grant making entities and Affiliated institutions	Ability to use funds for travel / conferences	
Researchers, Grant making entities and Affiliated institutions	Ability to use funds to hire talent	
Researchers	Find collaborators for projects	Access, diversity, efficiency, transparency and information symmetry for ease of collaboration
Researchers and Industry	Deploy invention/technology for commercial purpose	Access, diversity, efficiency, transparency and information symmetry for ease of commercialisation

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Thank you