A PUBLIC DIGITAL INFRASTRUCTURE FOR INDIA'S FUTURE

For over a decade, India has been at the forefront of building public digital infrastructures, collectively known as the India Stack. This started with solving India's «identity crisis» by attributing a digital identity to over 1.2 billion Indian residents through Aadhaar. This has not only redefined the relationship between the state and its citizens but through the interoperable, modular design of the technology platforms of the India Stack has also unleashed India's entrepreneurial energy, leading to a fintech revolution and is on the cusp of transforming the healthcare system. However, the governance and accountability frameworks currently in place leave the door open for potential misuse of these technologies, fostering public mistrust in those evolving technology-based policy tools.

Keywords: digital infrastructure, India Stack, Aadhaar, fintech, healthcare

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Redefining public infrastructures in the digital age

The development of the modern nation state was closely linked with the fundamental changes in the society and economy brought about by the Industrial Revolution. The shift from a largely rural, agriculture-based society to an urban, mass-manufacturing industrial one required the emerging modern states to build solid infrastructures, such as roads, railway systems, and airports as well as schools, hospitals, and public libraries. After the World War Two, the economic boom enabled by electronic automation and information and communication technologies (ICT) powered the expansion of the modern welfare state in Europe, establishing social security networks and public health systems. In this context, public infrastructures were largely understood as investments in physical common goods, primarily provided by the state for shared use by the public. In the recent advent of the Digital Revolution, this notion of public infrastructures is being revisited. Developing and emerging economies, in particular, have recognized the potential of digital solutions to leapfrog and to address socio-economic challenges in a novel way.

Building its version of public digital infrastructures, collectively known as the India Stack, India has been a front runner now for over a decade. The India Stack[1] is a so-called Open Digital Ecosystem (ODE), which can be defined as «open and secure digital platforms that enable a community of actors to unlock transformative solutions for society, based on a robust governance framework» (Omidyar & BCG 2020: 17). Accordingly, ODEs can be looked at from three distinct angles: (1) the technology platform itself, (2) the community building products based on this digital platform, and (3) the governance framework to safeguard users rights and define the rules of the game.

Creating the foundational technology: Aadhaar et al.

In several Indian languages, *Aadhaar* means «base» or «foundation». Today, Aadhaar also stands for the world's largest biometric ID system, which attributes a 12-digit unique identity number to Indian nationals and residents and is the centre piece of the India Stack. The initial mission of Aadhaar was to solve India's «identity crisis» (Ramnath & Assisi 2018: 2). In 2009, approximately 400 million residents of India were unable to prove their civic identity as they remained completely undocumented. As a result, millions of Indians from the lowest socio-economic bracket had been unable to claim government subsidies as the public authorities were unable to authenticate their identity. Nandan Nilekani, the co-founder of India's largest IT company, Infosys, who joined the federal government to lead and build the Aadhaar initiative, put it as follows: «Unique identification of each citizen also ensures a basic right – the right to an acknowledged existence in the country, without which much of the nation's poor can be nameless and ignored, and governments can draw a veil over large scale poverty and destitution» (Nilekani 2008: 368). By developing one IT-platform which makes the identity of Indian citizens more easily verifiable across the multiplicity of siloed government departments and schemes, «would make the relationship between the state and the citizen infinitely less traumatizing in both time and energy wasted», argued Nilekani. Today,

1 Technically speaking, the India Stack is a set of Application Programming Interfaces (APIs), which create a transmission bridge between two software applications. An OpenAPI, such as the India Stack, are APIs that are made publicly available to software developers, allowing them to build services which give consumers secure access to the data base. India Stack is the largest API in the world.

1.25 billion (out of 1.34 billion) Indians possess an Aadhaar digital identity.

The design principles of Aadhaar's technology platform – and by extension, the India Stack, – are as simple, as they are revolutionary. Aadhaar's chief architect, Pramod Varma, explained its approach as follows: «The way to solve India's hard problem, wicked problem, was not by building solutions, but by building Lego blocks that could be used by people on the ground, closer to the problem, to assemble, build solutions» (Ramnath & Assisi 2018: 88). Following this Lego-Design-principle, the India Stack's success is due to its interoperable modular design, whereby each platform performs only basic functions independently, but can be linked to other platforms and exchange information in a secure way. For instance, Aadhaar's mission was not to establish citizenship, or to ensure subsidy delivery, but simply to establish and document a unique identifier for all (eligible) residents of India. Over time, other modules of the India Stack were built on top of Aadhaar, creating four distinct technology layers[2]:

- *Presence-less layer:* On the basis one's identity being established via Aadhaar, its participants can now access various schemes digitally from anywhere in the country.
- *Paperless layer:* With the eKYC (Know-Your-Customer) platform, a bank account can be opened without having to provide paper-based documents; eSign provides for an officially recognized digital signature; and the Digilocker offers a repository for important documents (i.e., driving license, academic diplomas, etc.) which can be accessed by third parties upon the account holder' consent.
- *Cashless layer:* The UPI (Unified Payments Interface) enables payment apps to offer digital payments services, including peer-to-peer transactions between two bank accounts.
- *Consent layer:* The NBFC-AA[3] allows users to digitally share financial data with service providers, i.e., to apply for credit lines or other financial products.

On the basis of these modular technology platforms, it was then up to India's tech community to build customer-centric applications. Fintech entrepreneurs were the first to fully seize the opportunities of the India Stack and unleash the beginning of a digital payment revolution.

India's Fintech Revolution

With Aadhaar, eKYC and in particular UPI which was launched in 2016, the foundation was laid for the entrepreneurial community to build innovative financial products. Hence, from 2015 to 2016 more Fintech start-ups were founded in India than anywhere else in the world, except China (Medici 2019: 06). In 2019, the ecosystem had over 2000 Fintech start-ups, almost 50 % based in Mumbai, the financial hub, and Bangalore the Tech capital. The most prominent segment is the digital payment services providers; India's Unicorn Paytm tops the ranking with approx. 140 million active users a month. America's Big Tech is also looking for a slice of the expanding pie. In late 2020, WhatsApp gained permission to roll-out its Peer-to-Peer payment services to its 400 million user-base. GooglePay has been such a huge success in India that Google recommended the US Federal Reserve be inspired by India's UPI model. Aside from the payment segment, lending services have also experienced a huge uptick.

The biggest hope is that this entrepreneurial flurry will not only benefit urban India, but above all hopes it will increase financial inclusion of the rural and poorer populations. However, while most Indians now have a bank account, many accounts remain dormant due to financial illiteracy, inappropriate financial products for the poor, preferences for cash payment, and jewellery and animals persist as financial saving vehicles (USAID 2019: 36). Nonetheless, UPI-based transactions continue to grow rapidly. Currently, over 2 billion transactions are made based on UPI per month, and it is expected in two to three years daily transactions will grow to1 billion. In the light of this success story, India's policymakers and IT entrepreneurs now attempt to surmount the next big challenge: the healthcare sector.

The next frontier: The National Health Stack

In 2018, the Government of India launched its Universal Healthcare Coverage program, Ayushman Bharat, to increase access to affordable health services. Digital technologies are expected to play a central role. The COVID-19 pandemic has further exacerbated – worldwide – the necessity of data-driven healthcare systems to enable time-sensitive, evidence-based decision-making. The National Health Stack (NHS) is India's method for developing and bringing its health system well and truly into the 21st century. The National Digital Health Mission (NDHM) was launched, in August 2020, in the midst of the pandemic: «to create a national digital health ecosystem that supports universal health coverage in an efficient, accessible, inclusive, affordable, timely and safe manner, through provision of a wide range of data, information, and infrastructure services, duly leveraging open, interoperable, standards-based digital systems, and ensuring the security, confidentiality and privacy of health-related personal information»[4].

2 https://www.indiastack.org/about/ (5 February 2021).
3 Non-Banking Financial Companies – Account Aggregator
4 Government of India, National Health Authority (2020). Press Release of 15 August 2020. https://ndhm.gov.in/media/pressReleasePdf (6 February 2021).

The NDHM was not compelled to start from scratch to start from scratch. Over the last few years, the non-profit, technology think tank from Bangalore, iSpirit, had already been developing the core components of the Health Stack. The NHS is composed of basically two layers of cloud-based services: Firstly, the National Health Registries layer is a single, centralized repository of all the health facilities in the country (hospitals, labs, beneficiaries, insurers, pharmacies etc.). Building on these registries, the second layer offers: (1) a Coverage and Claims Platform for large-scale insurance programmes and government schemes; (2) a common Personal Health Record Framework to archive in one place all medical records of a person; and (3) a National Health Analytics Framework, which will draw on these aggregated and anonymized datasets to support health policy-making and interventions with specific data analytics. Similar to how the UPI drove innovation in the finance sector, the NHS's data goldmine and ODE approach is set to boost healthcare innovation in India. Efforts to find immediate solutions that can be integrated into the platform have been initiated by the Government, itself, with, for instance, specific start-up competitions. The National Health Authority of India has also begun to mentor start-ups in partnership with the ACCESS Health Digital's Social Entrepreneurship Accelerator (SEA) program.

Catching-up: Governance of the digital

While institutions such as the World Bank point to India's technology-based strategy to increase social inclusion as a blueprint for other developing countries, and the country's start-up community thrives due to the Open Digital Ecosystems approach, the India Stack and its various components have faced a great deal of criticism from civil society groups and privacy advocates. The various controversies have pinpointed India Stack's Achilles' heels: (1) the lack of – or the slow process in establishing sufficient governance structures to regulate those rapidly developing digital commons; and, (2) the tension between the need for public accountability and due process on the one hand, and the lean start-up culture – «move fast, break things and then maybe patch them later, launch and iterate» (Ethiraj 2020) – of India's entrepreneurial community, on the other. A case in point is Aadhaar which, despite its far-reaching consequences, was launched without a sufficient legal basis. Only years later, lawmakers followed suite. The lack of clear governance frameworks and the temptation to use digital tools to influence, govern or control the masses also leads to confusion over the voluntary or mandatory nature of those digital platforms. Aadhaar was initially meant to be voluntary, but the push of government and private players to make the Aadhaar ID a pre-requisite to access many services made it *de facto* mandatory. Very similar concerns have been raised about the National Health Stack (Singh & Porecha 2020). Hence, critics argue that this ambiguous approach leads to a renewed exclusion of the poorest as they are unlikely to possess the required infrastructure or the digital literacy skills to opt-in. Moreover, the long-awaited Personal Data Protection Bill appears to have stalled in parliament and competing legislative projects on regulating digital data are emerging from Delhi's bureaucracy, which contributes further to the confusion and uncertainty (Salman 2021).

India is – without doubt – among the leading countries in redefining and developing a public digital infrastructure. The speed and scale at which those digital commons are being deployed is impressive by any standards and speaks to the entrepreneurial energy of this country. Though the complexities of social challenges might not all be solved by a binary code, the India Stack presents a big opportunity to make the society more inclusive, whether in finance, health, or other sectors. The challenge for regulators is to keep up with the rapid pace of disruptive technologies and innovative business models, not least to ensure that the risks associated with those digital platforms are mitigated as much as possible and the public is able to maintain trust in these new infrastructures.

ABSTRACT:
EINE ÖFFENTLICHE DIGITALE INFRASTRUKTUR FÜR DIE ZUKUNFT INDIENS

Seit über einem Jahrzehnt steht Indien an der Spitze des Aufbaus öffentlicher digitaler Infrastrukturen, die unter dem Namen «India Stack» bekannt sind. Über 1,2 Milliarden indischen Einwohnern wurde durch das System «Aadhaar» eine digitale Identität zugewiesen, was nicht nur die Beziehung zwischen dem Staat und seinen Bürgern neu definiert, sondern durch das modulare Design der Technologieplattformen des India Stack auch Indiens unternehmerische Energie freigesetzt hat. Dies hat zu einer Fintech-Revolution geführt und das Land an die Schwelle zur Transformation des Gesundheitssystems gebracht. Die derzeitigen Rahmenbedingungen für Governance bergen jedoch auch einen potenziellen Missbrauch dieser Technologien und fördern deshalb das Misstrauen der Öffentlichkeit gegenüber diesen sich entwickelnden technologiebasierten Politikinstrumenten.

Stichworte: Aadhaar, digitale Infrastruktur, Fintech, Gesundheitswesen, India Stack

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References

Ethiraj, Govindraj (2020): *Is Aarogya Setu a tool for Covid-19 contact tracing or mass surveillance?*, in: Scroll.in, https://scroll.in/article/960566/interview-is-aarogya-setu-a-tool-for-covid-19-contact-tracing-or-mass-surveillance (6 February 2021).

Medici (2019): *Executive Summary: India Fintech Report 2019*. https://mediciinnercircle.com/wp-content/uploads/2019/03/FintegrateReport_ExecutiveSummary_Final.pdf (5 February 2021).

Nilekani, Nandan (2008): *Imagining India: Ideas for the new century.* Gurgaon: Penguin Random House India Pvt. Ltd.

Omidyar Network India & Boston Consulting Group (2020): *Building India's Digital Highways: The potential of Open Digital Ecosystems.* https://opendigitalecosystems.net/pdf/ODE-Report.pdf (6 February 2021).

Ramnath, N.S. & Assisi, Charles (2018): *The Aadhaar Effect: Why the world's largest identity project matters.* New Delhi: Oxford University Press.

Salman, Waris (2021): *Personal Data Protection Bill – Status of the Legislation and Data regulation Regime in India.* https://www.mondaq.com/india/data-protection/1022956/personal-data-protection-bill-status-of-the-legislation-and-data-regulation-regime-in-india (4 February 2021).

Singh, Seema & Porecha Maitri (2020): *Behind the rush and hush of India's National Digital Health Mission. In The Ken*. https://the-ken.com/story/behind-the-rush-and-hush-of-indias-digital-health-mission (6 February 2021).

USAID & mStar (2019): *India Digital Financial Inclusion: Journey Map Report.* https://www.usaid.gov/sites/default/files/documents/15396/mSTAR_IndiaDFI_Report_DRAFT_FINAL.pdf (5 February 2021).