



A Chief Technology Officer for India

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Executive Summary

As India advances towards realizing the vision of USD 1 trillion digital economy, the emphasis on technology adoption in private and public sector is ubiquitous. India has emerged as a global role model in its adoption of unified national identity (Aadhar), and Unified Payments Interface (UPI) etc . Even as newer technology innovations such as open data frameworks, United Health Interface (UHI) and Open Network for Digital Commerce (ONDC) are penetrating the public sector, there is no single, unified vision and direction towards driving technology and digital programs in the country. Technology initiatives remain siloed within respective government departments/agencies resulting in the need to reinvent each public sector innovation.

The rapidly evolving digital landscape in the government has opened a new role - the government's own Chief Technology Officer (CTO). IT leadership has been recast in government, advancing the case for filling the strategic position of the CTO. A CTO for federal India would be an agent of change and leader of digital transformation, making the office of the CTO front and center in government decision-making and strategy on digital technology.

We draw inspiration from the success of government CTOs in countries such as the United States of America, United Kingdom, Canada and Estonia to make the case for the appointment of India's own Chief Technology Officer, from India's private sector. This report sets out with contouring the challenges facing government technology initiatives, and makes the case for why a CTO drawn from the private sector will work well for India.

As to the specific role of the CTO, we recommend that the CTO would advise the Hon. Prime Minister and the Cabinet to develop and execute digital, data, and technology policies and strategies, provide professional leadership and support to ministries/ departments in matters related to technology and drive a common framework, standards and architecture for adoption of technology in Government. Thus, the role of the CTO would be very different from the role played by existing ministries and organizations like MeitY, NIC, etc., avoiding any scope overlap or conflict of power.

It is crucial to plan the position of the CTO, map reporting lines and equip the CTO with the budget and personnel to execute the vision. Accordingly, we enumerate scope conditions under which the CTO appointment would be successful, allowing the country to reap the benefits of the position. We conclude by recommending that India will undoubtedly benefit from appointing a CTO from the private sector, bolstered with an able Digital Corps, a contingent of graduates and post-graduates qualified in technology.

01

Introduction & Background



INTRODUCTION & BACKGROUND

Digital transformation enabled by new and emerging technologies is the mantra today. Governments too, are not far behind, as technology finds a place in public sector initiatives on taxation to public health to education. When everything becomes digital, technology becomes the core business. That requires technically savvy people to look after the technology strategy as it is intertwined with business strategy.

CTOs driving the technology strategy have become key players in any large organisation, especially the private sector. A CTO serves as the lead technologist for the organization, staying on top of tech trends, designing roadmap of technology and getting solutions implemented to help the business grow. A CTO's main duty is to enable the organization to reach its goals using an innovative tech approach.

Even though India has championed several cutting-edge initiatives such as United Payments Interface, Aadhar, GST etc., these initiatives remain siloed without the impact of a systemic transformation of embedding tech in government. As a result, technology reforms have not resulted in process reforms and efficiencies across various levels of the government. In 2015, Sri. Rajeev Chandrashekar (currently Union Minister of State for Electronics and Information Technology and Union Minister of State for Skill Development and Entrepreneurship /then MP Rajya Sabha) conveyed this idea in a blog titled "Wanted- a CTO for GOI".¹

Countries such as United States, United Kingdom, Canada, and Estonia have more readily embraced the appointment of a Chief Technology Officer (CTO) for the government. India too will benefit from a CTO at the federal level. If appointed, the CTO would provide advice to the Prime Minister and the Cabinet

in all matters of technology, contour the technology vision for the Government and draft the roadmap for achieving this. India's CTO would bring in a holistic, integrated and 'whole of government' approach to ensure a consistent and compatible technology adoption cutting across Ministries and Departments of the Government of India. Ultimately, this will improve efficiency and effectiveness of governance, better service delivery to citizens and foster great trust in the Government. We propose that a CTO for India, drawn from the private sector would be ideal.



¹<https://rajeev.in/?blog=wanted-a-cto-for-goi>

02

Digitisation in India's Government Sector



DIGITISATION IN INDIA'S GOVERNMENT SECTOR

India is expecting to unlock an economic value of \$1 trillion from the digital economy by 2025.² The vision of the Digital Initiative (2016) has three main pillars – digital infrastructure as a core utility to every citizen, governance and services on demand and digital empowerment of citizens.³ In the last five years, India has made unprecedented strides in large scale digitisation. Aadhaar, India's unique digital identity program, has a coverage of about 1.35 billion people.⁴ India's United Payment Interface (UPI) for real-time payments which processes nearly 5.3 billion transactions per month, is said to be more well developed than its counterparts in developed countries such as United States and United Kingdom.⁵ The Covid-19 pandemic paved the way for more innovation in tech-applications - Arogya Setu was developed for contact tracing and Co-Win was used for vaccination delivery.⁶

Successful implementation of initiatives for public service and governance hinges on vertical and horizontal co-ordination in the public sector.⁷ Similarly, to unlock the economic and social potential of information technology initiatives, a coordinated, collective, and nationwide effort is crucial.



²India's Trillion Dollar Digital Opportunity, (2019), MEITY accessed at https://www.meity.gov.in/writereaddata/files/india_trillion-dollar_digital_opportunity.pdf

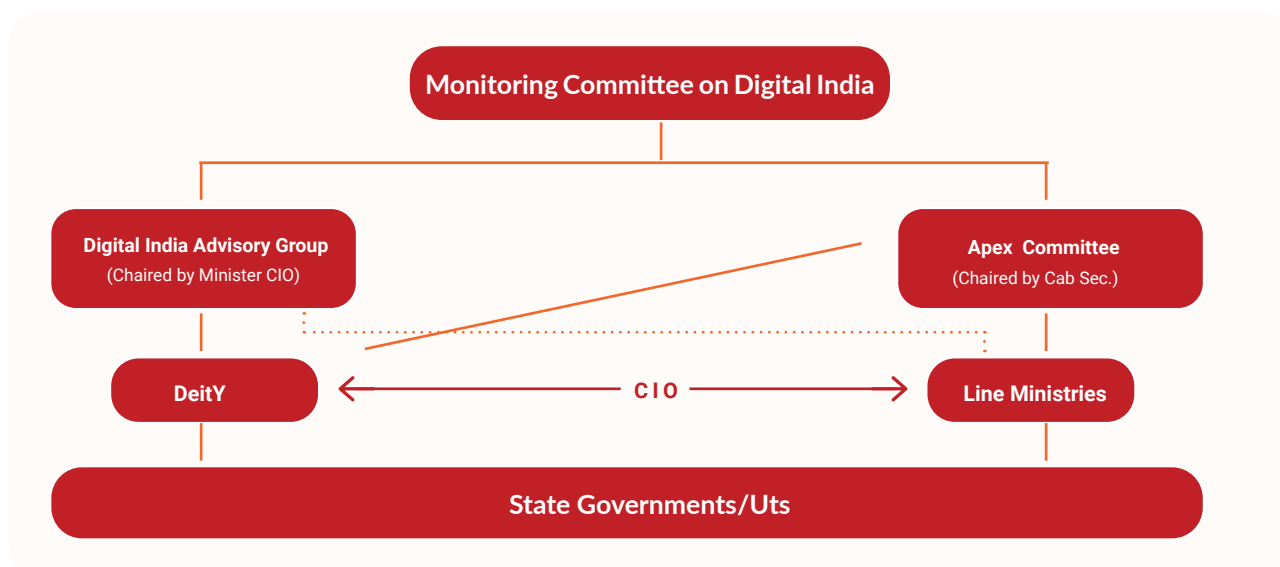
³<https://www.digitalindia.gov.in/content/vision-and-vision-areas>

⁴Aadhar Dashboard Data accessed on 14 June'22 at https://uidai.gov.in/aadhaar_dashboard/

⁵Prime Time for Real Time, (2022) ACI accessed at <https://www.aciworldwide.com/wp-content/uploads/2022/04/Prime-Time-for-Real-Time-Report-2022.pdf>

⁶<https://www.mygov.in/covid-19>

⁷The Challenge of Policy Co-ordination, (2018) Peters, accessed at <https://www.tandfonline.com/doi/full/10.1080/25741292.2018.1437946>



Digital India Initiative

Digital initiatives have cut across ministries. Bharat Health Stack (health), GST Systems, MCA(company affairs), SWAYAM (education), e-Shram (labour) and e-filing of court cases (judicial) are some examples indicating the breadth of digitisation in government service delivery in India. The Digital India Initiative lists about thirty-two agencies carrying out digital initiatives at the federal level in India.⁸

A Monitoring Committee on Digital India under the Chairpersonship of the Prime Minister and representation from relevant Ministries/ Departments is envisaged to provide leadership, prescribe deliverables and milestones, and monitor the implementation of Digital India programme. However, the last time this committee met seems to have been in 2016.⁹

The Programme Management for Digital India has been entrusted to the National eGovernance Division. The Programme Management team is expected to support

Central Ministries and Departments in State(s) and Union Territories (UTs) in conceptualising, developing, appraising, implementing, and monitoring the Mission Mode Projects and e-Governance Initiatives. The Programme Management Team also supports the Apex Committee on Digital India (headed by Cabinet Secretary, GoI), the Council of Mission Leaders (i.e. headed by Secretary, Ministry of Electronics and IT, GoI) and Meeting of State IT Ministers (i.e. headed by Minister, Ministry of Electronics and IT, GoI) and Meeting of State IT Secretaries (i.e. headed by Secretary, Ministry of Electronics and IT, GoI).¹⁰ However the Program Management Team comprises of only bureaucrats and lacks the technical expertise needed at the helm of the entire country's digitisation initiative.

The Digital India Corporation, a Section 8 not for profit company set up by Ministry of Electronics and Information Technology (MeitY) leads and guides in realizing the vision, objectives and goals

⁸<https://www.digitalindia.gov.in/ecosystem?page=1>

⁹<https://di.negd.in/about-di/management-structure/>

¹⁰National E-governance Division accessed at <https://negd.gov.in/node/70>

of the Digital India program.¹¹ Though the role of the Digital India Corporation to provide strategic support to Ministries/Departments of Centre/States for carrying forward the mission of Digital India, build capacity for e-Governance projects, promoting best practises, encouraging Public-Private Partnerships (PPP), nurturing innovation and technology in various domains has been quite limited.

Currently, technology implementation in Government of India and various State Governments predominantly happens through the following mechanisms -



In Respect of Providing IT Infrastructure

- Central Government Infra (Data Centres, Networks, large number of NIC applications) are predominantly handled by NIC
- Basic infrastructure at the State level gets handled by NIC and/or by the IT department or its agencies at the State level
- IT Infrastructure for Large projects and programs such as Aadhar, GST, Income Tax, MCA, Passport etc. are handled by the Ministries or organizations on their own (sometimes with the support of a private agency)



In Respect of Application development and selection of technology and platform

- Central Ministries: Largely driven by NIC.
- Large and complex projects like UID, Passport, Income Tax, GSTN has been done by the respective ministries on their own with private sector support. Similarly, in some cases, SPV are formed which do this on their own (with help of external experts)

- State Departments: Predominantly through the State NIC, State IT Department and / or its Agency.



In Respect of Providing technical and support Manpower

- Central Government Mostly through NIC, except few places like Income Tax, CBIC, GSTN, MCA, UIDAI where they have their own staff. In some cases, organizations like NISG are also utilized for availing of manpower.
- State Govt Departments: Very few of them like Commercial Taxes and Transport have their own IT staff. Mostly rely on contract staff taken from NICSI or empanelled vendors and consultants of State IT Agency.

The above demonstrates that there is no single, unified vision and direction towards driving technology and digital programs in the country. Every digital initiative goes through a life cycle comprising of the above components, causing the wheel to be reinvented for every initiative results in constraints in effective service delivery, duplication of efforts and inconsistent technology selection in some cases.

¹¹<https://dic.gov.in>

03

Current Challenges Before Government Technology Initiatives



CURRENT CHALLENGES BEFORE GOVERNMENT TECHNOLOGY INITIATIVES

Government organizations are often saddled with mistrust from their business partners, difficulty accessing top talent, and complicated legacy ecosystems that prevent them from quickly making transformative changes.¹² Some challenges facing the leadership of government sector technology initiatives are:

a. Technical Expertise at the Leadership



It is difficult to drive transformation on modern tech topics (such as agile and next-gen infrastructure) if leaders are steeped in traditional ways of working and legacy technologies.¹³ Further, workers with advanced digital skills often choose the private sector over the government, creating a dearth in the talent pipeline, particularly at the leadership level.¹⁴ India's eGovernance Division is staffed primarily by bureaucrats at the leadership. The Monitoring Committee is led by the Prime Minister, and is comprised of political representatives. The eGovernance Division and Monitoring Committee of Digital India would benefit from having competent technical expertise to lead and drive technology initiatives.

b. Quick Pace of Technological Change and Advancement



At a time of heavy technological disruption, even laws and policies regulating the technology sector are quickly becoming outdated. Digitisation can achieve

measurable and profound performance impact when it comes to citizen participation, transparency, and accountability, but only if the government sector keeps pace with technology. Generally, the government sector struggles to keep up with technology-driven citizen mobilization because they lack modern information infrastructure that encompasses artificial intelligence, hybrid cloud data management systems, open data platforms, mobile applications, predictive analysis models, user-friendly visualization techniques, blockchain, natural language processing etc.¹⁵

Governments are increasingly looking to adopt futuristic digital technologies to improve efficiency and service delivery. These include AI/ML technologies, Blockchain, IoT, Cloud and drones, AR and VR technologies, etc. The pace of development of new technologies is so high that while government organisations are embracing one emerging technology, the technology is surpassed by newer technology. Thus, government requires tech leaders at the top who keep themselves abreast of new technologies and are able to ensure agencies of the government embrace them fast.

Many governments have outdated or legacy systems that are difficult to maintain or upgrade. Replacing these systems by modern systems which are platforms with open interfaces require tech leaders of very high calibre.

¹²<https://www.mckinsey.com/industries/public-and-social-sector/our-insights/the-next-chapter-driving-technology-leadership-in-the-public-sector>

¹³<https://www.mckinsey.com/industries/public-and-social-sector/our-insights/the-next-chapter-driving-technology-leadership-in-the-public-sector>

¹⁴<https://www.mckinsey.com/industries/public-and-social-sector/our-insights/digital-public-services-how-to-achieve-fast-transformation-at-scale>

¹⁵<https://www.washington.edu/innovation/2016/01/24/can-the-public-sector-outpace-the-private-sector-when-it-comes-to-innovation/>

c. Co-ordination Challenges



Government services are owned by different departments and agencies, with significant operational autonomy. Governments often have to deal with multiple systems and applications that need to be integrated and work together seamlessly. In many cases they need to share data. This can be a challenge, especially when the systems use different technologies or data formats. For success, digitization journeys must be undertaken with a common and integrated vision. In this respect, China has done very well. China's policymaking takes a long view of world leadership, and has set 20- and 50-year vision statements and national goals. India will benefit from a unified visionary strategy plan for the long term.¹⁶

d. Talent Pipeline for Data Privacy and Cyber-Security



Government departments must ensure that personal data is collected, used, and stored in a way that protects citizens' privacy and security. This includes complying with relevant laws and regulations. Some recent cyberattacks on the Indian systems disrupted critical services for days and millions of records were compromised. Cybersecurity is now a very critical challenge for Government as attacks have originated from countries inimical to India, posing a national security challenge. The current setup to handle this aspect needs strengthening and overall guidance from the topmost tech leadership.

e. Data management



Government collects and processes large amounts of data from various sources, including citizens, businesses, and other organizations. The government data is currently being stored, managed and accessed in a disparate manner across government bodies and industry. This prevents development of innovative solutions as well as sharing of data amongst departments/agencies for day-to-day operations. In order to create value for public goods, data-based innovation requires relevant stakeholders to be aligned to create standard guiding principles. With this context, the Ministry of Electronics and Information Technology (MeitY) has released a draft National Data Governance Framework Policy (NDGFP), which aims to build upon the National Data Sharing and Accessibility Policy (NDSAP), 2012 and increase access to government data by leveraging emerging technologies. The Data Management Office (DMO) envisaged under the draft policy will require technical leadership and guidance. Also, ministries and departments will require handholding in classification of non-personal data for sharing and mode of sharing.

¹⁶<https://www.scmp.com/tech/big-tech/article/3183002/china-maps-out-digital-government-plan-2035-beijing-taps-technology>

04

Role of Chief Technology Officer in the Government



ROLE OF CHIEF TECHNOLOGY OFFICER IN THE GOVERNMENT

The rapidly evolving digital landscape in the government has opened a new role - the government's own Chief Technology Officer (CTO). IT leadership has been recast in government, slowly shifting from automation of processes to the strategic position of the CTO. As a change agent and leader of digital transformation, the CTO is front and centre in government decision-making and strategy in many countries.

The CTO is an executive leadership role, driving the overall strategy and structure of government, as opposed to an implementation-focused, or technical, role. How the CTO uses digital platforms and new technologies, introduces effective data governance and organizational structures, and builds in-house skills in digital are critical to this process.¹⁷

A chief technology officer at a nodal position in government of India would:



Provide advice to the Hon. Prime Minister and the Cabinet to develop and execute digital, data, and technology policies and strategies



Provide professional leadership and support to ministries/ departments to present an integrated view of citizen service delivery and help drive inter-ministerial coordination and synergy in matters related to technology



Devise a common framework, standards, data model and overarching technology and enterprise architecture for Government and support the development and enforcement of technical standards for efficient delivery



Communicate with stakeholders, including the public and media, about the government's technology initiatives and progress and thus being a face of the government for technology.



Prioritize programs and government spend in technology and lending a direction to digital transformation.



Enable preparedness and readiness of the Government in merging domains and facets of technology, to keep the country future ready.



Understand, evaluate, and recommend new age technology to help keep Government abreast of latest technology advancements, use cases of new technology and its relevance to Government.

¹⁷https://assets.ey.com/content/dam/ey-sites/ey-com/en_us/topics/digital/ey-agents-of-change.pdf



Providing leadership and guidance to teams responsible for implementing technology projects, including setting performance goals and objectives.



Help departments use technology to deliver against their commitments by co-ordinating with chief technology and chief information/data officers of the ministries/departments as well as NIC and other implementation agencies.



Formulate the Government strategy towards use of open standards, define technology stack for use, promote use of open data in Government.



Enable synergies and best practices from the private sector.



Drive technology adoption and improving e-Governance implementation and acceptance. To promote use of e-Governance across board, and see that more and more e-Services are delivered, and larger percentage of services are delivered through electronic means. (To be tracked through continuous improvement on the UN EGDI or equivalent rankings)



Ensure interoperability of government data and systems.



Drive capacity building and enhancement for government officials and staff.



Connect various departments to ensure that government and policymakers operate in a seamless, transparent, responsive and data-driven manner.¹⁸












Externalise India Stack / Digital Public Goods (DPGs) to help define more solutions and platforms as a Digital Public Goods (DPGs) and take the solutions to other countries, thus promoting an Indian soft power.

Why is the CTO different from existing roles and structures?

There are multiple agencies like Ministry of Electronics and IT (MeitY), NIC, NeGD etc. working in the area of developing applications for service delivery, management of IT infrastructure etc. It is important to see how CTO fits in this eco-system and what will be its key focus areas. This new addition should enhance and enforce existing efforts rather than topple the apple cart. The table below demarcates the boundaries amongst important stakeholders including CTO.

¹⁸<https://telecom.economictimes.indiatimes.com/news/why-the-indian-government-needs-a-chief-technology-officer-to-drive-digital-india/47919962>

Parameters	Proposed CTO / CTO Office	MeitY	NIC (and other implementing agencies)
 Placement	To be part of the Prime Minister's Office	Ministry within Government of India	IT Implementation agency of Government
 Key focus	Vision, strategy, roadmap and bringing in Whole of Government approach	Policy, regulatory, project implementation, promotion of IT / Electronics industry	Setting up and running data centre / cloud Technology and solution implementation for Government (Implementation focus)
 Term	The CTO appointed should be co-terminus with the Prime Minister	Continuous	Continuous
 Profile	The CTO would be a renowned technology leader, preferably drawn from the industry	The Ministry headed by a Minister (Political) and assisted by a Secretary (bureaucracy) with multiple officials	Headed by DG and having officers and staff across the country
 Technology Project implementation	Will not be directly implementing	May implement core tech. projects	Will be implementing projects as assigned to them by Ministries and States.
 Procurement	Since it is not implementing projects, so procurement will not be a focus	Responsible for procurement of projects under its ambit	Responsible for procurement of projects under its ambit
 Budget	Should have a separate budget	Budget is defined for the Ministry	Budget is assigned by Ministries and States for projects
 Stature	Would have greater influence on technology implementation across Government	Has limited influence on technology implementation across other Ministries	Has limited influence on technology implementation across other Ministries
 Innovation	Better suited to assess new technologies and promote innovation	Technocratic/ Political in nature – therefore, lesser scope for innovation	Implementation focus – therefore, lesser scope for innovation

05

Role of Private Sector in Public Sector Digitisation



ROLE OF PRIVATE SECTOR IN PUBLIC SECTOR DIGITISATION

Globally, the private sector emerges as a key partner in public sector digitisation, often determining the success of public digital transformation initiatives. Private sector helps in overcoming the challenges faced by the public sector in digitisation and a visionary leader at the helm of public sector digitisation, would be able suggest the right kind of interventions that are needed in the specific context.¹⁹

A study analysing the role of the private sector in digital initiatives for development conducted in the European countries of United Kingdom, Netherlands, Germany, and Norway identifies a three-fold role of the private sector in using digital technologies for development–



as a beneficiary of the digital technologies



as an implementing partner for the roll out of digitisation initiatives and



as a responsible actor which adopts good practices of technology such as data privacy and data security.²⁰

Private Sector Pathways into Public Sector Technology Jobs

In the United States, in the past decade, several programs have created new pathways into roles for public service innovation. These are pathways towards working for a government agency or in the federal policymaking process, that go beyond traditional structures of political appointment or tenured public service career opportunities. For instance, the United States Digital Service hires top technologists into term-limited ‘tours of civic service.’ By working alongside civil servants, they help build better tools for the people.²¹ Similarly the United States Digital Response places experienced, pro-bono technologists to work with government and organizations responding to moments of crisis, to quickly deliver critical services and infrastructure that support the needs of the public.²²

On similar lines, several initiatives in India have adopted the public-private partnership (PPP) model for digitisation. In the NITI Aayog, PPP Vertical is actively working towards deepening the reach of public-private partnerships as the preferred mode for the implementation of infrastructure projects.²³ The National e-Governance Department also envisages a judicious mix of professionals from private sector and government sector to ensure that requisite skill sets are available to execute designated tasks.²⁴ The Indian Administrative Fellowship program, launched

¹⁹[https://techobserver.in/2022/03/05/fuelling-indian-public-sectors-digitisation-story/Working with the private sector for sustainable digital transformation, \(2021\) accessed at](https://techobserver.in/2022/03/05/fuelling-indian-public-sectors-digitisation-story/Working%20with%20the%20private%20sector%20for%20sustainable%20digital%20transformation,%20(2021)%20accessed%20at)

²⁰<https://euagenda.eu/upload/publications/working-with-private-sector-sustainable-digital-transformation-ecdpm-briefing-note-136-2021.pdf>

²¹<https://www.usds.gov/mission>

²²<https://www.usdigitalresponse.org>

in Karnataka in June 2021 was designed to attract high-performance senior private-sector talent (senior corporate executives with 20+ years of experience) to get trained by knowledge partners like NITI Aayog and work inside the state government system.²⁵

In addition to robust private-public collaborations, the technology initiatives of India's government sector would benefit from technology leadership from the private sector. A Chief Technology Officer (CTO) for the government, modelled on the role of CTOs in the private sector and even borrowing the leaders from the private sector, to drive the overall technology strategy for the country would result in unlocking the 1 trillion dollar value of the digital sector while also proactively reshaping public services for efficiency with a unstinting focus on citizens' experience.²⁶ Instances of borrowing private sector leadership for the public sector is rare, but not unprecedented in India. For instance, Mr. Nandan Nilekani, relinquished his position as Co-Chairman and Member of the Board at Infosys to take charge of the Unique Identification Authority of India (UIDAI) as the Chairperson, in the rank of Cabinet Minister.²⁷ Similarly, Mr. Adil Zainulbhai, Former Partner McKinsey & Co. has been assisting government on multiple forums and now as Chairperson of Capacity Building Corporation, Government of India.

Globally too, the trend of appointing CTOs from the private sector to lead public sector initiatives, has been gaining traction.



²³<https://www.niti.gov.in/verticals/ppp>

²⁴<https://negd.gov.in/how-apply>

²⁵<https://www.livemint.com/brand-stories/role-of-innovative-ppp-models-in-india-s-development-11653402528339.html>

²⁶<https://www.weforum.org/agenda/2021/04/4-ways-leaders-are-driving-agile-governance-in-the-public-sector-agile50/>

²⁷<https://www.infosys.com/newsroom/press-releases/2009/nandan-chairperson-uidai.html>

06

Global Examples of Chief Technology Officer Appointments



GLOBAL EXAMPLES OF CHIEF TECHNOLOGY OFFICER APPOINTMENTS

Multiple Governments have appointed CTOs over the past 10-15 years. CTOs have been at two (2) levels, at the Federal / Central level and at the level of Departments / Ministries in Government. To understand best practices, we have looked at two categories of countries –

1. Countries traditionally focused on technology and innovation | In this category, we have looked at USA and UK
2. Consistently ranked in Top 10 in UN EGD I Rankings | In this category, we have studied Estonia



United States Chief Technology Officer

In 2007, Barack Obama, proposed the office of Chief Technology Officer to ensure that the government and its agencies have the right technology infrastructure, policies, and services. Aneesh Chopra was appointed as the first CTO of the United States (2009-2012).²⁸ He was from the private sector and started his career as an Investment Banking Analyst at Morgan Stanley (1994-95). His successor, Todd Park, was a relentless talent recruiter who organized the USDS. Megan Smith, who took the helm in 2014, was an MIT grad and ace engineer who went on to fill big roles at Planet Out, the legendary start-up General Magic, and then Google. Over his tenure of eight years in office, Obama appointed three CTOs, thus reiterating the critical need for and importance of the position. Before exiting office in 2017, Obama signed the bipartisan **American Innovation and Competitiveness Act** which made the role of U.S. CTO permanent. **The U.S. President nominates the CTO, which in turn**

needs to be confirmed by the Senate. However, the American Innovation and Competitiveness Act doesn't put the U.S. CTO at the cabinet table. In Section 604 of the American Innovation and Competitiveness Act, Congress designates the U.S. CTO as an associate director in the White House Office of Science and Technology Policy (OSTP), reporting to the Director.

U.S. CTO team composition and structure

The Office of the U.S. Chief Technology Officer is often called the Tech Team. The team is led by the Chief Technology Officer (CTO) of the United States and includes the National Artificial Intelligence Initiative Office (NAIIIO), which advances and coordinates federal work and policy on AI. The Tech Team also includes the U.S. Chief Data Scientist, whose team works to ensure that data science helps equitably address the country's biggest challenges. Alexander

²⁸<https://www.theatlantic.com/technology/archive/2014/09/what-does-the-chief-technology-officer-of-a-country-do/379665/>

MacGillivray currently serves as Principal Deputy U.S. CTO and Denise Ross serves as Deputy U.S. CTO and U.S. Chief Data Scientist.

Profile of the CTO

Most of the Federal CTOs had a successful tenure in the private sector in leadership roles in technology, before joining Government as the CTO.

CTOs across other Ministries and Departments

US has more than 100 CTOs appointed across various departments and ministries. Some of the prominent names that have served as CTOs across US government departments are -

- Nand Mulchandani was appointed as the first CTO of the CIA in May 2022
- Todd Park - Former CTO of the Department of Health and Human Services (HHS)
- Jennifer Pahlka - Former US Deputy Chief Technology Officer
- Nick Sinai - Former US Deputy Chief Technology Officer

Roles and Responsibilities of CTO

The roles and responsibilities of CTO are detailed below -

- Supporting the network of departmental Digital Leaders, Chief Operating Officers, Service Managers and Chief Technology Officers to drive the creation of digital public services.
- Leading the Government Technology function and profession.
- Setting and communicating the government technology strategy nationally and internationally.
- Leading IT spending reform, savings to date £3.56Bn and introducing new light touch controls for progressive organisations.
- Work on cross-functional (commercial, programme & technology) strategy to support large technology contract exits, reduced operational risk and expenditure.
- Advising the Government Senior Information Risk Owner on the balance needed between security risks and the practical technology needed to underpin Civil Service reform.²⁹



United Kingdom

Chair of the Central
Digital Data Office

In 2016, Andy Beale was appointed as the Chief Technology Officer for the Government Digital Service function (GDS). Prior to his appointment as CTO, he was working as Director of the Common Technology Services under GDS. He had also worked in the private sector as Technology Director at Guardian News and as a Non-executive Director at GMG Property Services Group.

²⁸<https://www.theatlantic.com/technology/archive/2014/09/what-does-the-chief-technology-officer-of-a-country-do/379665/>

²⁹<https://www.linkedin.com>

Dan Bailey, a former IBM UK and Ireland executive, has been seconded to the Cabinet Office as chief technology officer, commencing September 2021.³⁰

UK has a CTO Council since 2005, aiming to bring together CTOs from across the public sector on a common platform. The council created the principal inter-governmental forum, tasked with improving government practices related to the design, interoperability, development, modernisation, sharing, performance, and efficient usage of IT resources.³¹ The CTO Council implements a programme of Dan Bailey, a former IBM UK and Ireland executive, has been seconded to the Cabinet Office as chief technology officer, commencing September 2021.³⁰ UK has a CTO Council since 2005, aiming to bring together CTOs from across the public sector on a common platform. The council created the principal inter-governmental forum, tasked with improving government practices related to the design, interoperability, development, modernisation, sharing, performance, and efficient usage of IT resources.³¹ The CTO Council implements a programme of technological development and standards to deliver solutions to support the delivery of the ICT Strategy for the UK Government.³² Since 2010, the UK government has worked towards revolutionizing digital government services.

responsible for government cloud, platform services, artificial intelligence, and other emerging initiatives, as well as leading the engineering community from the public sector.³⁴ Kristo Vahter, was appointed as the CTO at the Estonian Ministry of Economic Affairs and Communications in 2018. Vahter had spent seventeen years from 2001 to 2017 in the private sector, prior to joining the government. Kristo's appointment as CTO has had a largely favourable impact and has catalysed Estonia's e-governance initiatives. Currently, 99% of all government public services are online and 98% of Estonians have a national ID-card³⁵. 98% of companies are established online, while 99% of banking transactions are online. Estonia's e-Government is ranked 3rd on the UN e-Government Survey 2020. Moreover, Estonia is ranked 1st on the Freedom on the Net index.³⁶ Estonia also has roles of CIO and CDO in Government. The CTO shares the same office with Siim Sikkut, the CIO of Estonia, and Ott Velsberg, the Chief Data Officer of Estonia.



Estonia

Chief Technology Officer

The CTO, at present, contributes to the strategic vision for the technologies chosen by the government, its technological roadmap, and innovation.³³ He is

³⁰<https://www.theregister.com/>

³¹<https://assets.publishing.service.gov.uk>

³²<https://assets.publishing.service.gov.uk>

³³<https://e-estonia.com/e-estonia-podcast-cto-of-estonia-kristo-vahter-dare-to-be-second/>

³⁴<https://www.linkedin.com>

³⁵https://e-estonia.com/wp-content/uploads/eeestonia_guide_a5_221021_rgb.pdf

³⁶<https://e-estonia.com/wp-content/uploads/e-governance-factsheet-aug2022.pdf>

07

Appointing a Chief Technology Officer from the Private Sector



APPOINTING A CHIEF TECHNOLOGY OFFICER FROM THE PRIVATE SECTOR

For India to be able to effectively unlock the value 1 trillion USD from digitisation, it is important to have visionary technology leadership. This leadership must be provided by an individual at the helm of the country's digital initiatives. A leader from the private sector who has driven large scale digitisation projects would be an ideal candidate to perform this role. Specific advantages of hiring a CTO from the private sector are:

a. Technology Advantage



A CTO from the private sector would have a keen sense of the technology roadmap for the future. Such a person would also be aware of sunrise technologies and their expected shelf life, so that the government's digitization projects deploy such technologies that are likely to be sustainable from a time, cost, scale and utility point of view.

b. New Perspectives



A CTO with a substantial private sector career will bring refreshing perspectives to an otherwise homogenous public sector. A leader without pragmatism and keen understanding of public service challenges might negatively disrupt the public sector, but one with the right technical expertise, maturity and keenness to contribute to public service would bring positive changes.

c. Ease in Managing PPP



Considering that the Government outsources several technology contracts to the private sector, having a CTO from the private sector will allow the government an insider's perspective to manage and administer PPPs. Having a CTO from the private sector would enable the government to ensure that the public sector's IT infrastructure is compatible with market practices and contractors hand-over and take overs are smooth. Also, a dedicated CTO for the government would help to overcome the challenges posed by turnover and churn of bureaucrats who handle tech projects today.

d. Strengthen Cybersecurity and Cyber-Defense Capacity



A CTO from the private sector would bring latest practices which will help to augment and strengthen the country's cybersecurity and defence capabilities. Cyber terrorism is perpetrated not by state actors, but by non-state actors.

e. Leveraging Big Data



Governments are the original "big data" entities producing large amount of data. The government CTO can unlock significant decision-making power by using data analytics effectively.³⁷

³⁷https://assets.ey.com/content/dam/ey-sites/ey-com/en_us/topics/digital/ey-agents-of-change.pdf

08

Operationalizing the Vision



OPERATIONALIZING THE VISION

Scope Conditions for Success of the CTO

A case-study compilation of digitalization initiatives in Asia highlighted that quality and culture of ICT leadership, availability of ICT infrastructure and ICT skill availability in the private sector positively influence the scope conditions for the success of government's digital initiatives.³⁸

The role of the CTO must go beyond the role of a Chief Information Officer (CIO), tasked with keeping the lights on. The CTO appointed from the private sector would succeed in performing their role only if:

a. Support from top to ensure its writ runs large



The position of the CTO has to be either equivalent to a Secretary to Government of India, or to that of a Minister. The position must be housed in the PMO, to ensure that the voice of the CTO is considered to be the single voice of Government on matters related to technology.

b. Authority & Decision-Making Capacity



They are vested with authority and autonomy in technical decision making. The CTO must be given breadth of authority to operate across ministries/ departments of the central government. Clear demarcation of role with existing tech organizations such as MeitY, NIC etc. is also needed.

c. Budget



The Office of the CTO has to be assigned adequate and independent budget to ensure the following –

- requisite staff and team to draw the best talent from the private sector if need be with the technical capacity to drive the vision of the CTO and operationalise the roadmaps drawn
- pilot and implement new age and innovative technologies
- enable grant making to departments and Ministries for critical technology programs.

d. Ethical Leader



The CTO must be an ethical and competent leader who can navigate potential conflicts of interest that may arise in the normal course of short term, fixed expiry tenures of the government.

e. Other Attributes



The CTO must have -

- Strong technical background
- Credible reputation in the industry
- Been in a technology leadership role in the past
- Vision for Digital India, with a flair for new age and innovative technology
- Capacity as a team builder to attract and retain a team of collaborators
- Minimum 20-25 years of professional experience, in the private sector

³⁸Digitalization Of Public Service Delivery In Asia, (2021) accessed at <https://www.apo-tokyo.org/publications/wp-content/uploads/sites/5/Digitalization-of-Public-Service-Delivery-in-Asia-final.pdf>

Onboarding and Operationalization Model

The process and model for onboarding a CTO to Government of India is critical and important to ensure that the right candidate with experience and expertise is selected for the role.

- The person can be nominated directly by the Prime Minister and then ratified by the Parliament (through enactment of an Act). This would also ensure that the best talent from the private sector is attracted for the role.
- The person can be selected through a search committee led by the Principal Secretary to PM and then finally approved by the Cabinet Committee on Appointments.

Position, Stature and Reporting

Based on the process of appointment -

- The CTO can be equivalent to a Minister of State or Cabinet Minister if he/she has been nominated by the Prime Minister and then ratified by the Parliament. In that case, the CTO will directly report to the Prime Minister.
- The CTO can report to the Principal Secretary to Prime Minister and is to be considered equivalent to Secretary to Government of India if he/she has been appointed through a search committee under the chairpersonship of Principal Secretary to PM.

Term

The term of the CTO should be co-terminus with the term of the Prime Minister.

Team

The GOI-CTO will need to be supported by a team of tech professionals, which the CTO should be empowered to source from market and/or government. Also, major ministries having large projects/schemes require CTOs to look after the

automation of the projects, service delivery and data management etc. So augmenting the GOI-CTO with Ministry/ Department level CTOs can result in setting up a CTO council.

The ministries and departments require trained tech manpower to write scope of work, project documentation, SRS, look after deliverables, data classification & data sharing etc. Presently, this need is fulfilled by taking people from consulting companies or from research / educational organisations (e.g. International Innovation Corps (IIC) India Program of UChicago). However, a drawback is that under this arrangement, the ministry does not retain the knowledge and expertise and thus remains perpetually dependent on external talent. Absence of own tech manpower also impacts speed and quality of delivery of projects.

Creation of a Digital Corps under CTO is recommended to be placed in various departments like U-Chicago fellows. Taking graduate and post graduate students from reputed organisations is already being done by NITI Aayog. This could be replicated for creation of Digital Corps. GOI-CTO may be given the authority to design, structure and manage this Corps.

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Conclusion and Summary of Recommendations



CONCLUSION AND SUMMARY OF RECOMMENDATIONS

India needs a Chief Technology Officer (CTO) who would work to maximize the benefits of technology and data for all Indians. This includes ensuring that the Indian government can leverage technology and data to effectively deliver services, make policy that is informed by data, and enable easy, transparent access for citizens and business vis-à-vis the government. In the post Covid-19 scenario, where there has been extensive digitisation of public service delivery, the CTO can also optimally leverage big data and machine learning. A CTO of the right calibre from the private information technology sector of India, if appointed to lead India's Digital Initiatives from the helm, will provide India a coherent and coordinated strategy to unlock the 1 trillion dollar value of the digital economy. The following are the recommendations for the position of CTO at the Central Government level in India -

1. The role of the CTO and the associated responsibilities will be very different from any of the existing roles, positions and organizations such as the MeitY, NIC etc., thus ensuring segregation and separation and avoiding overlap.
2. The CTO will provide advice to the Hon. Prime Minister and the Cabinet in matters of technology, digital and innovation as well as lead the technology vision and roadmap of Government.
3. The CTO may ideally be selected from private sector candidates with relevant experience and expertise. It is important that candidates should be of repute to ensure acceptability from all stakeholders.
4. The CTO will be housed as part of the Prime Minister's Office (PMO) and will be given significant autonomy, authority and budget.
5. The appointment of the proposed CTO will be co-terminus with the tenure of the Prime Minister.
6. The CTO can either be nominated by the Prime Minister and then ratified by the Parliament (through an Act) or selected through a search committee headed by the Principal Secretary to Prime Minister.
7. The CTO position will be either equivalent to State/Cabinet Minister, or to Secretary to Government of India, based on the appointment process.





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