McKinsey & Company

FICCI

India's Century:
Sustainable and inclusive growth in Digital economy sector

A FICCI-McKinsey multi-year forum

Aug 2022

India's Century Vision for the Digital Economy for 2047

Top 3 Digital economy in the world

12-15%[1] Digital economy as % of GDP in India

Human and data capital for the world - global hub for talent (such as software, semiconductor manufacturing, electronics design etc.) and open data flows

World leader in ICT services, software & hardware (semiconductor design, chip design, electronics product design) and emerging tech like Web3.0 and gaming

Self-sustaining infrastructure needed to fully leverage trends in IoT, AI/ML, immersive internet, Metaverse, gaming, blockchain

>90%[2] of population with high-band cellular connectivity

Sustainability capital of the world; **Repair and Refurb** capital of the world

1. US currently at 9-11% with historical trend to continue growing share to 12-15% by 2047; China currently at 8% expected to reach 10% share by 2025, which would further take it to 12-15% by 2047
2. McKinsey Connected World Discussion Paper

Vision for the ICT sector (ITES, Software/SaaS) and consumer tech for 2030

IT / ITES / software sector

From $190-200Bn[1] in 2021 to **~$500 Bn**	IT services revenue by 2030
8-10%	YoY Growth in IT Services *(vs. 3-4% globally[2])*
From ~26%[2] in 2021 to **~100%[2]**	Digitally skilled employees by 2030
From $2-3Bn[3] in 2021 to **$50-70Bn[3]**	SaaS revenues by 2030 *(4-6% of global share vs. 1% currently)*
#1	Global leader in Cloud, AI, IoT and cybersecurity
Top Ranking destination for incorporating SaaS startups	

Consumer tech

From 0% in 2021 to **>90%[4]**	% age of population with 5G cellular connectivity (75-80% with low to mid-band 5G i.e., <300mps)
From ~50% in 2021 to **70%+**	Internet users by 2030
From ~28% in 2021 to **54%**	Share of digital and organized market in overall consumer spend[6]
From 30% in 2020 to **~55%**	Share of digital + organized markets in 2030
From 26% in 2021 to **~70%[5]**	E-retail transactors in 2030 *(from 162Mn in 2021 to 770Mn by 2030)*
10x	Growth in daily digital transactions by 2030

1. NASSCOM – Technology sectors in India 2022; includes IT services, BPM and ER&D
2. Source: NASSCOM: India's Tech Industry Talent: Demand supply analysis; NASSCOM – Winning in the decade; 100% digitally skilled employees – every employee skilled in atleast 1 digital skill
3. SaaSBhoomi – Shaping India's SaaS landscape
4. McKinsey Connected World Discussion Paper
5. % of internet users
6. Consumer spend across categories such as F&G, electronics, lifestyle, pharma, healthcare, travel & mobility, leisure and education expected to increase from $1Tn in FY20 to $2.3Tn in FY30; McKinsey analysis on Digital opportunity

We predict 5 key shifts in the future, that underpin our vision

	Shift	Tech enabler	Description
	**5G-Enabled digital penetration**	5G, Edge	• **85-95% Indians to have high-speed mobile internet coverage**, including tier-3, rural areas; with **lowest data prices in the world (0.09$/GB)** & over **65-70% smartphone** penetration • Increase in daily screen times creating impetus for new business models & innovation to cater to new consumers in the digital economy
	**Immersive internet (2D to 3D interactions)**	AR/VR, Metaverse, Blockchain, Gaming, Quantum computing, digital / crypto assets	• Scarce physical spaces from population increase will drive up demand **for virtual spaces** • Increased consumer convenience with increased use of AR/VR in the **gaming, media and entertainment sectors** as also in critical sectors, e.g. **medical and financial services** • Transformation of global financial and investment landscape due to **digital / crypto assets**
	**Global demands for workforce**	Automation, Remote collaboration solutions	• **Global ageing population will create demand for younger workforce** which India can supply • Emerging sectors such as Web3.0 and gaming will serve as seminaries for highly skilled IT jobs • Greater shift to **flexibility, distribution and digitization of workflows** with reduced physical infrastructure, work permits and administrative costs

	**Decision automation (enabled by AI/ML, IoT)**	AI/ML, Quantum computing, IoT	• **Technology to automate consumer choices**
			  ○ Better matched products using **data on consumption patterns and data-driven decision making**, creating **virtuous feedback loops**
			  ○ Government's use of **automation** will remove inefficiencies and **improve service delivery**

	**Sustainability**	AI/ML, Cybersecurity, secure internet, XAAS	• Greater focus on **renewable energy sources and sustainable supply chains,** e.g., widespread use of **low-waste XAAS models** will bring help **reduce carbon emissions** • Advancements in technology to **predict and minimize the impact of climate change** • Shift from **linear economy to circular economy**

Key unlocks required Now – fix the basics

UNLOCKS | Company Level | Industry body | Central government | State government

Develop human capital: scale-up talent for the future – universal tech literacy, skills in high growth domains

- **Update university curriculum to industry requirements:** large IT services players / digital native / SaaS companies to collaborate with state universities / boards of higher secondary education (e.g., CBSE, JAC) / skill development institutions (e.g., KSDC, OSDA) to link curriculum to **industry demanded skills** (e.g., infra mgmt., testing or design engineer) and offer **apprenticeship** through **gamified / live projects & internship programs** (e.g., HCL has onboarded 7k+ school pass-outs under TechBee program, Freshworks Academy – 14k students trained in customer service) to enhance to enhance deployability of existing STEM graduates[1] and **increase tech pool** from ~4Mn in FY22 to ~9-10Mn[2] in next 8-9 years

- **Re-skill / upskill workforce:** define industry wide consistent digital skill taxonomy and curate continuous training program for tech talent (mandatory certifications at pre-defined frequency) in partnership with industry bodies (e.g., NASSCOM Future Skills program), universities, foreign institutions (e.g., MIT xPRO for quantum computing) to achieve 100% digitally skilled tech workforce by 2030, for e.g., **Oracle works with Stanford Center for Professional Development (SCPD)[3]** to upskill its employees. Focus areas could include:
  - Horizon 2 tech (IoT, AI/ML, CX, 5G – ORAN, test labs, SD WAN)
  - Horizon 3 tech (blockchain, AR/VR, Quantum computing)
  - Product development, Product management[4], product engineer, products ops, product design including design for BOM, quality, service, manufacturing and sustainability (for a circular economy)

- **Update foundational curriculum to enable tech literacy:** state governments could work with sector experts & other external stakeholders (e.g., companies, industry bodies) for implementing NEP[5], 2020 to supplement **school curricula with digital literacy modules** and strengthen learning outcomes through **simulation / gamified** projects on basic IT skills (e.g., web-dev., basic coding, data analytics) supported **by teacher capacity building programs** through **specialized educator certifications** (e.g., MS-Sikkim MoU provide tech curriculum at school level). Similar adult literacy courses may also be designed, with emphasis on use of India stack and tech for services such as banking, health care & agriculture etc.

1. NASSCOM: India's Tech Industry Talent: Demand supply analysis; Only 35% of India's STEM graduates have adequate tech skills to directly enter tech jobs
2. Source: NASSCOM: India's Tech Industry Talent: Demand supply analysis; growth required in tech talent pool assumed in line with expected growth in the industry
3. Source: NASSCOM: Winning in this decade
4. 3-6x growth required; Source: SaaSBhoomi – shaping India's SaaS landscape
5. National Education Policy, 2020

Key unlocks required Now – fix the basics

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Develop human capital: scale-up talent for the future – universal tech literacy, skills in high growth domains

- **Research grants:** Department of Higher Education, Ministry of Education could **map top 50-100 Indian institutions** to **key STEM modules (AI/ML, Robotics, biotech)** and **provide risk capital / non-term grants (e.g., Rs.100-200 cr.** annually) through bodies such as **National Research Foundation** to build **India's R&D ecosystem**
  - Promote post-graduates, PHDs in hard skills such as Physics, Maths, IT, embedded (AI/ML, chip-design, semiconductor, blockchain, quantum computing, robotics etc.) **through scholarships** (e.g, Visvesvaraya PhD scheme) & **dedicated hiring programs to create job opportunities**
- **Adopt new operating model:** enable models such as **gig workforce, in-house workers** at scale by implementing solutions (work board tools, collaboration tools) & tailoring policies (e.g., portable benefits system, insurance packages)
- **Digitization support to MSMEs:** companies (including digital natives, SaaS etc.) can offer **solutions / advisory services for MSMEs** to leverage **digital opportunities** (e.g., e-commerce, digital design, analytics etc.), and collaborate with state government or MSME etc. to develop courses / training modules for small businesses on **digitizing business processes** such as demand forecasting, procure-2-pay, inventory planning, cataloguing, supply chain etc., for instance, Amazon India launched 'Kala Haat' program in collaboration with Uttar Pradesh govt. and provided training, account management guidance, marketing tools, storage and delivery network to ~750k artisan households
- **Enable talent exchange:** MEA could sign of international agreements with ASEAN, Japan, Korea, South America on reciprocal basis for Work Visas instead of Immigration visas for easier flow of business

Key unlocks required Now – fix the basics

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Becoming Data Capital

- **Harmonize standards:** industry bodies could work closely with government (e.g., Digital India Corporation, IT Ministry etc.) to **develop and harmonize key** industry standards and governance rules on **data management, classification, data privacy, 'Right to Repair'** and technologies such as **cybersecurity and blockchain, quantum computing etc.;** user feedback could be incorporated through public consultations in such programs
- **Develop regulatory sandboxes:** central government bodies such as MeiTY, RBI, SEBI, TRAI etc. could update regulation to **accelerate development and deployment of regulatory sandboxes** to enable free exploration of new technologies such as **cryptocurrency, quantum computing, 5G/6G** etc. (by allowing for testing and piloting of R&D in new tech under government supervision) and enhance regulatory trust in new technologies; encourage self regulation to ensure efficient consumer redressal and compliance
- Industry players and startups could collaborate with Central government under **National Programme on Artificial Intelligence**[1] to **set-up "datasets of national importance"**[2] **(e.g., healthcare, grain value chain, land records, weather data, etc.)** and develop the necessary infrastructure to enable industry to use the data sets e.g., enrich data on the marketplace, host open-source solutions and AI models, and run AI models or bigdata analysis using computing infrastructure
- Industry / individual companies could invest and build out cost-effective, innovative and environmentally-friendly **data storage and processing centres** and solutions

1. National Programme on Artificial Intelligence has been conceptualized under National e-Governance Division and is under development
2. Source: NASSCOM – Unlocking value from data and AI

Key unlocks required Now – fix the basics

UNLOCKS | Company Level | Industry body | Central government | State government

Develop an ecosystem by enhancing access and connectivity

- Telecom companies leverage unique **Indian 5Gi standards** (designed to facilitate 5G coverage for rural areas) to develop **standard essential patents** for device connectivity solutions (e.g., modules optimized for emerging countries with lower density of network infrastructure, indigenous 5G stack) in collaboration with software players; government **rigorously tests for 5G adoption** with, e.g., small-scale enterprises, to improve business outcomes
- Increase adoption of **AI/ML, Robotics / RPA, NLP** etc. at scale to enrich customer insights and **personalize + automate marketing decisions**, accelerate product to launch, **drive hyper-local product assortment & pricing**, and create **unique experiences** (digital avatars, virtual trial at home, RFID-enabled customization, customer service through emotion sensing)
- Banking institutions / Fintech companies / software players could collaborate with NPCI to facilitate full scale commercial launch of **UPI Lite**[1] to serve populations in rural areas with limited internet connectivity and enable development of security framework and utilize DLT & emerging tech like IoT to bring innovation to existing system
- **Bridge Digital Gender Divide** by instituting women-targeted mobile phones / internet access schemes, building targeted digital skilling programs for women entrepreneurs to help them access credit and markets via digital India stack (e.g., micro-loans via DEPA), and developing specialized digital applications to assist women in delivering key services (e.g., as antenatal / infancy care providers that help provide primary care)

Focus on sustainability

- Industry-backed (FMCG, electronics manufacturing players etc.) **innovation / R&D funds to underwrite risk** of startups engaged in emission reducing, effective water usage technologies, and handling of electronic wastes through guaranteed uptake contracts
- Government ministries could create **visible demand signals** to boost investments in emerging sustainability technologies (for e.g, next-gen solar, energy storage technology, green hydrogen) through procurement mandates, production subsidies, regulatory framework to replace non-sustainable practices (fossil fuels, ICE vehicles) etc.
- Continued focus by individual companies on adopting innovative and sophisticated recycling & reusing solutions including **plastic alternatives** for digital electronics and products, handling of electronics waste, **waste water treatment**, desalination etc.

1. National Payments Corporation of India (NPCI) announced launch of 'UPI lite – On-Device wallet' in 2022 (under pilot currently) which will enable processing of transactions in offline mode

Key unlocks required Now – fix the basics

UNLOCKS | Company Level | Industry body | Central government | State government

Unlock path for scale of SaaS companies

- Large IT services players / digital natives could support scale up of SaaS companies (target 10x increase in $100Mn+[1] revenue players) by partnering with them to **jointly develop offerings** (e.g., with pilots), **provide access to end customers** in target segments**,** enabling **GTM / sales engine in international markets;** opportunity for global leadership in areas aligned to **India's strengths** e.g., horizontal infra (cybersecurity, DevOps and dev tools, Data management and observability etc.), vertical (e-commerce enablement, healthcare tech, logistics tech, ESG tech) and SMB focused SaaS, for instance, HCL has tied-up with Innovaccer to jointly drive digital health transformation for healthcare and life sciences organizations
- Central government / bodies (e.g., MeiTY, MSME ministry) could enable expansion of domestic market for Indian SaaS startups through:
  - Launch of spend initiatives including **development support for "India Stack"** e.g., ICT grand challenge to develop modular, and cost-effective solution - "Smart water supply measurement and monitoring system" under National Policy on Software Products, Innovation challenge for development of Indian Video Conferencing solution
  - Launch of **awareness / skilling / digital training programs and providing incentives** (e.g., better credit scores, subsidies, free subscription up till certain users etc.) **for SMEs** to adopt **software solutions built by Indian SaaS companies** to drive business digitization (e.g., inventory management, customer marketing, accounting etc.)

Software companies to accelerate adoption of emerging technology / delivery models

- Accelerate innovation and product/service quality by scaling up adoption of emerging delivery models & tools -**Software 2.0, Low Code No Code, AI based code reviews & defect prediction, DevSecOps, Software crafts.** For e.g., Eka scaled with a low-code platform to accelerate time-to-market for new products
- **2-3x increase in investments into building 'productized' offerings / assets / platforms** (in line with digital specialists) to enable innovation (for end clients), drive standardization/quality and accelerate time to market
- **Strengthen capabilities and operating model to orchestrate partnerships and ecosystems** e.g., develop leadership talent, deepen partnerships with hyperscalers or SaaS players with joint IP creation, GTM

1. Source: SaaSBhoomi – shaping India's SaaS landscape

Key unlocks required Now – fix the basics

UNLOCKS | **Company** Level | **Industry** body | **Central government** | **State government**

Become hub for Localised Development

Companies in respective domains (agri-tech, fintech, e-commerce, logi-tech etc.) could leverage **India stack** and **emerging technologies** to innovate business models or create new solutions:

- **Commerce**: build solutions to enable small businesses to **integrate with ONDC** & deliver personalized customer experience (e.g., **virtual storefronts, website / chat-bots / voice support in vernacular languages, loyalty tracking**), and drive adoption by other value chain players (e.g., logistics, wholesalers etc.) to **increase market access,** enable **buyer-seller interoperability** and facilitate **dynamic pricing** leading to overall **reduction in cost of doing business for all players**
- **Agriculture**: build **'Farm to Fork'** business models by leveraging farmer's data **(through 'Agri stack') and hardware & software solutions** (**geo tagging & imaging, IoT sensors, distributed ledger, smart contracts etc.**) for real-time process monitoring
- **Logistics**: reduce logistics costs by 20-25%, leading to savings of $180-200B in 2030 alone by **adopting universal reference numbers for consignments** across agencies, **IoT based tracking systems** for real-time monitoring of all cargo, **blockchain for payments** and analytics for **multi-modal mix optimization, route optimization etc.**

Key unlocks required Next (explore adjacencies) / New (explore frontiers)

UNLOCKS | Company Level | Industry body | Central government | State government

Become hub for Localised innovation and development (software and hardware)

- Healthcare / health-tech companies can partner with government to offer platforms, bots, wearable devices to enable ubiquitous (remote) healthcare and **personalize pre-emptive care** (with **innovative solutions for older generations**) through AI/ML algorithms that utilize **patient health records and lifestyle data of millions from 'Health stack / EHR'** to **reduce overall costs;** generating **$40-60B value by 2030** through remote healthcare models, wellness & prevention therapeutics and medical & care-based exports

- Set up industry led **Innovation clusters as collaboration among state-industry players- academia** with **enabling infra**, testing / prototyping labs, startup incubation funds (e.g., privately administered public funds) and **talent skilling programs** to become **global innovation and manufacturing hub** in tech products and services relevant for India market**.** Focus areas of the hubs could include:
  - **Address significant India market demand (near to Mid term horizon):** 5G (ORAN, 5G test labs), embedded design for EVs, IoT for Agri, AI/ML for public digital stack etc.
  - Develop **indigenous hardware and products** for high growth areas – e.g., Renewable energy tech, Smart Mobility solutions, chip-design, semi-conductors, 5G/ORAN equipment, low cost IOT sensors etc.
  - **Become leading innovator in set of emerging areas (long term horizon):** technologies such as quantum computing, AVGC[1], Crypto, blockchain, Web 3.0, space-tech etc.
  - **Build use cases relevant to public sector** leveraging emerging tech and India stack (e.g., mission critical services such as AI-enabled public safety, healthtech, cyber defense)

- **Win the battle to become the R&D hub for leading product companies** – enabled by favorable policies (e.g., super income tax deduction, subsidized GST on inputs etc.), grants from central government scaling up availability of skilled talent, streamlined IP protection laws and enabling infrastructure (e.g., land, prototyping labs)

1. Animation, Visual effects, Gaming and Comics

Key unlocks required Next (explore adjacencies) / New (explore frontiers)

UNLOCKS — Company Level — Industry body — Central government — State government

Become hub for Localised innovation and development (software and hardware)

- Consortia of companies (consumer tech, software players) could collaborate with industry body, central government **to raise India's profile on innovation by hosting conferences, industry meetings, roadshows,** at **global** scale like **CES, SXSW, London's Global IoT Technology Expo etc.** (Asia, Europe and other regions where tech spend will grow significantly) in areas such as AI/ML, IoT, CX etc. to showcase technological capabilities and developing two or three domestic success stories across **cloud, AI and cybersecurity as World Economic Forum lighthouse projects**

Develop an ecosystem by enhancing access and connectivity

- Industry players (digital natives, SaaS players, hybrid players etc.) could collaborate with government to build '**Metaverse strategy**' with global standards to help in adoption of blockchain, Web 3.0 etc.; invest in Innovation clusters / CoE to prototype, pilot and commercialize Metaverse use-cases such as virtual engagement, gaming, tourism, content delivery etc. (for e.g., South Korea has invested ~$200Mn in Metaverse alliance with over 500 companies)
- Industry could increase support for startups building for **6G and beyond** through targeted investments and mentorship

Backup

Agenda

IT services / SaaS

Consumer Technology

Trends shaping the ICT sector (ITES, Software/SaaS)

Deep-dive in back-up

1. **Increasing tech intensity:** 200 bps increase in enterprise tech spending (~5% of revenue in next decade from current ~3%), led by "Change" & "Innovate" spend themes (e.g., digital business build, CX, omnichannel, personalization, cloud native apps etc.)

2. **Sectors without borders:** Tech Natives and Digital innovators which operate without boundaries across verticals (e.g., Amazon across retail and tech) will drive ~75% of enterprise tech spend by 2030

3. **Cloud and hyperscalers disrupting profit pools:** 40-50% of future opportunity pipeline to be influenced by partnerships and ecosystems, led by "hyperscalers" (AWS, Azure & GCP) and as-a-service platforms (SFDC, SAP, etc.)

4. **Software disrupting legacy services:** Indian SaaS industry expected to create as much value in 10 years as IT/BPM services generated in the last 25 years – potential for $1 trillion in value and nearly half a million jobs by 2030

5. **M&A as core differentiator to build capabilities & to scale:** Tech services providers are focusing on programmatic M&A ("low-value, capability driven" acquisitions) to fill capability gaps

6. **Reimagining delivery models:** accelerating adoption of next-gen delivery models (e.g., software 2.0, software crafts, low code / no code platforms, hyper-automation) for dramatic improvements in productivity, quality and time-to-market

7. **Workforce of the future:** Building the talent supply chain engine for emerging domains[1] (e.g., digital 2.0 skills, SaaS), by scaling new talent pools (e.g., gig workers), capabilities (e.g., product management, design thinking) and reimagined employee value propositions

8. **Tech trends driving next wave of innovation:** 10 technologies to shape future of industries – hyperautomation, future of connectivity (5G, IoT), distributed infrastructure (cloud, edge), AR/VR, applied AI, software 2.0, trust architecture (blockchain, cybersecurity) and ESG tech

1. Domain= Intersection of vertical, SL, geos & customer archetypes that are high spend and fast growing

However, some challenges to be addressed along this journey

- **Intensifying war for talent** – demand/supply gap for digital skills expected to grow from 10% to 30% by 2025 under current trajectory

- **Accelerating decline in traditional services –** growth of automation and platforms likely to drive accelerate decline in traditional services (~8-10% pa decline projected over next 5 years)

- **Rising important of cybersecurity with growth in data/analytics, digital -** total cost of cybercrime globally, including destruction of data, stolen money, lost productivity and other factors could reach USD 10.5 trillion annually by 2025[1]

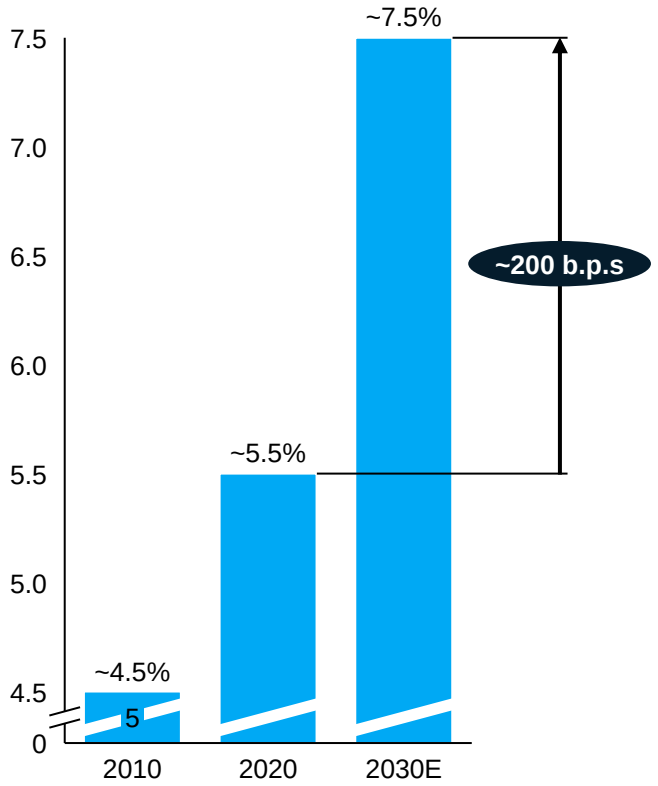
- **Historically low investments into R&D / innovation / new offerings -** Indian IT companies[2] spend only ~0.6% of their revenues on R&D, lower than global digital leaders and other Indian sectors (~3-7%)[3]

- **Changing regulatory landscape -** Indian technology service providers will need to make significant shifts in their operating/delivery models in response to global regulatory shifts (H1B restrictions)

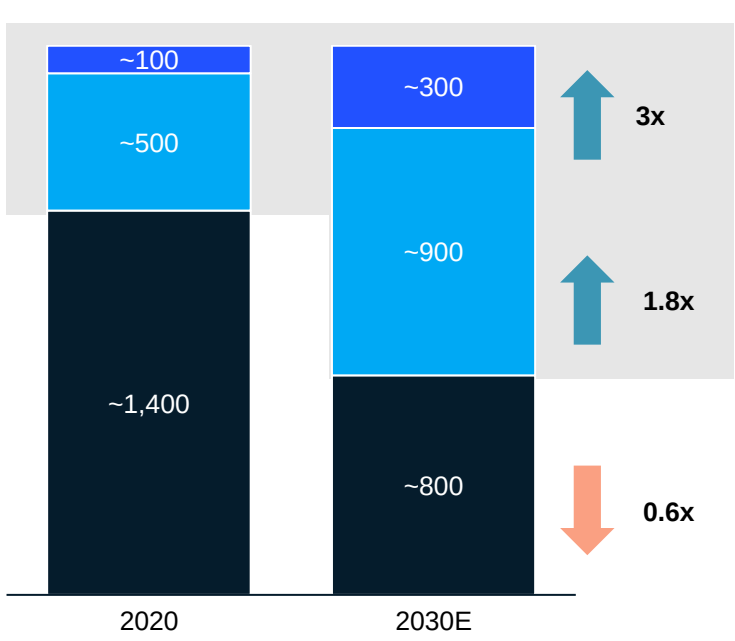
1. Cybercrime to Cost the World $10.5 Trillion Annually by 2025," Steve Morgan, CyberCrime Magazine, Nov. 13, 2020
2. Listed companies
3. Source: NASSCOM – Future of Technology Services; Winning in this decade

1: Global enterprise and consumer tech intensity likely to amplify to ~7.5% in the next decade; Tech natives and Digital reinventors to drive 75% of enterprise tech spend

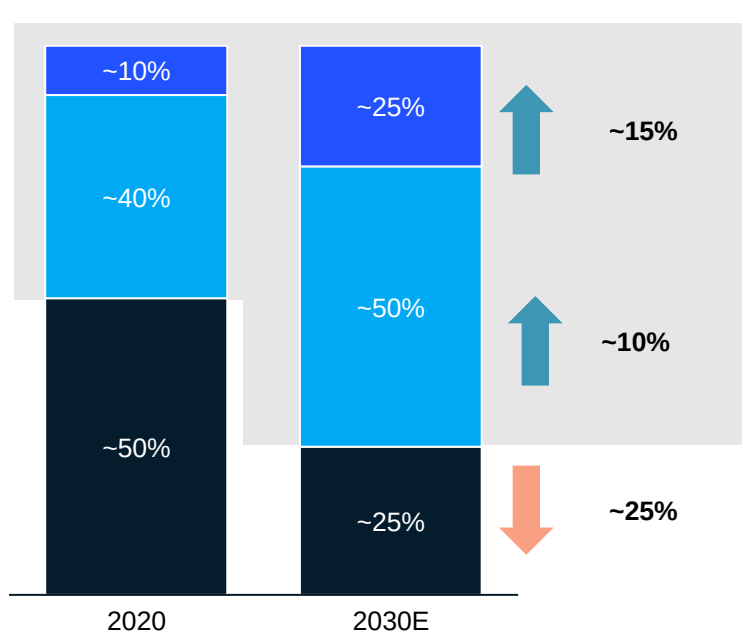
Global enterprise and consumer spending on technology (as % of GDP)



~2x number of Tech natives and Digital reinventors by 2030
# of players in G2000[1]



~75% of tech spend driven by Tech natives and Digital reinventors
Share of enterprise tech spend (%)



Tech natives: Leverage Cloud and SaaS first architecture and low propensity to outsource

Digital reinventors: Focus on outcome, agility and experience, and usage of next-gen technology to enable @scale digitization

Classic incumbents: Spend largely directed to run and change and in early stages of digitization

1. Analysis based on G2000 companies as ranked by Forbes, N=2000

Source: McKinsey proprietary Enterprise TAM Predictor, IDC, World Bank, Globaldata 2019 Tech Spend, McKinsey Analysis, Annual reports

3: Value pool in tech industry is shifting towards cloud providers & software/SaaS players

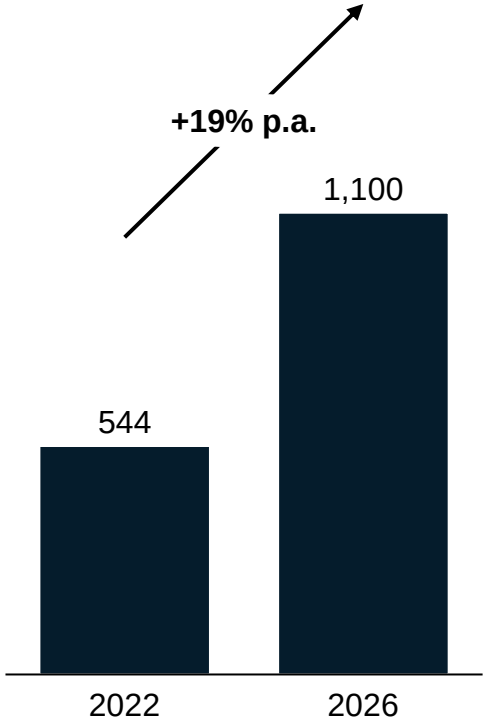
Cloud, Software & SaaS players **gained 5pp share in revenue & 6pp share in margin** from Hardware providers & ITSPs over last 5 years

	Change in share of revenue (in %)	Change in share of EBITDA (in %)	Top players that have impacted the shift
Hyperscalers[1]	+3%	+2%	Google Cloud, aws, Azure
Software & SaaS	+3%	+3%	SAP, salesforce, Microsoft, Adobe
Semiconductors	+3%	+4%	intel, Qualcomm, NVIDIA
Hardware providers	-3%	-4%	Hewlett Packard Enterprise, DELL, lenovo
IT Service providers & BPO[2]	-2%	-3%	accenture, TCS TATA CONSULTANCY SERVICES, Capgemini, DXC TECHNOLOGY, genpact
Telecom players	-4%	-2%	HUAWEI, NOKIA, MOTOROLA SOLUTIONS

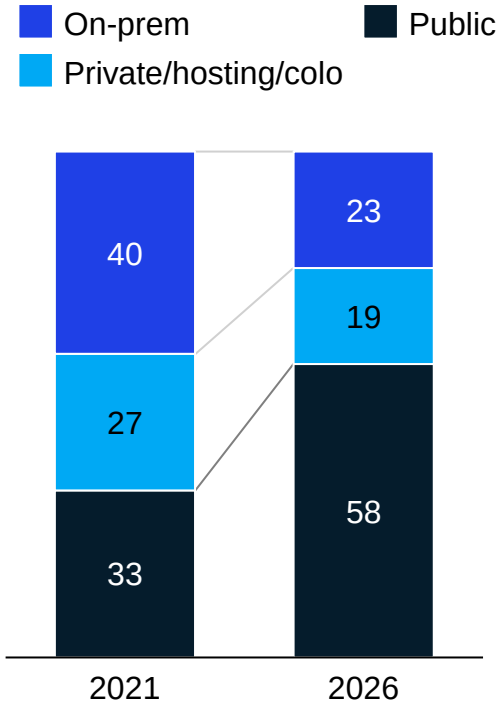
1. Considering the operating margin for majority of cloud players
2. Includes digital service providers

3: Cloud is likely to become a $1 Trillion opportunity by 2026

Cloud spend to reach $1 Tn by 2026…



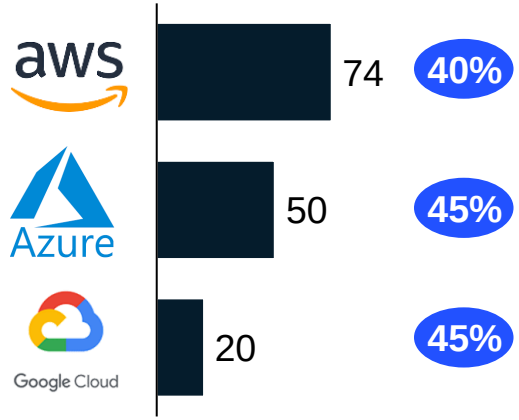
…67% migration yet to happen



No vertical will be untouched

Banking	+16%
Retail	+12%
Manufa-cturing	+15%
Health-care	+11%

Hyperscalers to capture lion's share of market



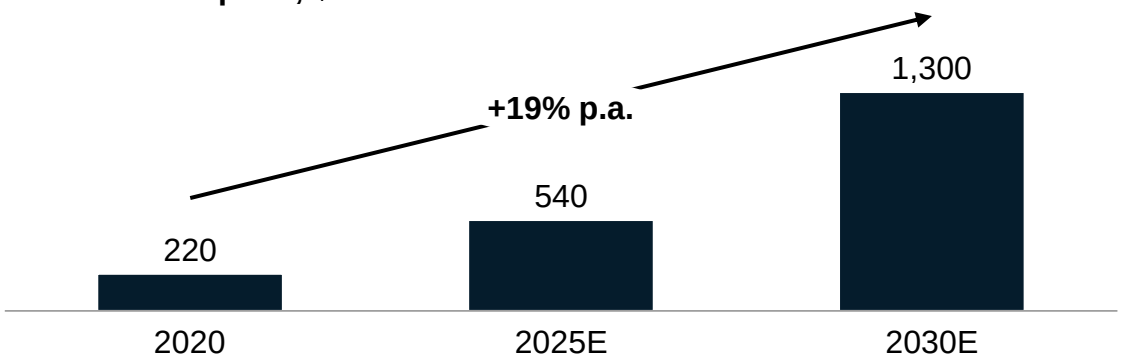
ITSPs need to adapt to the pace of cloud shift to capture market share within key verticals

Source: Gartner – Sizing cloud shift Worldwide 2019-2025; Preliminary Cloud Adoption Enterprise survey 2021 (N=200)

4: Global SaaS market is expected to cross $500Bn in revenue by 2025 growing at 18-20%, with India as a key hotspot

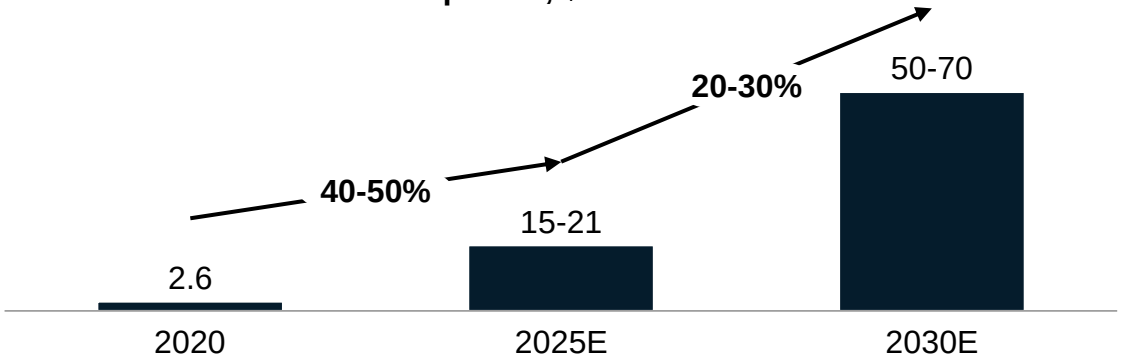
1 SaaS is an attractive market globally

Global SaaS spend, $Bn



2 India is a key SaaS hotspot growing at a rapid rate

Revenue of Indian SaaS companies, $Bn

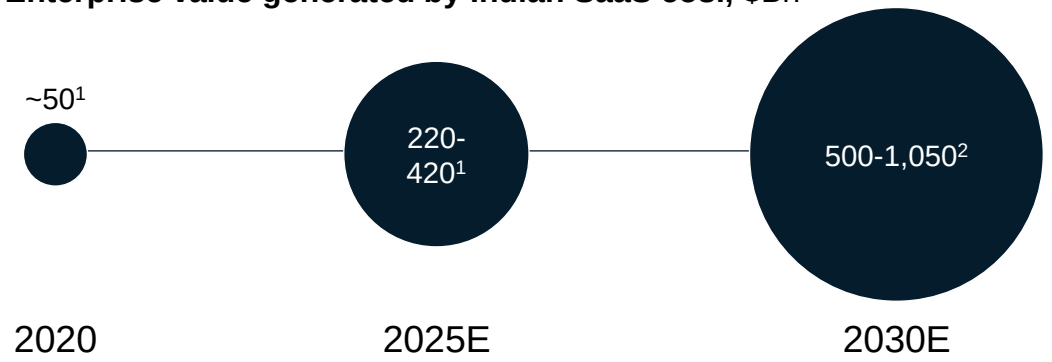


3 India already has a flourishing SaaS landscape with nearly 1,000 players

~1,000	# SaaS companies based in India	**~10**	# Indian SaaS unicorns
150+	# Indian SaaS companies having >$1M in ARR	**~$4Bn**	Total VC Investments in Indian SaaS companies in the last 5 years

4 Indian SaaS industry will generate as much value in 10 years as IT/BPM services generated in 25 years

Enterprise value generated by Indian SaaS cos., $Bn



Source: IDC public cloud spending guide 2019-2024, McKinsey analysis, Other Analyst reports, Expert interviews

7: Talent war for Digital 2.0 skills could be slowing down, but is not over yet

Demand for next-gen tech talent will continue to outrun supply for the next few years

	Top skills with high growth in 2021-22	Hiring growth (LTM), %	Open positions in India (as of Jul-22), #
1 **Cloud computing**	Amazon Web Services (AWS)	53	11,699
	Microsoft Azure	74	7,736
	Google Cloud Platform (GCP)	75	3,277
2 **AI and data-related**	Data Science/AI/ML	37	10,106
	Data Analytics/Power BI/Tableau	59	3,484
	Deep learning/NLP	33	1,808
3 **E2E software development**	Python (Programming Language)	45	11,311
	DevOps	60	8,290
	Kubernetes	75	5,892
	React.js	65	5,820
	Full-Stack Development	65	3,366

Source: LinkedIn, Jul-2022; McKinsey analysis

8: 10 technologies set to transform the future of industries

Industry-agnostic trends

1 Next-gen manufacturing… … and process virtualization

- Industrial IoT[1]
- Robots/Cobots[2]/ RPA[3]
- 3D / 4D printing
- Metaverse
- AR/VR
- Digital Twins
- Gaming and gamification[4]

$4-5 Tn

Metaverse value creation potential by2030

2 Future of connectivity

- 5G & IoT connectivity

Up to 80%

of global population could be reached by 5G coverage by 2030

3 Distributed infrastructure

- Cloud & Edge computing

>75%

of enterprise generated data will be processed at edge or cloud by 2025

4 Next-gen computing

- Quantum computing
- Neuromorphic chips (ASICs[5])

>$1 tn

value potential of Quantum Computing use cases at full scale by 2035

5 Applied AI

- Computer Vision, Natural Language Processing & Speech technology

>75%

of all digital service touch points (e.g., voice assistants) will see improved usability, enriched personalization

6 Future of software / web

- Web 3.0
- Software 2.0

~30x

reduction in the working time required for software development and analytics

7 Trust architecture

- Zero-Trust Security
- Blockchain

~10%

of global GDP could be associated with blockchain by 2027

Industry-specific trends

8 Bio revolution

- Biomolecules/X-omics/ Biosystems
- Bio machines/Bio computing/Augmentation

9 Next-gen materials

- Nanomaterials, graphene and 2D materials, molybdenum disulfide nanoparticles

10 Future of Green tech

- Nuclear fusion
- Smart distribution/metering
- Battery/battery storage
- Carbon neutral energy generation

1. Internet of things; 2. Collaborative robots; 3. Robotic Process Automation; 4. $40Bn projected enterprise valuation for gaming in India by 2025; 5. Application-specific integrated circuits

Agenda

IT services / SaaS

Consumer Technology

India’s superpowers positioning us to leapfrog as a digital economy

- **‘India Stack’ –** Access to customer data and use of advanced analytics innovating business models/products
- **World’s largest internet community with cheapest data** – ~320M new internet users by 2025
- **High investor interest –** investments of US$77B across 1,266 deals, with 164 large deals worth US$58B in 2021
- **Global rebalancing of supply chains** – opportunity for new manufacturing hubs to emerge and to modernize manufacturing via digital and tech solutions
- **Access to local talent** combined with the virtual ways of working allowing us to be a talent hub for the world
- Headroom to increase participation from **under-represented communities in the digital economy** – women today making up 44% of online consumers (up from only 10% in 2018)
- **New markets** (Africa, Middle-east, South America) present huge opportunities to export technologies / solutions
- **Job creation and potential increases to customer base as a result of expansion of digital platform-based services** to Tier-2 and 3 cities as well as rural areas with improving digital infrastructure

Challenges in growth of digital economy

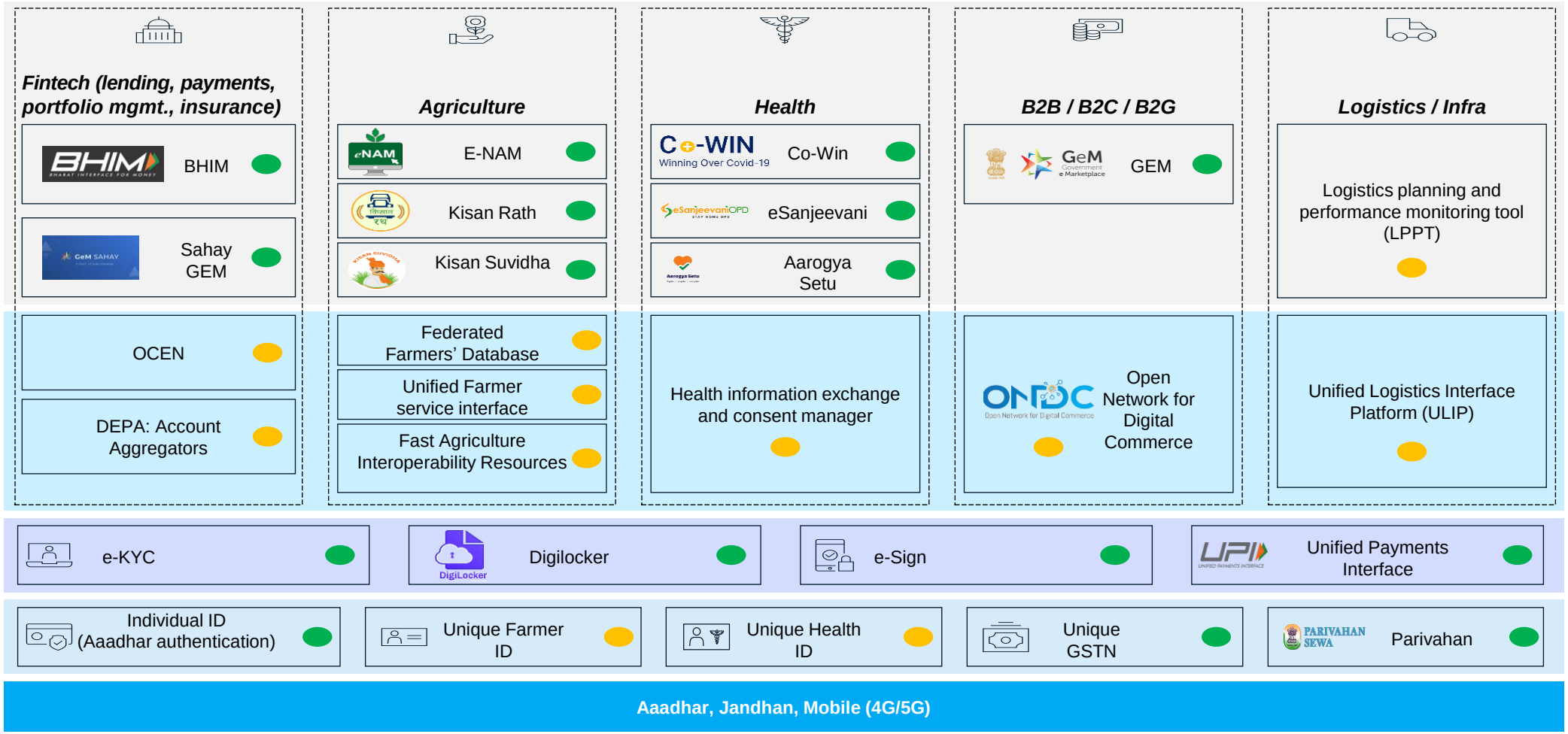
- **Privacy and cybersecurity:** mass adoption of the internet and digital life is dependent on creating a safe experience for all and protecting the vulnerable.
- **Regulatory uncertainty:** absent global convergence around standards and differential regulation creates uncertainty and inhibits innovation
- **Foundational barriers:** prohibitive costs and scarcity of underlying hardware and software impede adoption of new technologies
- **Unforeseeable crises:** events like COVID-19 and Russia-Ukraine war disrupt global supply chains and raise costs for businesses and consumers alike
- **Logistical issues:** High logistics costs and underdeveloped infrastructure hinder quality of service and last mile connectivity in Tier 2/3 cities and rural India

Open Tech stack / platforms pioneered by GoI have accelerated business innovation and formation of ecosystems

Not Exhaustive

Level of maturity / usage — High — Under development / pilot stage

India's stack developed / under works by GoI presents huge opportunity for private sector



Source: McKinsey team analysis