



IT-BPM Sector in India 2019

DECODING DIGITAL

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NASSCOM is the industry association for the IT-BPM sector in India. A not-for-profit organisation funded by the industry, its objective is to build a growth led and sustainable technology and business services sector in the country. NASSCOM Research is the in-house research and analytics arm of NASSCOM generating insights and driving thought leadership for today's business leaders and entrepreneurs to strengthen India's position as a hub for digital technologies and innovation. NASSCOM Research, the most credible source of technology insights in India publishes an annual edition of its Strategic Review which analyses the key trends in IT-BPM industry and disseminates the latest status of the industry performance.

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Foreword

At NASSCOM, we have been researching the Strategic Review for over two decades now. For those of us who are closely involved, it provides an opportunity to go back and corroborate various data points, ideas and of course, the overall relevance of these. In a shifting landscape this becomes an imperative.

In the financial year 2019, the IT-BPM industry grew at a shade over 6% and by year-end the overall revenue in reported currency is expected to touch USD 177 billion; and, it employs about 4.1 million people directly.

For 2019, we have suggested a cautious outlook for the global economy, what with emerging challenges doing rounds - trade wars leading to policy uncertainty, volatility in currency, possibility of a No-Deal Brexit, weakening financial market sentiments, among others. And yet, the Indian economy grew at a healthy 7.3% and is among the fastest growing large economies. To be sure, the advanced economies and the emerging ones grew at 2.3% and 4.6% respectively.

For Indian IT-BPM industry, FY2019 was the year of growth in ways more than one – digital revenue grew at a remarkable 30+% to reach USD 33 billion, 8 unicorns were added, over 2,500 patents were filed in digital technologies alone, presence of >400 AI startups and counting, and the National AI Strategy was announced. All of these and more have contributed substantially towards India's positioning as an Innovation Hub.

Obviously, the journey continues but I am indeed happy to say that the Indian IT-BPM industry today has 600,000 digitally skilled people, as part of the workforce. NASSCOM is working closely with the government and industry stakeholders to ensure that we have a fresh talent supply of 1 – 1.5 million people (in digital tech) in the next 4 – 5 years.

To add here, digital revenue is currently at one-fifth of the total industry revenue. Primarily there are six technologies from the suite which are driving this phenomenal growth – Intelligent Automation, Robotics, Cloud, IoT, Immersive Media & Blockchain. Companies have now included several new measuring metrics to track their digital businesses, including yardsticks like client mining, IP monetization and patents filed, which are fast gaining ground across the industry.

On all four major counts – innovation, competitiveness, entrepreneurship and talent & security, the industry performed quite favorably and rose in rank (rather appreciably) in some areas.

So what are the key trends that's changing the rules?

- Product/Services centric business model shifting to 'Experience First' model
- Rise of the 'Collaborative Economy'
- 3 D's : Data, Domain, Digital- disrupting the landscape
- And of course, the pace of change is unprecedented

So, here's the annual report card of the industry. It's an engrossing story of how the world is changing and Indian IT-BPM industry continues to be the preferred transformational partner. As equal stakeholders, let us join hands to nurture India's innovation capabilities, foster the right ecosystem and be constantly on the lookout for new growth opportunities.

"Changes call for Innovation,

And Innovation leads to Progress"

Happy reading.

Debjani Ghosh

President, NASSCOM



Acknowledgements

The IT-BPM Sector in India report is NASSCOM's annual flagship publication that analyses the performance of the industry, traces its continual evolution and highlights key trends that are influencing and driving this sector forward. The NASSCOM Research team relies heavily on both primary and secondary research, internal and external research reports, and reaches out to stakeholders across the board – industry, government, research firms, etc. – for their inputs that add value to the report. We would like to thank all these stakeholders for their valuable contributions, without which this report would not have been possible

We would like to thank NASSCOM member organisations, who provided relevant data and insights about various industry trends and developments. We would like to acknowledge the inputs and insights from all our research partners, government bodies specifically MeitY, Ministry of Commerce and Industry, Department of Industrial Policy and Promotion, STPI, RBI and other departments/ministries of Government of India and state governments who, as always, willingly provided us with relevant information.

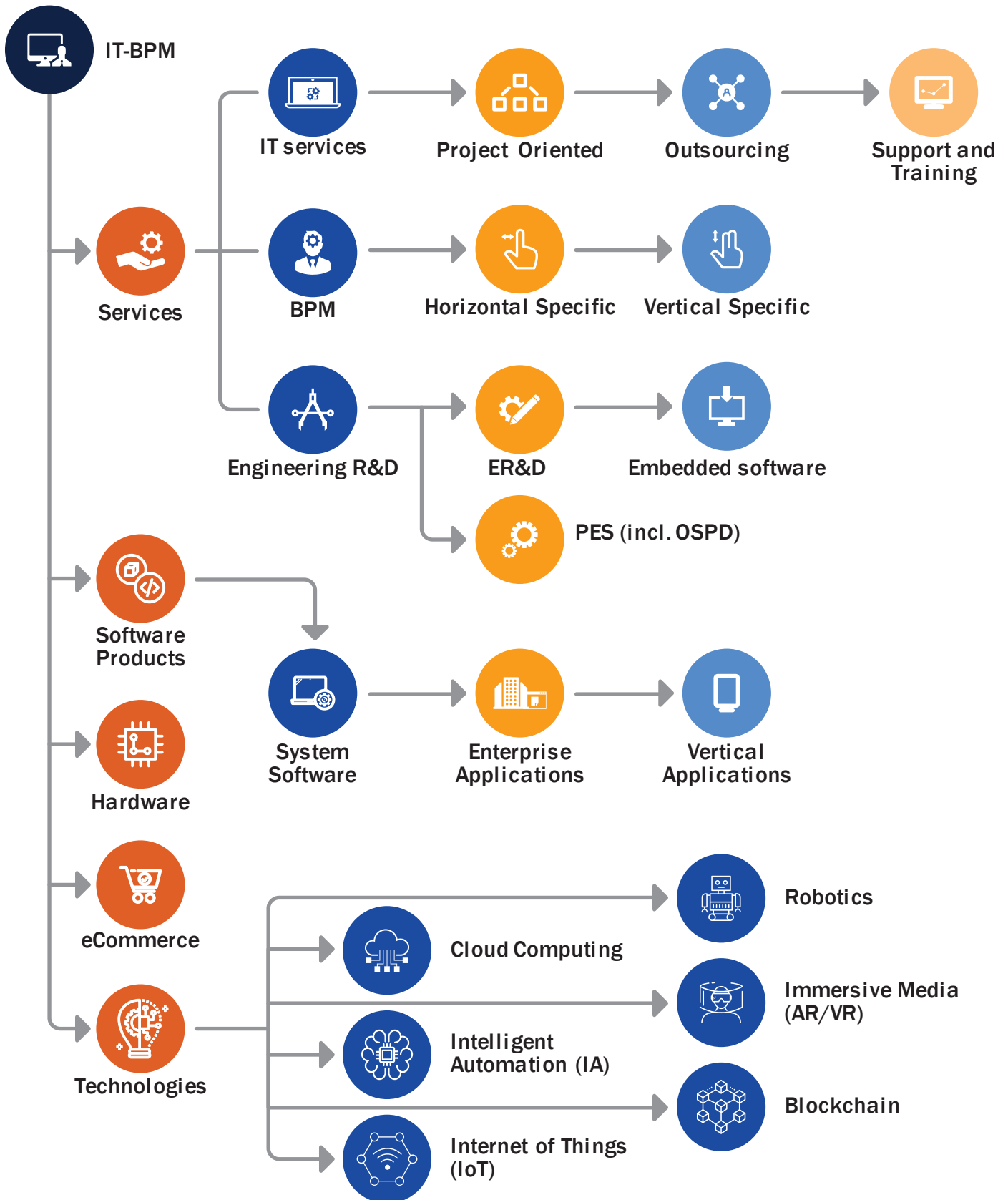
A special acknowledgement to Zinnov Research who helped us build the content for the section on “Digital@scale: Deriving value from digital” and Infoholic Research who assisted us in our secondary research for the report.

All sources and participants have been listed in the appendix section.

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IT-BPM Industry Segmentation



NOTE: The continual evolution India's IT-BPM landscape and an in-depth analysis of its segments has necessitated a more relevant segmentation and re-classification of the industry:

- 1) ER&D: Now includes product engineering services (PES) of both third-party firms (earlier termed as OSPD) and MNC GICs
- 2) eCommerce has been analysed separately and isn't included in total IT-BPM market

IT-BPM Industry: At a Glance



Global spend
USD 1.4 trillion
 Growth 4.9%



As-a-Service deals
USD 21.8 billion
 Growth 45%



Revenue
USD 177 billion
 Growth 6.1%



Exports
USD 136 billion
 Growth 8.3%



Domestic
₹ 2.9 trillion
 Growth 7.9%



Employees
4.14 million
 Growth 4.3%



No. of GCCs
1,250+



Patents filed
4,331 nos.



Digitally skilled emps
600,000



Digital revenue
22-24%



Global
2018



India
FY2019



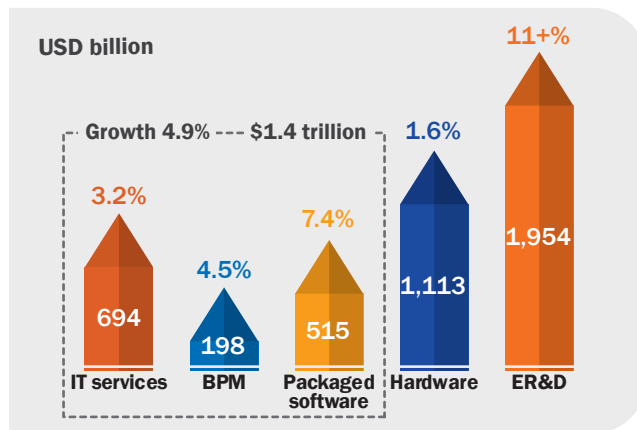
India:
Hub of
innovation

Key Trends

- Industry growth increases as software-led digital penetration increases
- Digital revenue is currently one-fifth of the total industry revenue
- ER&D, the fastest growing segment at >11 per cent
- Six digital technologies primarily driving growth of the industry – industrial automation, robotics, cloud, IoT, AR/VR, blockchain
- Key metrics that companies are tracking for digital business – digital revenue, investments in digital, automation, client mining, IP monetization/patents filed, skilling and C-SAT

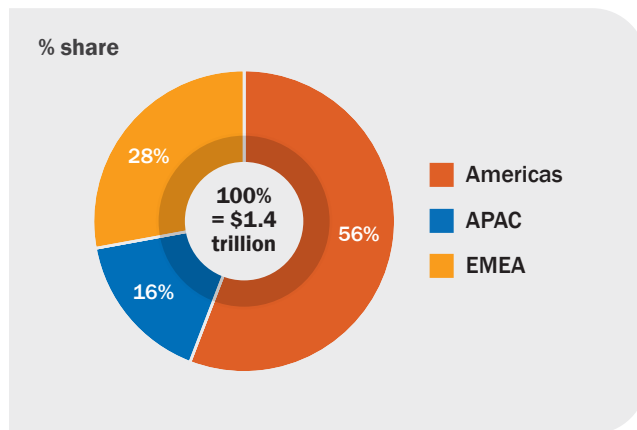
Global IT-BPM: Shift towards software and digital driving growth

2018: Growth in ER&D spend outpacing software & services



- IT services grew at a slightly slower rate vis-à-vis 2017; growth was led by demand for application development & management services
- RPA playing a key role in BPM growth as customers look to automate low-hanging fruit and shift their focus to more strategic work
- Software spend driven by rapid adoption of SaaS, esp. CRM, (focus on better customer experience); renewed interest in security and privacy solutions

APAC: Fastest y-o-y growth at 5.7%



- Fastest growing among technology segments was ER&D – 11.4% growth; increasingly software-led engineering and digital technologies (IoT, analytics) driving demand
- In terms of geographies, APAC grew fastest (5.7% y-o-y), Americas (5.3%) and EMEA (3.6%)

Global digital revenue growing at over 20% CAGR

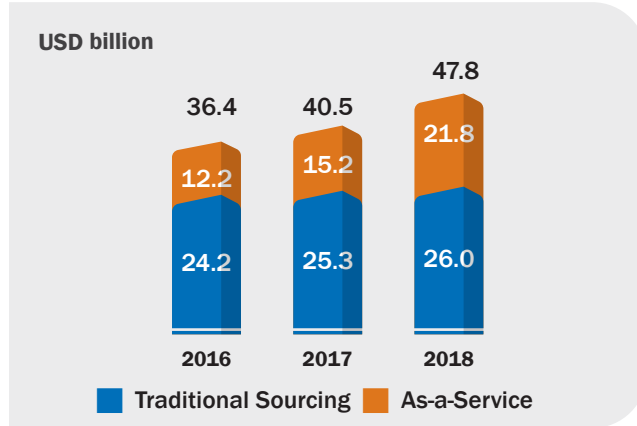
Global revenue from digital is seeing a 20+% CAGR growth over 2017-19 and is estimated at USD 267 billion in FY2019

Vendors are making agile and cloud the central themes in their applications business, thereby shortening sales cycles and ramp up new app work

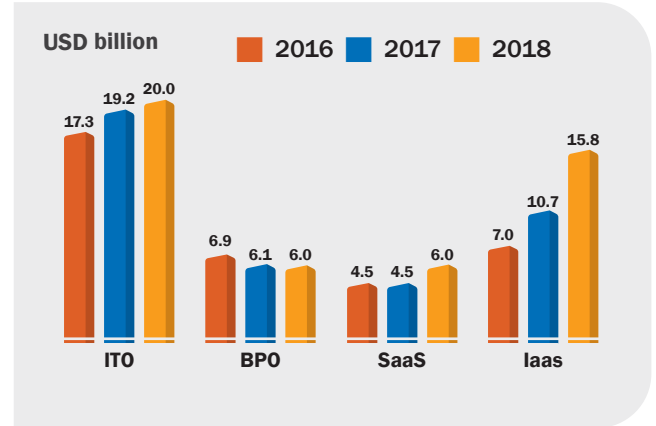
Cloud adoption is one key growth driver; also, manufacturing sector's implementation of Industrial IoT, robots, etc.

By total contracts awarded, 2018 was the most bullish year since 2015

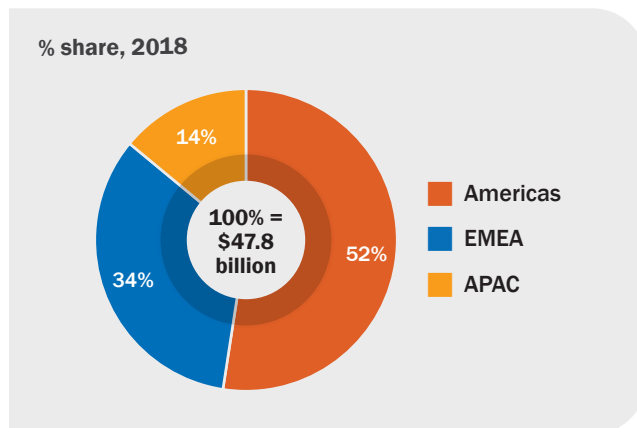
2018: ACV grew 18% over 2017



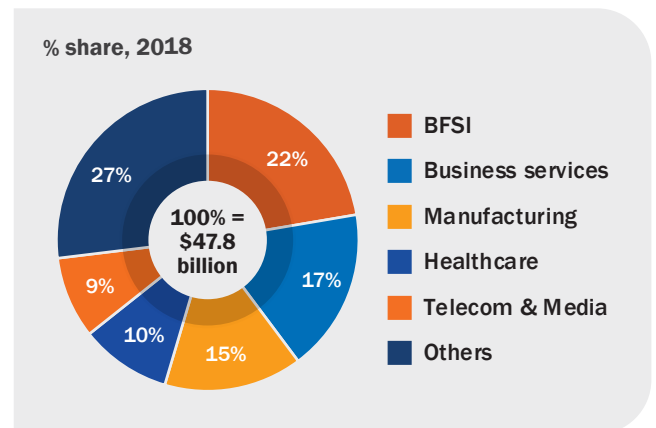
2018: As-a-Service saw a 45% growth over 2017



APAC: 30% growth; As-a-Service, key driver



Healthcare: Fastest growing ACV



Outsourcing contracts in 2018 grew a robust 18 per cent largely driven by a 45 per cent growth in As-a-Service contracts

- As-a-Service contracts were worth USD 21.8 billion in 2018
- 72 per cent of these contract were for IaaS and the balance for SaaS
- Traditional contracts stood at USD 26 billion (77 per cent ITO; 23 per cent BPO)

While Americas' share in total ACV stood at 52%, APAC was the fastest growing at 30 per cent:

- Driven largely by As-a-Service contracts (~63 per cent share) with y-o-y growth of 55 per cent

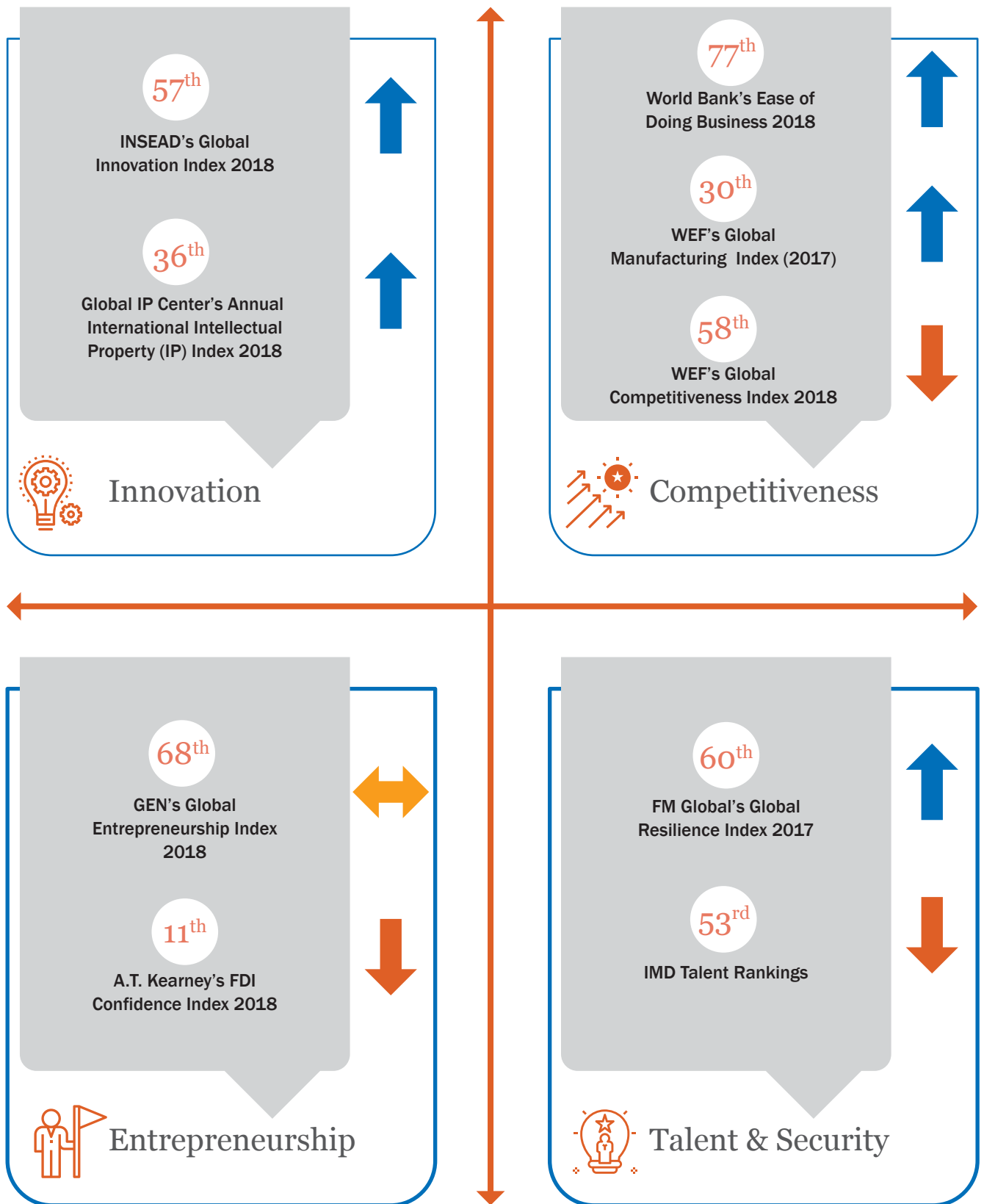
BFSI, business services, manufacturing, accounted for ~55% of total contact value:

- Top verticals leading adoption of As-a-Service – business services, financial services and manufacturing

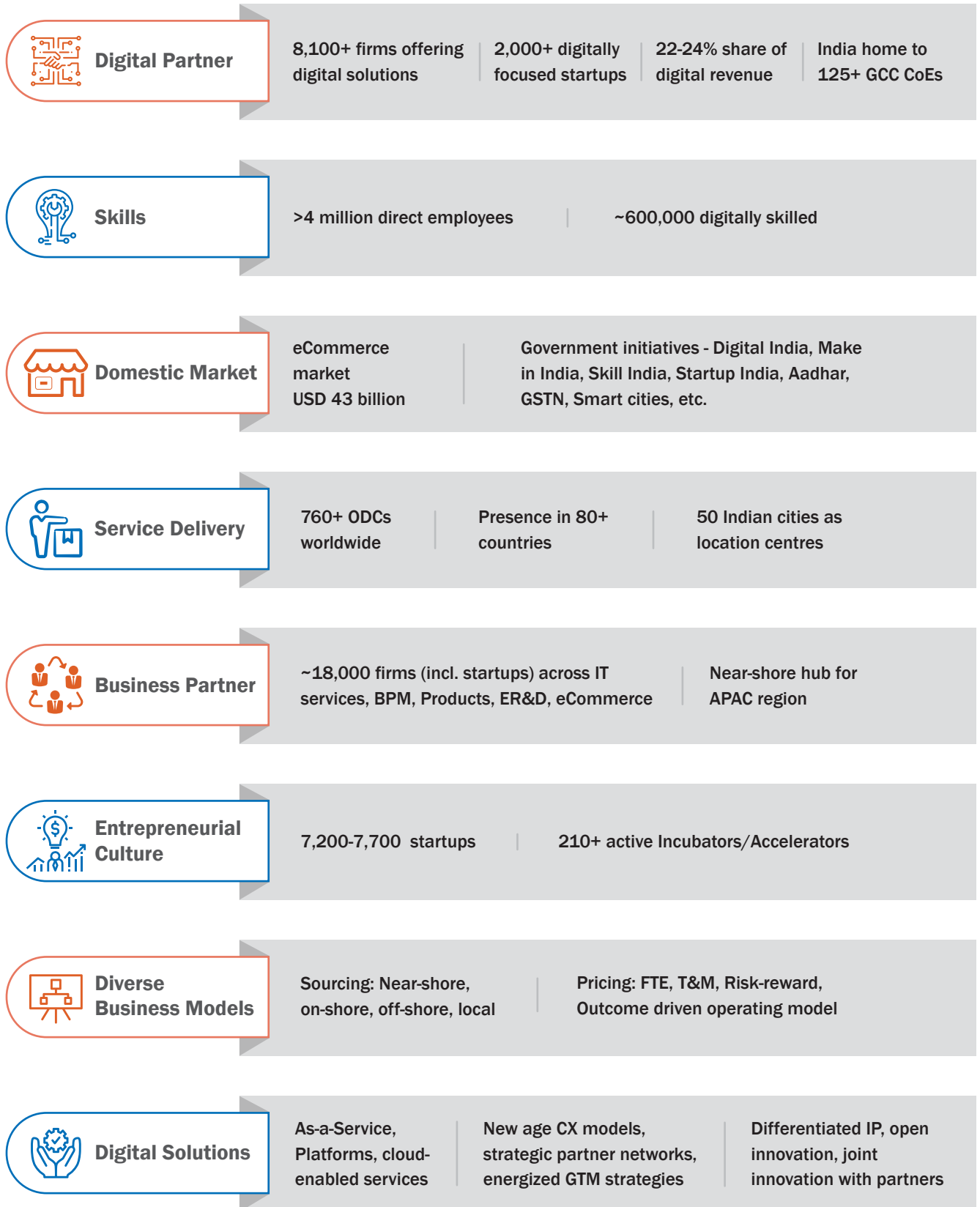
Notes: ACV: Annual Contract Value; * Contracts with ACV ≥ \$5M

Source: ISG Index 2018

India: Setting itself up as a global investment and innovation destination



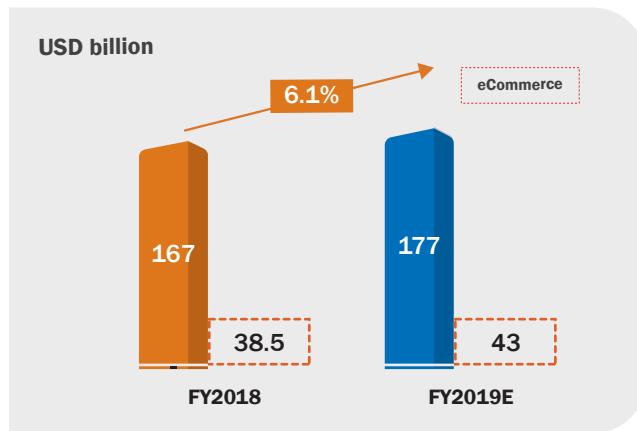
India value proposition: A digital solutions' destination



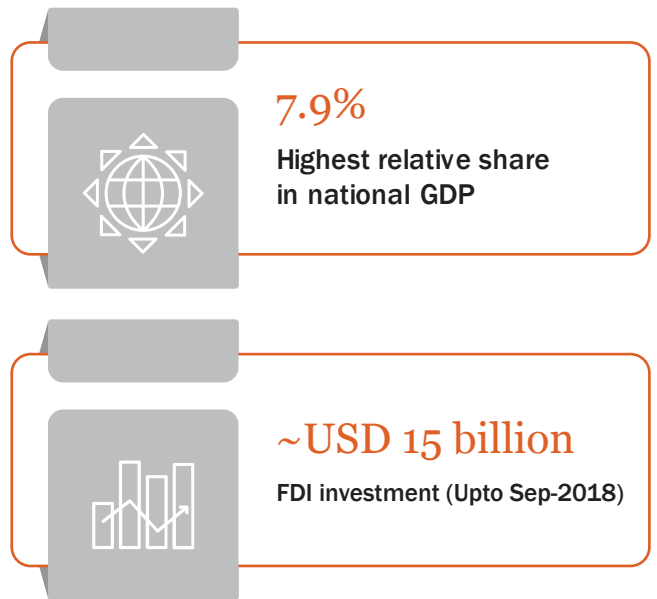
Source: NASSCOM

Indian IT-BPM: USD 177 billion market; digital business driving growth

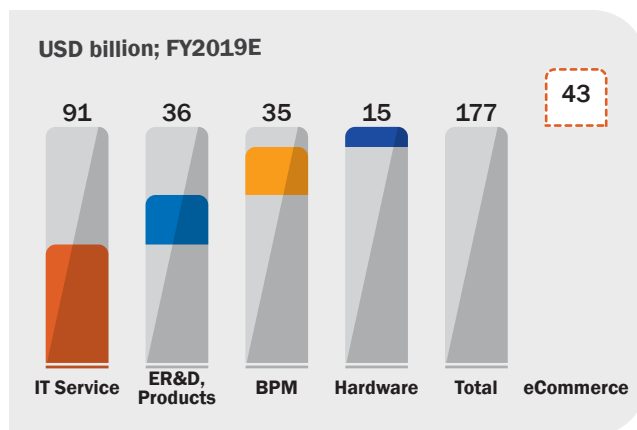
Revenue¹: Forex volatility bringing down \$ growth



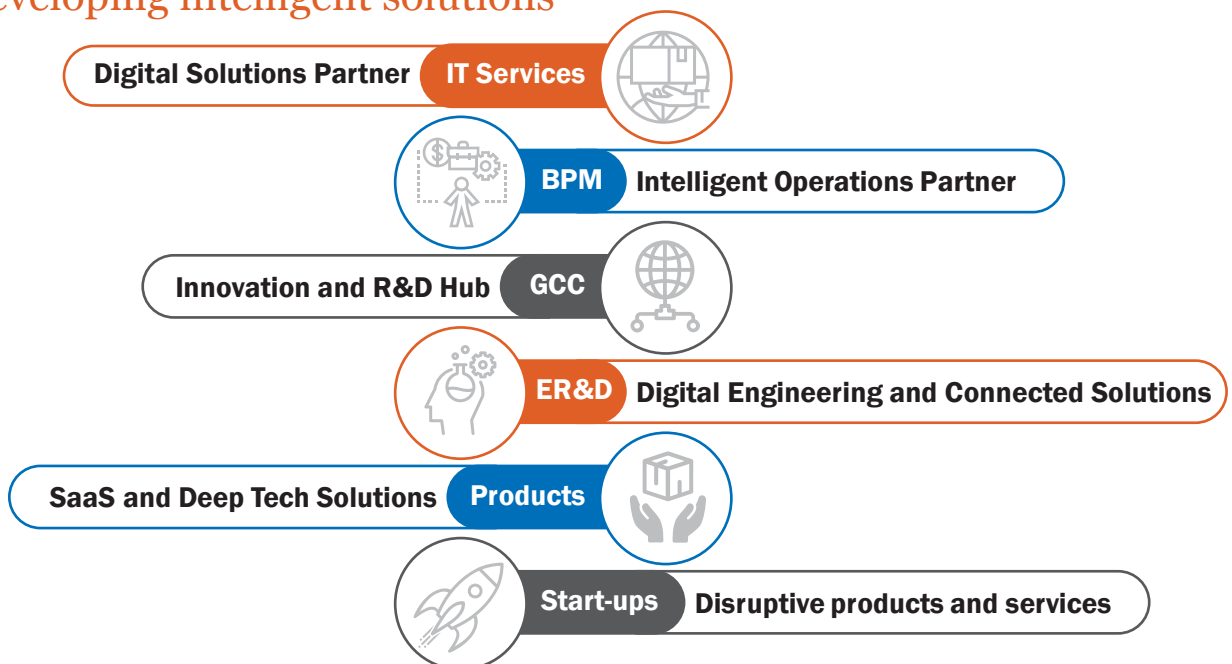
Bolstering the Indian economy



ER&D: Fastest growing among all segments



Developing intelligent solutions

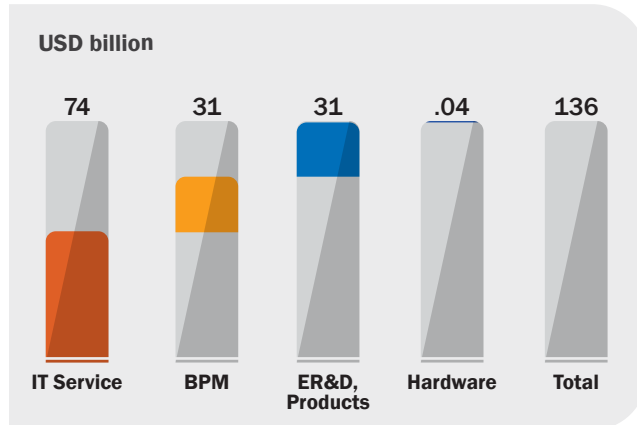


¹ Calculated as per reported currency; E: Estimate

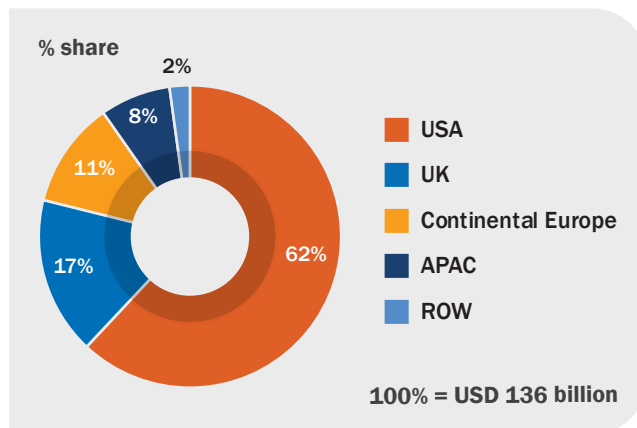
Source: DIPP, RBI, World Bank, NASSCOM

IT-BPM exports closing in on USD 140 billion

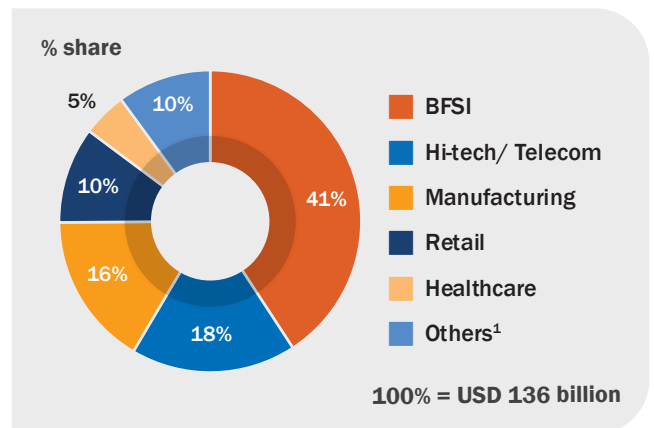
FY2019E: ER&D, steadily increasing share



FY2019E: APAC, fastest growing region



Hi-tech & telecom, retail growing fastest



Indian IT-BPM industry's exports for FY2019 estimated to reach USD 136 billion, an 8.3% y-o-y growth

- USD 10 billion added over last year
- ER&D once again leading growth (11%), followed by BPM (8.3%) and IT services (7.3%)

While all regions growing at an average 8.3%, APAC is the fastest growing at 8.5%

Top three verticals account for ~75% share of global revenue

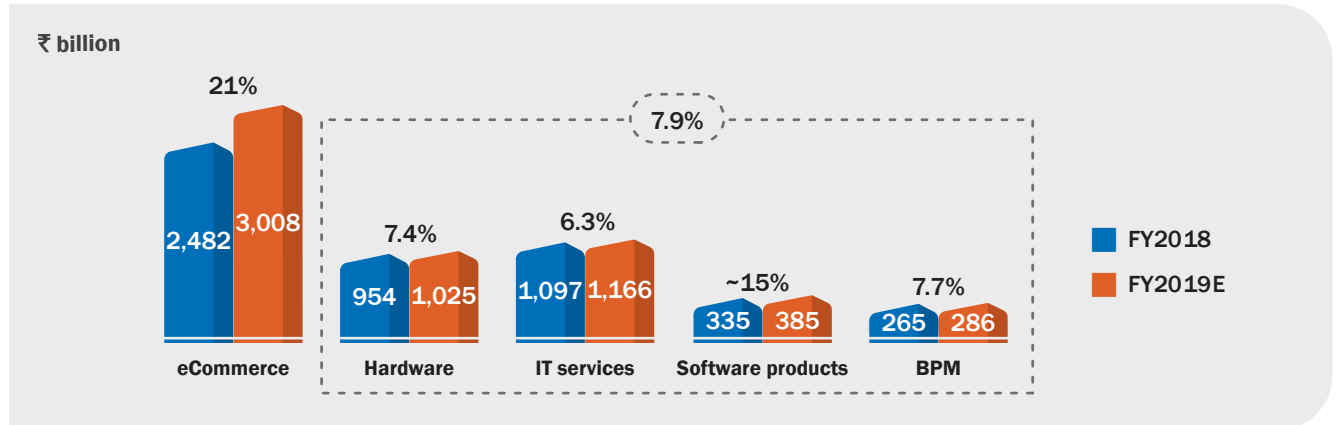
Emerging verticals (retail, healthcare, etc.) growing at 8.4%

Notes: Geographic and vertical split excludes hardware exports; 1. Others incl. travel & transportation, construction & utilities, MPE (Media, Publishing and Entertainment), etc.

Source: NASSCOM

Domestic IT-BPM: ₹2.9 trillion market, growth of 7.9%

FY2019E: Software products, the fastest growing segment



Key contracts 2018

Tech M has signed a 5-year, ₹270 crore deal to enable digital transformation for Coal India Limited.

- Objective is to set up an integrated ERP system, supply & implementation of HIMS (Hospital Information Management System)

Atos supports Indian government in its National Supercomputing Mission

- Won a major 3-year contract with C-DAC to supply its BullSequana supercomputers - create a network of 70+ high-performance supercomputing facilities for various academic and research institutions across India

TCS helps Voltas implement Industrial IoT to improve customer service operations

- Using TCS' IoT framework and Intel's IoT gateway, Voltas jointly developed a centralized system that could remotely monitor chillers across different sites in India

Infosys to develop the next-gen income tax filing system

- The project worth ₹4,241.97 crore will cut down processing time for returns to one day from 63 days and expedite refunds
- Project to be completed in 18 months and will be launched after three months of testing

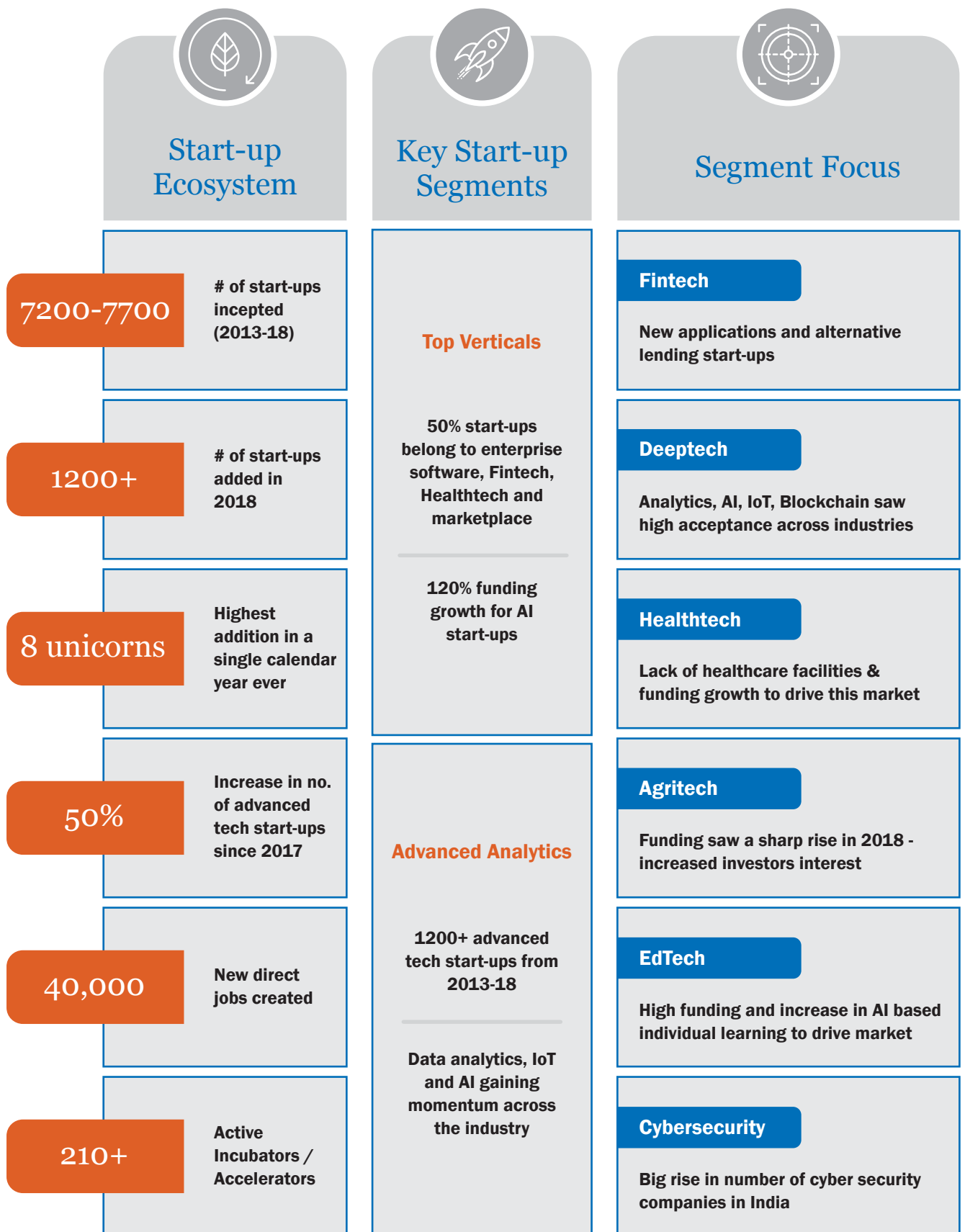
2018: M&As across industry spectrum; non-tech companies also in the fray as they seek to implement digital solutions

Acquirer	Access Healthcare	L&T Tech	Ceat	Tanla Solutions	Mahindra & Mahindra	Ola	One97 Communications
Acquired	Pacific BPO	Graphene Semiconductors	Tyresmore	Karix	Carsense	Ridlr	TicketNew
Segment	BPM	Semicon	Online market place for tyres	Sw. Products	IoT	Mobile VAS (Traffic Information)	Online Services (Ticketing)
Remarks	-	100% stake for USD 12.9 million	6.67% stake for USD 1 million	USD 48.7 million	USD 0.9 million	100% stake for USD 25 million	USD 40 million

E: Estimate

Source: Venture Intelligence, Secondary sources, NASSCOM

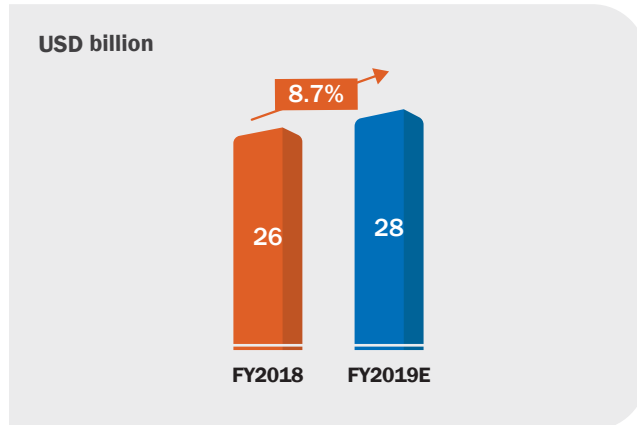
Indian Start-up base growing at 12-15% y-o-y



Source: NASSCOM-Zinnov-Indian Start-up Ecosystem-Approaching Escape Velocity – 2018 report

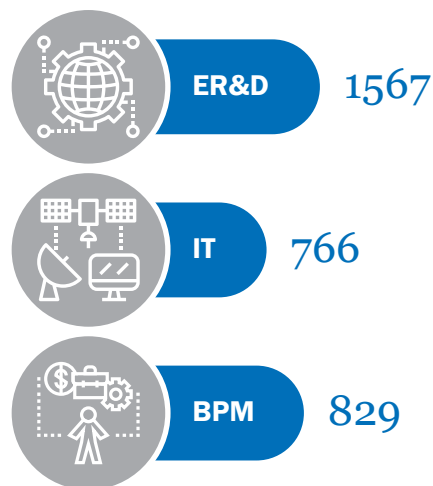
GCCs: India home to over 1,250 GCCs

GCCs: 21% share of total exports



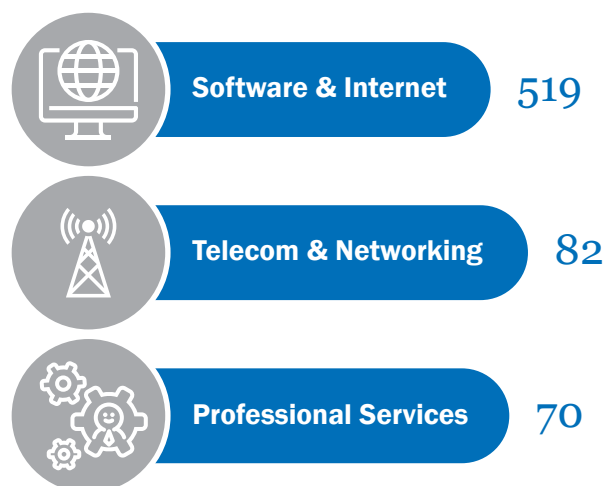
- GCCs are upping the Innovation agenda by building new age technology CoEs around AI/ML, Cloud, IoT, etc.
- GCCs increasingly leveraging India for shared services specific to IT, F&A, HR, and Procurement
- Ahmedabad, Thiruvananthapuram, Vadodara and Coimbatore are the emerging Tier-II locations in India

Number of GCCs¹

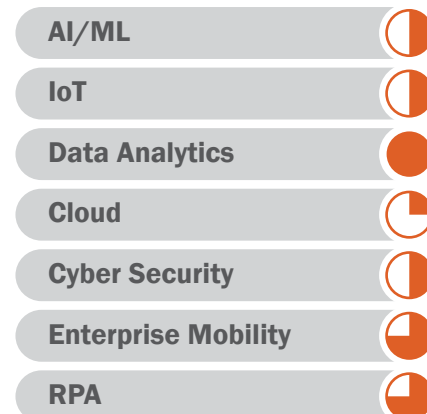


- ER&D GCCs: Digital transformation & global product ownership, key focus areas
- IT GCCs: Application development & maintenance, system integration and infrastructure management services – top workloads
- BPM: Working on cutting edge analytics and automation to improve overall business process efficiency

GCC – Top Verticals (Number of MNCs)



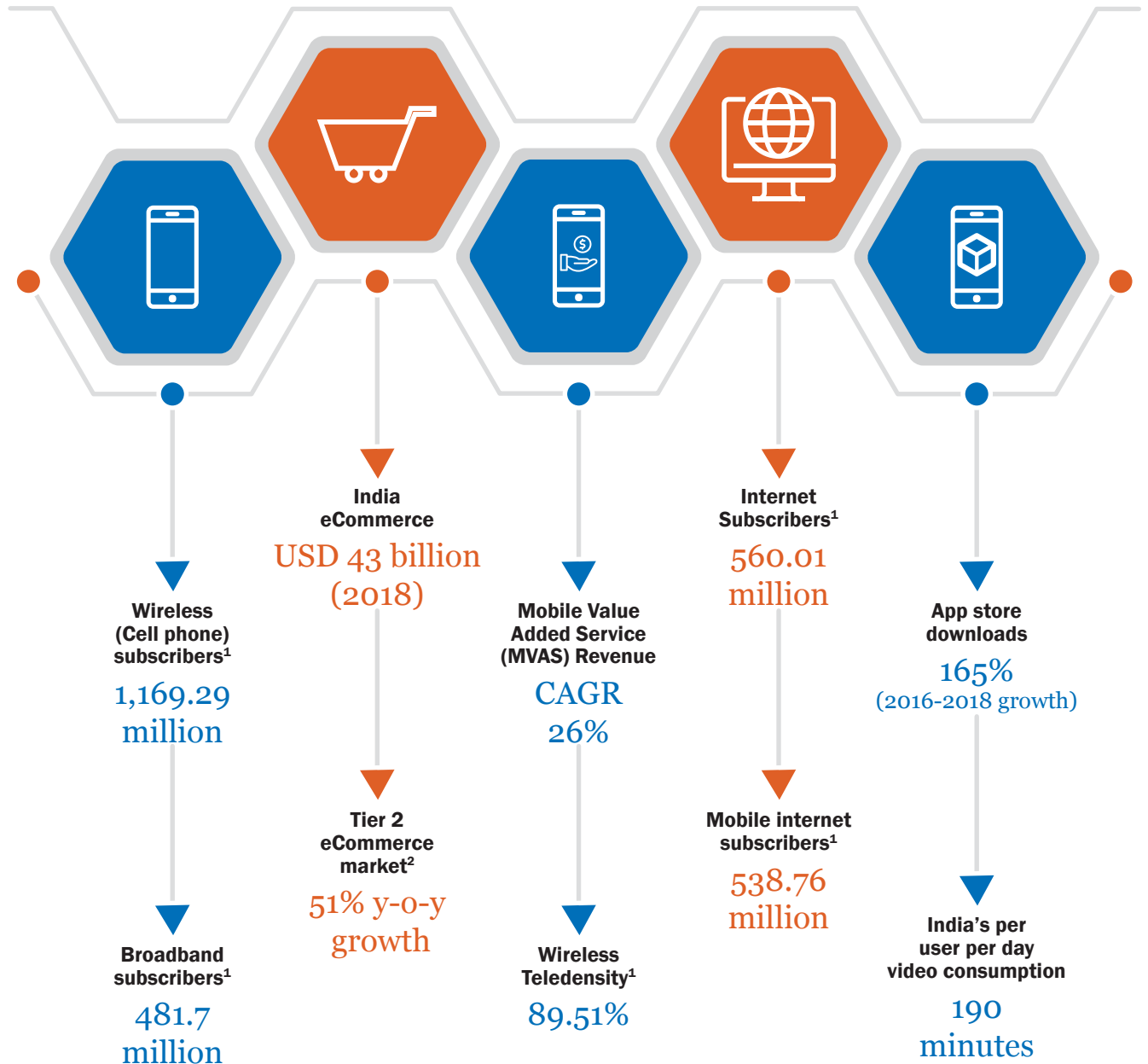
GCC presence and work intensity



Note: 1. Total won't add up to 1,250 GCCs as there would be overlaps

Source: NASSCOM-Zinnov GCC report 2019

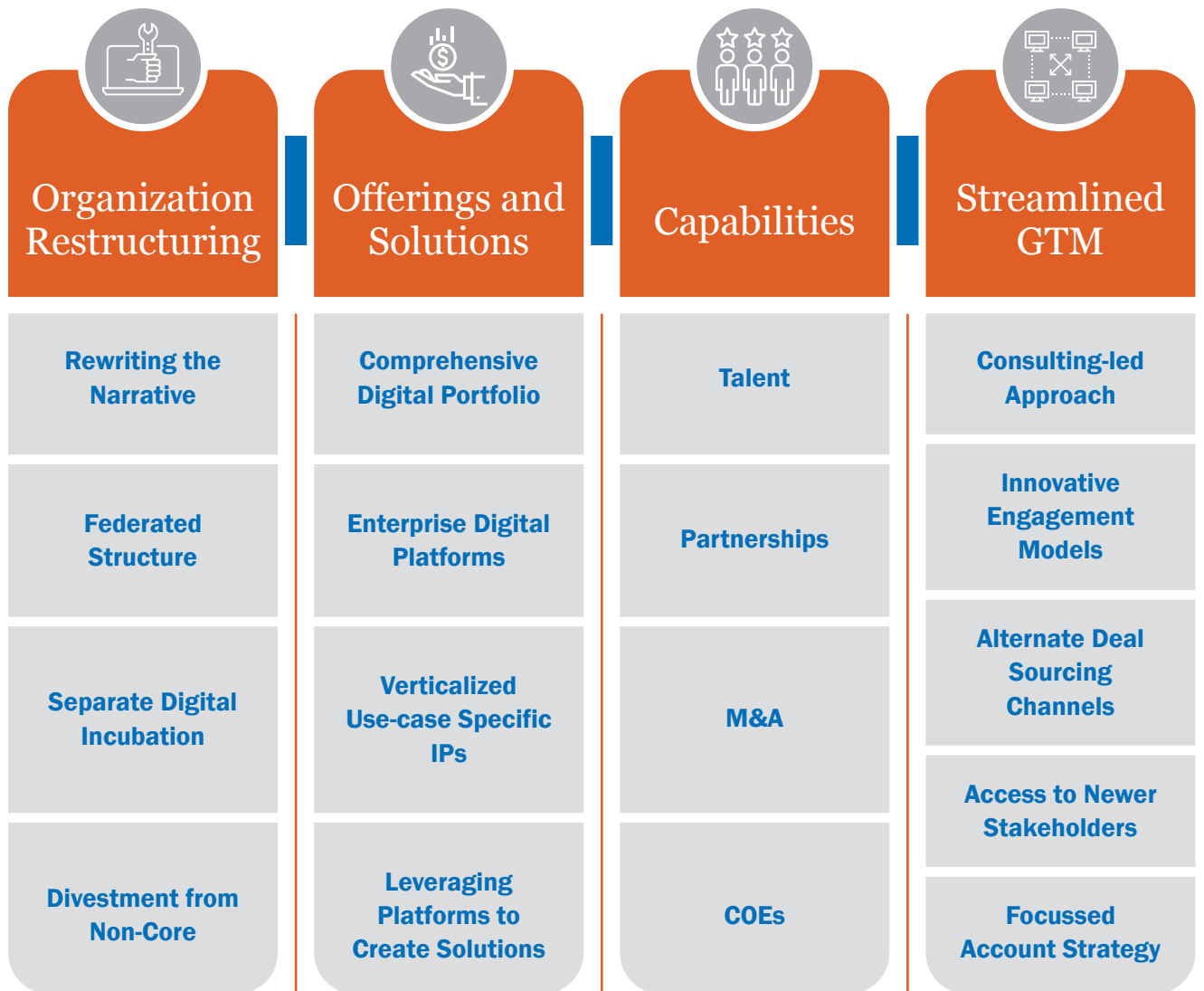
India: A fast growing internet economy



Note: 1) As of Sep-2018; 2) Estimated for 2018

Source: App Annie, IBEF, TRAI, NASSCOM

Strategy Pillars for Digital Service Providers



Six digital technologies primarily driving growth of the industry

Shift from experiment centric to business case centric model resulting more projects moving to production phase

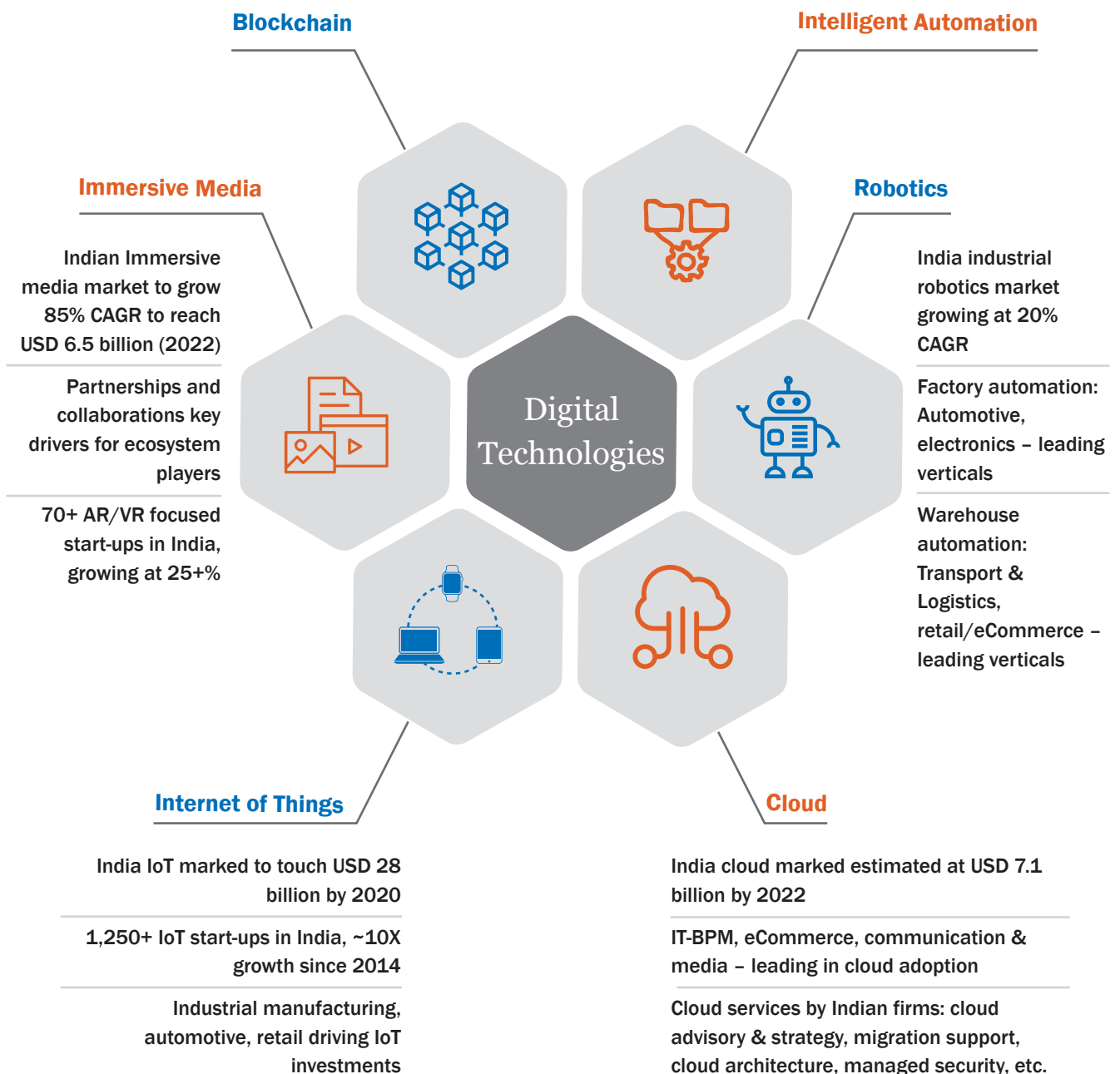
About 50% states in India involved in various blockchain initiatives

BFSI at 55% leads adoption; opportunities in retail, logistics, healthcare, manufacturing

India leads developed countries like the US, the UK and Japan in deployment of AI- and RPA-based technologies

Going forward, combining cognitive technologies would allow bots to work within more complex scenarios

BFSI, retail, CPG - key sectors driving IA adoption



Services companies tracking key metrics for digital business



IP Monetization / Patents Filed

Service Providers showcasing increased focus on creating products / platforms on new age technologies

Wipro filed over 400+ patents in 2017-2018 with majority of them across emerging technologies such as AI, IOT, Robotics

TCS launched plan to reskill around 200K employees as a part of their in-house development program

Digital Skilling

Re-skilling existing employees at all time high across the Service Providers ecosystem



Customer Satisfaction

Measuring customer satisfaction emerges as a key metric for Service Providers to measure Digital growth

Wipro actively monitors its Digital customers and interacts with them regularly to measure client experience

TCS to start disclosing Digital Revenue starting 2019 to highlight monetizing businesses from new age technologies

Digital Revenues / Margins

Service Providers have started to measure and disclose Digital revenues publicly



Investments in Digital

Service Providers are actively investing into building capabilities on Digital platforms and services

HCL invested USD 100 million in digital platforms since 2018 and intends to spend additional USD 100 million till 2020

Mindtree actively using bots since two years and has over 350 bots working 24/7 to automate core organization processes

Driving Automation Internally

IT Firms actively looking to deploy automation internally to boost productivity



Client-related Metrics

Large Client Mining

Service Providers actively mining targeted clients to drive Digital revenue (E.g. Targeting clients based on spending propensity & industry)

Accenture lays high focus on driving majority of their Digital revenue from large enterprise clients (>55% of the Digital revenue) driven by clients with USD 10+ billion revenue



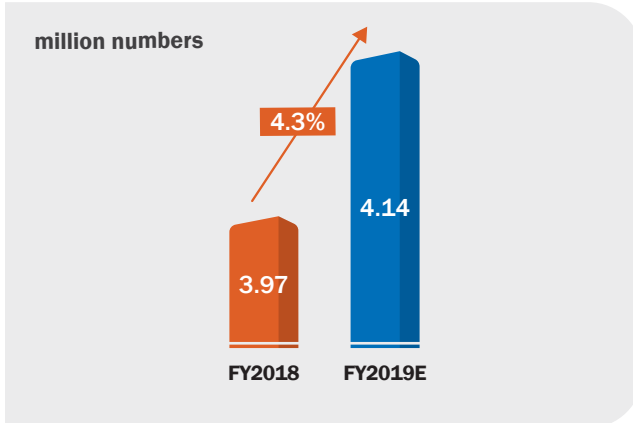
Client Mining Metrics

Actively measuring Digital engagements with existing clients and initiatives to convert non-digital customers

TCS highlighted that it provided Digital services to over 55% of its existing clients and plans to increase it even further

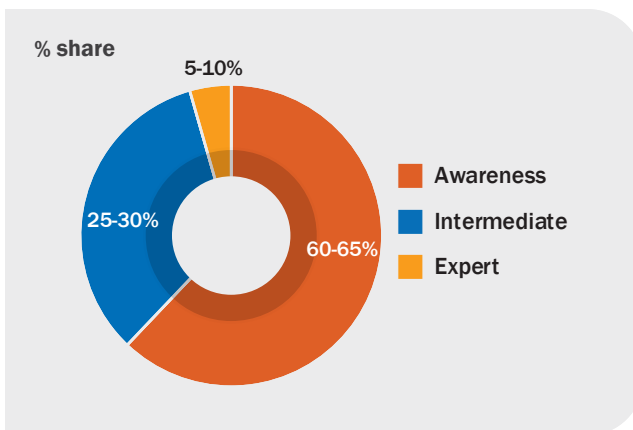
India: Largest source of digital talent for the world

FY2019E: Crossing 4 million direct employees

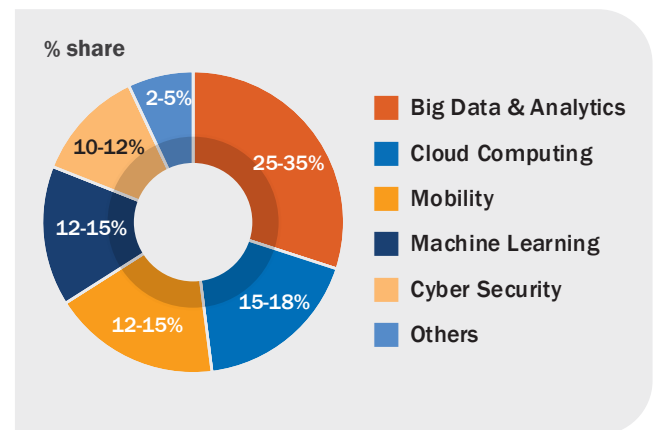


600K - Digitally skilled employees

Digitally Skilled Employees by Skill Level



Top Practice Areas in Demand

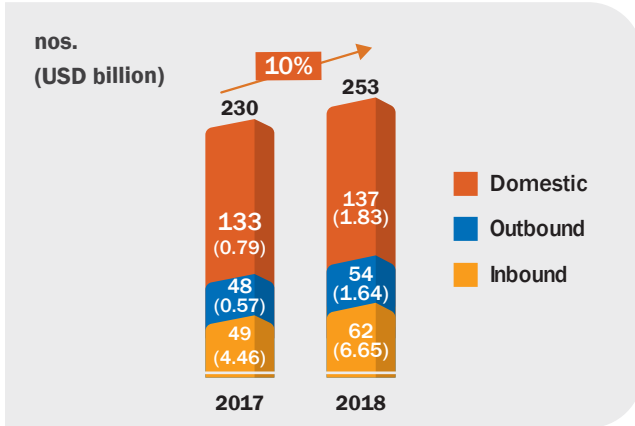


Reskilling Initiatives

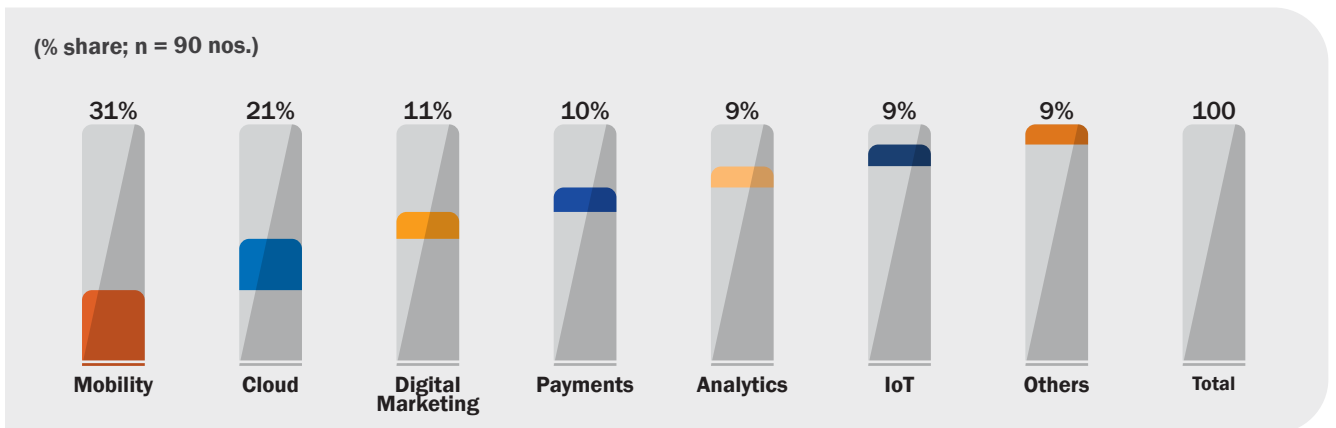


M&As: 2018 saw four multi-billion dollar deals

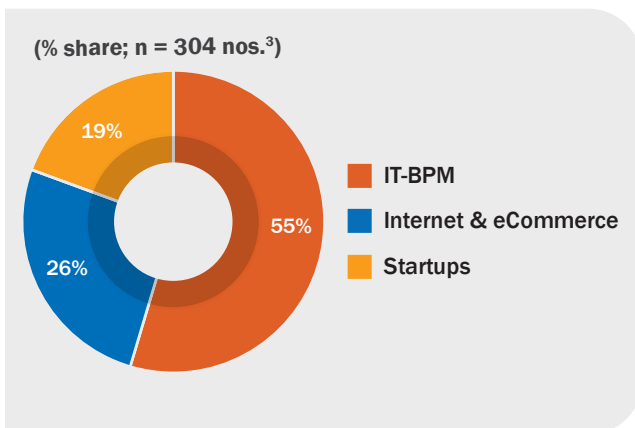
Technology convergence & digital driving M&As^{1,2}



2018: ~36% share of digital deal in total (nos.)



2018: 166 M&As in IT-BPM segment



2018: Prominent deals

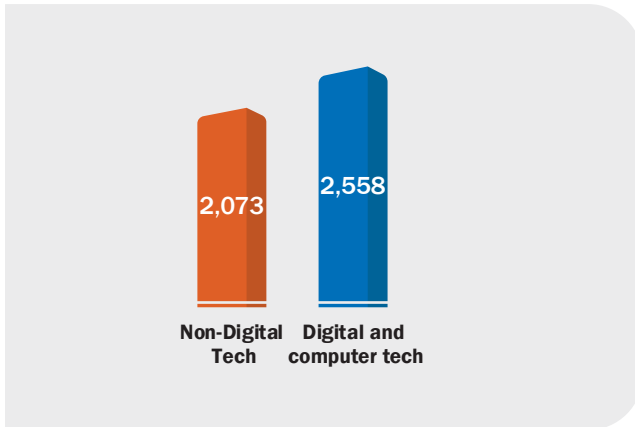
Acquirer	Acquired	Amount (USD mn.)
Walmart	Flipkart	1,600
Atos Origin	Syntel	3,400
HCL Tech	IBM (select products)	1,800
Teleperformance	Intelenet Global Services	1,000
KPIT Technologies	BirlaSoft	716

1 Incl. Internet & eCommerce, start-up transactions; 2 Cumulative disclosed value excl. Walmart-Flipkart and HCL-IBM deals; 3 n >253 nos. as there are overlaps between startups and Internet & eCommerce segments

Source: Venture Intelligence, NASSCOM

Over 4,300+ patents filed by Indian firms in the US during 2015-18

Number of patent families filed by Indian Companies in the US



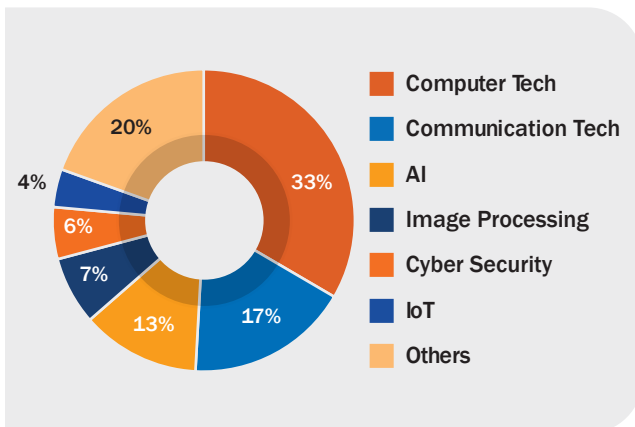
Out of the total 4,331 patent families over 2015-2018:

- Digital and computer technology patents had a ~55% share
- 40% of all patent families were granted

Top five Indian firms filing patent in the US in digital and computer tech include Wipro, Tata Group, HCL Technologies, Intel and Infosys

Top five application areas include software applications, health & medical devices, electronic devices, testing (software and hardware) and telecom / optical communication

~50% of patent families filed are in the digital space



- Within digital technologies, leading areas for patents filed include AI, image processing, cyber security and IoT – together, these account for 30% share
- Others include patents for cloud, AR/VR, robotics, drones, etc.

Note: Analysis is only for the patent families published in the public domain; for 2017-18, the total number published would be smaller as there is usually a lag of 18 months bet. the filing and publication date

Source: Questel Orbit Patent Database, NASSCOM

IT services: At a Glance

Key Trends



Global spend
USD 694 billion
 Growth 3.2%



Global sourcing
USD 113-115 billion
 Growth ~4%



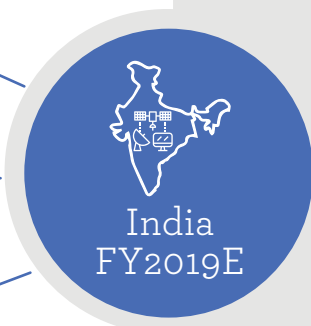
Revenue
USD 91 billion
 Growth 5.4%



Exports
USD 74 billion
 Growth 7.3%



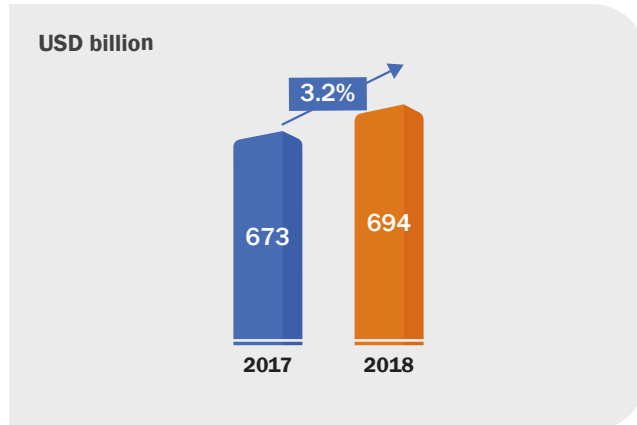
Domestic
₹ 1,166 billion
 Growth 6.3%



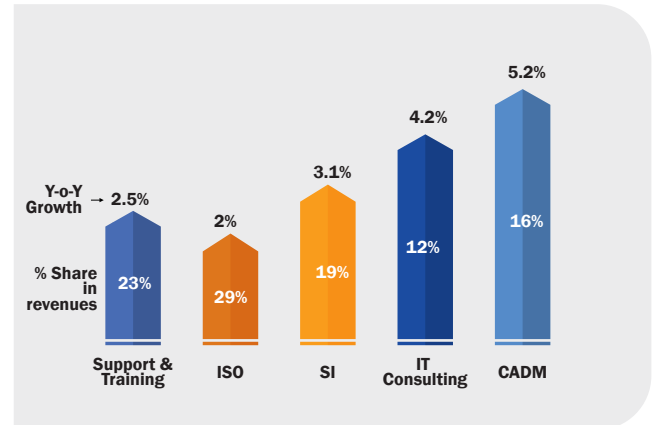
- Every enterprise is reimagining multiple aspects of its business, leveraging digital technologies
- Business transformation driven by top line concerns, and the need to participate across multiple segments
- Cloud platforms driving growth in managed services for security and data platforms
- US tax reforms and increasing interest rates drive growth in BFSI and retail; healthcare and telecom catching up soon
- Customers increasingly moving from point deployments to enterprise-wide adoption of automation
- Larger proportion of clients adopt digital at scale and modernize legacy systems
- Increased spending by customers in next-generation customer experience, re-architecture of data for delivering insights and micro services
- Companies invest higher in products, platforms, M&As to build digital capabilities

Global IT services: Large scale spending on digital to modernize legacy systems

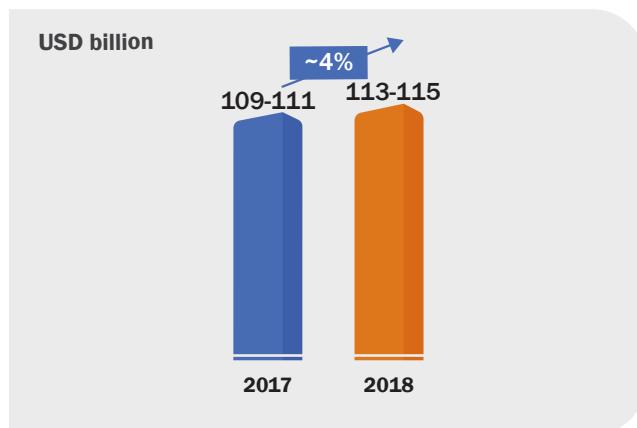
IT Spend growth remains moderate



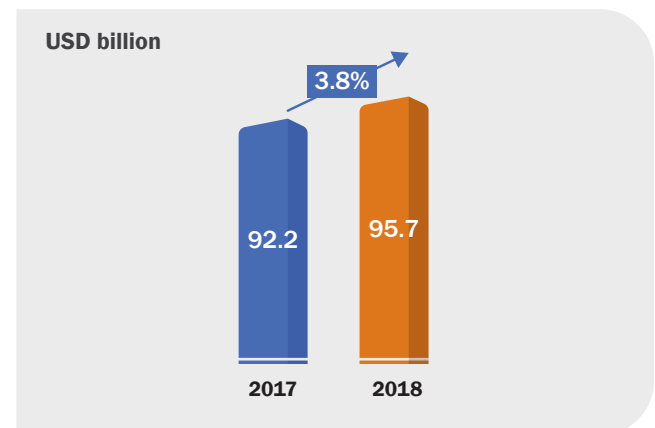
IT Consulting and CADM key growth drivers



Global sourcing growth steady



IT TCV¹ deals sizes grew driven by digital services



Key Highlights

Global sourcing and IT spend grows at 3.7% and 3.2% respectively in 2018

Overall ITO demand remained moderate with market characterized by shift from traditional services to digital technologies, DevOps, and as-a-service models

APAC region driving growth at ~5%; leveraged the most for digital services delivery; growth mainly driven by tier-1 cities in India and Singapore

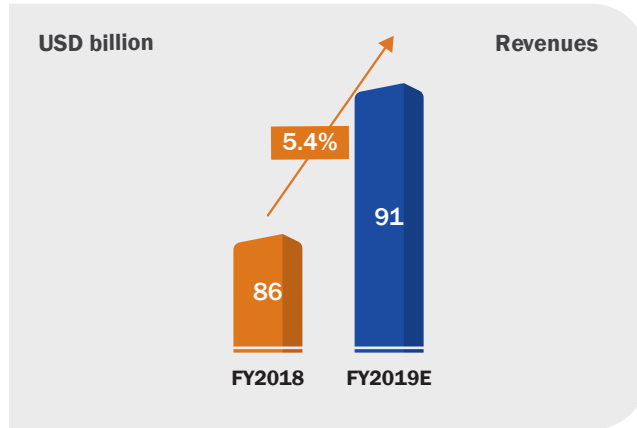
CADM- highest growth segment driven by mobile and digital transformation services

BFSI and manufacturing : more than ~60 per cent of vertical spending

TCV deal sizes grew by nearly 4% driven by digital deals

Indian IT services: Matured segment focusing on growing digital capabilities & driving digital at scale growth

IT services, the largest, most matured segment for the industry



Key Highlights

Improving profitability and productivity remains the key focus for service providers and customers

New technology platforms, analytics, cloud, mobility the key enablers for growth

Customers increasingly moving from point deployments to enterprise-wide adoption of automation

Matured clients moving towards gain sharing, outcome based pricing; though FTE model continues to dominate

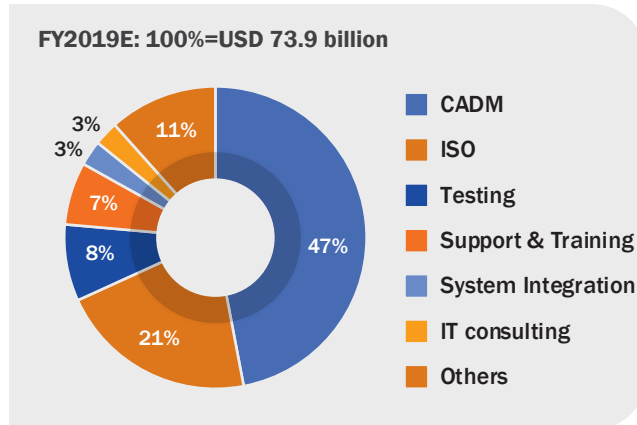
Customer demand driven by design thinking, automation, innovation centres and cognitive computing capabilities

Cross vertical sell, deeper client mining, adding local talent and increasing onshore presence-key focus for providers

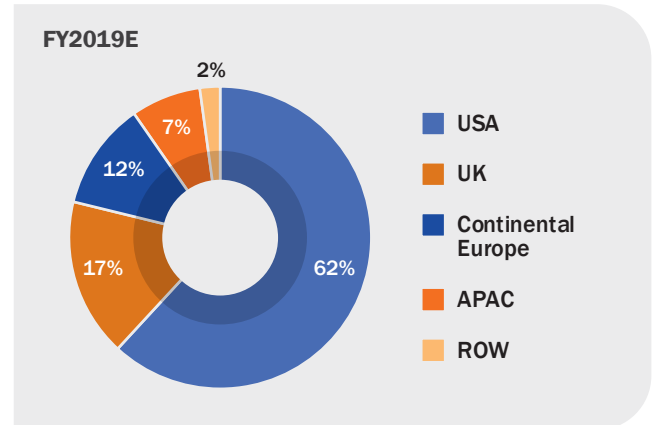
Building deep contextual knowledge of customers businesses to deepen relationships and gain share

Indian IT services exports: Digital projects gaining scale and driving business value

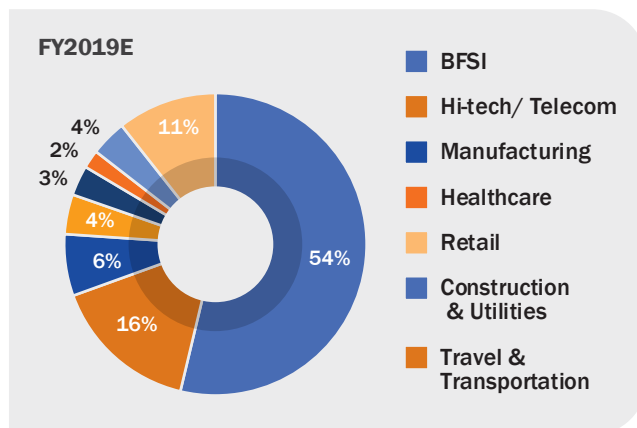
Growth across segments driven by digital adoption



Growth driven by the US market



Retail and healthcare high growth drivers



Key Highlights

Focus on transforming core business and creating business value for the client

ISO and software testing growth segments

Emerging vertical-healthcare, retail-growth drivers

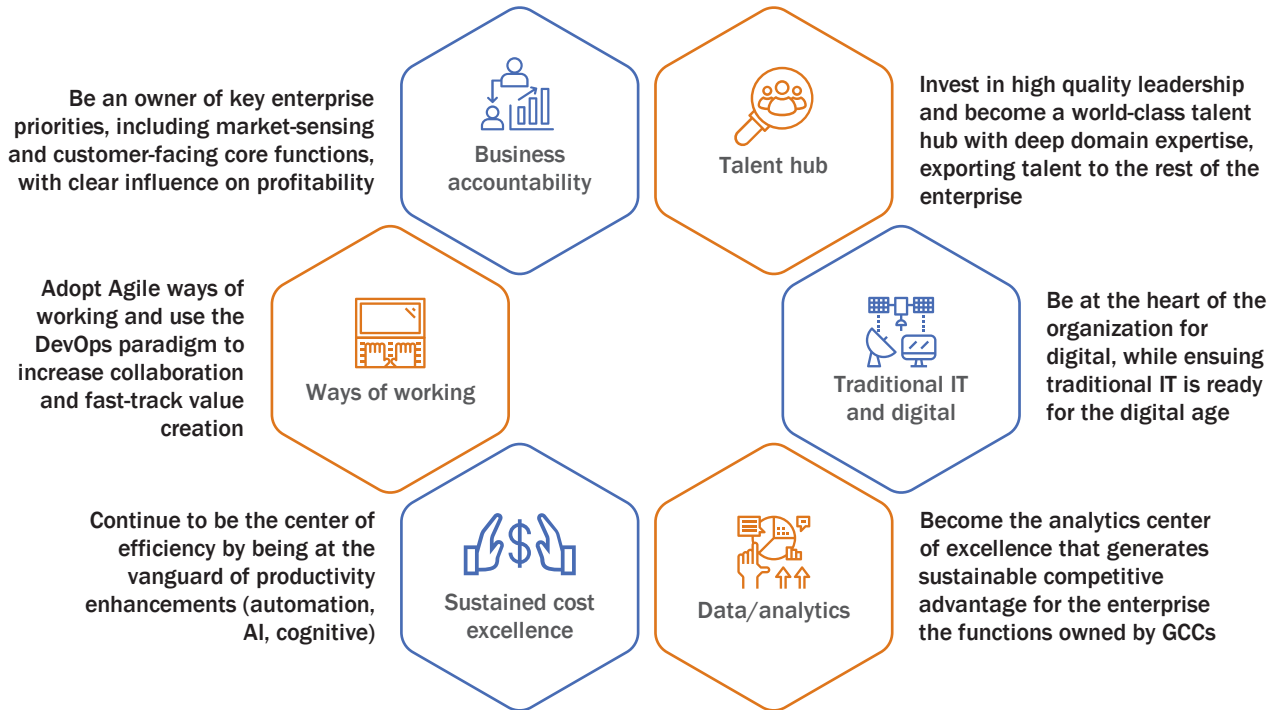
Increased spending by customers in next-generation customer experience, re-architecture of data for delivering insights and micro services

Rise in AI adoption to compensate for lower maintenance spending in terms of new use-cases through consulting and system integration services

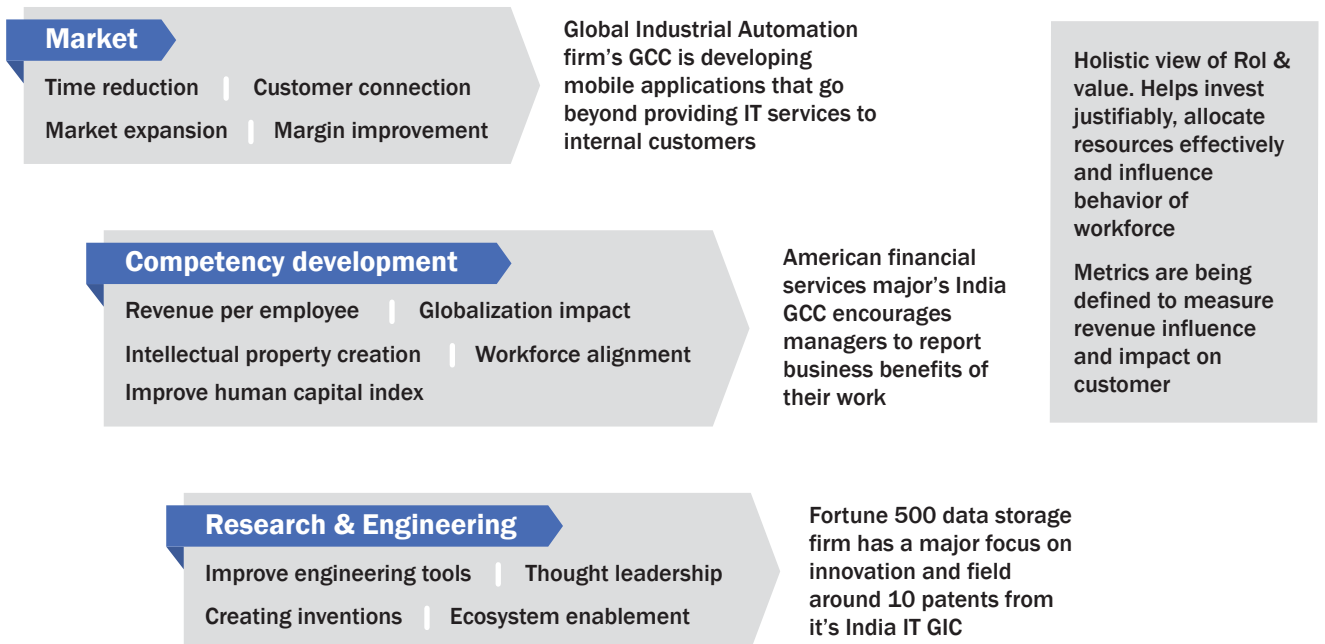
Cloud migration, cyber-security services and cloud brokerage to create new demand

Indian GCCs playing an active role in investment priorities for their parent firms

Priorities have shifted from just cost excellence.....

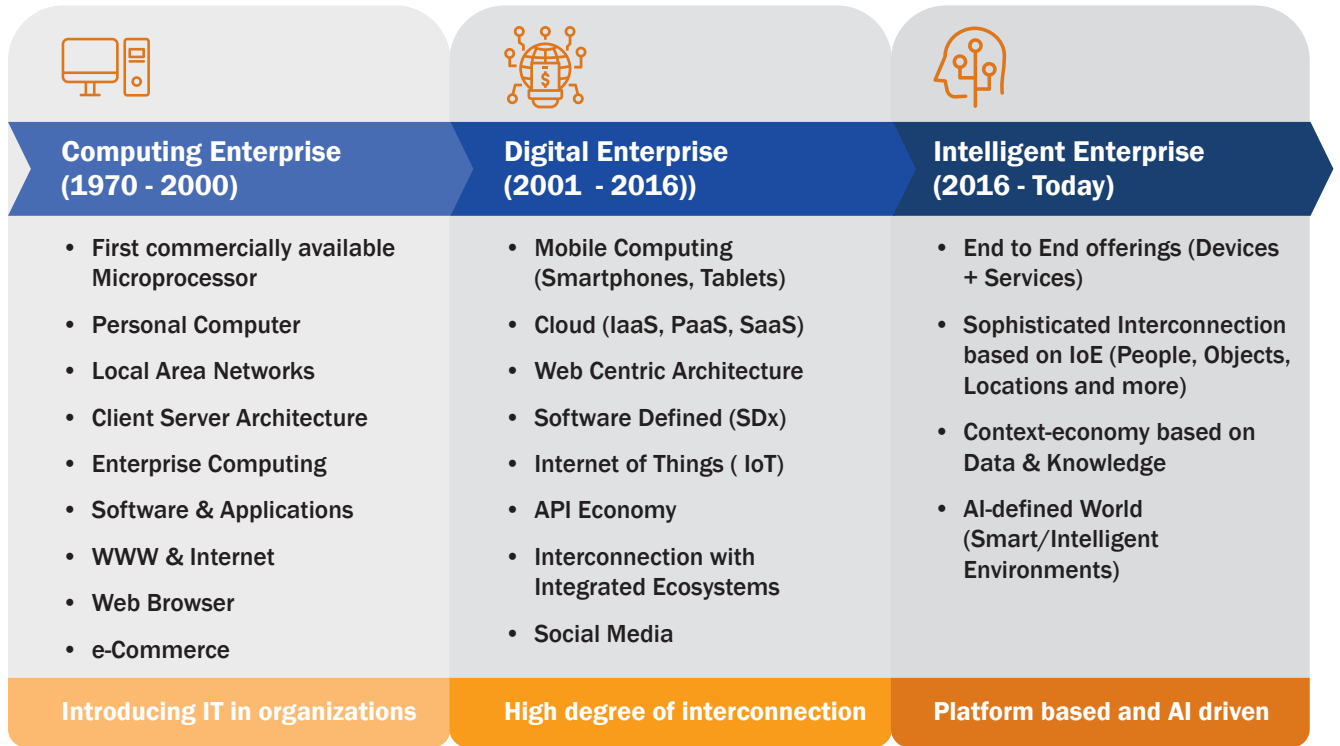


...towards creating business impact

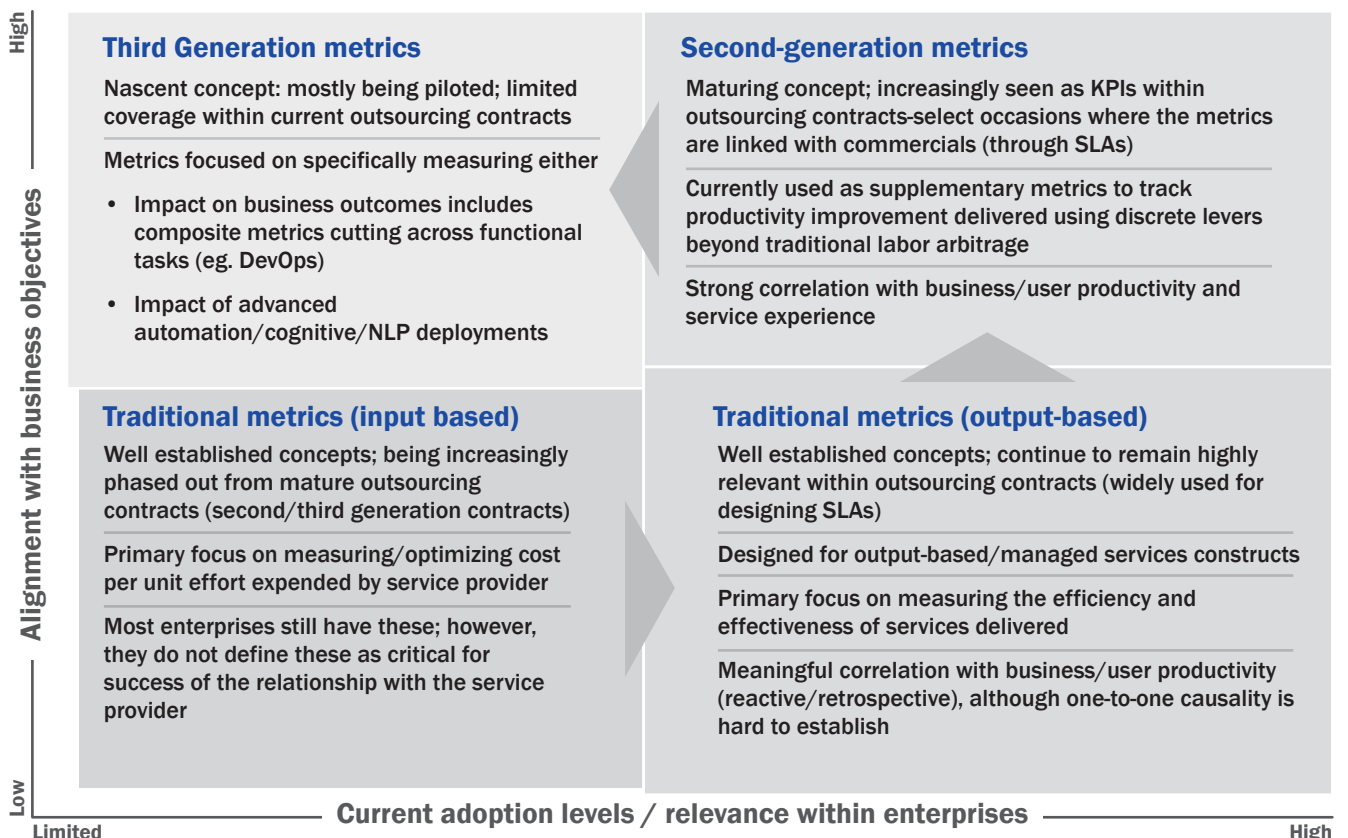


IT services industry focusing on digital enterprise transformation, new metrics coming into play

Enterprise Evolution: From pure computing to AI driven services



Evolution of IT Services






Source: BCG, Everest Group, Rene Buest, NASSCOM

Expanding portfolio from pure services to 'Platform +Services'

Platforms of top Indian IT service providers

Illustrative

	 Key focus Area	 Deployment & platform overview	 Stated dominant use cases
TCS Ignio	Infrastructure services	<ul style="list-style-type: none"> • Plug & play deployment requiring customization and learning • Standalone platform for core infrastructure services 	<ul style="list-style-type: none"> • End-to-end Infra services such as <ul style="list-style-type: none"> - Infra blueprint, - Self healing - Deployment - Predictive maint
Wipro Holmes	Broad based (BPO focus)	<ul style="list-style-type: none"> • Plug & play deployment requiring customization and learning • Standalone platform offering a menu of multiple cognitive services 	<ul style="list-style-type: none"> • Digital Virtual Assistants • Prediction systems • Robotics & Drones
Infosys Nia	Broad-based (incl. engg, ADM & BPO)	<ul style="list-style-type: none"> • Bespoke Deployment • AI capabilities bolt-on to existing automation architecture (IIP, IKP, IAP framework) 	<ul style="list-style-type: none"> • Engineering (aircraft floor beam development) • Forecasting as a service
HCL DryICE	Broad Based (Infra services focus)	<ul style="list-style-type: none"> • Bespoke deployment • AI modules bolt on to existing automation platform; collaboration with Watson, S-Now, Dynatrace, Splunk 	<ul style="list-style-type: none"> • Detect and correct Infra and App issues • Watson power chat agent
Mindtree CAPE	Integrated Services (entire IT ecosystem)	<ul style="list-style-type: none"> • Bespoke deployment • Customized automation platform with unified DevOps, Agile with (RPA), machine learning and test automation 	<ul style="list-style-type: none"> • Tool chains get standardized and rationalized • Brings transparency at management layer into working value streams



Investing in building digital capabilities and services

Investments in digital



Illustrative

Acquisitions



DevOps automation AWS cloud



End-to-end BPM and CRM solutions using Pega platform



Platform implementation services

Design studio focused on digital marketing









Salesforce advisor and consulting

Partnerships

Cloud, Technology and automation tools

- Partnerships and collaborations with cloud service providers, technology and automation tool providers

Enterprise partners

- TCS and Singapore Airlines, launches a jointly developed solution that transforms airlines' ground operation
- HCL has set up a joint robotics development center with one of its banking clients in India

Start-ups

- Mphasis investing over ₹ 4.5 crore to incubate 26 non-profit start-ups over 3 years in partnership with N/Core
- Wipro Ventures a \$100 million fund has invested in 11 start-ups in the areas of AI, cybersecurity, testing automation etc

Talent



- Trained over 292,000 employees in Digital
- Over 318,000 employees on Agile methods.



- 9000+ certified & 20,000+ trained agile professionals
- 500+ Devops experts



- 90,000+ trained in digital skills
- 3,000+ trained and certified in AI/ML

Enablers



- 20 Design Studios & Labs
- 150 Distributed Agile Development Centres
- 11 Innovation centres



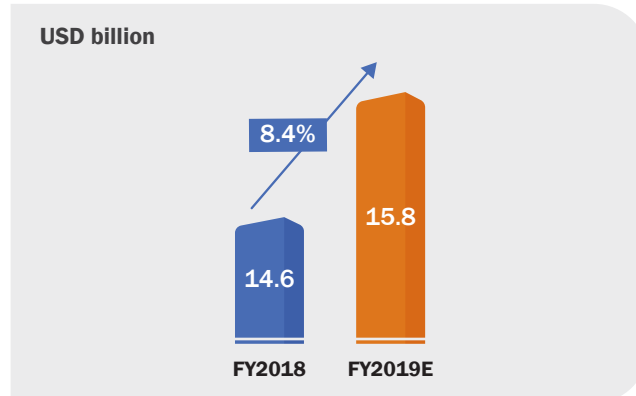
- 80+ Engineering Labs
- 100+ client development centers and CoEs in industrial design, niche high-performance computing



- 2 'Digital Pumpkin' innovation hubs
- 28 Centers of Excellence

Infrastructure services: Digital taking centre-stage

IS: Automation disrupting the traditional model



Service providers creating valuable impact on customer environment

Illustrative

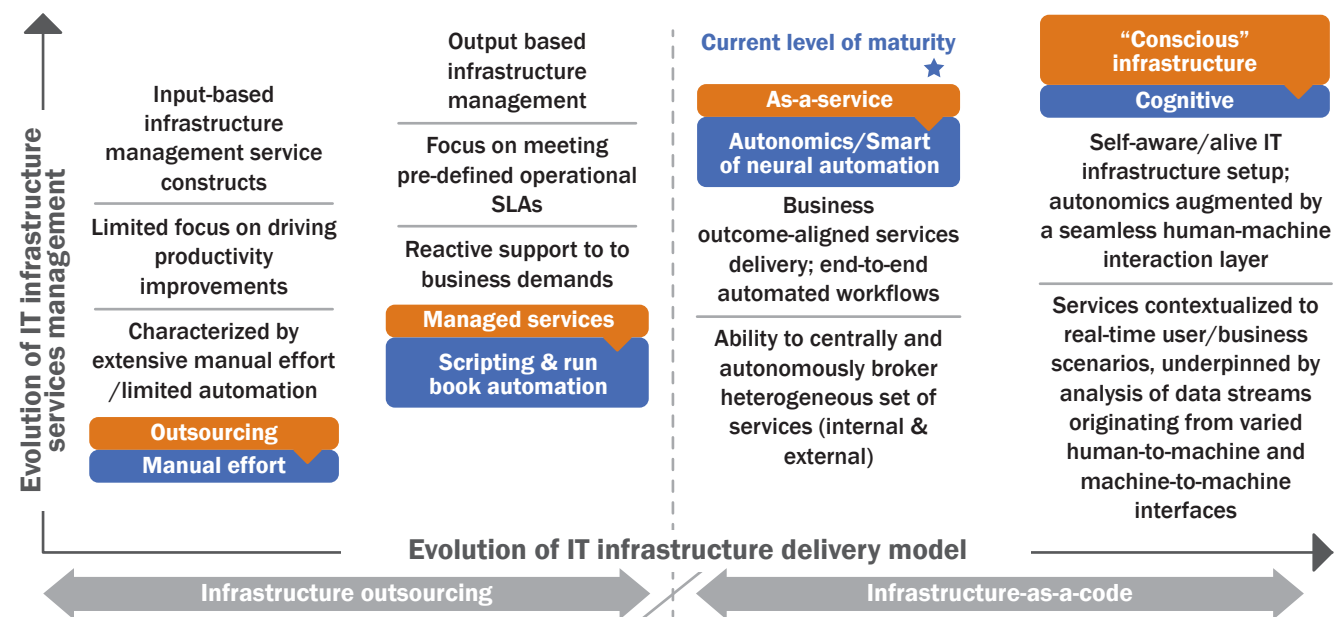
Core modernization

Infosys consolidated India's Department of Posts' core systems onto its Finnacle platform across a nationwide network of post offices

Experience transformation

LTI worked with UTC to create a 24x7 unified command center for monitoring IT operations and preventing and resolving issues across a hybrid, multi cloud environment

The "automation-delivery model" interplay



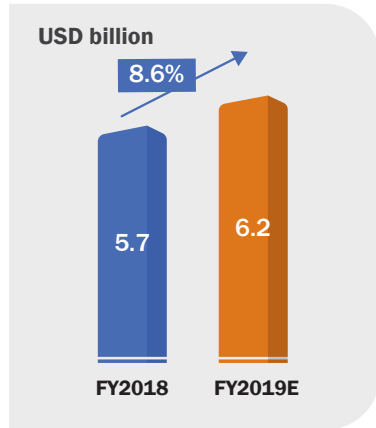
Key Trends

Automation tools	Cloud and As-a-Service models	DevOps models	Software - defined infrastructure
<p>Automation cutting across infrastructure provisioning and management, IT security, and workplace services</p> <p>Enterprises investments driven to "self-learning", "self-correcting", and "zero-touch" support mechanisms</p>	<p>Cloud becoming an integral part of the enterprise IT infrastructure services strategy</p> <p>As-a-service (AaS) models are gaining traction as they enhance service agility and flexibility</p>	<p>DevOps model enables collaboration between discrete business functions for managing rapid application delivery and operations at scale</p> <p>DevOps model continues to boost demand for containerized and cloud based infrastructure services</p>	<p>Will revolutionize datacenter operations as it enables tighter coupling and interlinkage among infrastructure technology stacks</p> <p>Will reduce human intervention, thus improving overall efficiency of operations</p>

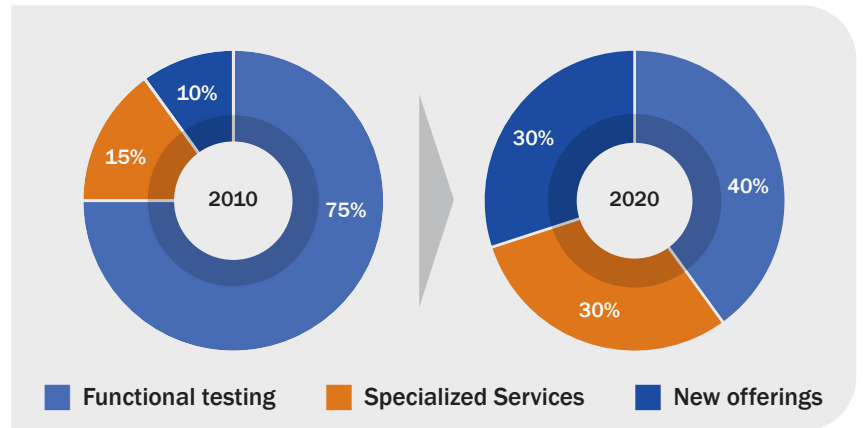
Source: Everest Group, NASSCOM

Software Testing: Rise in specialized testing, automation and testing in agile development

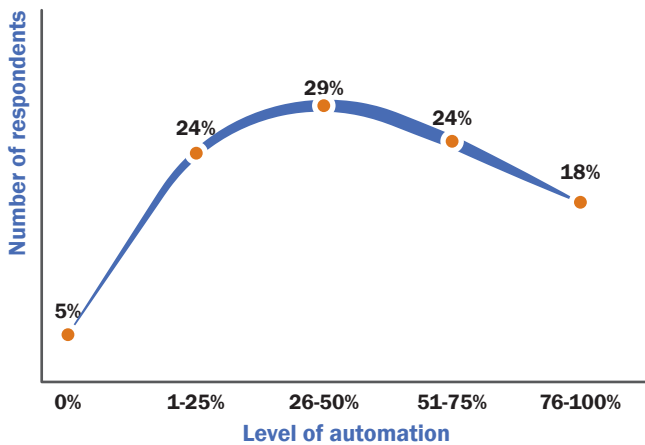
Software Testing: Key growth segment for the industry



Shift to specialised high-end automated services



Increase in automation of testing services¹



Illustrative



Test Automation services: End-to-end automation engineering consulting and services for strategy, tools, frameworks, Hyper automation with AssureNXT, Intelligent and cognitive automation using IntelliAssure, powered by Wipro HOLMES™

Test Automation Centre of Excellence, Test automation as a service, Tooling as a service, Test Automation Factory



Built automated functional testing with frameworks to mitigate the challenges of open source tools and linguistic approach to localisation testing



Quality Assurance Platform (QAP), AssurePrime™ SaaS model

Key Trends



Growth in agile testing and test automation services



Shift from agnostic testing to industry specific testing



Enterprises need for cost reduction and faster release of software



Increasing business focus on digital transformation



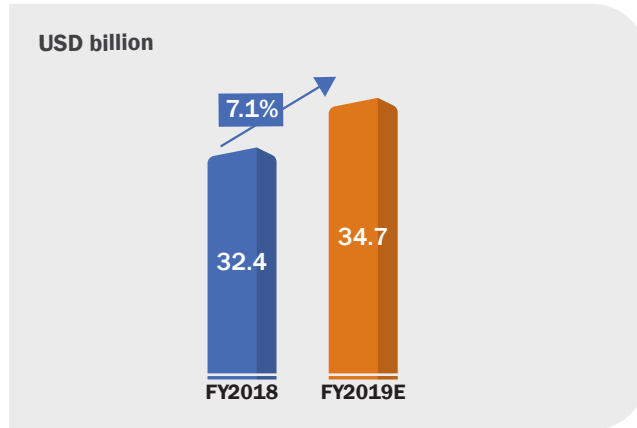
Rise in outsourcing and crowdsourcing of software testing

Note: 1 KPMG Survey Results

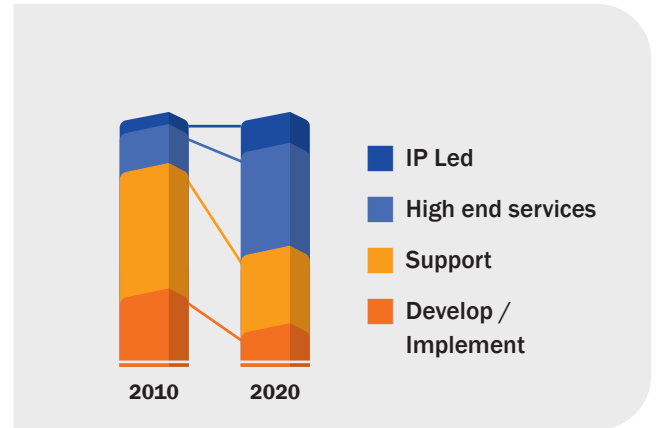
Source: NASSCOM KPMG Report on Software Testing 2019

CADM: Shift to next-gen ADM, augmenting traditional services with digital technologies

CADM: Largest segment in terms of share at 47%

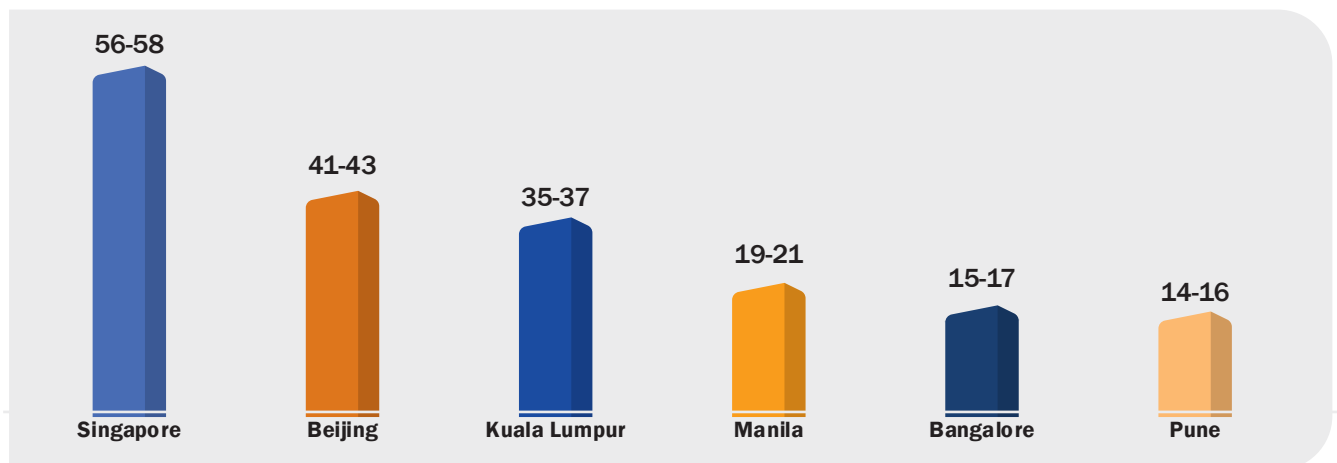


Shift in focus to IP led high-end services



India remains the most cost effective location

Operating cost per FTE for ADM Services 2018; USD '000 per annum



Key Highlights

Development processes centered around a minimum viable product (MVP), short feedback loops, and test-driven development

Projects focused on driving rapid innovation, experimenting with new technologies and leveraging cloud services

Quantum of traditional development, customization and implementation work shifts to new generation apps

Vendors focusing on building capabilities around IP, automation high end services; partnering with cloud service providers to offer platform-based CAD services

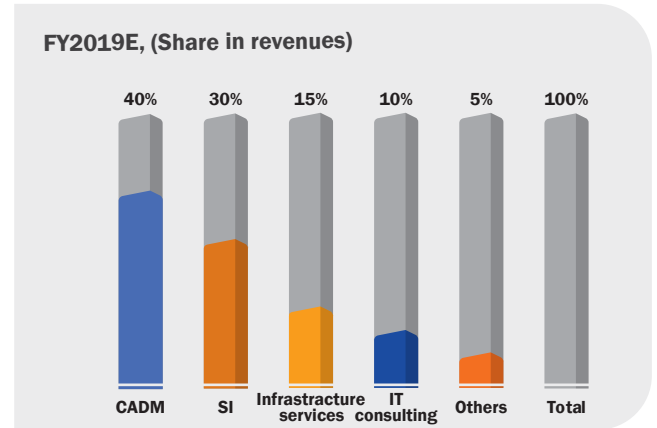
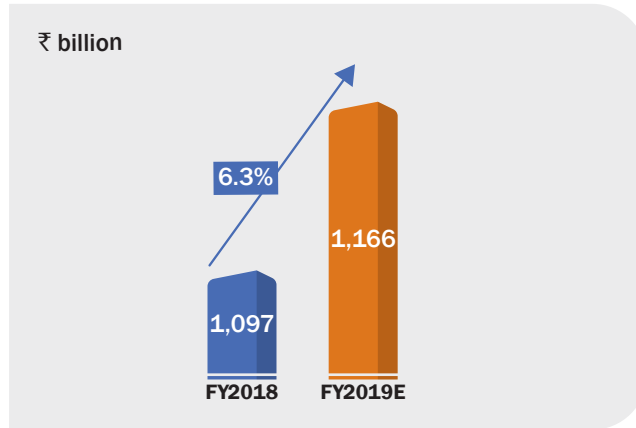
Maintenance & support budgets of enterprises shrink while reinvestments in agile development, DevOps, Big Data, RPA increases

Customers looking for innovative applications that integrate all processes

India, continues its lead as the most cost effective offshore location

Domestic IT services: Government's digital transformation agenda driving growth

Digital transformation and Government initiatives driving growth



Providers building and customising solutions specific to domestic market

Illustrative

iON is a strategic unit of Tata Consultancy Services focused on manufacturing industries (SMB), educational institutions and examination boards.

Offers end-to-end business solutions using IT-as-a-Service model catering to multiple industry segments

Developing a blockchain solution for vehicle registration and related activities where the buyer is issued a registration certificate and number for a vehicle by the dealer at the time of purchase

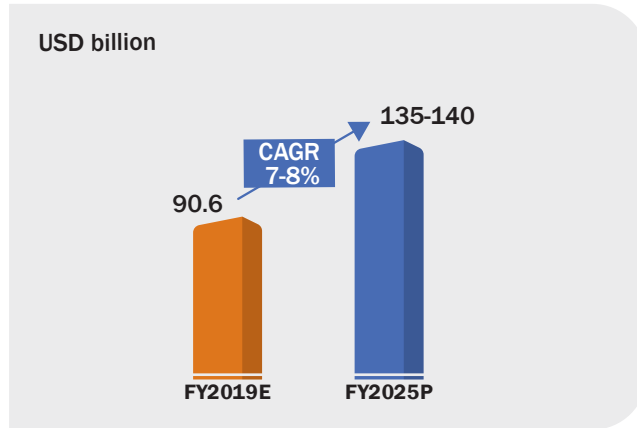
Deployed Rolta Oneview a 'State Residential Data Hub' for a State Government, collating and mapping information across multiple state departments and UIDAI to create a single trusted data hub

Key Highlights

<p>Key growth driver: Government initiatives like Digital India, Smart Cities Mission and higher demand for new technologies</p>	<p>Digital spend driven by mobile migration from technology savvy industries, such as financial institutions, media</p>	<p>Mobile payments, online banking, e-wallets and growing trend of digital branches among banks in India other key growth drivers</p>	<p>Adoption of technology for basic digitization by technology follower industries, such as manufacturing, transportation and healthcare</p>
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Outlook: Digital goes mainstream with larger projects and developing economies too joining the race

Digital to take the industry to the next growth phase



Key Highlights

Enterprises reimagining multiple aspects of their businesses, looking to leverage new technologies

Customers demand for digital transformation projects shifts from pilots, proof of concepts to larger engagements

Growing demand for expansive cyber security services, digital consulting and transformational analytic and AI projects

BFSI, Retail, Telecom and Healthcare to drive growth

Americas will continue to grow, APAC to pickup further while Europe to see a slight slowdown

Rise in demand for unique skills-analytical and high-end technicians

Strategic acquisitions, partnerships and collaborations to build digital capabilities

BPM: At a Glance



Global spend
USD 198 billion
 Growth 4.5%



Global sourcing
USD 81-83 billion
 Growth ~7%



India share in global sourcing
 Share ~38%



Revenue
USD 34.8 billion
 Growth 7.2%



Exports
USD 30.7 billion
 Growth 8.3%



Domestic
₹ 286 billion
 Growth 7.7%

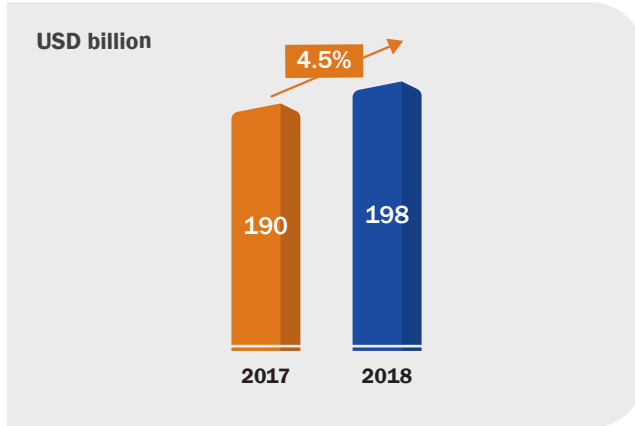


Transition to BPM 4.0

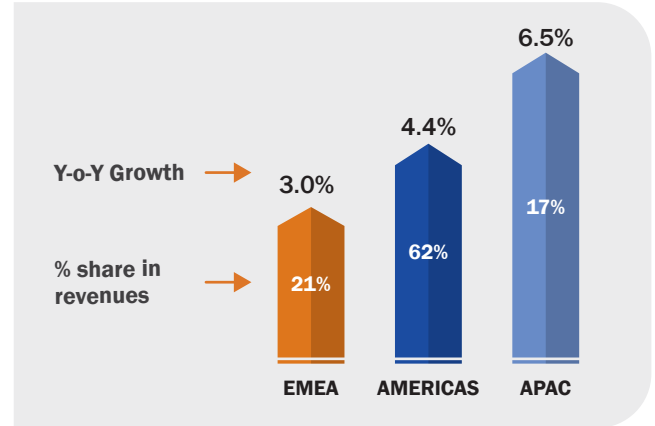
- **Re-engineer the value chain**
Change from services to solutions
 - End to end solutions; streamline value chain
 - Platforms, data, domain key levers
 - New business models – solution providers, specialists, platform developers
 - Diverse talent pool – domain, tech and business
- **Re-imagine the offerings**
Develop new markets & opportunities
 - Digital consulting, plug & play digital solutions & services
 - Predictive analytics
 - Bots with intelligence
- **Re-define customer engagement**
New engagement models; enhanced customer relations and journeys
 - Anticipate customer needs
 - Intuitive and pervasive experience
 - Focus on business outcomes and collaboration

Global BPM: Growth remains positive, driven by innovation and emerging technologies

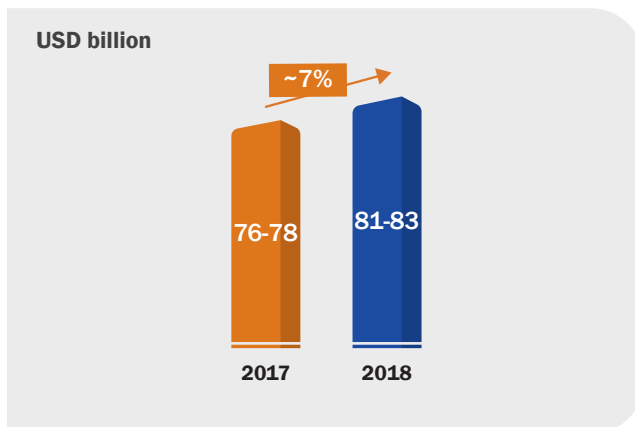
Global BPM spend records positive growth



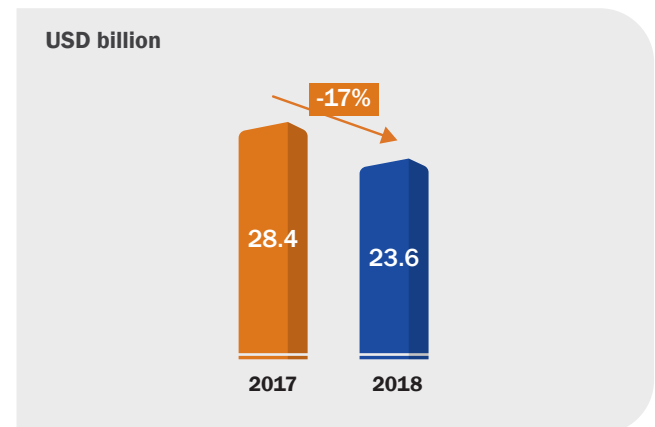
APAC the key growth driver for the segment



Global BPM sourcing growth remains positive



BPM TCV¹ deals sizes dropped, digital deals gaining traction



Key Highlights

Global BPM spending recorded positive growth of 4.5% in 2018 compared to 3.4% in 2017, emerging technologies creating larger impact

APAC region the key growth driver, though Americas and EMEA together account for 83% of the market

Sourcing market driven by digital and transformational projects, creating business impact for customers

India's share in global sourcing spend grew from 35% in 2012 to 38% in 2018, attributed to increase in customer trust

Enterprises preferences shifting to onshore and co-location delivery with greater emphasis on multi-skilled workforce

TCV deal size dropped in 2018 even as digital deals received an impetus during the year as customers sought business value and outcomes

Most BPM deals incorporate 'bots plus humans' as a standard requirement as automation becomes a norm

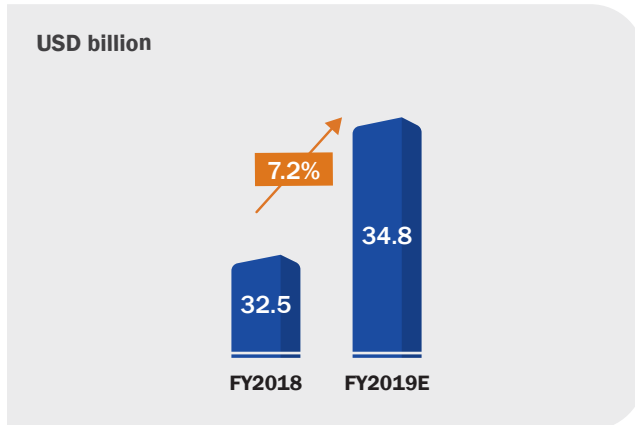
2018 was marked by consolidations as large firms focused on strategic acquisitions to increase market share and add new capabilities to their portfolio of services

Note: 1) Contracts with TCV ≥ USD 25 million

Source: Everest Group, IDC, ISG, NASSCOM

Indian BPM industry shifting from pure services to platform solutions and new revenue streams

Revenue records 7.2% growth, exports key growth driver



Key Highlights

India remains the largest BPM base in the world with over 2,500 firms

GCCs in India remains the growing hub for innovation and excellence for global enterprises

Digital becomes a key component of all RFPs

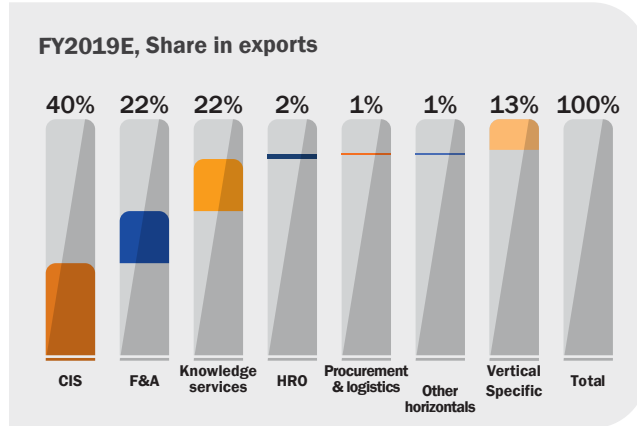
Customers the key focus for providers, creating experiences, elevating industry conversations

Increase in number of digital transformation deals; accelerates new client wins and scales existing clients

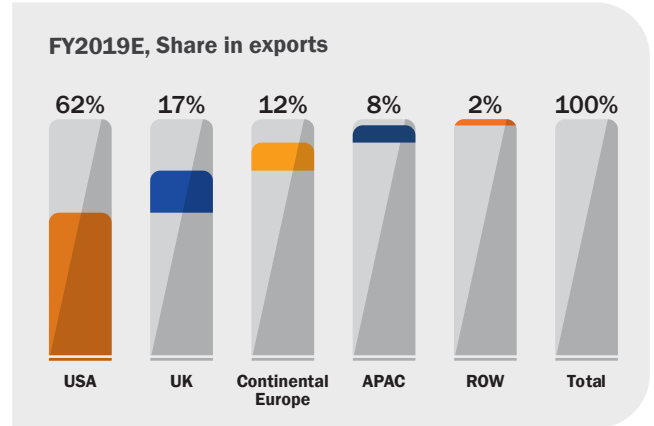
Omni-channel, Analytics, AI- creating new revenue streams while disrupting traditional services

Exports growing at 8.3%; driven largely by automation-led high-end services

Analytics and automation-led services driving growth



US and Europe remains the major markets



BFSI leading vertical; growth driven by emerging verticals



Key Highlights

Automation-led services in F&A, HR and analytics driving growth, increasing adoption of RPA in high-volume, repeatable work

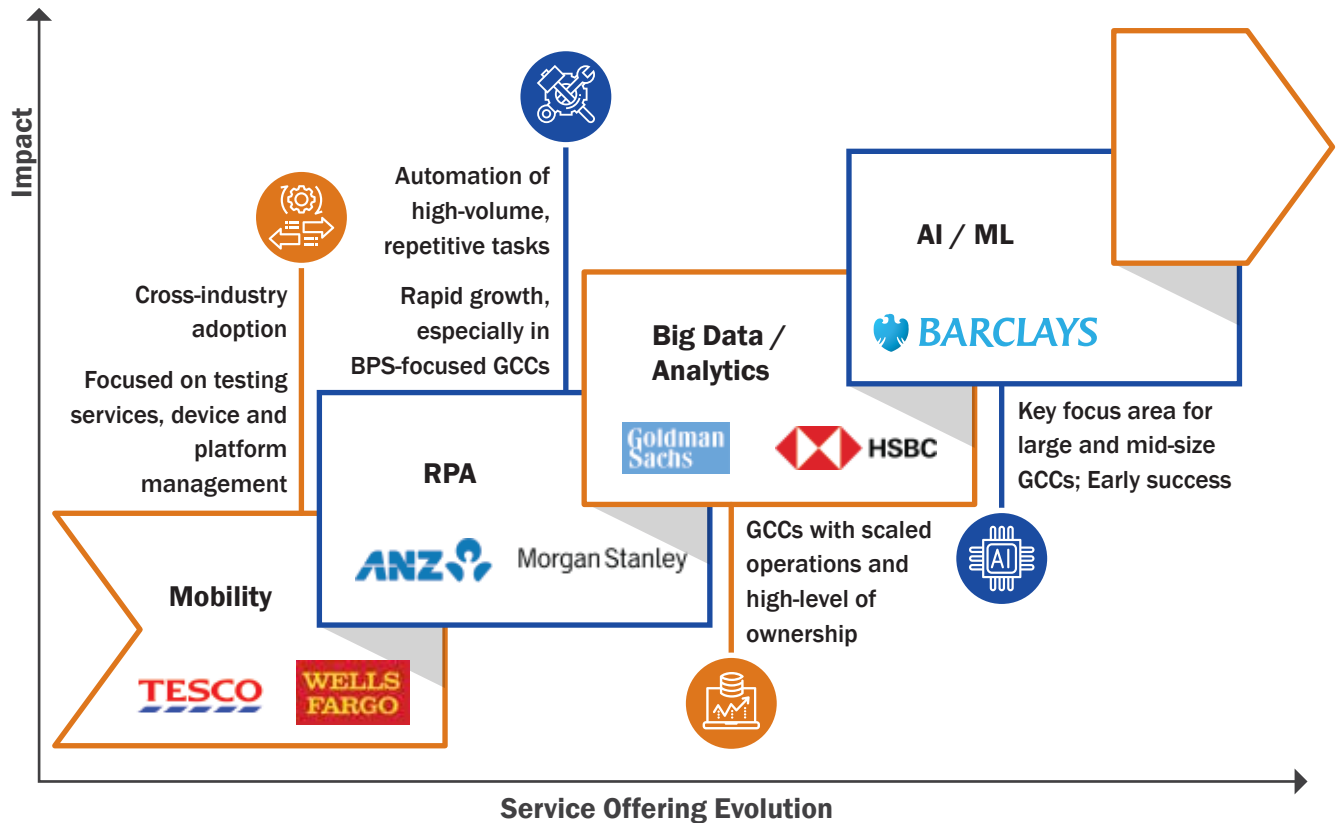
CIS with 40% share remains the key service segment, with non-voice value added services growing consistently

BPaaS/cloud based services/ analytics/RPA leading to a strategic shift in traditional verticals

Retail, healthcare, utilities- emerging verticals; to generate significant opportunities

US and UK largest geographies; APAC, emerging regions driving growth

GCCs in India moving towards digital maturity



Case Examples of GCCs leveraging digital technologies

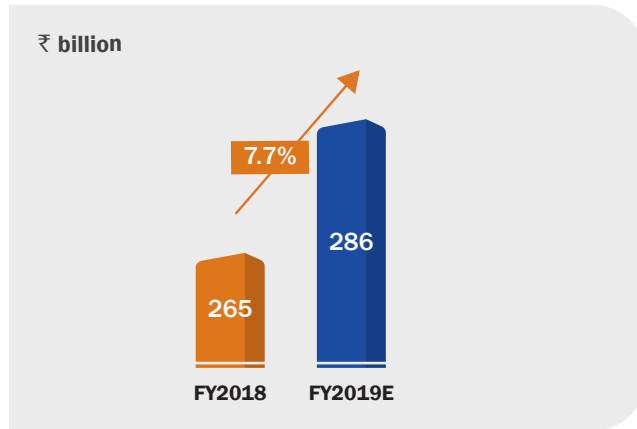
Illustrative

GCC Operations	Project Intent	Technology Focus	Impact/Outcome
Global bank	Introduced new product for emerging markets that enables customers to open an account in 90 seconds, is totally paperless and includes features like QR code, UPI, MF	AI, Chatbot, Advanced analytics	2 million customers added in 18 months Onboarding done with a team of 15-20 employees as opposed to 300 without the product
Global retailer	Built a smart forecasting system to have minimal manual intervention and reduced errors related to supply chain	ML	ML-based system provided actionable insights about sales, inventory, customer profile, store dimensions, etc., to manage the supply chain efficiently
Reinsurance firm	Transform India-based GCC from transactional services provider to a knowledge hub	Data and text analytics, ML	Automated quotes, reduced waiting times and reconciliations Technology-driven products offering better risk assessment and up-selling/cross-selling opportunities
Computer technology enterprise	Address incidents raised by internal employees for IT supported applications Automate the processes to bring more efficiencies	AI, NLP, ML	Achieved 20% incident reduction, 15% efficiency gains with resource optimization Automated solution recommendation for incidents with common resolution patterns

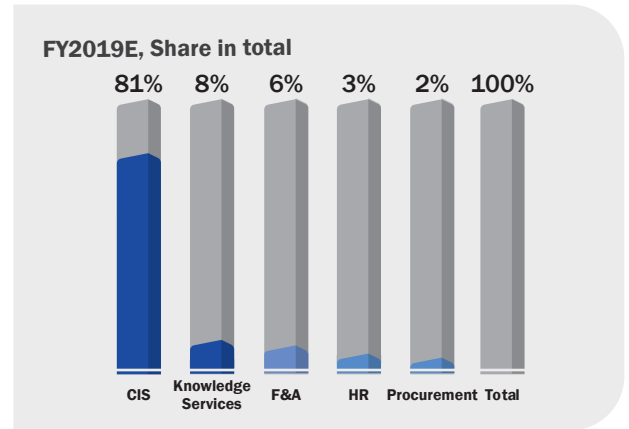
Source: Everest Group, Zinnov, NASSCOM

Domestic BPM: Government initiatives continue to drive growth

Domestic BPM growing at ~8% in rupee terms



Customer services continues to be the key growth driver



Digital India an opportunity for BPM service providers

Total budget for Digital India: ₹ 1,13,000 crore till 2020

Schemes/projects with in Digital India initiatives that provide an opportunity for BPM services include

e-governance: Governance through technology	eKranti: Delivery of services electronically	Information for all: Online dissemination of information
<ul style="list-style-type: none"> E-forms, form simplification Online applications and tracking, interface between departments Electronic databases and repositories such as voter ID cards, Aadhar cards, etc. Digitization of government records 	<ul style="list-style-type: none"> Healthcare: Online consultation, digitization of records and online medicine supply Education: Digital literacy program, wi-fi connectivity for all schools Others: Technology for justice, agriculture, financial, financial inclusion, etc. 	<ul style="list-style-type: none"> Online, open data platform for hosting information and documents for citizens, in all official languages Increased interaction through social media, web based platforms such as mygov.in

Budget for the above 3 schemes: ₹ 30,000 crore till 2020

Key Highlights

Market dominated by a few large players (about 15-17) constituting ~80% value share and 70% volume (headcount) share

'Digital India' platform for domestic BPM growth, high demand from e-governance projects and other welfare schemes

Government initiatives to digitize records to drive growth in non-voice processes

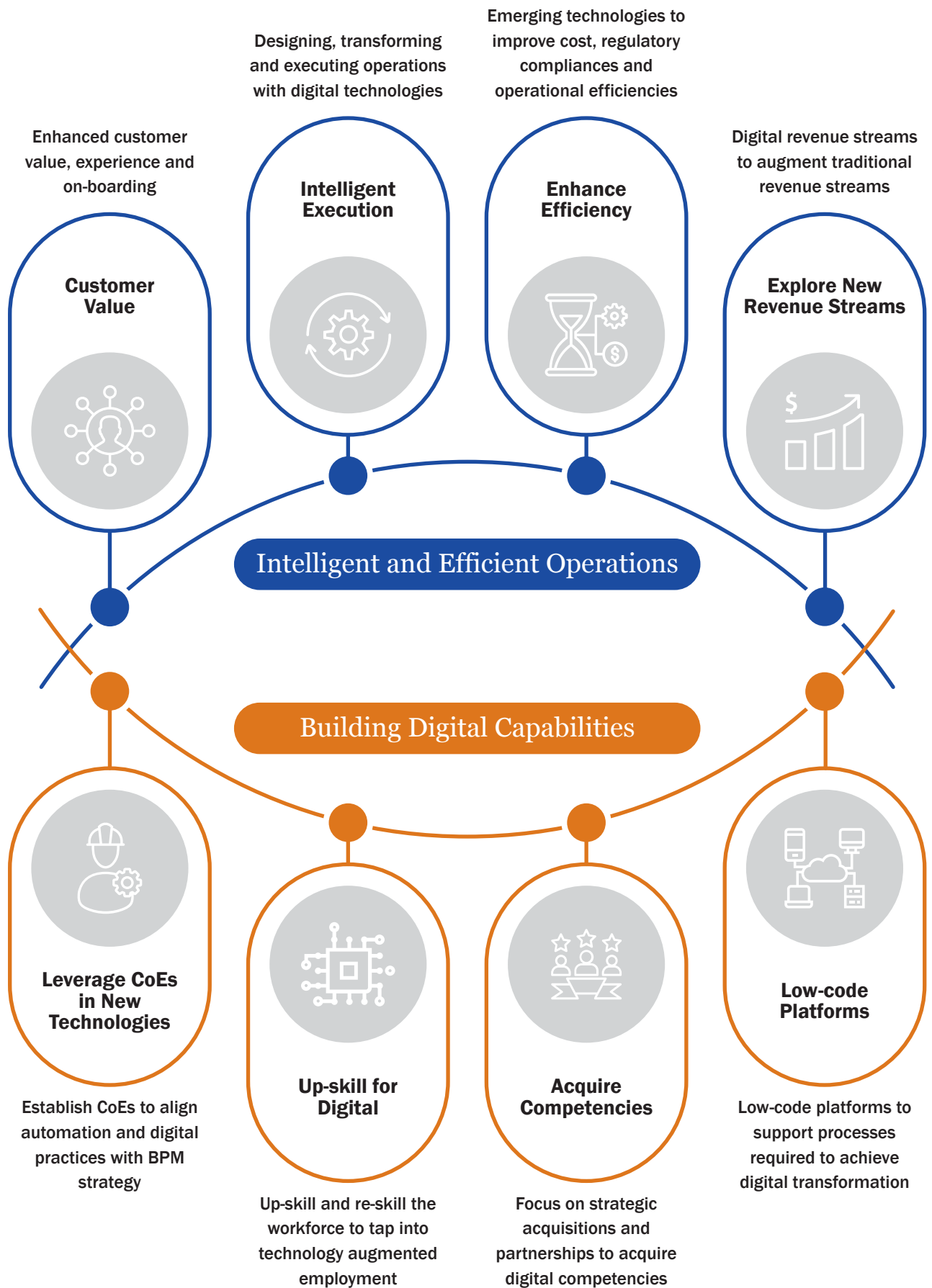
Telecom and BFSI most mature sectors; implementing large scale Outsourcing

eCommerce the sunrise industry for the segment

Demand from local and small businesses for better customer services

Vernacular, local language services expected to give a huge boost to the sector

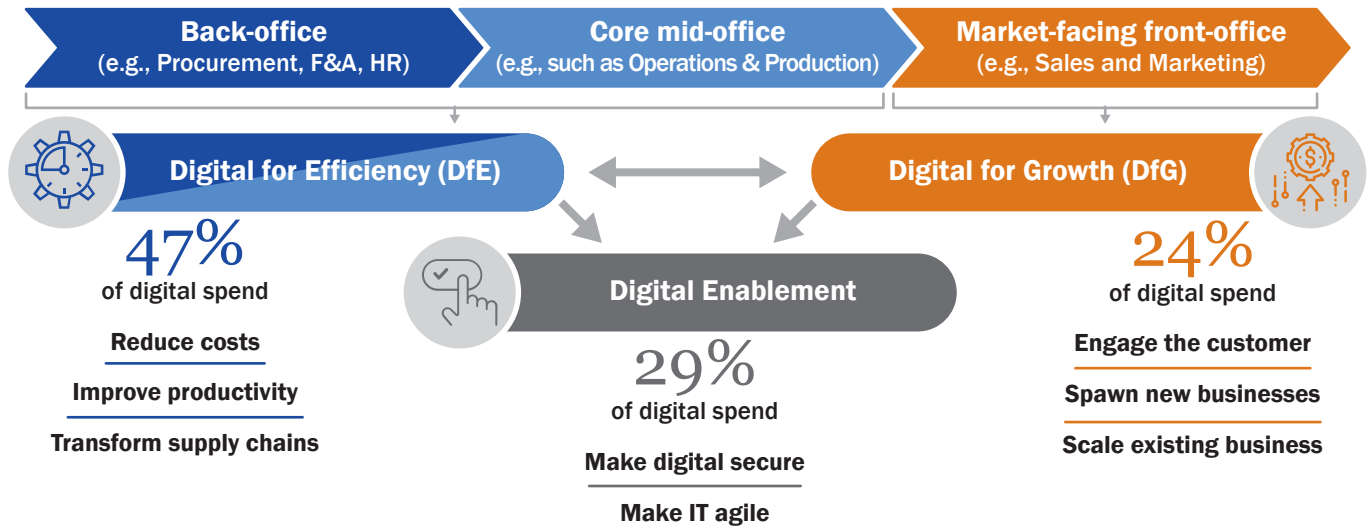
Providers focus on building digital capabilities for intelligent and efficient operations



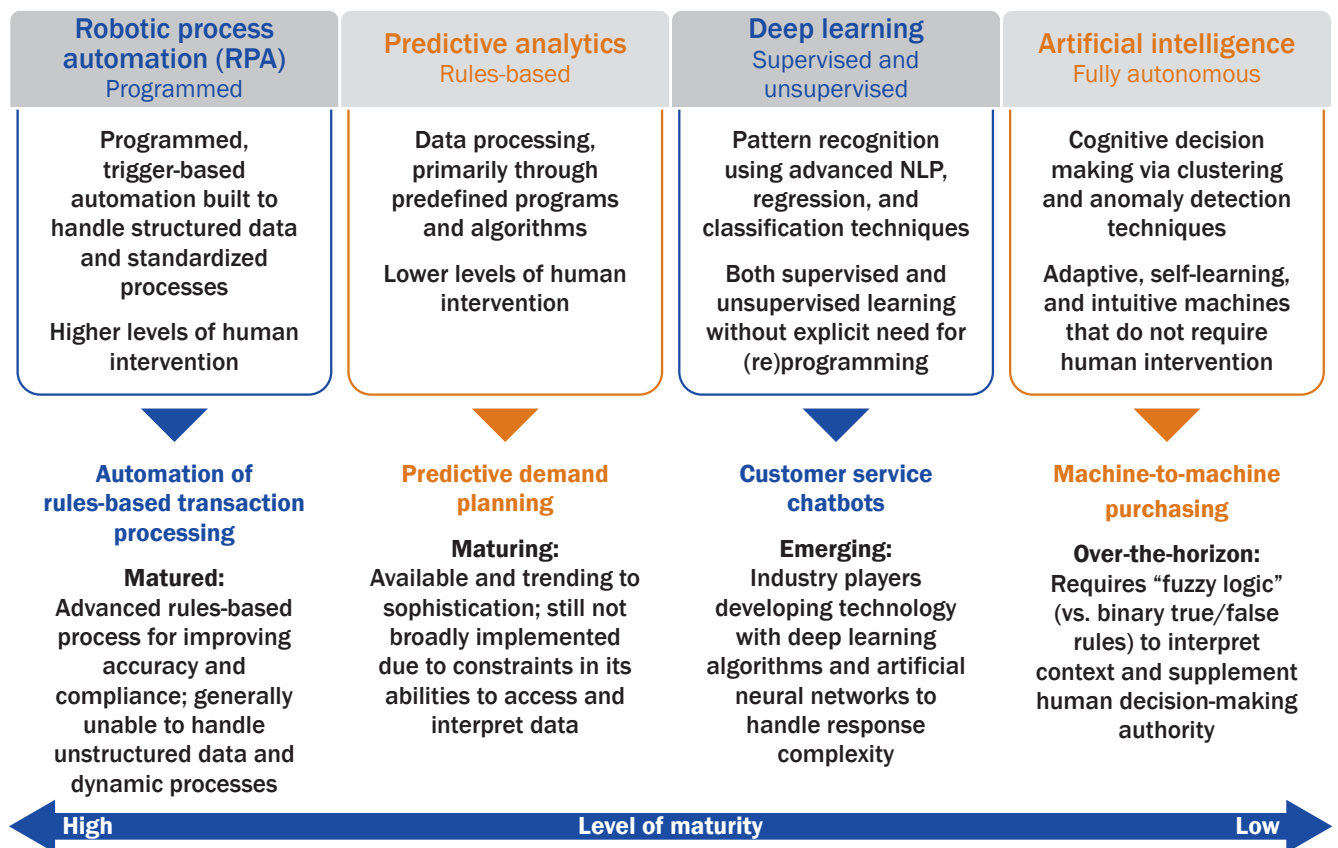
Source: NASSCOM

Digital all pervasive, automation becoming more intelligent

Digital pervasive across all functions and operations



Automation maturity in BPM

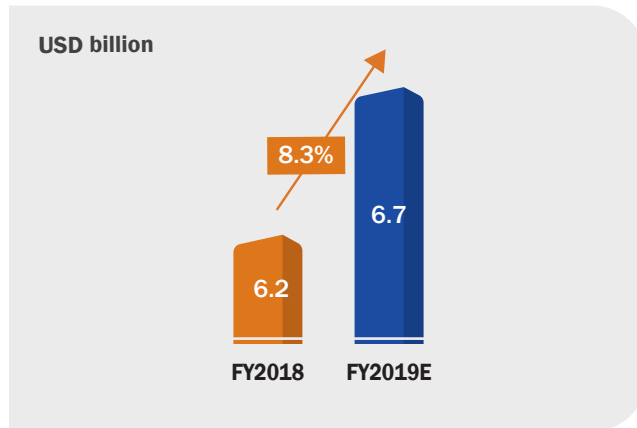


<p>Launched social media monitoring and engagement support for its client operating in retail sector</p>	<p>Deployed analytics tool for a telecommunication provider to measure customer sentiment, emotions and behaviors across an omni-channel environment</p>	<p>Transformed FAO services with its AI-enabled EXACTO tool, offering solid domain expertise, optimizing business processes and achieving better business outcomes for clients</p>
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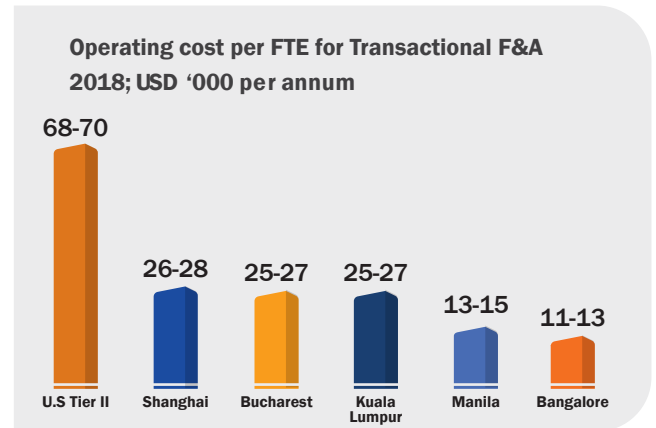
Source: AT Kearney, Everest Group, Genpact, NASSCOM

F&A: A key growth driver for the industry, shifting to new value creation levers

F&A the second fastest growing segment



India continues to be the most cost effective location for F&A work



Value creation levers for differentiation

<p>Artificial Intelligence & Analytics</p>	<p>AI-based smart matching for real-time unapplied cash reconciliation</p> <p>Intelligent invoicing solutions to predict accuracy and outcomes</p> <p>Smart analytics to optimize financial planning</p>			
<p>Platforms</p>	<p>Cloud-based end-to end SaaS solution provides reduced need for intensive manual and technology investments</p>			
<p>Automation</p>	<p>Potential for RPA in F&A processes:</p> <table border="1"> <tbody> <tr> <td>Procure to Pay: 40-70%</td> <td>Order to Cash 50-70%</td> <td>Record to Report 65-70%</td> </tr> </tbody> </table>	Procure to Pay: 40-70%	Order to Cash 50-70%	Record to Report 65-70%
Procure to Pay: 40-70%	Order to Cash 50-70%	Record to Report 65-70%		
<p>Blockchain</p>	<p>Smart contracts in Order to Cash to eliminate billing errors and dramatically speed payments</p>			

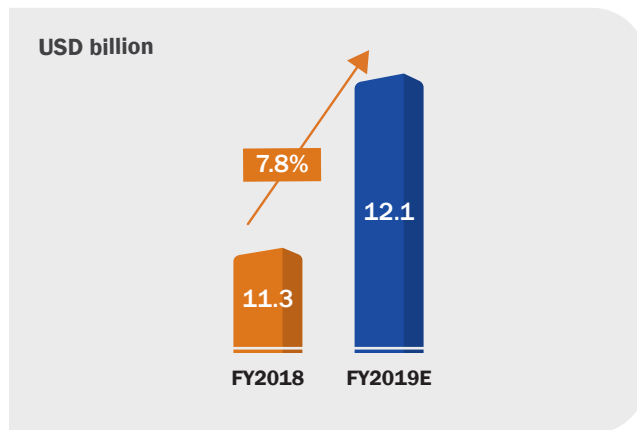
Key Highlights

<p>Evolution of technology-led, judgment-intensive processes with an end-to-end process-driven approach</p>	<p>Increasing adoption of RPA for F&A operations, deployment of AI gaining traction</p>	<p>RPA, AI, Analytics, Platform, Blockchain—new value creation levers to disrupt legacy F&A services</p>
<p>Demand for vertical specialization, strategic leadership, value creation and technological innovations from outsourcing partners</p>	<p>Shift from transaction intensive processes to digital-first model to eliminate human effort and improve efficiency</p>	

Source: Everest Group; Hfs Research, WNS, NASSCOM

Customer Services: Digital services disrupting the traditional service models

Traditional customer service moving to enhanced self service channels



Illustrative case examples



Provided enhanced user experience, reporting and analytics for broadcasting company using RPA bots



Activated social media as a support channel to improve CX for a global automotive OEM



Activated omni-channel and automation to optimize revenue and enhance CX for a technology and e-commerce company

Key Highlights




Focus on new digital customer service models, supported by technologies such as cloud, NLP, ML, analytics and RPA

India represents ~11% of the global customer services delivery market

Use of AI-powered cognitive chatbots & virtual assistants to drive self-service channels and reduce dependency on voice

India value proposition moving from agent scalability to digital customer experience center of excellence

Next-generation technologies and solutions creating enhanced customer value

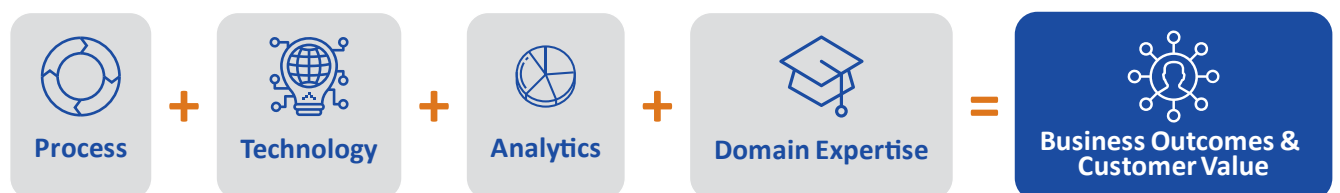
 Artificial Intelligence	 Analytics	 Automation and Others
<p>ML/Deep learning Text to speech conversions, fluid CX delivery, diagnose broken CX processes, identify root causes and recommend optimizations.</p> <hr/> <p>NLP Identify and classify requests, segment customers, optimize self-service options and improve contextual understanding</p>	<p>Prescriptive analytics Set-up hot fixes for contact centres, identify and optimize faulty steps in the customer journey</p> <hr/> <p>Predictive analytics Segment the customer base and identify target groups for proactive campaigns</p>	<p>RPA Automate highly repetitive tasks to improve productivity, scalability, quality, compliance and CX spending</p> <hr/> <p>Omni-channel platforms Provide flexibility to add, modify and integrate new channels, apply analytics and automation and deploy business rules across locations</p>

Source: Everest Group; Hfs Research, WNS

Upward trend in building IP-led platform services leveraging automation and new age technologies

Illustrative

			
<p>Key focus areas: Actuarial, Airlines</p>	<p>Key focus areas: Customer experience</p>	<p>Key focus areas: Bill entry process, KYC documents</p>	<p>Key focus areas: Customer complaints management</p>
<p>Technology: Advanced Analytics</p>	<p>Technology: Analytics, AI/ML/NLP, RPA</p>	<p>Technology: Advanced Analytics, AI, RPA</p>	<p>Technology: Advanced Analytics, AI</p>
<p>Actuarial platform automates file generation process, creates a central repository of rule-based asset files for actuarial modelling software</p> <p>Verifare PlusSM is a fully-automated, web-based fare audit solution that offers airlines revenue protection</p>	<p>Cora AI-based platform transforms customer experience – front to back – using automation, analytics, and AI</p> <p>Neural Intelligence Platform harnesses the power of RPA and AI to mine large-scale datasets, automates continuous learning, and leverages predictive analytics and sentiment analysis</p>	<p>Freight Billing as a Service applies domain expertise, advanced analytics, OCR and advanced automation to transform the bill entry process</p> <p>Leveraged Digital Intelligence platform powered by AI and advanced automation; expanding from a KYC and exits management tool to an end-to-end CLM solution</p>	<p>FirstAnalytics: AI-based analytics platform, processes large data volumes at high speed freeing up resources to focus on core competencies</p> <p>FirstResolve a customer complaint management solution delivers claims handling methodology that includes a portfolio of claims management services</p>



Source: Company websites

Year marked by strategic acquisitions changing the service provider landscape...

Consolidation in the contact centre business

Illustrative



USD 2.43 billion acquisition

Key benefits to Concentrix

- Strengthen digital capabilities
- Adding new clients and complement delivery footprint



USD 1 billion acquisition

Key benefits to Teleperformance

- Augment capabilities in solution design, digital integration and operational excellence
- Complement delivery presence in high growth markets of Asia



USD 230 million acquisition

Key benefits to Aegis

- Created a combined business of revenues exceeding USD 700 million as of 2017
- Enable re-entry into US market and reduce client concentration

Adding digital capabilities: Analytics, RPA



PE firms acquiring controlling stake in BPM firms



100% stake

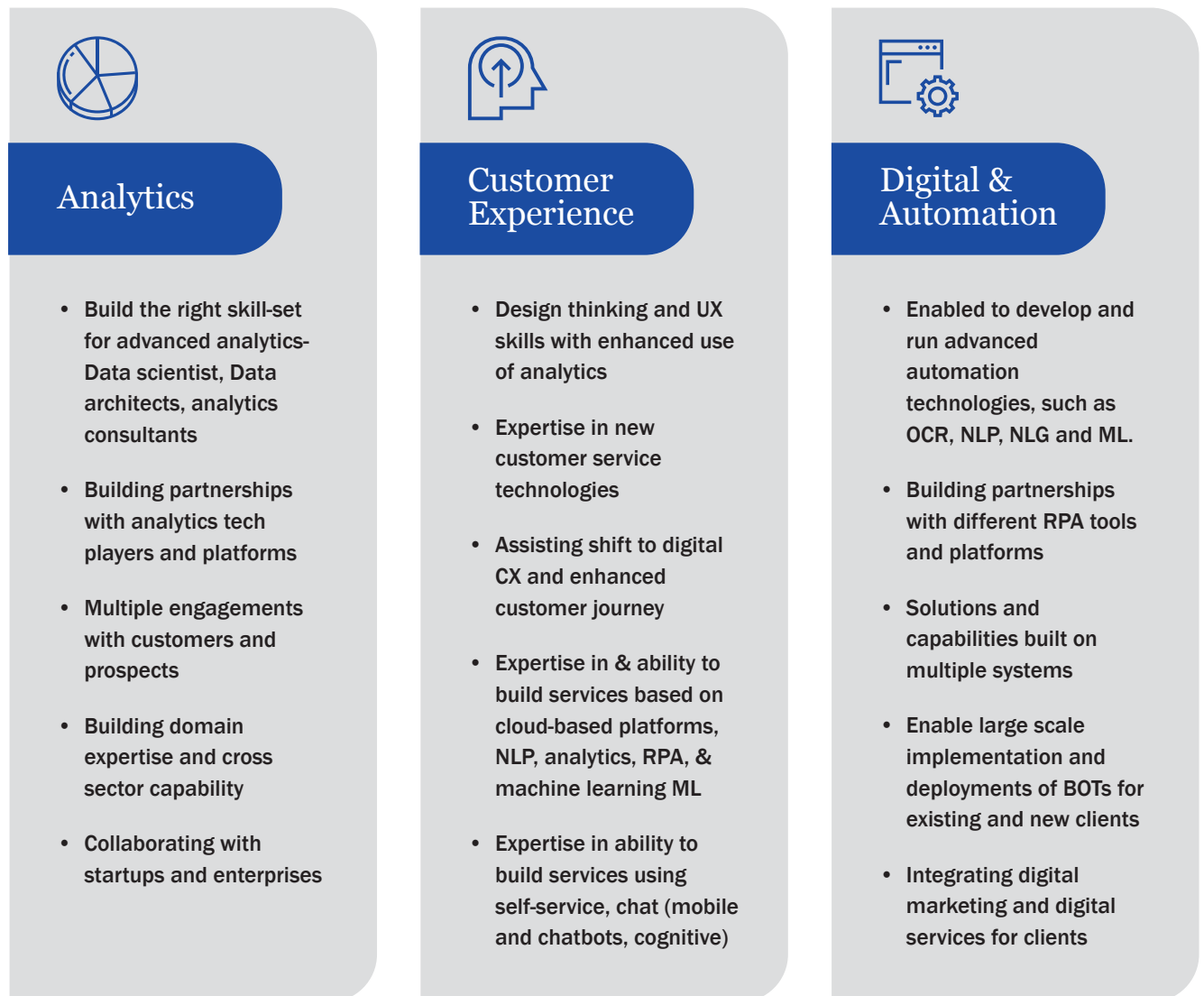


100% stake



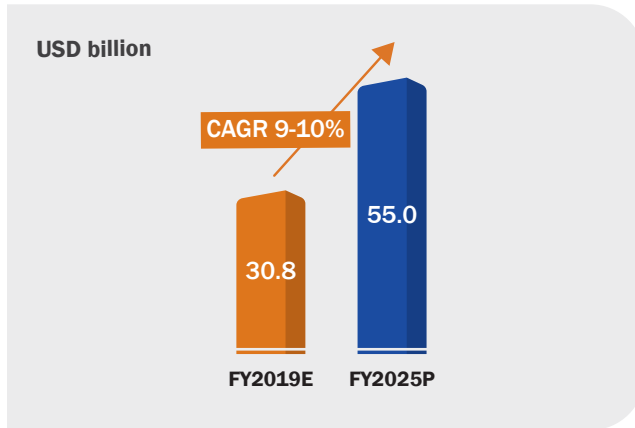
55% stake

...simultaneously investing in building capability Centres of Excellence



BPM 4.0: Changing dynamics of the industry

To reach revenues of USD 50-55 billion by 2025
industry fast tracking to BPM 4.0



Industry fast tracking to BPM 4.0 to achieve revenue target of USD 50-55 billion by 2025

Focus on new revenue streams: digital services, plug and play platforms, digital consulting

Adoption of advanced analytics, RPA and AI reaches next level

Digital transformation not a technology but business opportunity with real outcomes

Talent upskilling and reskilling top priority for the industry

Strategic investments in building capabilities both organically and inorganically to continue

ER&D: At a Glance



Global spend
USD ~2.0 trillion
Growth 11.4%



Global Innovation
1000
USD 782 billion
Growth ~11%



Global sourcing
USD 93 billion
Growth 6.4%



- Global R&D investments saw significant growth in 2018 across industries
- Firms increasingly leveraging digital technologies for delivering customer value & experience, leading to:
 - Business models shifting to platforms, data monetization, differentiated go-to-market strategies
- Global sourcing continues to grow as firms look to improve productivity and overcome political & economic challenges



Revenue
USD 30 billion
Growth 10.0%



Exports
USD 28 billion
Growth 11.3%



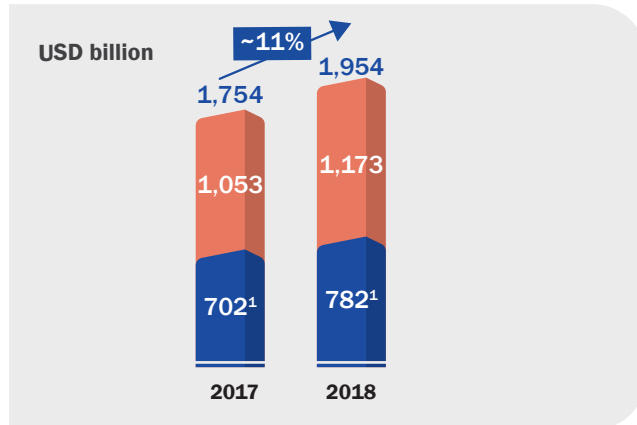
Projections-2022
USD 42 billion
Growth 14.0%



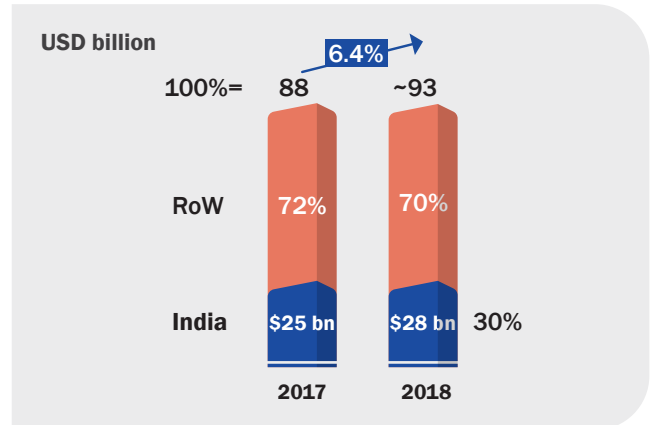
- India ER&D: A mature segment, fastest growing, accounting for one-fifth of total exports
- Changing landscape: Consolidation (Altran-Alten), PE investments (GlobalLogic-Partners Group), etc.
- GCCs: Driving productisation, innovation, collaborative agility, digital for parent firms
- Emerging industrial startups playing key role in developing innovative solutions

Global ER&D: R&D spend at USD 1.8 trillion: 2018 saw big growth in R&D investments

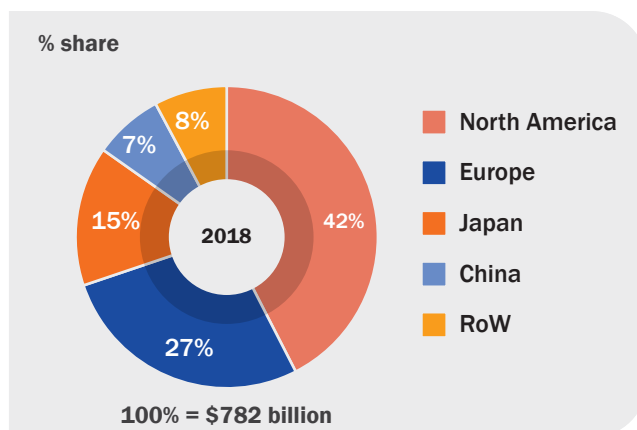
Growth % of R&D spend: 3.6x over 2017



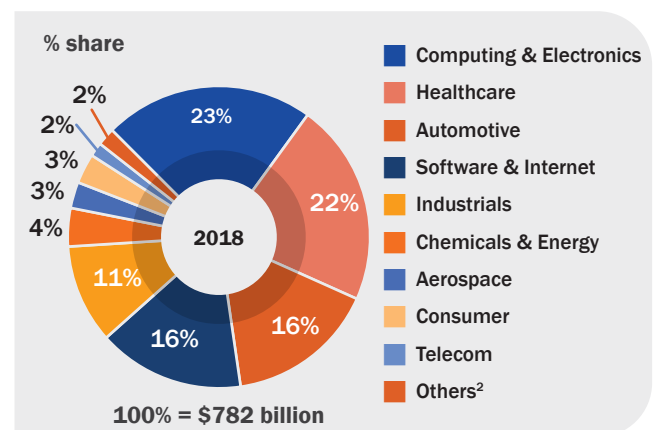
Global sourcing: ~5% of total ER&D spend



China leading APAC ER&D spend



Healthcare, software: Sustained growth in R&D spend



Key Trends

Global ER&D spent upto 11.4% in 2018 reflecting broad-based growth across regions & industries

R&D intensity at 4.5% in 2018

R&D spend in automotive, focused on electronics, software and autonomous vehicles

Semicon firms diversifying into AI, IoT and cloud

Software-led engineering: Focus shifting from hardware to software & services

Apple's deals with Samsung and Amazon for streaming services on Samsung smart TVs and US Amazon Echo smart speakers, respectively

Healthcare: R&D for personalized medicines, AI and analytics in drug discovery, cognitive computing to improve patient outcomes, etc.

ER&D spend by Chinese firms focused on auto, software & Internet, computing & electronics

GLOBAL SOURCING

Global sourcing market for ER&D grew 6.4% to USD 93 billion

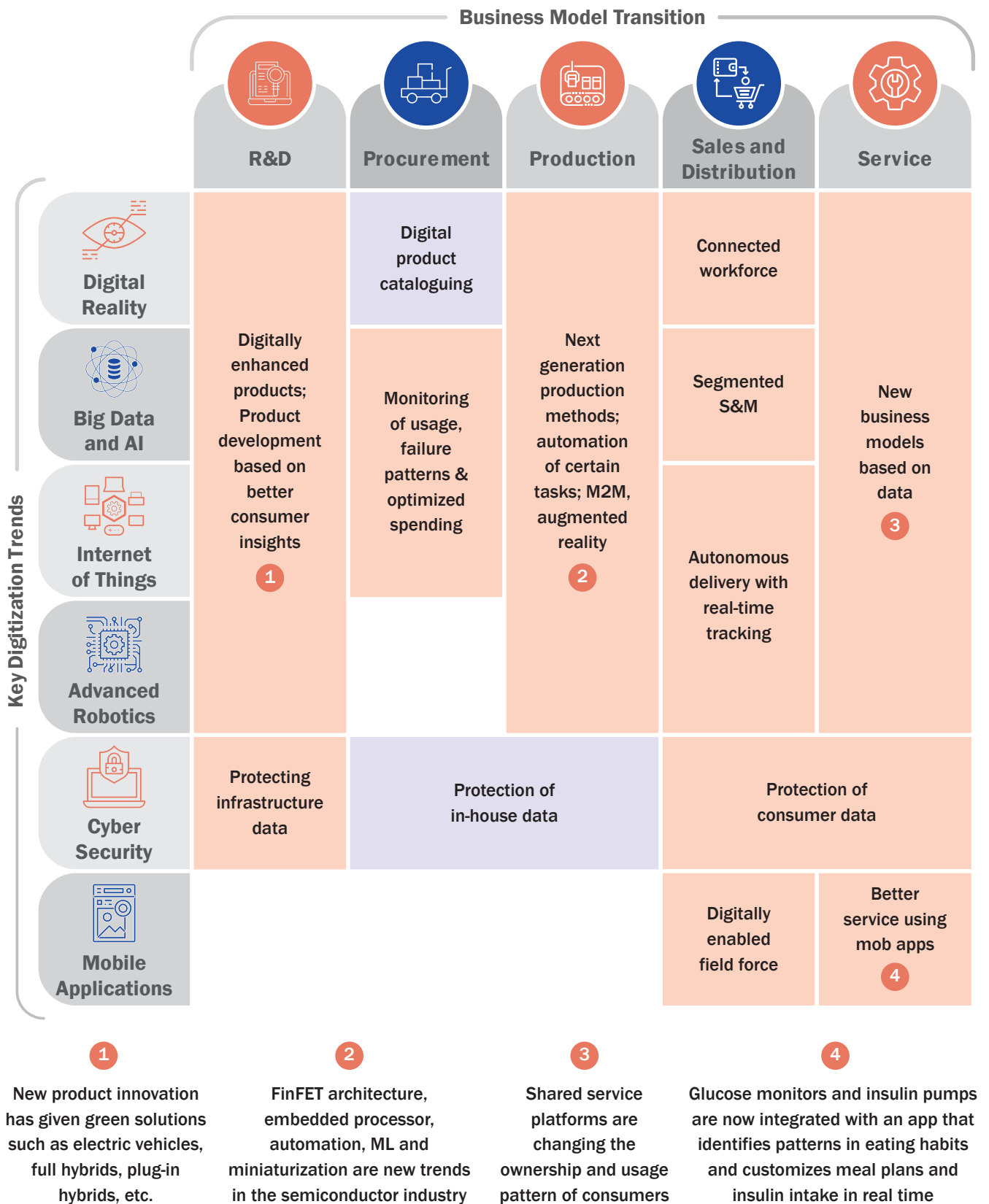
India's share increased to 30%

¹ Represents the 1,000 public corporations worldwide that spent the most on R&D of products, software & services

² Includes Construction and Industrial Automation

Source: Everest Research, R&Dmag, Strategy&, NASSCOM

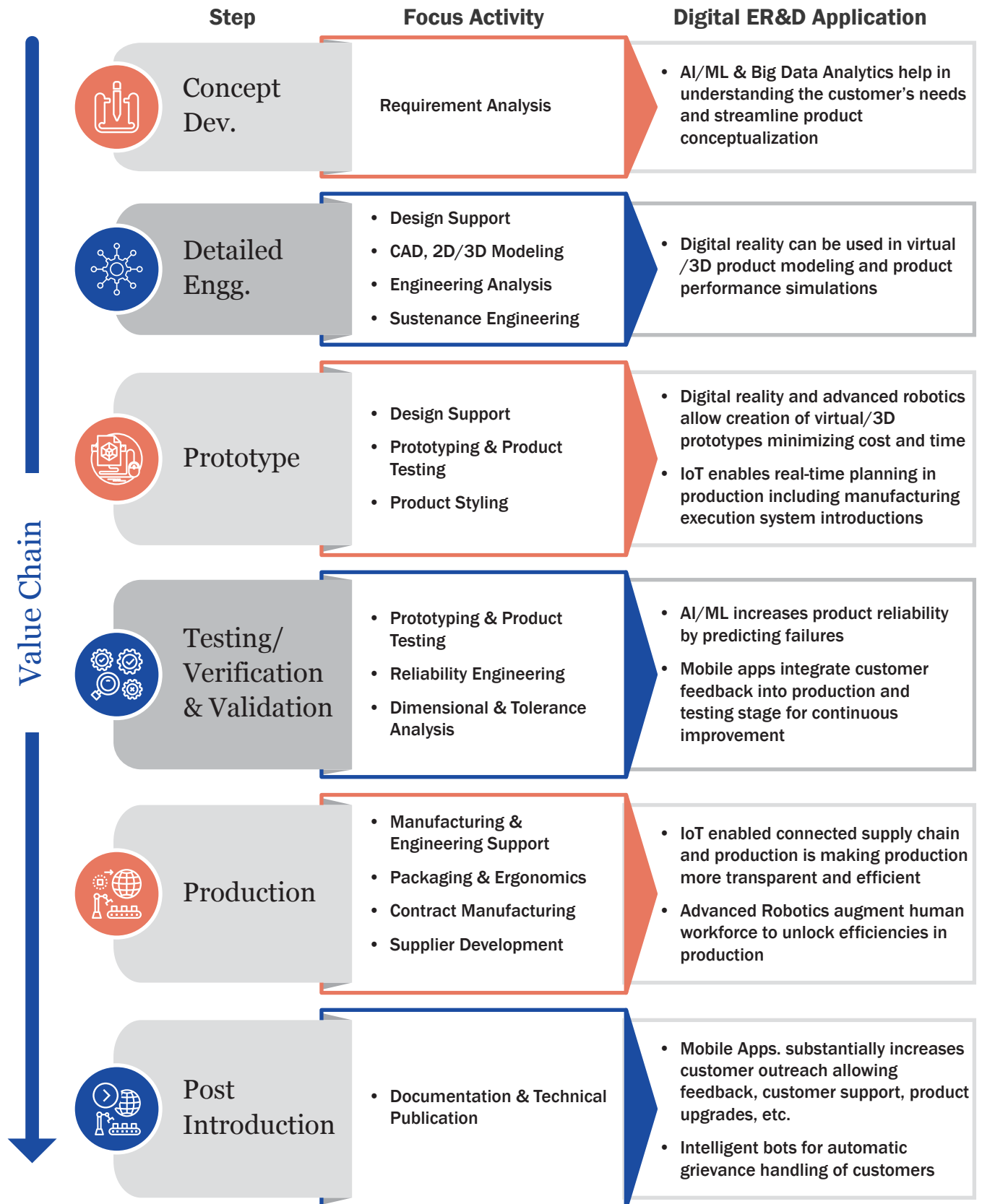
Digital impacting business models; potential to boost revenue, cut costs, enhance UX



■ High digitisation opportunity ■ Low digitisation opportunity








Also disrupting traditional product engineering value chain

Product Engineering – Value Chain & Digital ER&D Applications



Source: Strategy & analysis

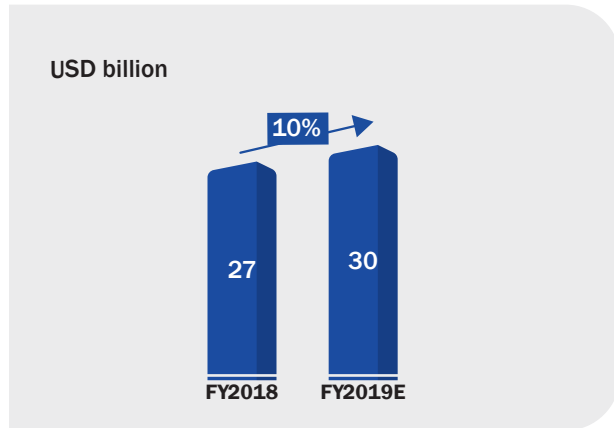
ER&D spend growth outlook – most development happening in software

Sector	Comments	Key themes driving ER&D
 Software products	Accelerated spend growth will be driven by the need for enterprises to continuously explore and invest in new use cases for emerging technologies	<p>Technologies such as cognitive computing, AR/VR, natural language processing, containers, microservices and blockchain</p> <p>Software security and as-a-services business models</p>
 Automotive	Investments in efforts to enhance autonomous driving capabilities and electric powertrains will drive growth, but the effort to bring existing innovations to mass production may limit growth	Electrification, connected vehicles, autonomous driving and compliance with environmental and safety regulations (in addition to regular R&D activities for launch of new product models)
 Aerospace and defense	Revenue growth will accelerate in this sector in both the commercial and defense areas, driving higher R&D investment	<p>Additive manufacturing, simulation-based design, real-time monitoring, predictive maintenance and drone technology</p> <p>Efforts to leverage automotive tech for fleet visibility, advanced materials, computer vision, etc.</p>
 Semiconductors	Spend will grow as enterprises seek further improvements in chip size, energy efficiency, and responsiveness for IoT applications in mission-critical areas	<p>Development of sensors and components with a small physical footprint, low energy consumption and high responsiveness</p> <p>Other areas include components for 5g and AI applications</p>
 Telecom	Spend growth will accelerate as enterprises realize that innovation is the only way to address declining margins	IoT, 5G, Machine to Machine (M2M) communication, Software-Defined Everything (SDx) and Over-the-Top (OTT) services
 Consumer electronics	Spend growth will be sustained by enterprise efforts to make their products intelligent and ready to plug into the connected ecosystem	<p>Next-generation user experiences, AI and IoT</p> <p>Co-innovation of products based on market feedback</p>
 Industrial, energy, chemicals and natural resources	Innovation in connected industrial ecosystems will be the primary driver for spend growth in this sector	Investments for various “Industry 4.0” initiatives, including connectivity enablement, AI, additive manufacturing, autonomous robotics and sensors

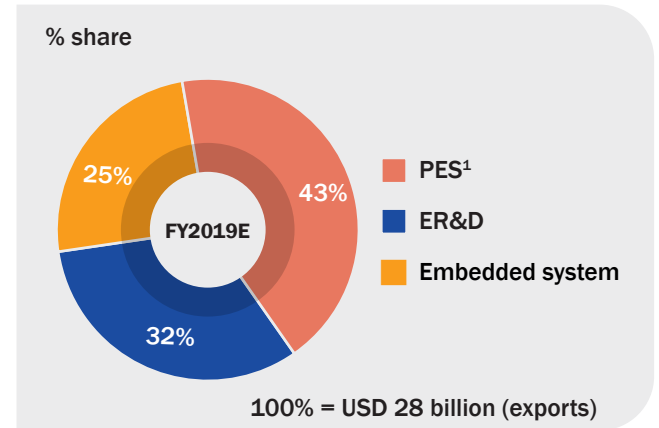
Source: Everest Group: Leading the Pack: Trends for the Top 200 ER&D Enterprises

India ER&D: Rapidly maturing segment; one-fifth share in IT-BPM exports

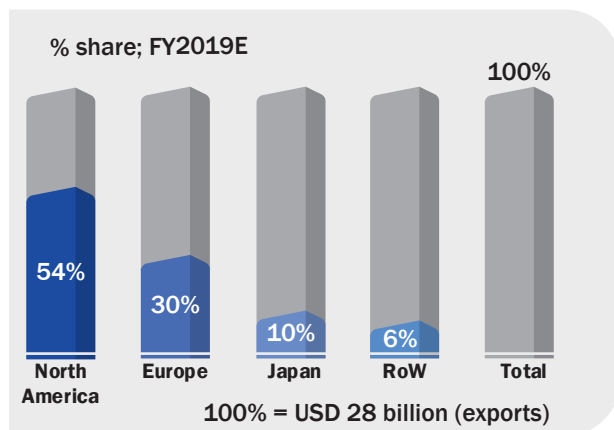
ER&D total revenue at USD 30 billion



Software-led ER&D driving growth of PES



Uptick in offshoring from Europe



Key Trends

Increased value chain integration: Not just engineering, but also manufacturing, supply chain, markets, customers

Global enterprises facing margin and cost reduction challenges – ER&D offshore play to further increase

ER&D efforts focused on driving efficiencies in design, development, testing using automation, analytics and design thinking

GCCs: Driving Productisation, Innovation, Collaborative agility, Digital for parent firms

Industry-specific technologies - 5G, Software-Defined Everything (SDx), electric automotive powertrains, additive manufacturing gaining significant traction

CASE²: Going beyond automotive – emerging as an industry-wide trend incl. aerospace

Software-led ER&D

Increasing platformisation leading to a growing As-a-Service economy

A sharp rise in software-led ER&D contracts and IoT deals have helped ER&D business grow faster than traditional IT services

Cyber-security: Getting increasing embedded into products and services as inter-connectivity increases

Growing demand for hybrid skills – software + technical + domain

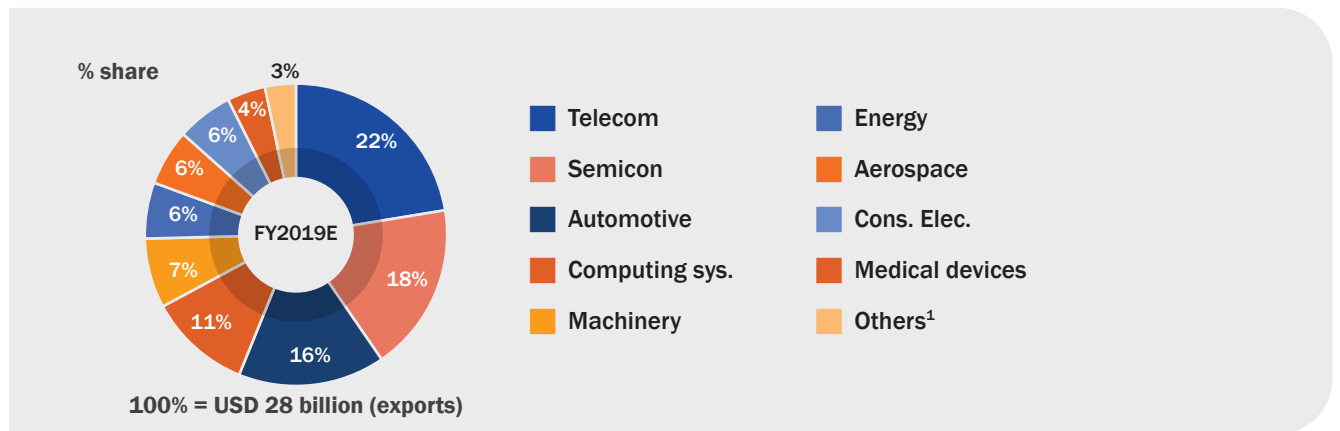
Numbers include engineering R&D, embedded systems, product R&D of GCCs and offshore software product development (OSPD)

¹ Product engineering services offered by both GCCs and third-party players;

² Connectivity, Autonomous, Shared mobility, Electrification

Source: NASSCOM

Share of digital spend varies across industries; much higher activity in automotive and energy (1/2)



Increasing penetration of software and greater application of digital technologies across industries is seeing a steady shift from legacy ER&D to digital ER&D. This shift is also driving a move towards a more as-a-service model and enabling additional revenue stream from analytics, AI/ML, data monetisation, etc. Across the ER&D sector, six digital technologies are making a significant impact:

As connectivity across machines, equipments and products increase, the role of cybersecurity is becoming more and more crucial. Cybersecurity is now emerging as the underlying technology for all products & services

IoT is enabling sensorisation on the shop floor thus ensuring predictive and preventive maintenance of machinery

Digital reality (AR/VR) enabling enhanced user experience

Mobile apps: Enabling remote monitoring, infotainment on the go

Analytics/AI/ML: Predictive analytics and service personalisation






Robotics: Autopilot operations, autonomous driving, etc.

Numbers include engineering R&D, embedded systems, product R&D of GCCs and offshore software product development (OSPD)

¹ Includes construction, industrial automation industries

Source: NASSCOM

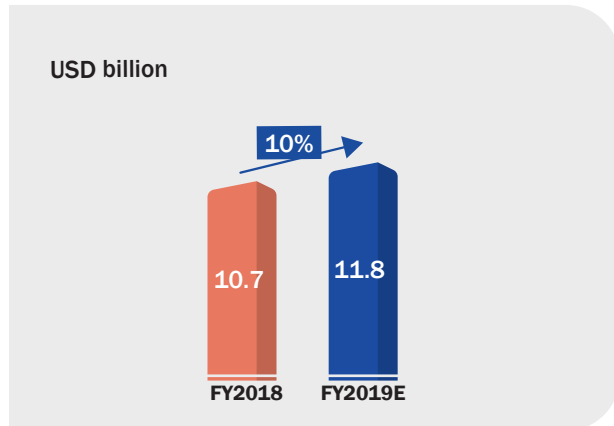
Share of digital spend varies across industries; much higher activity in automotive and energy (2/2)

Sector	CAGR	Key digital trends	Outsourcing trends
 <p>Auto</p>	9.1%	<p>Connected: Cloud, connected home, infotainment, cyber security, V2V</p> <p>Autonomous: Driving, lane monitoring, road safety, route optimization, motion sensors, telematics</p> <p>Shared: GPS, payment integration, cyber security, app development</p> <p>Electric: EV design, power train, charging & battery technology, power electronics, material design</p>	<p>Software integration, platform customizations</p> <p>Crash testing and data analytics</p> <p>Enhance overall customer experience</p> <p>Product localization to adhere to local laws & benefit from tax breaks</p>
 <p>Construction & Heavy Equipment</p>	7.6%	<p>Connected, autonomous, AR/VR & AI/ML form the major digital trends in this segment</p> <p>Telematics in Off-highway is expected to grow at 8% CAGR</p>	<p>Technologies for wireless connectivity and increased range</p> <p>Sourcing drones configured for custom needs</p> <p>Complex project planning with AR/VR</p> <p>Testing of autonomous vehicles under different navigation scenarios</p>
 <p>Energy</p>	7.0%	<p>Digital Oilfield market expected to grow to \$27 bn by 2022</p> <p>Digital technologies can cut production costs by up to 20%</p>	<p>SI services to integrate software & hardware in upstream value chain</p> <p>Big Data Analytics</p> <p>Cloud solutions for real-time smart metering</p> <p>SCADA for monitoring cyber security</p>
 <p>Medical Devices</p>	7.8%	<p>Connected: Wearables, connected hospital/ambulance, remote monitoring</p> <p>AI/ML & Analytics: Medical imaging, chronic disease management, advanced wearables</p> <p>Blockchain: Drugs/device traceability, autonomous monitoring, data encryption</p> <p>Digital marketing: Mobile apps, integrated devices, advanced analytics</p>	<p>Development and integration of medical devices with ML capabilities</p> <p>Secure flow of medical data between patient, doctor & hospital key focus area</p> <p>Incorporating traceability in devices</p> <p>e-Commerce – the new retail channel</p>
 <p>Semiconductors</p>	3.1%	<p>Driven by digitization, communications to be the biggest segment</p> <p>EUV lithography & bigger wafer size (450mm) to help reduce feature size</p>	<p>Higher variety of components driving increase in capacity; thus driving offshoring</p> <p>Increased variety of components call for higher number of skilled engineers</p> <p>Fabrication and packaging being offshored</p>

Source: Strategy&, NASSCOM

PES: Increasing software penetration driving demand

Accounts for 43% of ER&D global revenue



Key Trends

Consulting: Increasing as customers implement new age technologies and transition from legacy to digital

New business models: Cloud based products driving non-linear pricing (outcome-based, risk-reward, on-demand)

Enterprises: Beyond ISVs are building their own products & platforms, driving demand for PES

Digital: Automation, IoT, AI enabling competitive advantage and enhanced customer experience, thus impacting customers' business outcomes





IP deals: Service providers partnering with ISVs to take full ownership of IP and upgradations

Increasing software penetration leading to demand for testing, product sustenance and support

Firms investing in labs, CoEs, studios, innovation centres, etc. for demonstrating industry solutions

Growth strategy of PES firms focused on strengthening partnership ecosystem and M&As

Examples

 Pricing models	 IP deals	 Partner ecosystem	 Innovation
<p>Altran has one of the highest percentage total revenue from outcome-based pricing models</p> <p>Mindtree is working with a US-based data management firm in revenue share model for complete ownership of EOL products</p>	<p>Persistent in product takeover partnerships with IBM, Citrix, Intel (Aepona Holdings)</p> <p>HCL invested USD 1.8 billion in buying some of IBM's software assets</p>	<p>Tech M collaborating with 20-30 startups a year under its TechMNext program - primarily in the networking, communication technology and VR</p> <p>Schneider, with its OT domain expertise and Microsoft (cloud capabilities) create commercial IoT solutions in energy management and automation</p>	<p>L&T Tech: As of Q3FY2019, patent portfolio stood at 363 - 264 co-authored with customers</p> <p>TCS' R&D spend in FY2018 grew >17 per cent to Rs 15 billion: Rs 2.98 billion spent on R&D; Rs 12.02 billion directed towards innovation centres</p>

Source: HfS, NASSCOM

ER&D GCCs: Driving productisation, innovation, collaborative agility and digital

New GCCs set up in India



Key Trends

Currently, India has about 1,250 GCCs

Top 3 verticals: Software & Internet, Telecom, Automotive

Platformization and digital transformation – major drivers for hiring digital talent

Automotive, aerospace & defence, semiconductors – hiring actively for design engineering roles

Digital transformation and global product ownership – key focus areas



Innovation Panasonic

India R&D Centre focused on product design to expand current organization gradually by local product manufacturing and development of technologies such as AI and robotics from India for a global platform



Collaboration Medtronic

Partnered with Tech M to design and develop a remote patient monitoring system



Digital Rocket

Rocket Software has presence in Bengaluru and Pune in India
Building AI/ML and data science capabilities for its IBM ecosystem based offerings

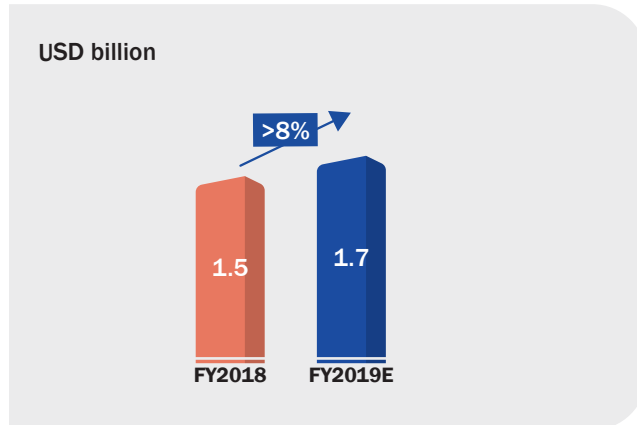


Productisation Oppo

Established a R&D center in Hyderabad, to build software-based solutions in areas like AI, cameras, charging, 5G, smartwatches, and IoT

Domestic ER&D: Going beyond the Proof-of-Concept stage

Getting closer to USD 2 billion mark



Key demand drivers

Ind 4.0

- Smart factory
- Digital twin
- Smart products

Smart Cities

- Smart buildings
- Smart transportation
- Smart energy

Public Utilities

- e-Procurement
- GPS, handheld devices, IoT
- Predictive maintenance

Make in India

- Offset requirements
- Auto, aero & defence electronics
- Healthcare automation

Illustrative examples



India's Central Railway has developed an AI-powered robot, USTAAD, to check faults in trains. It would take pictures and videos of the under-gears of trains and send them to engineers for repair and maintenance



Apollo Hospitals (Navi Mumbai) launched Mazor Robotic Spine Surgery Systems, an advanced minimally invasive robotic system that helps in increasing accuracy through 3D mapping of the area to be operated



Using 3D printing to build prototypes in its research and development facility in Pune
The 3D-printed support structures occupy ~30% of a part's weight vis-s-vis double or triple earlier; also generates less build failures



Mahindra Electric recently launched a VR based drive experience for its e2oPlus small electric car
Innovatively communicate all the features through an immersive experience

Key Trends

India's R&D spend: USD 83.3 billion (2018; incl. government & academia) – 3.8% share in global R&D

Focus areas: Big data analytics, AI/ML, Industrial IoT, industrial robotics, etc.

India Inc. expected to focus on technology integration, backward integration and innovation to increase competitiveness

Enterprises in India actively seeking startup collaboration for product/service differentiation

R&D efforts now moving from the PoC stage to PoD stage

ER&D: Investment in innovation through collaboration, platformisation, CoEs

Platformization and digital transformation

Signed a USD 20 million deal with ExxonMobil to enable rapid conversion of historical Geoscience content into digital by leveraging sophisticated automation utilities



L&T Technology Services



Shift from asset-based to As-a-Service models

TCS' Engineering Environment as a Service framework enables anytime-anywhere development and test environment to product engineering teams across the globe, through self-service portal



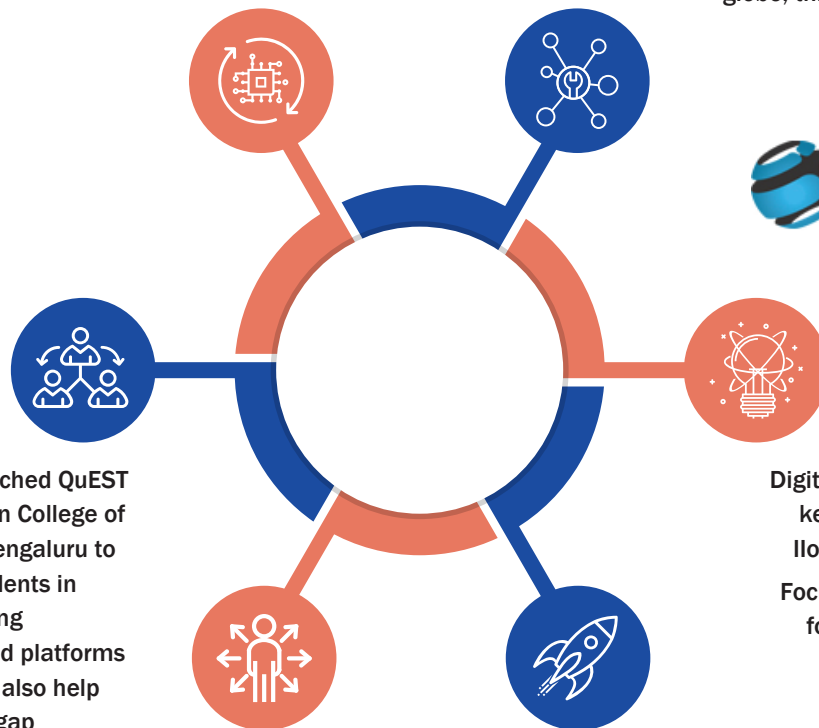
Increasing university collaborations for research and incubation initiatives

QuEST Global has launched QuEST IIoT CoE at New Horizon College of Engineering (NHCE), Bengaluru to provide training to students in cutting-edge engineering technology streams and platforms including IIoT. This will also help bridge the technology gap between academia and industry



Upping Innovation agenda through new age technology CoEs

Digital CoE in Pune to house key technology stack incl. IIoT, AR, AI/ML, PLM, MES
Focus on cutting-edge apps for shop floor digitization



Verticalisation focused on new opportunities

Set up a new 'Video Integration and Engineering' (VIE) BU to cater to heavy demand of video services in the 5G ecosystem



Startup engagement through accelerators, co-creation & vendor engagements on a rise

Partners with WebNMS for its IIoT platform and Cyient's proficiency in operations and network management in order to enable effective operations of multiple cell towers from a single point

Emerging industrial startups playing key role in developing innovative solutions

Customer Impact Stories



Intelligent robotics for supply chain automation



Pipeline integrity at high temperatures



Monetizing process sensor intelligence in Energy & Engineering industries



Disrupt underwater critical infrastructure inspections



Bring space within everyone's reach

In stealth mode with early adopters



Autonomous vehicles

Early private beta

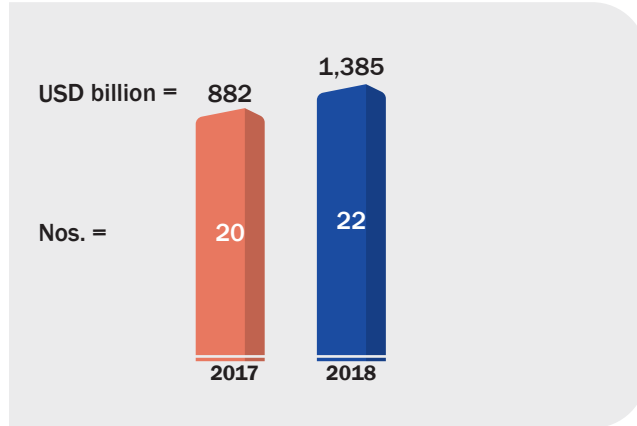


\$2 million rocket

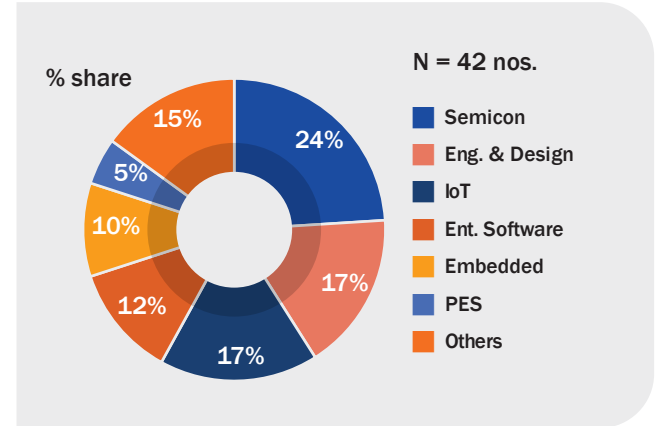
Early private beta

M&As: Key to capability development, access to design capabilities

2018 saw 22 M&As in ER&D segment



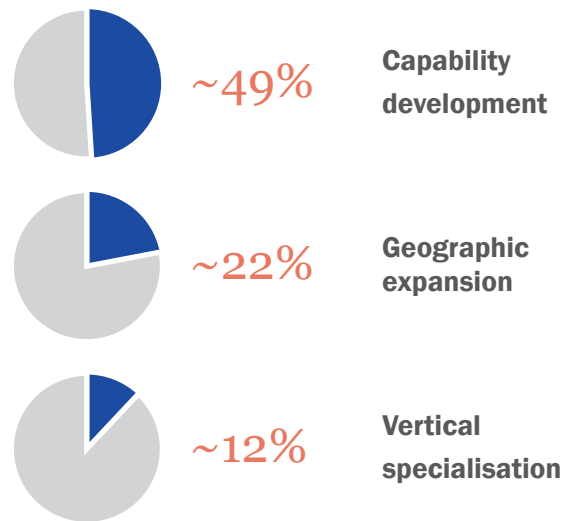
Sector-wise split: 2017 & 2018



Largest deals

\$ million	Acquirer	Acquired
720	PE Firms	GlobalLogic*
716	KPIT	birlasoft
343	TATA SONS	TATA POWER
283	ARROW	Infochips

Top three reasons for M&As



Key Trends

M&As saw a 10% y-o-y growth in 2018; 57% growth in valuation

Top three reasons for M&As: Capability development, geographic expansion, vertical specialisation

~38% of M&As were of non-tech companies taking over start-up: Carsense, CoveloT, Resson, Teleena, etc.

Per deal value up from USD 44 million in 2017 to USD 63 million in 2018

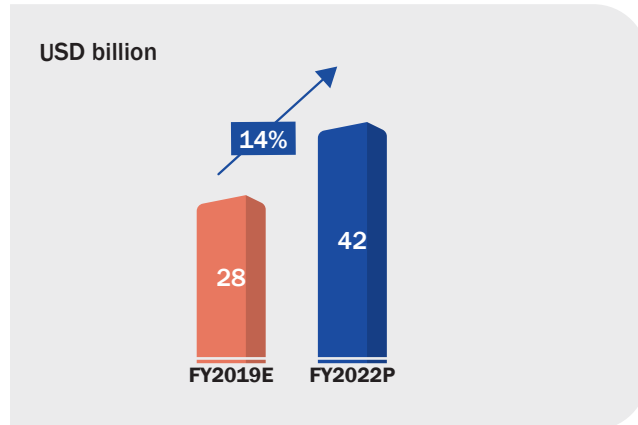
Building design capabilities emerged as one of the key drivers for M&A: Cyient-B&F Design, Quest Global-Engicom, Tech M-Inter-Informatics, UST Global-Sevitech Systems

* Cumulative value for which the deal amounts have been disclosed

Source: Venture Intelligence, NASSCOM

ER&D outlook: Market size to cross USD 40 billion by 2022

ER&D: 14+% CAGR expected by FY2022



Key Growth Drivers

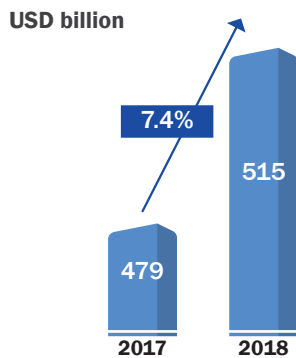
India's rising capability across Automotive and C&HE market is going to drive ER&D growth

Industry consolidation as firms seek to fill capability gaps and offer end-to-end propositions

Domestic market get boost from smart cities, IoT, defense; future demand from EVs, smart cities and semiconductors

Growth factors include Ind 4.0, 5G, EVs/ autonomous/connected vehicles, smart products/ services and automation

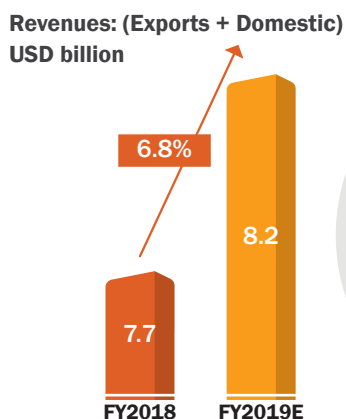
Software Products: At a Glance





 Global software spending continues to see a rise

- High demand for structure management data software
- Acquisitions in cloud computing and enterprise software businesses increased, Adobe to acquire Marketo, a marketing automation company
- SaaS to contribute USD 129 billion (7%) of the total software & services market by 2022
- Global cloud computing to grow at a CAGR of 16.5% to reach USD 345 billion by 2022
- Global Enterprise software market to grow at 8% till 2023 to reach USD 634 billion
- Americas lead the software spending followed by Asia Pacific and EMEA



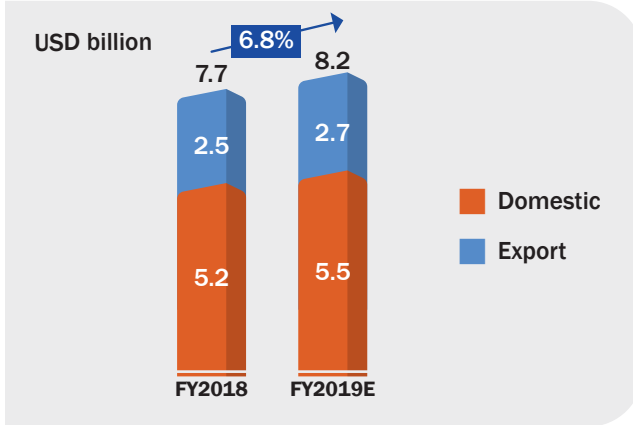


 Indian Software product market continues to maintain a good growth

- Focus on security, marketing product businesses for many firms, HCL acquisition of IBM product business is the biggest example
- More than 50% of the total software market spending is done on Applications followed by Application Design & Development and System Integration
- For the period till 2022, ERM, content workflow and management, collaborative applications and CRM will be the major drivers
- SaaS contribution in India market to reach USD 3.4 billion by 2022

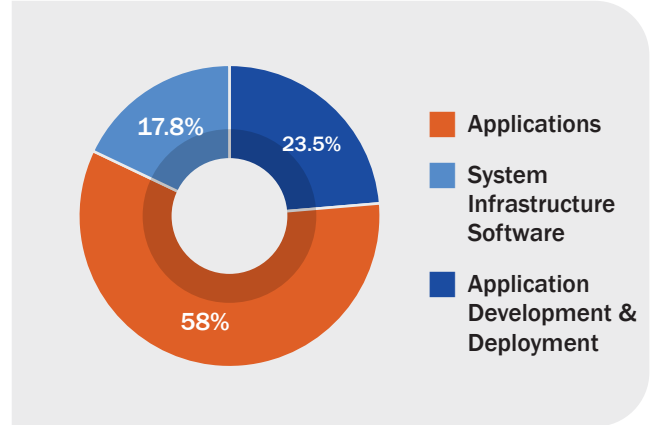
Indian Software Product Industry

Indian product market continues to grow and mature



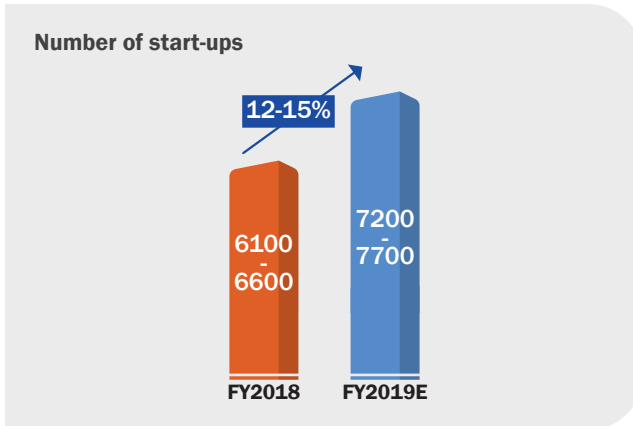
Indian software product market is maturing and continues to be the fastest growing within Asia Pacific region (excluding Japan)

Indian software market (1H 2018): Applications attracted lot of interest in the market



DevOps to be the important infrastructure related focus for large organizations

Indian product start-ups growing due to improving support structure



Adoption of advanced technology in B2B start-ups are driving growth in the Indian start-up ecosystem, Freshworks turned unicorn in 2018

Growth Segments



With focus towards business process efficiency, high growth market looks to be the emphasis

Indian Software Product Industry

Illustrative



Gartner Supply Chain Magic Quadrant



Gartner Magic Quadrant for Enterprise Asset Management Software



Hype Cycle for Retail Technologies (Algorithmic Merchandise Optimization)



Magic Quadrant for Content Services Platform



Named to Forbes 2018 Cloud 100



Collaboration Solution of the year Award (UK Cloud Awards)



Positioned in Chartis Credit Risk Solution Quadrant



Gartner Magic Quadrant for Industrial IoT Platform



Global Grain Award for Digital Commodity Management Platform

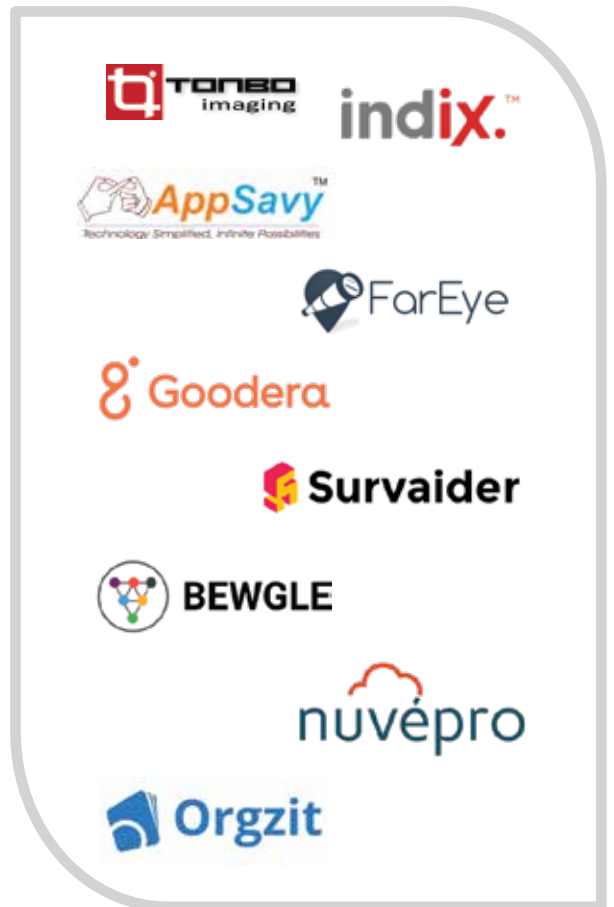
Diverse product landscape

Illustrative

Global Product MNCs



Indian Product MNCs

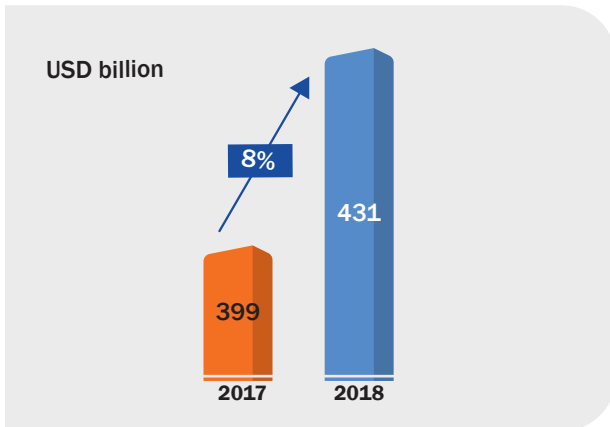


Indian Product Firms

Indian Product Start-ups

Enterprise software to see continued growth in India with double digit spending increase

Business Intelligence and Analytics leading to growth in global Enterprise software market



Business Highlights



Global enterprise software market to reach USD ~634 billion by 2023 with CAGR of 8%



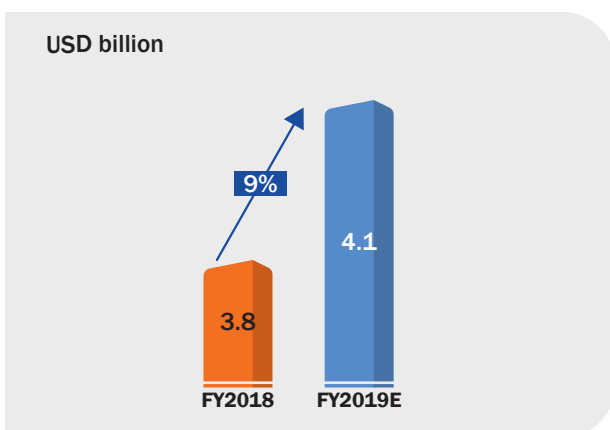
Microsoft's acquisition of GitHub for USD 7.5 billion, showcases the rising interest towards software development businesses

Key Trends

High demand in USA, China and growing popularity in India make North America, Asia Pacific an attractive market

Asia Pacific is anticipated to witness high growth due to increasing number of start-ups and presence of large number of small scale industries

Increasing Enterprise Applications lead to a rise in Indian enterprise software market



Business Highlights



With more than 1,100 start-ups, increasing digitization is driving growth in the Enterprise software market



India enterprise software spending to reach USD 2.5 billion in 2018 with an increase of almost 20% from 2017



Content management, open source, customer relationship management and business intelligence are the most interesting enterprise applications in India

Key Trends

SaaS market which is expected to triple by 2020 is giving a huge boost to Enterprise software market

Enterprise software increasingly used in analytics dashboards, analysis of customer behavior, providing insights on revenue

AI applications like automation frameworks for data integration, dashboards for visualization etc

Data analytics and development platforms most attractive verticals in the enterprise software market

Illustrative

Top Enterprise Software Sub Verticals (2018)



Data Analytics/AI/ML Platforms

Analysing user's history and providing recommendations, data extraction solutions, web scrapping and screen automation

AI and analytics platform for autonomous decision-making for retail and consumer businesses



Help enterprises by automating processes using enterprise data



AI based algorithm mine deep insights from visual and textual data



Offers RPA based process automation techniques



Sales/Marketing Solutions

Resource management, lead generation and feedback platform

iAlign enable collaborative sales planning through enterprise analytics platform



Workforce productivity technology platform for businesses



Provides Sales development representative automation Platform



Online SaaS platform to measure how your users feel about your Ads, Trailers, Products and User Experience



Development Platforms

Web application framework, APIs and application deployment

Provide ERP on cloud platform to improve business processes



Rapid application delivery platform for building customized apps



Provides platform to create mobile apps



Productivity Applications

Real time monitoring and performance tracking

Enables enterprises to adopt cognitive automation through seamless integration with Google



Deals in compliance management software for corporates



An intelligent voice interfaces that can deliver human like understanding of spoken queries



Automating processes, deriving insights, rapid and customized application development, technology platforms, tracking customer experience etc. have seen a good push in the enterprise software segment

Source: Company Websites, NASSCOM Tech Start-up Report 2018

Customer Relationship Management and Business Analytics expected to drive the market growth

Illustrative

Customer Relationship Management

~\$700 Million (2018)



Business Intelligence / Analytics

~\$304 Million (2018)



Customer Relationship Management



Massive availability of data and its analysis lead to a rise in CRM usage



Large organizations and SMEs to play a key role in driving demand



CRM software on mobile and increasing cloud based CRM solution saw high adoption



Rise of social CRM due to the increasing usage of social media and its impact



Increasing adoption of machine learning for managing data



High usage of analytical tools for data cleaning and structuring



Corporate performance management (CPM), Analytic applications, data science platforms, modern and traditional BI platforms are the major segments



Data management market to reach USD 950 mn in 2018 with a growth of over 13% YoY

Emerging Segments

Collaborative Applications

CAGR 47.8% (2017-22) ↑



Provide productive communication services for organizations



Also offers enterprise messaging applications



India's large number of SMB enterprise will drive this market



Security Software

CAGR 15.7% (2017-22) ↑



Rising government initiatives for digitizing sector segments and processes in the field of healthcare, BFSI, education etc.



Security operations, incident response network and data center security being the major focus area.



Enterprise Resource Management Applications

CAGR 25.3% (2017-22) ↑



Indian banking sector to adopt ERP in a big way



Many organization wants to deploy state of art information technology system



Indian majors looking at acquisitions, partnerships and developing enterprise specific analytics based products for business expansion

Illustrative

New Market Expansions



Launched Jile, an Agile DevOps product –on-cloud to plan, deliver and track Agile programs within the enterprise



Launched Digital Engagement Suite for banks to onboard, sell and service customers with customized experiences

Partnerships



Launched machine learning models on Amazon Web Service marketplace across variety of domains



Partnered with Tookitaki Decision Support System to help business take smarter decisions using Artificial Intelligence

Acquisitions



Instead of launching a new product HCL acquired 6 products of IBM (Appscan, BigFix, Unica, Commerce, Portal, Notes & Domino and Connections)



InMobi acquired Adtech firm to create mediation platform



PERSISTENT

Persistent Systems acquired hospital data management start-up Herald Technologies



Ebix acquired Mile software, leading provider of asset & wealth management software



Nutanix (leader in enterprise cloud computing) acquired Botmetic maker Minjar



Software AG acquired built.io for hybrid and cloud integration

HCL expanded its business portfolio by adding legacy products of IBM, whereas other big players partnered or developed new products in-house

...partnering with global firms and expanding to global locations

Illustrative



Cloud Data Protection Major

New facility in Pune with 1000 employees for handling growing international demand



Enterprise Cloud Software Specialist

Extended relationship with PHI which will be upgrading its commercial aviation business



Data Driven Mobile Marketing Company

Sold its commerce business to mobile marketing company Affle



Business Intelligence Solution Provider

Partnering with global airline Allegiant Air Partners and Bangkok Airways



Supply Side Software Platform Provider

Partnered with Indonesia publisher to create media marketplace



Global leader in customer engagement software

Expansion in Africa with investments in Kenya & Nigeria



Global Adtech Firm

Partnered with Microsoft to offer marketing solutions



Cloud-hosted help desk solution

Launching new data center in Mumbai for its cloud based customer engagement product



Customer Relationship Management tools provider

Expansion in Vietnam, Philippines and Turkey



Leader in Customer Support Software

Kayako acquired by private equity firm ESW Capital



Cloud Telephony Solution Provider

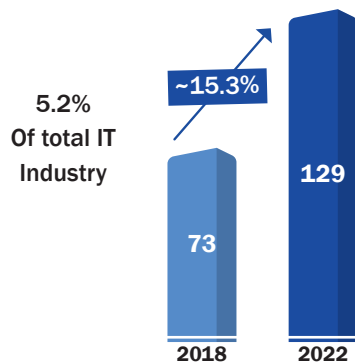
Acquires Sunoray solutions to increase customer base

Increasing Indian workforce and expanding business in new countries have been the target of software product firms

SaaS - A key segment of the software product business

SaaS demand enhanced by continuous development of world-class solutions

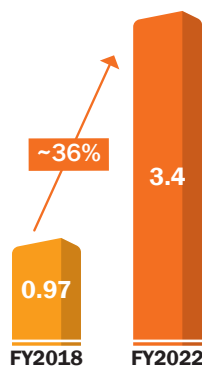
USD billion



- Increasing focus towards vertical SaaS companies, majority funding in last 2 years towards vertical SaaS
- Growing interest in new technologies like AI, Machine learning and IoT

India is one of the fastest growing SaaS market in the world

USD billion



- Shortage of legacy software making enterprises to move towards advanced software on cloud
- Increasing number of start-ups using SaaS solutions for business
- >50% of SaaS spending is majorly in IT-BPM, telecom & media, manufacturing and Government

Adoption across multiple sectors driving demand for SaaS

Illustrative

Banking, Financial Services & Insurance

SaaS Implementation Areas



Digital Solutions



Cyber Security



Customer Experience



Data Analytics

Use Cases



Highlights

Cloud based solutions are seen mainly in lead management, email services and human capital

Manufacturing

SaaS Implementation Areas



Capacity Planning & MRP



Quality Management



Job Tracking & BoM Tracking



Defect Reduction & Compliance Management

Use Cases



Highlights

Automation and adoption of digital technologies to improve operations ensuring lower costs, high throughput

Retail

SaaS Implementation Areas



Point of Sale Management



Digital Payments



Inventory Management



Distribution Management

Use Cases



Highlights

Centralization of inventory and inter-store fulfillments as a part of enhanced customer service

Digitization push, lending platforms, financial marketplace have seen a substantial rise in recent years driving usage of SaaS in BFSI. In manufacturing, reducing cycle time/lead time, improving product quality/traceability driving growth in SaaS adoption

Source: Economic Times, IDC, Transparency Market Research

SaaS Success Story

SaaS strengths



IT services behemoths
Strong Enterprise, GTM expertise



Scale in talent
Easy adaptability to new technologies



Frugal innovation
Business model & pricing for Indian customers



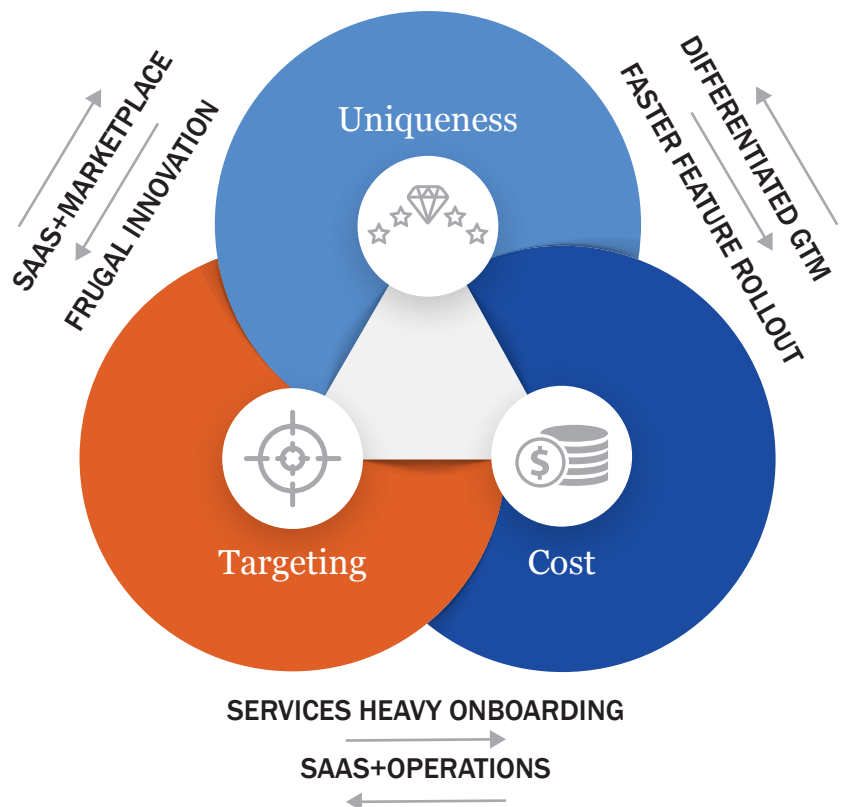
Lower cost base
Longer staying power, Faster feature development



Pioneers as role models
Lot of pioneers in SaaS companies that attained scale in revenues & valuation

Key market drivers

- Changing customer behavior
- Market accessibility and growth
- Availability of talent
- Cost advantages



Massive rise expected from small and medium businesses (SMB)



Chennai based SaaS firm raised over USD 500 million



SaaS based logistics management solutions have grown a lot in 2-3 years



Clocking close to USD 500 mn in revenue per year and 250,000 customers



Crossed USD 100 mn ARR with 100,000+ customers

SaaS market has developed strongly in recent years and its success is clearly visible by the exponential growth of start-ups like ZOH0, freshworks and funding raised by Chennai based SaaS firm etc.

Source: Company Websites, NASSCOM Report: Product Opportunities Driving 1 USD 10 Trillion Economy

With over USD 50 billion deals by major global firms indicating the interest towards SaaS based services globally, Indian firms following similar route

Illustrative

Global



Acquired Qualtrics, the pioneer in experience management software category for USD 8 billion



Acquired GitHub, leading software development platform for USD 7.5 billion



Acquired MuleSoft, leading platform provider for building application networks for USD 6.5 billion



Acquired Duo Security, a unified access security provider using cloud for USD 2.4 billion



Acquired SendGrid, leading email API platform for USD 2 billion to drive customer base



Acquired Vocado, that offers student centric, cloud based financial aid solution for higher education institutions



Focus on building innovative products: experience management, application network, open source platform key interest areas

India



Acquired iTeknika, SaaS based end to end recruitment and assessment management system



Nutanix (leader in enterprise cloud computing) acquired Botmetric maker Minjar



Acquired Kayako, SaaS based customer service software company



SaaS provider for ecommerce and supply chain logistics companies acquired Dipper Technologies, an internet-of-things (IoT) platform



Acquired Exaxe, SaaS provider of software solutions that helps life and pensions companies



Acquired Torqus, SaaS based restaurant management software platform

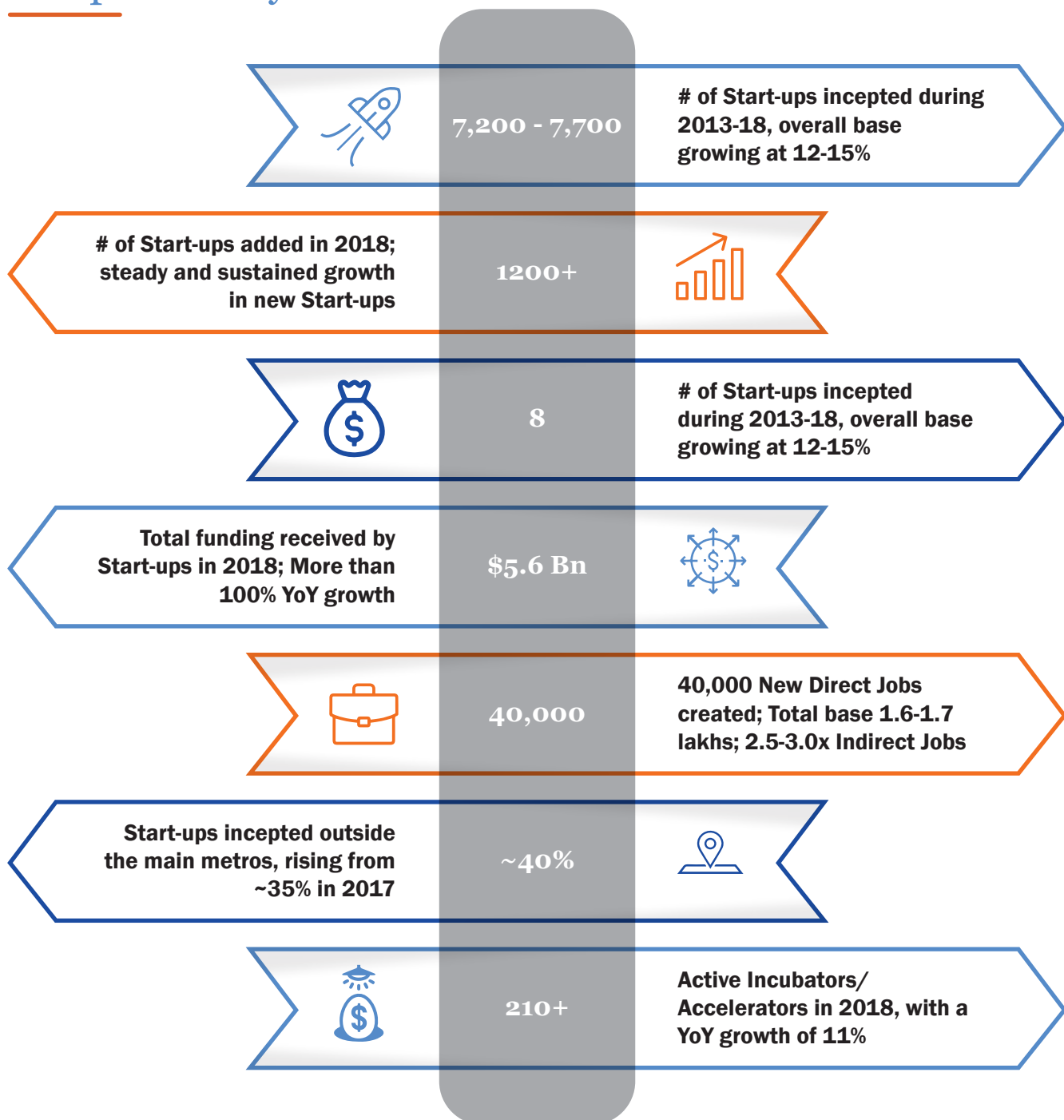


SaaS accounts for more than 10% of the total M&A deals in India with focus towards customer service businesses

Start-ups: At a Glance

STARTUP

Indian start-up 2018 ecosystem – Approaching escape velocity



Note: A unicorn refers to privately held tech start-up valued at \$1 Bn or more
Source: NASSCOM Tech Start-up Report 2018

Start-up ecosystem regained momentum after the slowdown in 2016 & 2017

Unicorns in 2018



India Business Highlights

India continues to be the 3rd largest Start-up ecosystem in the world

8 Unicorns added in 2018, the most in a single calendar year

50% Growth in Advanced Tech Start-ups

Bengaluru ranks among top 3 cities globally for launch of tech Start-ups²

5-7 years time required to turn a start-up into a unicorn in India



Funding Highlights (2018)

Total funding reached USD 5.6 bn

Funding in 2018 up by 108% from last year

More than 70% of the funding went to late stage

Top 5 deals garnered ~50% of the total funding

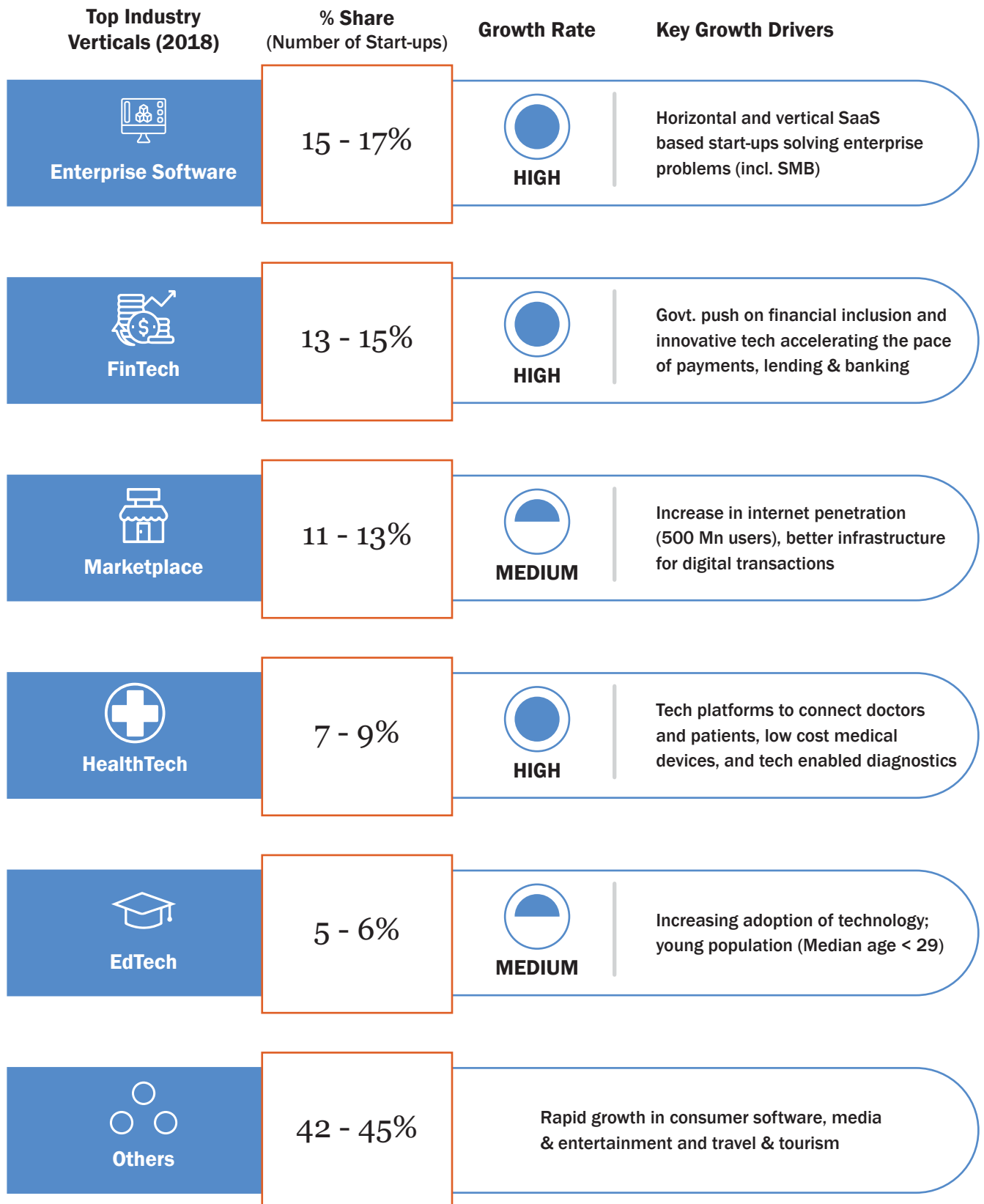
Late stage funding increased by more than 250%

Top 5 Deals in 2018



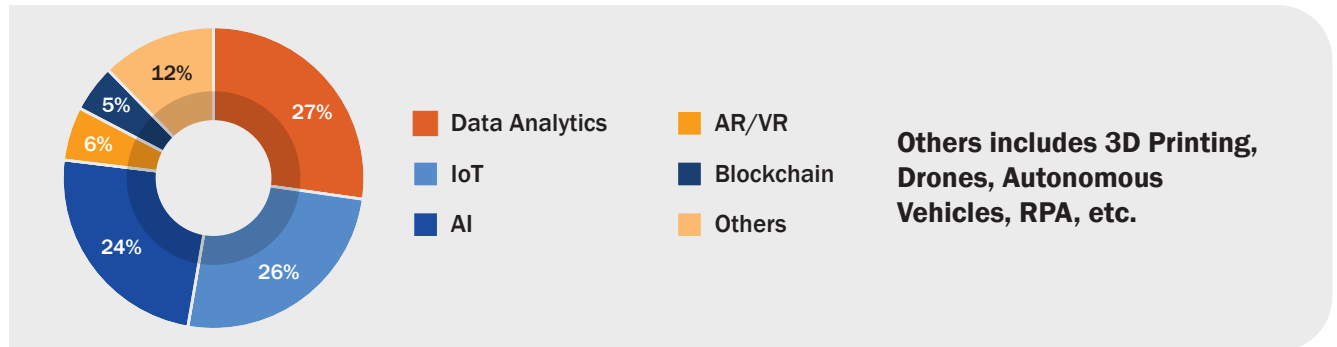
¹GII ranking published by Cornell University, INSEAD, World Intellectual Property Organisation;
²Based on the list of top global start-up ecosystems compiled by Small Business Prices
 Note: Unicorn Data is based on CB Insights Database
 Source: NASSCOM Tech Start-up Report 2018

Enterprise software, FinTech, Marketplace and HealthTech together comprise nearly 50% of total start-ups



Adoption of Advanced Tech increasing rapidly with 50% YoY growth

Advanced Tech Analysis (2013-2018)



Advanced Tech	5 year CAGR (Number of Start-ups)	Key Segments
Data Analytics	18 - 20%	Enterprise FinTech RetailTech
Internet of Things	15 - 17%	Industrial Home Automation HealthTech
Artificial Intelligence	54 - 58%	Enterprise FinTech HealthTech
AR/VR	26 - 28%	EdTech RetailTech Real Estate
Blockchain	>100%	FinTech Enterprise AgriTech

Data Analytics, Artificial Intelligence and IoT start-ups are witnessing fastest adoption across Industry verticals











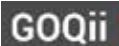
120% funding growth for AI Start-ups (Over USD 150 Mn invested in 2018)

India is rapidly developing into a global start-up hub

Illustrative

B2C Indian start-ups are expanding globally

B2C start-ups from India have started expanding to other markets

			
Travel & Hospitality	Transport	EdTech	Other Examples
			 
Malaysia, Indonesia, China, UK, Japan	Sri Lanka, Bangladesh, Australia, UK	US, UK, Australia	 

400+ B2B Start-ups expanded globally

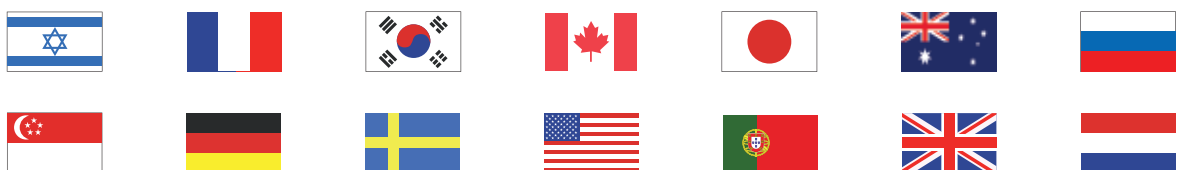
Build in India, built for the world

				
US	Singapore	Singapore	US	US
Funding: \$24 Mn	Funding: \$10 Mn	Funding: \$3 Mn	Funding: \$3 Mn	Funding: \$20 Mn

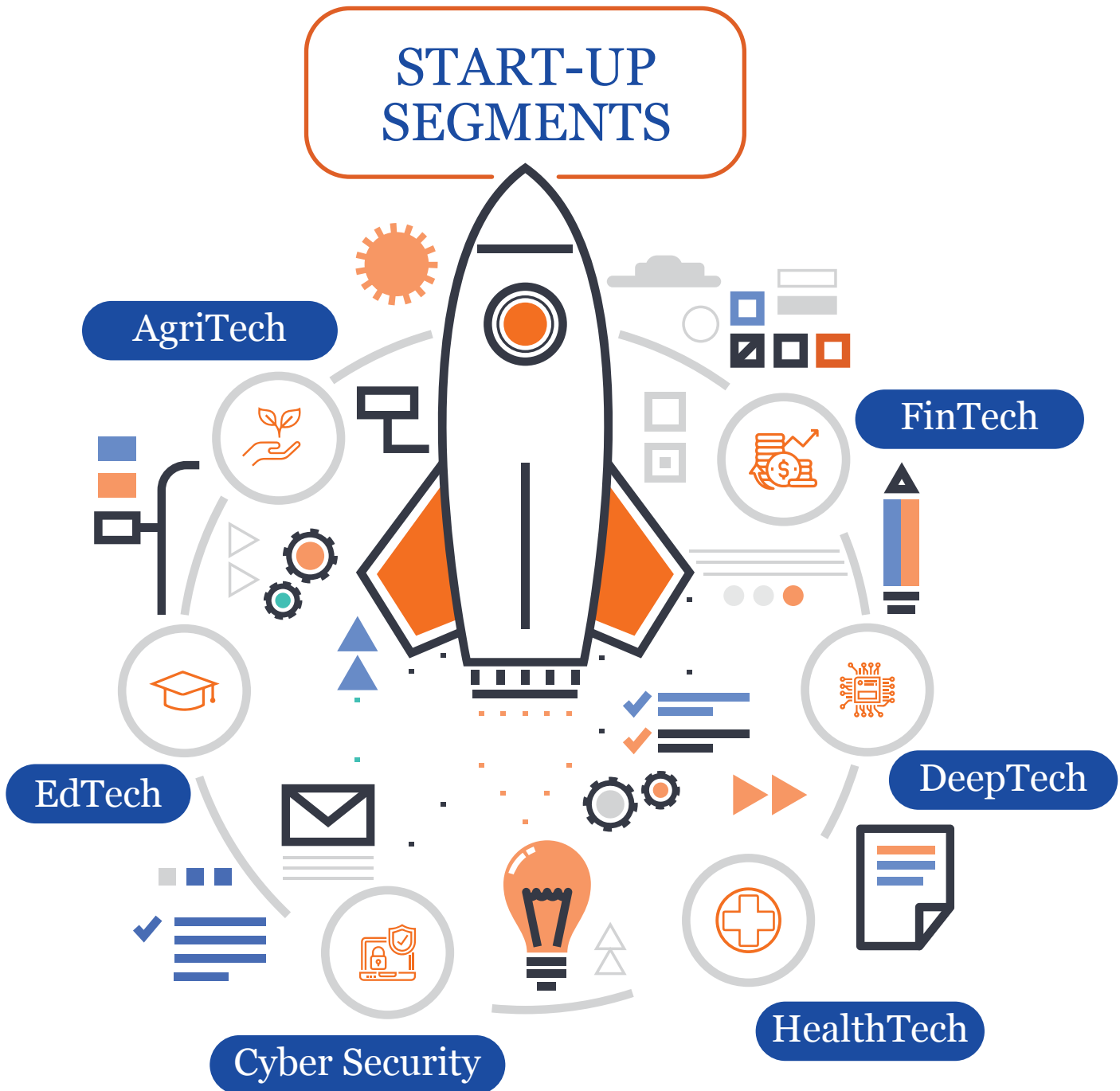
Global start-ups entering India for market and talent

				
US	Singapore	Indonesia	China	US

14 + International Start-up Exchange Missions



A Deep Dive into key Start-up Segments in India

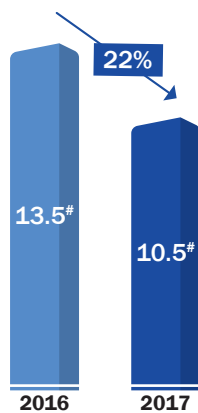


START-UP FinTech

Fintech Outlook

Larger funding rounds becoming more frequent globally

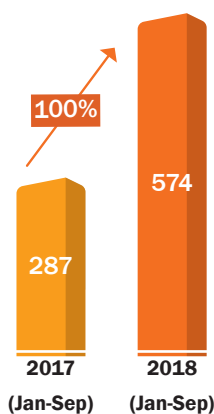
USD billion



- Intelligent automation could add USD 512 billion to the global revenues of financial services firms by 2020
- Natural Language Processing (NLP) and RPA are the majorly adopted technologies in Fintech sector
- Blockchain and Distributed Ledger Technology (DLT) are emerging and gaining lot of traction
- Large players acquiring companies with complementary capabilities
- Continued growth of niche solution providers and players serving local needs

Lending and Digital Payments are the key focus areas in India Fintech funding

USD million



FinTech Start-ups

900+

- Other than digital payments new Fintech applications like Robo Advisory, Bot enabled conversational banking, automation of underwriting and e-KYC are emerging as some leading use cases
- Alternative lending start-ups are using advanced tech like data analytics and AI to determine creditworthiness of potential borrowers
- According to NPCI, BHIM Unified Payment Interface (UPI) transaction rocketed to ₹ 1 trillion while volume of transaction reached 910 million

Series B+ Funding

Source: Capgemini Report 2018, Start-up Genome Report 2018, NASSCOM Tech Start-up Report 2018, Business Insider

FinTech India Major Segments

Illustrative



Lending

31%

Capital financing, SME lending, P2P lending, consumer and credit lending

CoinTribе
FAST EASY SECURE

upeelend
Fast loans. Smart Loans

mPokket

sme lending.com



Digital Payments

25%

Mobile wallet, POS terminals and online payment gateways for billings, bookings and recharge transactions

slonkit

Razorpay

affordplan

fonePaisa



Wealth Management

18%

Robo-advisory tools, platform for investment in small funds schemes

Tax2win

wealthy

fisdом

ORO WEALTH



Trading Platform

7%

Trading of mutual funds, unlisted and listed securities and stocks and thematic investments

WealthTrust

Expowealth

TRADING BELLS

CLEARFUNDS



Blockchain

7%

Finance apps, order tracking apps, smart contracts, ethereum, hyperledger etc



PIVOTCHAIN Solutions

LeewayHertz

SOMISH



KYC/ Regulations

5%

Data integration, transaction monitoring, identity management, financial scoring and credit rating solutions

Cetas

Aadhaar API

Scrabble Technologies

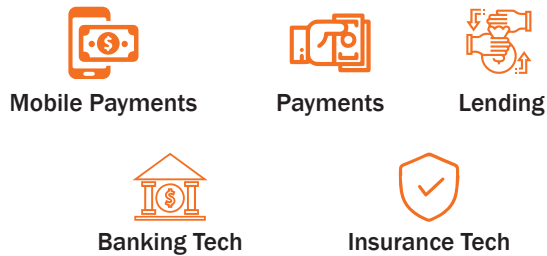
Credence Online

Source: Deloitte Outlook 2018

With transaction value to reach USD 73 billion by 2020, FinTech is set for high growth

Funding Highlights

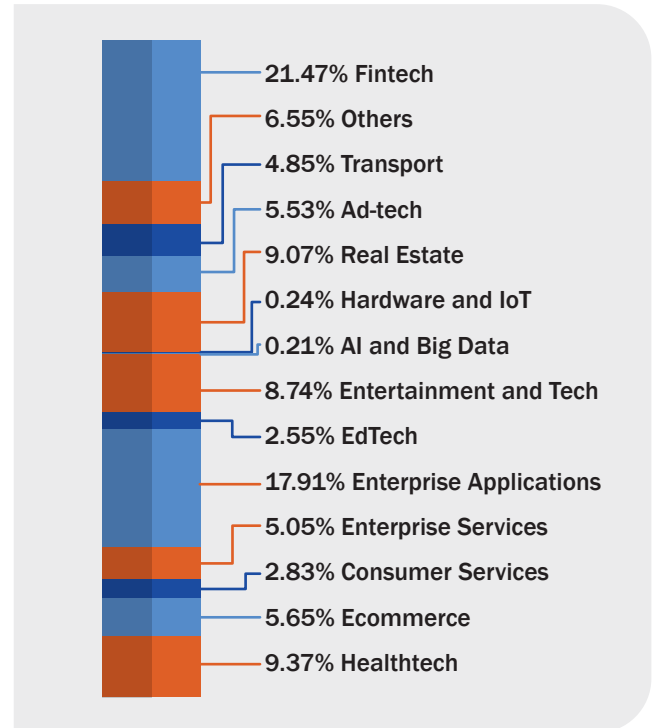
Popular Funding Areas



Top funded FinTech companies



Indian Tech Startup Funding Q1 2018



Growing end market making FinTech attractive

Blockchain



India blockchain technology market projected to grow at CAGR 58% till 2024



Need for the integration of blockchain technology for more secured transactions

Payments Banks



Mobile wallet industry expected to reach USD 183 million by 2019



Several banks launching their own digital wallets to leverage IMPS platforms

Robo-advisory



Expected to grow at a CAGR of 68% till 2022



Robo advisory firm Upwardly has built assets over ₹ 400 crores in just 2 years

Biometrics



Biometric market to grow at a CAGR of 31% till 2021

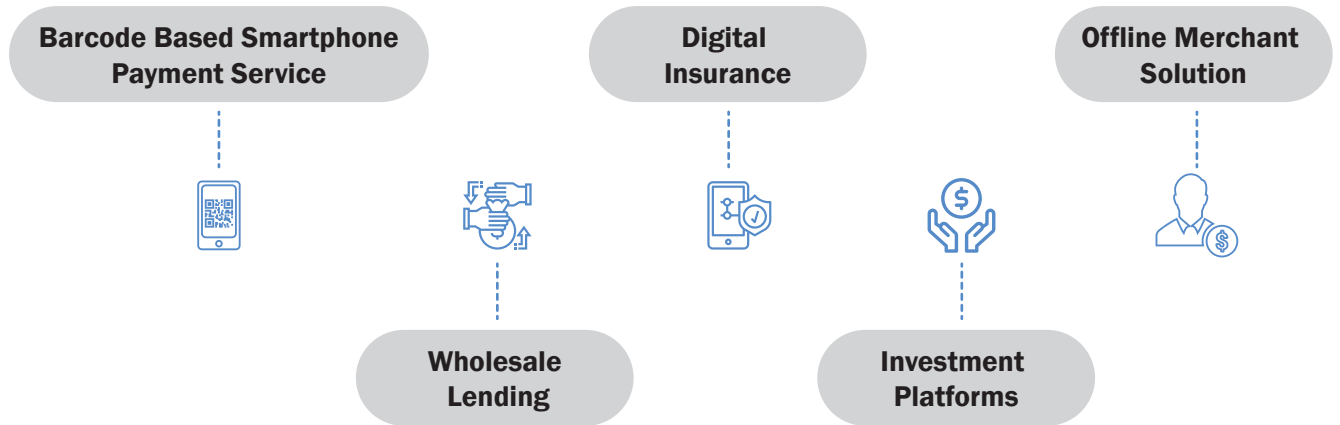


High adoption to be seen in healthcare, education and other sectors

Expansion is on the cards for many India Fintech firms

Illustrative

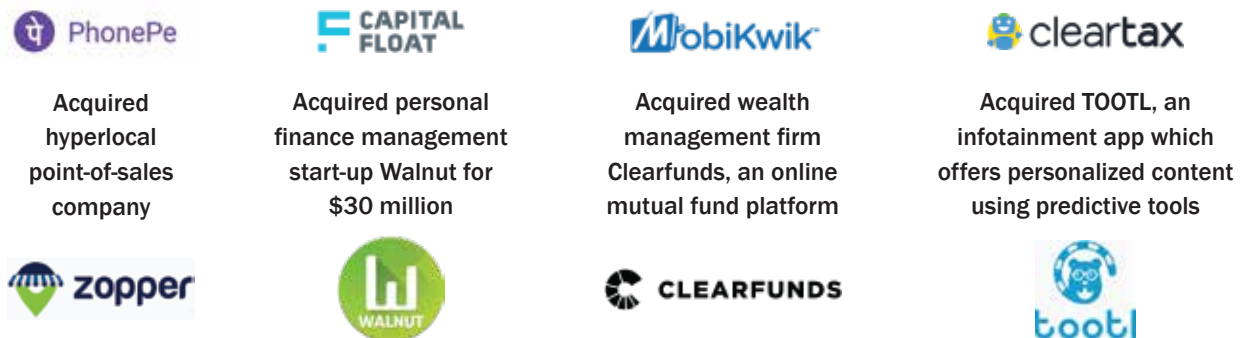
Focus Areas



Expansion Plans



Expansion through M&A



Data analytics and IoT start-ups continue to find growth across all sectors

Data Analytics

Key Trends



Data analytics continues to be the most widely adopted advanced tech among start-ups



Sector saw 5 years CAGR of 18-20%

Key Industries Affected



Enterprise



Fintech



Industrial



HealthTech



RetailTech

Applications

Enterprise Software

Analytics dashboards, analysis of customer behaviour, providing insights on revenue, etc.

FinTech

Suggest relevant products/services based on financial history of consumers

Industrial

Tracking assets, Predictive maintenance and optimising supply chain

RetailTech

Evaluate customer behaviour and provide personalised recommendations

Emerging / Mature Start-ups

Emerging Start-ups



Mature Start-ups



Increase in data generation and storage has led to penetration of AI across industries

Internet of Things

Key Trends



Enterprises are looking for IoT solutions to address gaps in internal capabilities, and create unified IT, R&D and digital organizations



Sector witnessed 5 years CAGR of 15-17%

Key Industries Affected



Industrial



Home Automation



HealthTech



Enterprise



Wearables

Applications

Industrial and Automotive Sector

Monitor and control the performance of machinery; they are using the data for predictive maintenance of machines

Home Automation

Connect and control devices and home appliances through smartphones

HealthTech

Analyse medical information remotely, manage personal health through wearables

Emerging / Mature Start-ups

Emerging Start-ups



Mature Start-ups



Artificial Intelligence

Key Trends



With most of the enterprises adopting digital strategy, the AI applications solving enterprise problems have a strong global market



Sector witnessed 5 years CAGR of 54-58%

Key Industries Affected



Enterprise



Fintech



Marketplace



HealthTech



EdTech

Applications

Enterprise Software

Automation frameworks for data integration, dashboards for visualisation

Marketplace

Personalised shopping experiences for online buyers

HRTech

For AI based talent search platforms

FinTech

Conversational platforms to offer credit solutions, credit assessment and handle financial queries

HealthTech

Patient engagement, task automation and disease diagnosis

Emerging / Mature Start-ups

Emerging Start-ups



Mature Start-ups



Note: Illustrative list of start-ups included

Source: NASSCOM Start-up Report 2018

Blockchain and AR/VR are steadily gaining momentum

Blockchain

Key Trends



75% of all Blockchain start-ups have emerged in the last 3 years



Telangana govt. launched a Blockchain tech. incubator, and Niti Aayog started using Blockchain to maintain land/health records

Key Industries Affected



Fintech



Enterprise



Security



HealthTech



AgriTech

Applications

FinTech

Real time data validation and storage

InsuranceTech

Real-time insurance data, claim management solutions etc.

AgriTech

Improving food supply chain, increase food safety and authenticate agri products

HealthTech

Tracking integrity of data collected from IoT devices

Case Studies

Funding round: Seed



PIVOTCHAIN SOLUTIONS
(2017)

Blockchain-based analytical solutions for risk modelling, price optimization, credit scorecards etc.

Augmented Reality/Virtual Reality

Key Trends



AR/VR adoption in start-ups has grown at 5 year CAGR of 26-28%

Key Industries Affected



EdTech



RetailTech



Real Estate



Media & Ent.



HealthTech

Applications

EdTech

AR based learning products (Books, Training Videos)

HealthTech

Medical training using superimposed 3D models

Real Estate and Travel

Virtual tours

Others

Visualisation of products such as furniture, home decor, automobiles, etc.

Case Studies

Funding round: Seed



(2016)

Platform for people to experience remote places and events virtually through AR/VR tools

Note: Illustrative list of start-ups included

Source: NASSCOM Start-up Report 2018

Drone applications are expected to increase while 3D Printing may take more time

Drone

Key Trends



India is the fastest growing market for Unmanned Aerial Vehicles (UAV)



Drone start-ups have grown at 5 years CAGR of ~35%

Key Industries Affected



Security



AgriTech



Real Estate



Military



Logistics

Applications

Data collection and analysis for archaeological surveying, GIS and mapping, Remote sensing etc.

Military ISR, Border patrolling and Surveillance

Aerial surveying for precision agriculture, disaster response, etc.

Consumer needs such as photography, cinematography, selfies etc.

Case Studies

Funding round: Seed

DRONA AVIATION
(2014)

Manufactures Nano drones for educational and industrial applications.

3D Printing

Key Trends



There are 80+ 3D printing start-ups in India



Industries like Automotive and HealthTech are adopting the technology fast

Key Industries Affected



Automotive



Manufacturing



Industrial



HealthTech

Applications

Manufacturing commercial products such as automotive prototypes, CNC machines, Laser marking machines etc.

Manufacturing consumer products such as mobile accessories, fashion products, sports products, jewellery, etc.

Developing prosthetics and medical models for surgical procedures

Case Studies

Funding round: Seed

SUPERCRAFT3D
(2014)

Customized medical implants & patient specific visualization solutions for surgical procedures

Note: Illustrative list of start-ups included

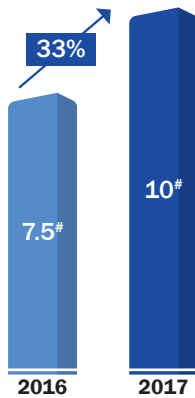
Source: NASSCOM Start-up Report 2018

START-UP

HealthTech

High rates of innovation makes Healthtech highly attractive space for investors

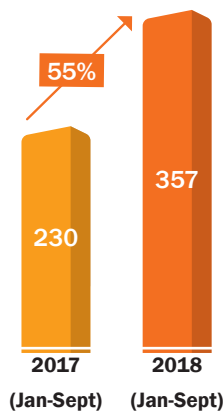
USD billion



- Due to falling infant mortality rate, life expectancy to reach 74.1 years by 2021
- In developed countries aging factor will drive the spending, like in Western Europe where 21% of the population will age over 65 by 2021
- Increase in M&A's due to decreasing margins and rising costs
- Current population of 7.6 billion expected to reach 9.8 billion in 2050

Investment in the entire healthcare value chain saw a strong growth

USD million



HealthTech Start-ups

550+

- Lack of adequate and high cost healthcare facilities are the major driver for HealthTech
- Complex treatment, diagnosis and tech based monitoring are solutions built by start-ups
- Medical practitioners proximity to patients increasing through these tech start-ups

Series B+ Funding

Source: Capgemini Report 2018, Start-up Genome Report 2018, NASSCOM Tech Start-up Report 2018, Business Insider

HealthTech Segments

Illustrative



Aggregator

22%

Online pharmacies, Aggregator platforms for doctors, clinics, etc.



Personal Health & Fitness Discovery

19%

Wearable solutions for fitness tracking and coaching, Health monitoring applications, sleep monitoring devices



Health Information Management

17%

Electronic Health Records solutions to organisations, storing patient records, SCM applications for healthcare organisation



Tech-enabled Diagnostics Services & Anomaly Detection

15%

Diagnose and analyse medical conditions through image detection



Tele-health/Remote Consultation

13%

Doctor-patient platforms; remote consultation with doctors



Medical Devices

9%

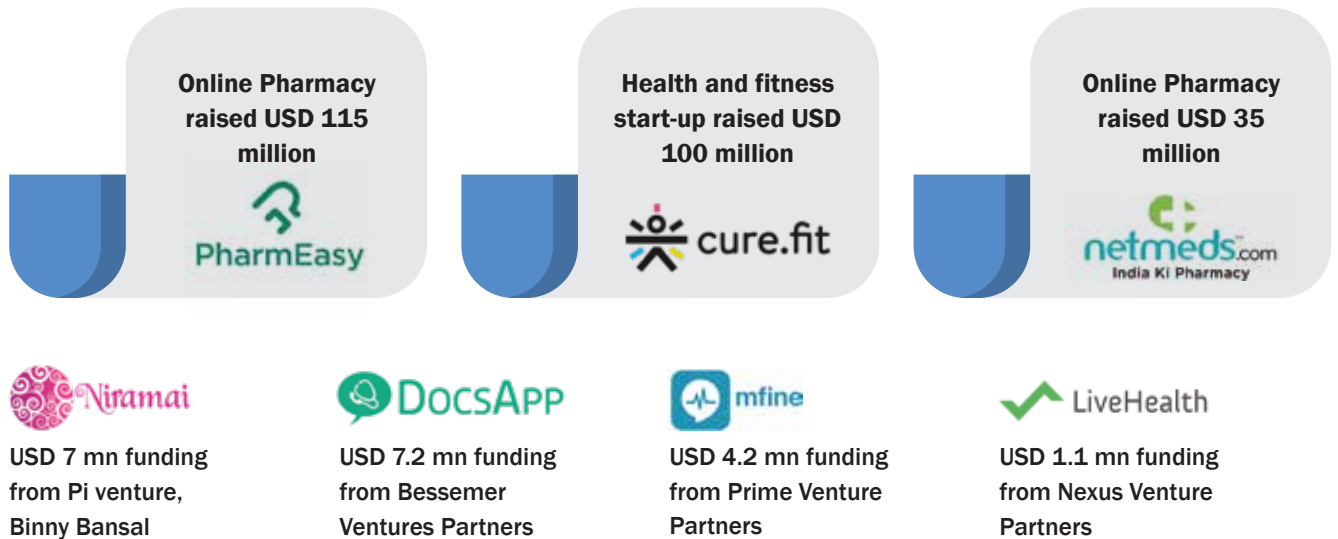
Low-cost, easy to use and portable devices for applications like diagnosis, screening and ECG monitoring



Funding / Growth Trend

Funding Highlights

Top Funded Start-ups of 2018



Prominent growing themes in the future

Home Healthcare



With the rise in NCDs, geriatric population and the lack of adequate hospital infrastructure, home healthcare is picking up in India



Start-ups like Portea and Care24 are changing this space with technology-enabled home healthcare services

Remote health and mobile health



DoctorInsta, a video-medicine consultation platform which allows round the clock medical consultation over video through smartphones & web

Patient doctor interaction



Mirai Health, a connected healthcare start-up is leveraging technology powered solutions to improve doctor and patient experiences

Expansion Models - Inorganic growth and entering in new areas of Artificial Intelligence, Medical IoT



Technology-assisted Diagnosis/ Surgery



Telehealth/ Telemedicine


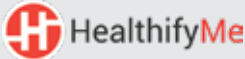











Consumer Centric Solutions

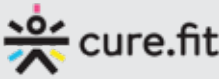





Health Information Management Solutions

Artificial Intelligence and Medical IoT

Offers IoT solutions for remote diagnosis	Offers IoT solutions for remote diagnosis	AI and IoT-enabled comprehensive lifestyle tracking platform	Offers portable ECG machines with easy data transfer to mobile phones
			
IoT-enabled remote diagnosis of eye problems	POC solutions for cardiac care using AI and IoT approaches	AI conversational mental health chatbot, also connects to health apps to extract data for better analysis	Pen to text electronic medical records solution
			
Using deep learning and cloud computation to help physicians with data-driven clinical insights to enable better care	End-to-end health-monitoring AI-enabled IoT platform	AI-based health content, consultation, networking platform	Deploys AI and big data to offer doctors and patients access to clinical data for better health management
			

Inorganic Growth

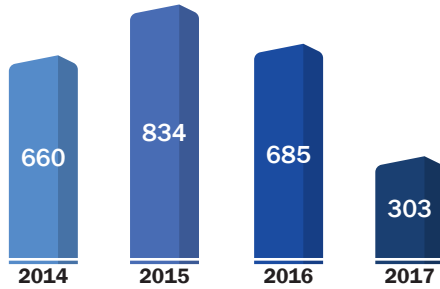
			
Acquired Seraniti, mental wellness service provider	Acquired healthtech start-up with B2B digital platform, Miljon Medi App	Acquired online video consultation app JustDoc	Acquired EClinic24/7, a telemedicine platform that connect its users with doctors for a Video consult

START-UP

Agritech

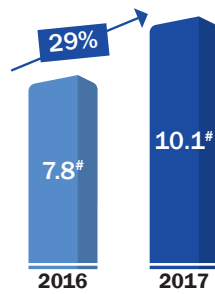
Global Agritech capital inflow saw a big growth

Global Agritech Start-ups



Global Agritech Funding

USD billion

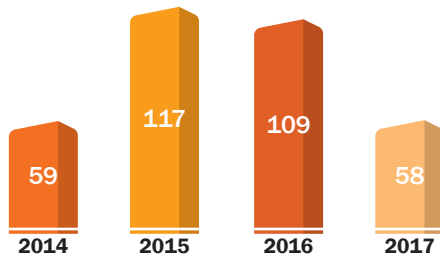


Global Key Trends

- Biotech is expected to improve crops performance and output
- Sensors based technology can gather lot more information than sensing moisture content, scanning crops etc.
- Agricultural robot market to grow approx. 10% over the next 5 years
- Increasing corporate activity in Agritech: Syngenta and Monsanto actively invested in agritech companies

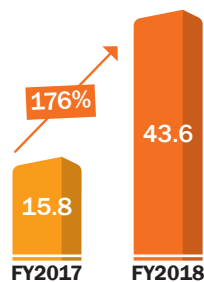
India Agritech start-ups funding have risen since 2015

India Agritech Start-ups



India Agritech Funding

USD million



India Key Trends

- With government's target to double farm income by 2020, Agritech sector is expected to get a major boost.
- Hydroponics and Aquaponics techniques are expected to be more visible
- Agritech start-ups are receiving funding across all stages with seed stage and early stage together accounting for more than 90% of total funding

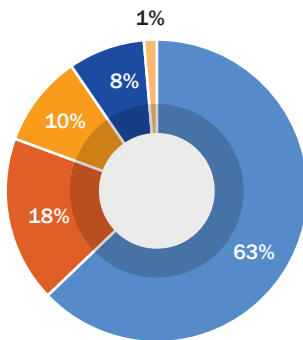
Series B+ Funding

Source: Business insider, Capgemini Report 2018

Agritech major segments

Start-ups by segment (2013-17)

Illustrative



- Supply Chain
- Farm & Data Analytics
- Infrastructure
- Information Platform
- Finance

aibono

DRONE

easy.krishi

PHYSIZ
E.P.O.W. SMART

AGNEXT

fresha.market

FutureFarms




















LeanAgri

Hydroponics Outlet

MutualFarm



New high-end solution focus areas

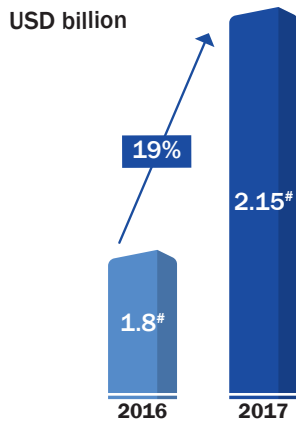
 Big Data Using farm data to determine opportunities and key areas	 Market Linkage Model Helping farmers to keep abreast with the market prices and scenario	 Farming as a Service Providing affordable technology solutions for efficient farming	 IOT Enabled Technology Using IOT devices for remote monitoring, tracking
   	   	  	   

START-UP

Edtech

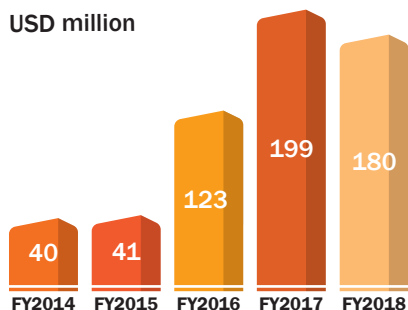


High rates of innovation makes Global Healthtech highly attractive space for investors



- Asian countries are the major drivers due to rise in middle class population which is expected to reach 3 billion
- Annual expenditure on education is projected to grow at 8% yearly and will reach USD 8 trillion
- Advanced country's school going population moving towards one device per student

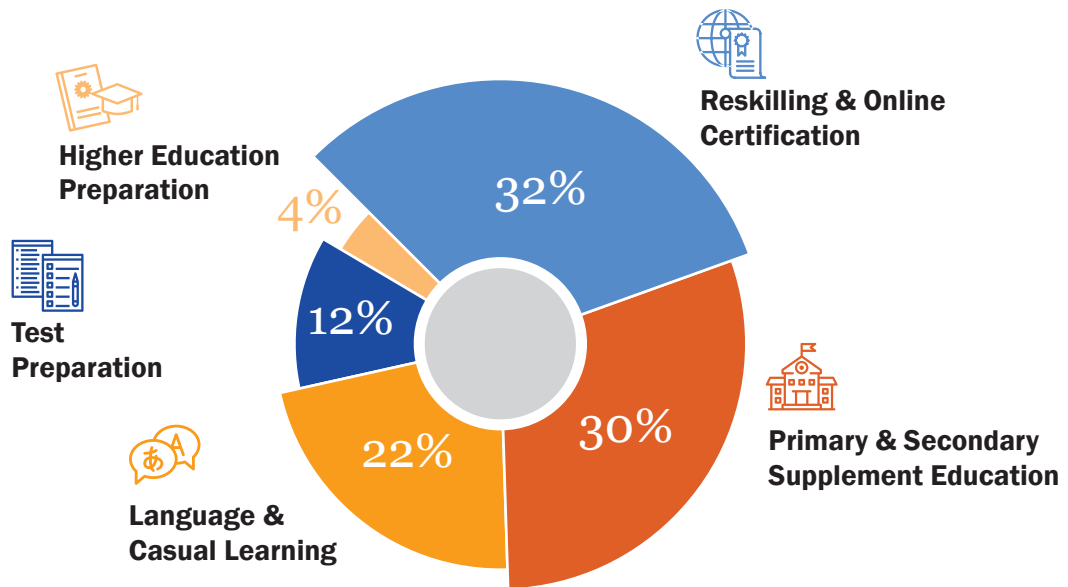
Sector continues to lure the investors showcasing the maturity of this segment



- Individual learning using Artificial Intelligence has seen a substantial rise
- Online assessment has seen a high adoption in recent years which is expected to reach USD 750 million by 2021
- Drop in new start-ups but the sector continues to lure investors showcasing the maturity of the segment

Edtech Major Segments / Funding

Online Learning is the biggest segment under EdTech



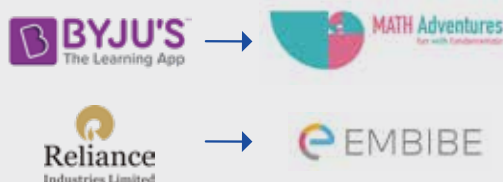
EdTech sector now attracting investors interest towards more established start-ups



Government has been active in promoting digital education by offering many platforms

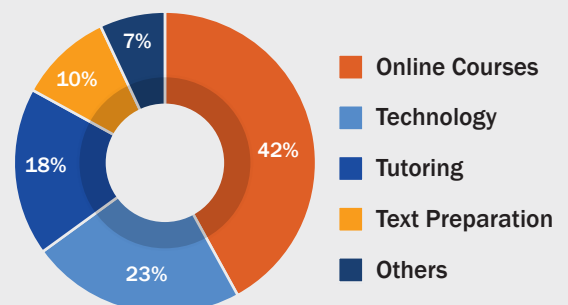


Acquisitions/acqui-hires for portfolio diversification and sector attractiveness



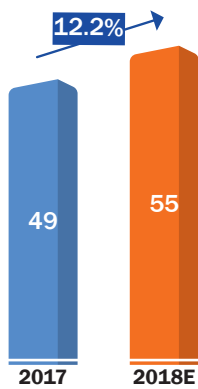
Personalized robots, AR/VR, cloud computing, big data, biometrics are expected to be the next big thing in EdTech

EdTech Funding Breakup (FY2018)



Network security is the largest product segment: Data security is the fastest growing

USD billion



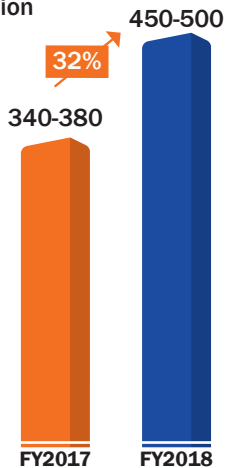
Cyber security Product Market Size



- Rising incidents of cyber attacks, rapid adoption of cloud computing and IoT
- Due to rise in internet penetration, Asia’s cyber security market is growing fastest
- Major tech players spent nearly USD 5 billion in cyber security related M&A transactions

Indian companies offering cyber security products generated a cumulative revenue of USD 450+ million in FY2018

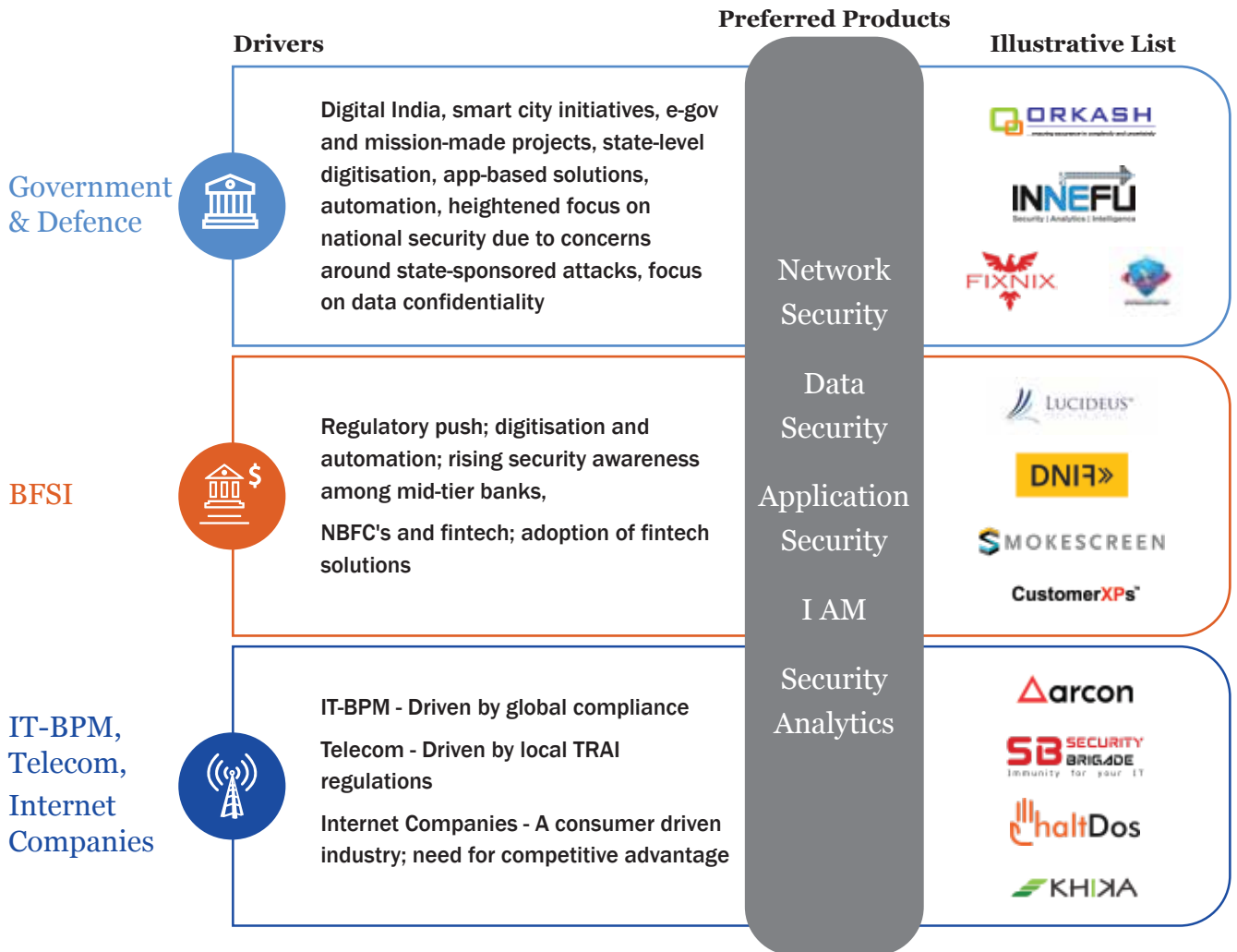
USD million



- 70% of cyber security companies incorporated in last decade
- Identify & access management, network security, threat intelligence & security analytics and data security are the major segments
- Indian start-ups offering cyber security products have seen revenue growth of ~120% from 2016-18

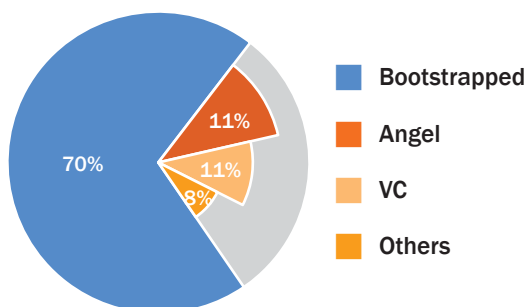
Key Verticals/Funding

Focus verticals of Indian Cyber Security Product companies



Indian Cyber Security Product sector is predominantly bootstrapped

Funding Status



Most founders have significant experience in cyber security or IT and mostly have integrated businesses, offering both products and services.



It is because of this mature founder base that the landscape is self-sustainable, despite being largely bootstrapped.

eCommerce - At A Glance

eCommerce
USD 2.8 trillion

mCommerce
USD 1.8 trillion

Other channels
USD 1 trillion



- Global eCommerce market witnessed strong growth in 2018, however, pulled down a bit due to slow growth of digital buyers
- eCommerce penetration (sales as a percentage of total retail sales) continued to expand to reach 11.9%
- Mobile with over 60% share continued to be the dominant purchase channel
- Led by China, Japan, South Korea and India, Asia-Pacific remains one of the largest and fastest growing eCommerce markets in the world

eCommerce
USD 43 billion

eTailing
USD 21 billion

eTravel
USD 19 billion

others
USD 3 billion

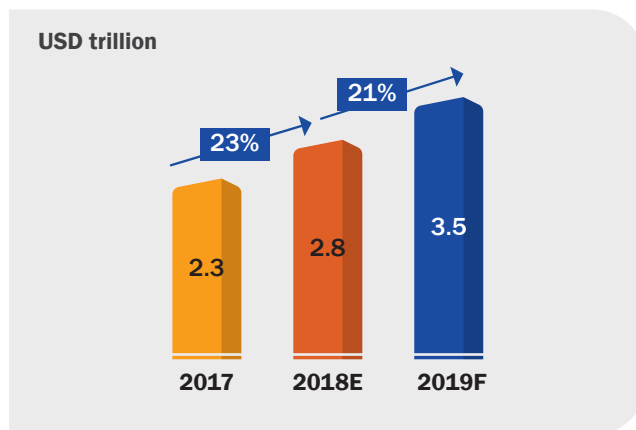


- eTail surpassed eTravel to become the largest eCommerce segment
- Online grocery and pharmacy emerged as new focus areas due to large ticket size and high repeat purchase
- eCommerce players continued acquisitions and investments in technologies such as IoT, analytics, data science, AI, ML, etc.
- Government's push for a cashless society, improved infrastructure and adoption of digital instruments resulted in strong growth of digital payments
- B2B eCommerce gained traction due to growth in funding from global investors

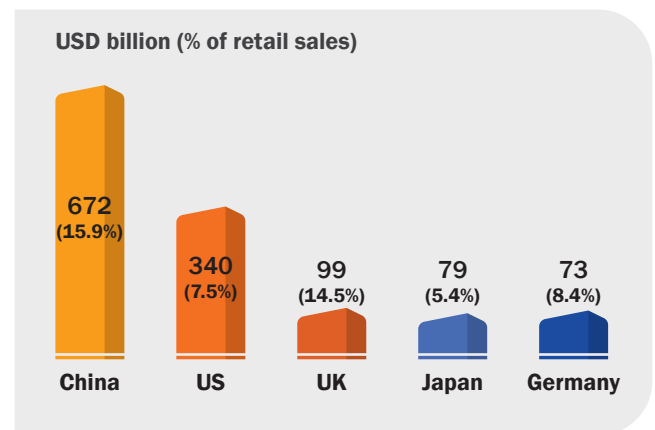
The global eCommerce market grew an estimated 23% to reach USD 2.8 trillion in 2018

Global eCommerce Market Snapshot

Retail eCommerce Market



Leading Markets in 2017



Global retail eCommerce sales continued to grow in 2018, albeit at a relatively slower growth rate as compared to previous years. Going forward, the growth would remain positive, however, expected to slowdown a bit due to slow growth of digital buyers worldwide. The market is projected to reach USD 4.9 trillion in 2021, growing at 19.7% CAGR during 2018–2021.

In 2018, eCommerce sales as a percentage of total retail sales exhibited an upward trend to reach 11.9%. Going forward, eCommerce share in retail sales is expected to increase further to reach 13.7% in 2019. According to Euromonitor, by 2021, eCommerce would become one of the largest retail channels in the world.

Mobile or mCommerce has been a key contributor for this growth as consumers are spending increased time on their phones and to meet these expectations retailers continue to invest in mobile platforms. mCommerce accounted for about USD 1.8 trillion sales in 2018, and is expected to grow 28.6% in 2019 to reach USD 2.3 trillion.

Asia-Pacific is one of the largest and fastest growing eCommerce markets in the world, led mainly by China, Japan, South Korea and India. Apparel and electronic products witnessed higher growth in 2018, as compared to other categories such as health and beauty, which consumers still prefer to purchase in-store.

Key Takeaways

Global retail eCommerce was valued at USD 2.8 trillion in 2018; expected to grow at 19.7% CAGR through 2021

Mobile is playing a key role in the growth of eCommerce; mCommerce expected to reach USD 2.3 trillion in 2019

eCommerce is expected to become one of the largest retail channels by 2021

Technology themes that became significant in 2018

Illustrative



Social Shopping

Increasing number of customers are leveraging social media platforms such as Facebook, Pinterest and Instagram for online shopping. In India, Facebook, WhatsApp and Facebook Messenger are used most by merchants than anywhere across Asia (excluding China)



According to a survey conducted by PayPal, social media platforms account for 79% of eCommerce in India



Voice Commerce

Voice emerged as one of the leading innovations in eCommerce (restricted not only to mobile) due to increased popularity of Google Home and Amazon Echo. Use of these devices to complete purchases has also grown. It is estimated that in 2018 about 30% online buyers used voice technology to make a purchase



Acquired Liv.AI, an AI-driven speech recognition start-up to fuel consumer's buying propensity



AI and ML assisted eCommerce

AI and ML became essential tools for eCommerce players to differentiate themselves in the marketplace. The tools are being used primarily in the areas of product recommendation, customer loyalty and retention, gain operational efficiency, etc.



Amazon India, Flipkart and Paytm Mall are expected to have spent about USD 2.5 billion on AI and ML in 2018



AR VR

AR and VR are providing customers with new ways to experience products outside of a physical store



An eyewear eCommerce platform leverages immersive technologies and enables users to try out frames in 3D



Advent of Vernacular Tech

eCommerce companies have started focusing on vernacular technologies as more and more Indians from Tier 2 and 3 cities have started shopping online via smartphones



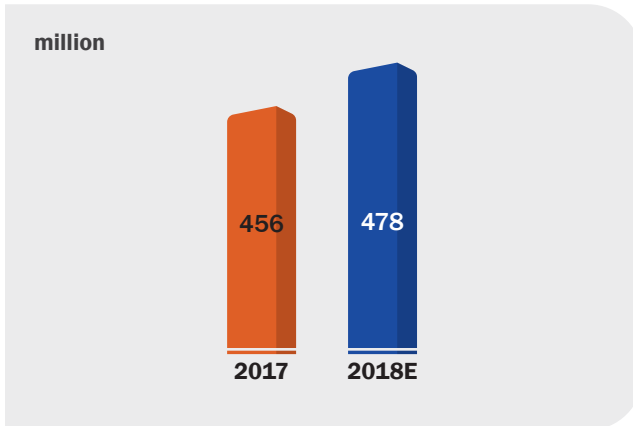
Amazon launched its Hindi mobile app and website to tap Hindi speaking customers from small towns and villages

Increasing mobile and internet penetration, perfect ground for the growth of internet and eCommerce services

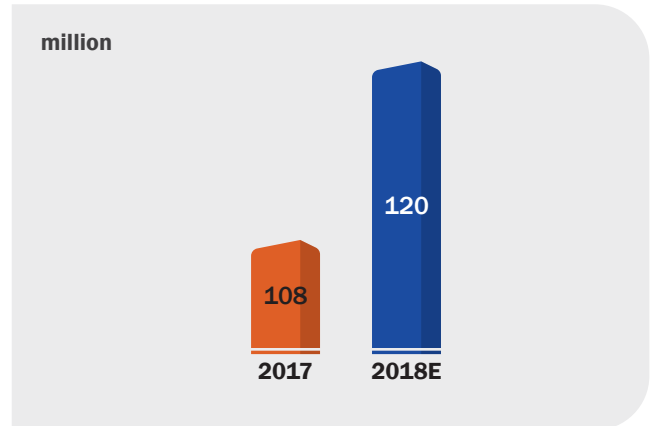
According to Google, India is adding **~10 million active internet users** per month, higher than anywhere else in the world

9 out of 10 new internet users are exploring the online content only in their **native language**

Mobile Internet Users in India



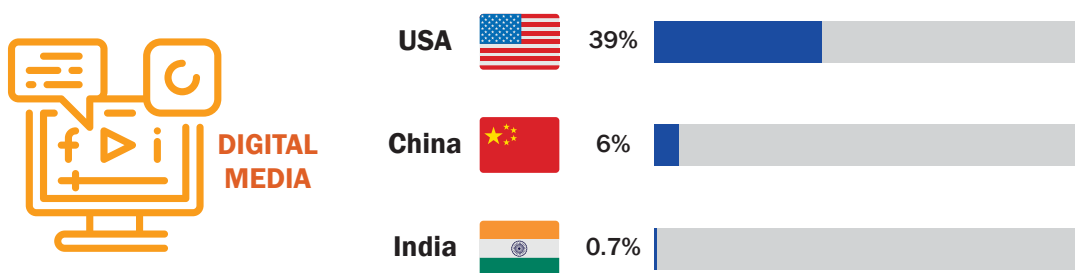
Online Shoppers in India



With 59% mobile penetration, urban India is expected to witness a slowdown, while rural India, with 18% mobile internet penetration, would emerge as the next area of growth. Online communication remains the largest use case in urban areas, whereas entertainment is the biggest use case in rural areas.

Adoption of online transactions lags in India as compared to the US and China, especially paid digital media which is still in nascent stage as users are happy with free content.

Adoption of Online Transactions Among Internet Users (%)



With rising internet penetration, greater digital maturity of users and growth in supporting infrastructure, adoption of digital transactions is expected to increase at a brisk pace to reach USD 100 billion by 2020.

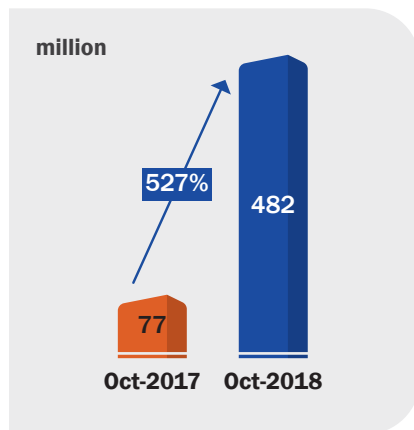
Digital payments on the rise

Digital payments witnessed strong growth in 2018, as consumers moved away from cash and card transactions. While medium to large-value transactions continue to be made through digital banking channels, the low-value day-to-day transactions are carried out through mobile wallets.

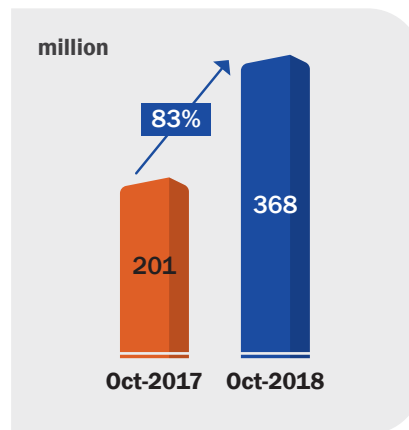
The growth is driven by government's push for a cashless society, improved telecom and payment infrastructure, an increase in adoption of digital instruments by merchants and proliferation of UPI.

Going forward, digital payments are expected to demonstrate even stronger growth due to RBI's guidelines which allows interoperability of prepaid instruments including e-wallets, meal and gift vouchers, etc.

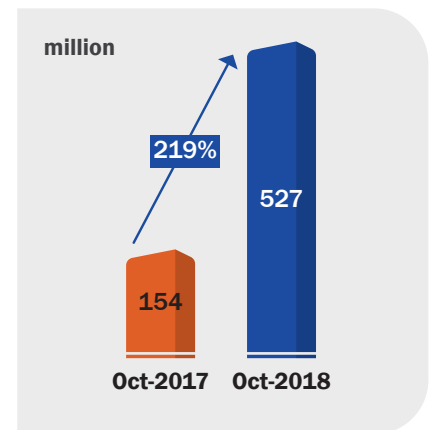
UPI Transaction



Mobile Wallet Transactions



Mobile Banking Transactions



Illustrative

	Paytm	G Pay	MobiKwik	PhonePe
User base	350 million (total active users)	25 million (monthly active users)	107 million (total active users)	118 million (total users)
Model of payment	UPI, Wallet, Payments bank	UPI	Wallet, UPI	Wallet, UPI
What all you can do with it	UPI payments, mobile, DTH, flight, train, movie ticket	UPI payments, DTH, flight, movie ticket, food	UPI payments, wallet, mobile, DTH, electricity, gas, insurance	UPI payments, wallet, mobile, electricity, water, insurance
Number of offline merchants	9.5 million	1.2 million	143,332	300,000
Transaction	Over 1.5 billion transaction in a quarter	860 million transactions in 2017-18	\$3 billion gross transaction value in FY 2017-18	\$110 million transaction value in August

Sources: National Payments Corporation of India, RBI, Secondary sources

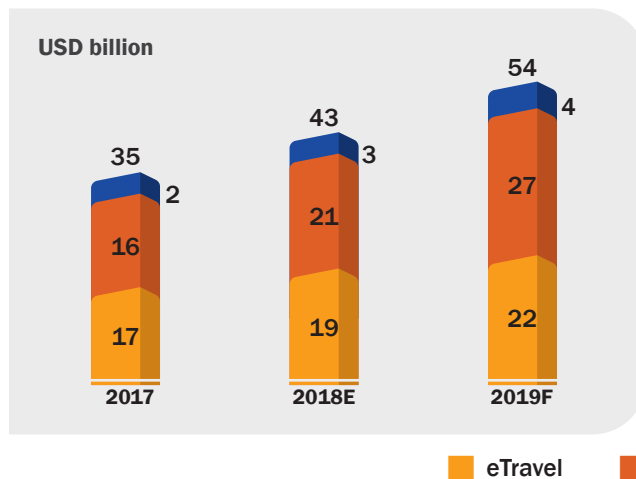
Expanding eCommerce market in India

India's eCommerce market is well positioned to reach USD 43 billion in 2018. Further, it is forecasted to reach USD 54 billion in 2019. eTail witnessed stronger growth in 2018 to surpass eTravel segment, a trend which would continue going forward.

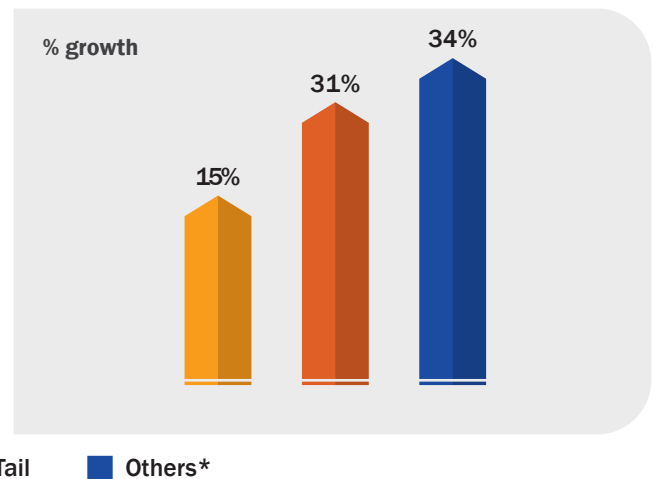
A major push to the eCommerce industry came from new offering such as online grocery, apparel and online pharmacy which witnessed increased focus from both demand and supply side of the value chain and more digital buyers coming onboard from Tier 2 towns and beyond. The growth was also fueled by rising internet and smartphone penetration, improved technology and logistics infrastructure.

Indian eCommerce Landscape

Indian eCommerce Market by GMV



eCommerce Growth by Segment 2018



Key Drivers

<p>Increasing smartphone penetration, rising internet penetration and decline in data costs</p>	<p>Flow of credit to consumers, sellers and micro enterprises</p>	<p>Growing online population comfortable making online transactions</p>
<p>Evolution of robust payment solutions and consumers' enhanced trust using them</p>	<p>Improved logistics infrastructure with a focus on last-mile delivery</p>	<p>Increasing number of online shoppers from Tier 2 cities and beyond</p>

Key Takeaways

<p>India's eCommerce market registered an estimated growth of ~24% in 2018 to reach USD 43 billion. Further, it is expected USD 54 million in 2019</p>	<p>Apart from infrastructure and technology improvements, the growth was driven by strong performance of online grocery, apparels, ePharmacy and increasing demand from Tier 2 cities and beyond</p>
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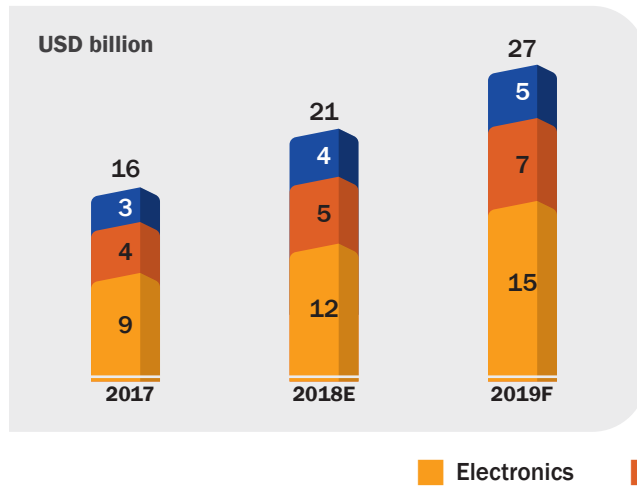
Note: *Others includes financial services, consumer services and digital content

Sources: Propelling India towards global leadership in e-Commerce September 2018; NASSCOM Analysis, Secondary sources

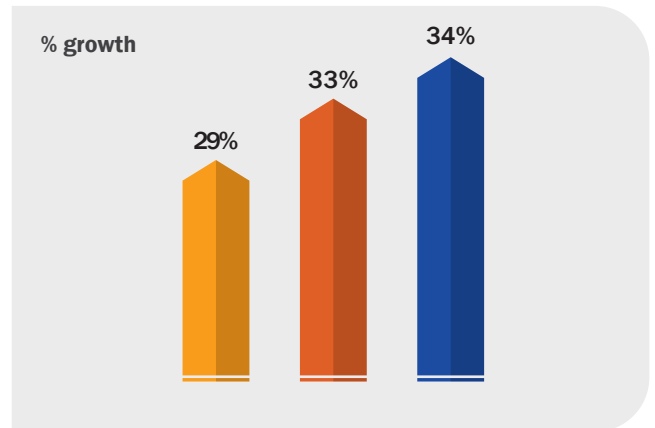
As data consumption explodes, eTail expands into newer segments

Indian eTail Landscape

Indian eTail Market



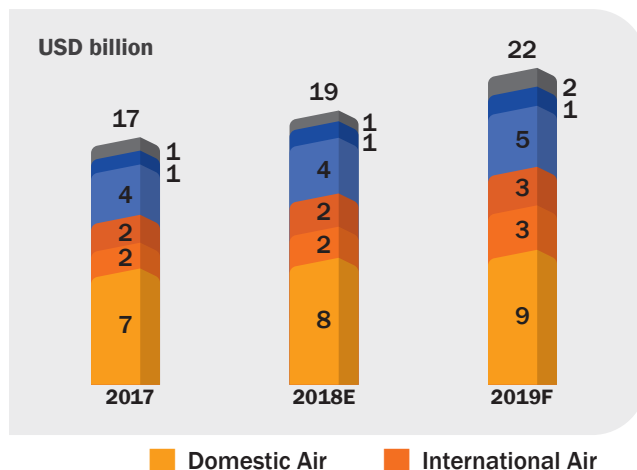
eTail Growth by Segment 2018



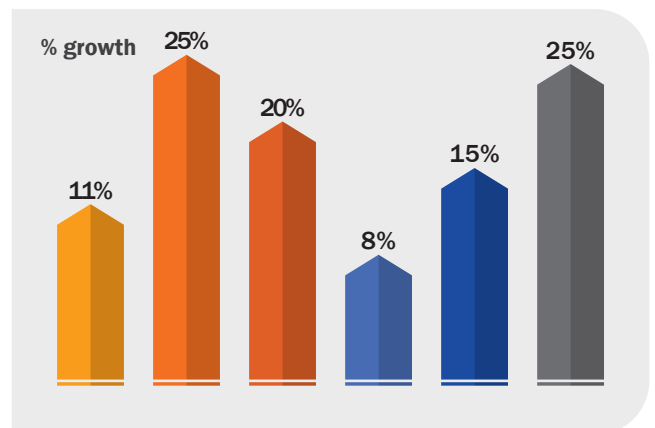
India's eTail market is expected to reach USD 21 billion in 2018, led by electronics and fashion segment. The market is forecasted to reach USD 27 billion in 2019, driven primarily by increased smartphone and internet penetration and low data prices, increasing demand from Tier 2 cities and beyond and proliferation of eWallets and easy payment options.

Indian eTravel Landscape

Indian eTravel Market



eTravel Growth by Segment 2018



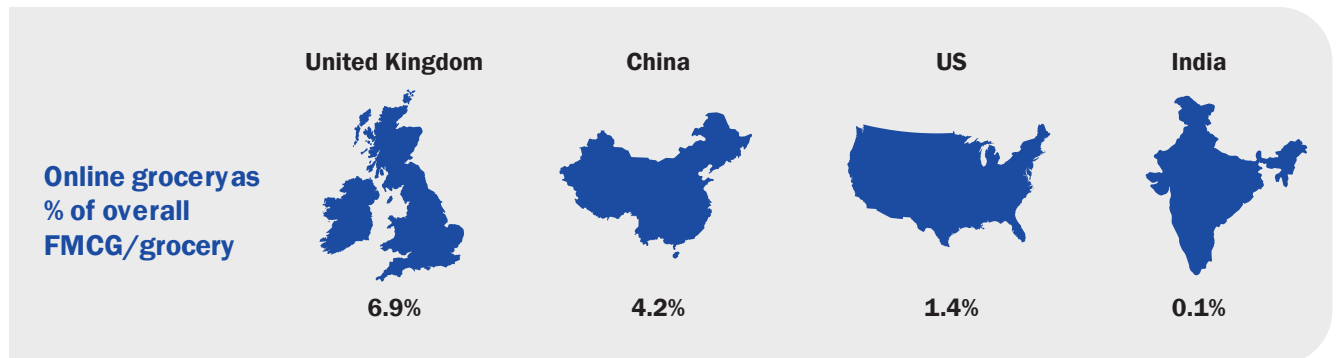
India's eTravel market is expected to reach USD 19 billion in 2018. Further, it is forecasted to reach USD 22 billion in 2019 due to increasing online domestic air travel, growth of online booking of international travel and hotels, and maturing online cab and bus bookings, expected to gain traction in Tier 2 cities.

Niche Segments witnessing high growth

Online Grocery – The Next Battleground



Grocery is the largest consumer segment in India, accounting for about 60% of the country's total retail market. Despite low online penetration as compared to other countries, online grocery has emerged as a must-capture area for eCommerce players mainly due to large ticket size, stickiness and high repeat purchase rate of essentials.



On an average ~80% online orders are for about USD 20

Illustrative



2018 witnessed significant push into online grocery business by already established players BigBasket, Grofers and relatively new entrants/eCommerce giants such as Amazon and Flipkart. Going forward, the market is expected to be driven by technological advancements, push for private labels, same/next day delivery, and B2B food services.



Amazon re-branded its online groceries service to Prime Now. It also expanded its service to include more delivery slots for customers



Flipkart forayed into online grocery segment with the launch of 'Supermart'. The company plans to invest USD 264 million over next three years in the business



Grofers forayed into the FMCG segment with the launch of seven new brands under two categories - Budget and Popular G-Brands. With this, Grofers' private labels expanded to 250 food and non-food products



Despite presence of players such as BigBasket and Grofers, online grocery startups in Tier 2 cities thrive. Some of the startups that have mushroomed beyond Tier 1 cities include Flipfresh (Hubballi), ShopitDaily (Indore), PinkCityKirana (Jaipur), GharBaitheBazar (Lucknow) and Kada (Thiruvananthapuram).



Sources: Secondary sources

Data and technology driving growth of new online sectors

ePharma Gaining Traction



Online medicine delivery represents a significant opportunity for eCommerce players. The market is expected to reach USD 1.2 billion by 2020, driven primarily by increased investments, ability to track and trace, abuse prevention and no sale of drugs without prescription.



However, there has been a lot of uncertainty after the Delhi High Court's order that bans online sales of medicines across the country.

YTD funding ~USD 180 million

ePharma penetration stands at about ~1%, with an average frequency of one purchase a month

Leading ePharma companies handle ~25,000-30,000 orders/day



The industry witnessed some big ticket investments in the online pharma start-ups

Illustrative



Raised USD 50 million in Series C round, led by Eight Roads Ventures India, F-Prime Capital, Fundamentum Partnership, Think Investments and existing investor Bessemer Venture Partners



Raised USD 35 million in Series C round, led by Singapore-based Daun Penh Cambodia Group and existing investors Sistema Asia Fund, and Tanncam Investment



Raised USD 11 million in Series B round, led by SAIF Partners, Nexus Ventures, and IL&FS

ePharmacy Technology Focus



Working on technologies such as data sciences and AI to create 'doctor assistant' that would make a doctor more productive



Acquired EClinic24/7 to offer e-consultation services, for both patients and doctors, through its platform



Adopted inventory-based model, direct procurement, warehouse automation and technologies such as data sciences, predictive modelling, etc., for maximizing profits and supply chain efficiencies

Expanding consumer base across the country

eCommerce Goes Rural

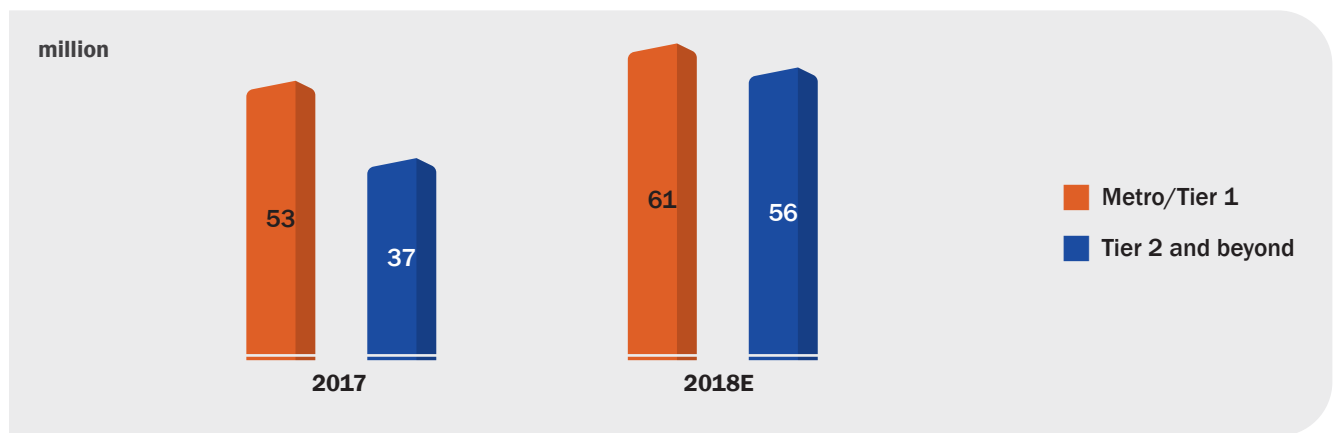


eCommerce players witnessed strong growth in customers from Tier 2 cities and beyond in 2018, driven primarily by millennial consumers in these cities who mimic those living in Tier 1 cities, slow deployment of physical organized retail and introduction of no-cost EMIs which has the highest penetration in Tier 2 and 3 cities.



According to RedSeer Consulting, online shoppers in Tier 1 cities will continue to dominate the customer base. However, online shoppers in Tier 2 cities and beyond will grow at a faster rate in 2018 to reach an estimated 56 million.

Online Shoppers Metro/Tier 1 vs Tier 2 and Beyond



Illustrative



eHaat, a subsidiary of Dhampur Sugar Mills clocks about 1,400 transactions per day. Besides Uttar Pradesh, the firm also plans to expand its operations to the states of Karnataka and Orissa in 2018-19



StoreKing, one of the largest rural eCommerce players has 55,000 retail outlets in 10 states. It also registers 75,000 transactions a day



Flipkart plans to target non-metros and smaller cities to position itself as the “fashion capital” of the country. The company mentioned that it is witnessing 100% YoY growth in the kids fashion category, driven by demand coming from across urban cities and Tier 2 and 3 towns



Amazon recorded more than 80% of its customers from small towns during the festival sale. More than 50% sale of large appliances and 63% sale of fashion products came from Tier 2 cities and beyond and about 70% of its EMI customers came from Tier 2 cities and beyond



LoadShare Networks, a provider of services ranging from first mile, line-haul, last mile deliveries and modular logistics software solution, announced plans to further strengthen its base in Tier 2 and 3 towns



Snapdeal witnessed a shift in customers as 80% of new users on its platform come from smaller towns across India

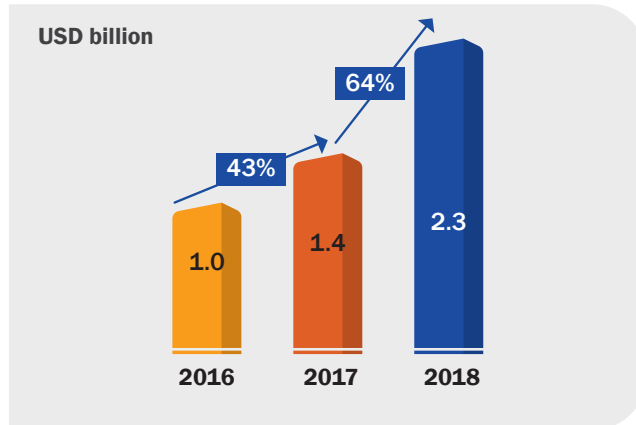


Swiggy expanded its presence to 16 new Tier 2 and 3 cities to meet the strong consumer demand that the company noticed through thousands of app downloads in cities where it was not present

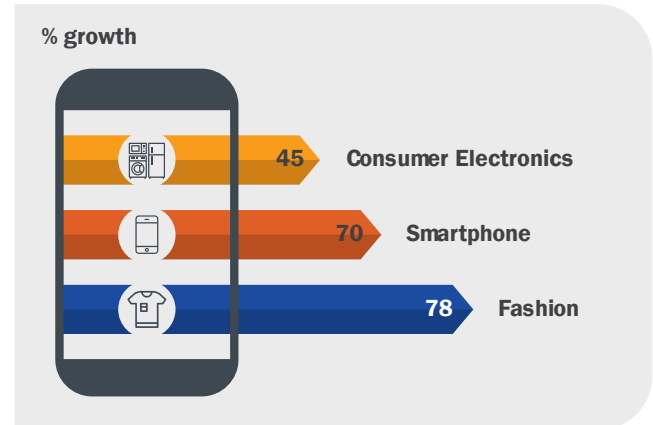
The Festive Season continues to spike demand

According to Redseer Consulting, festive sales have helped to grow the eCommerce market in India from 0.7% to 3.2% in the last five years and 2018 was no different.

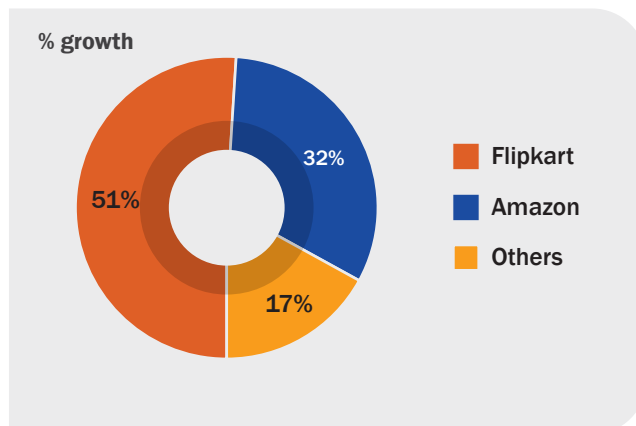
Overall GMV During Festive Sales



Segment Growth 2018



Market Share During Festive Sales 2018



- Amazon India and Flipkart hired an estimated 120,000 new temporary employees to service the anticipated demand surge during the festive season, twice the number they hired last year during this time
- Online retailers had spent an estimated USD 54 million on advertising to promote festive sales, a 10% jump from last year

Illustrative

VS

More than 82% of its new customers were from Tier 2 and beyond

EMI Purchases grew to 12X; Over 70% EMI users from Tier 2 and beyond

Private labels AmazonBasics and Solimao grew 10X and 13X, respectively

40% customers for the private label brands came from Tier 3 towns and beyond, and over 12% of them were new

EMI and other options drove 60% of overall sales

Private brands portfolio grew by 550X

Sources: Secondary sources

Content is grabbing attention

Video streaming has been one of the most successful avenues in the Indian content consumption landscape, primarily due to increasing internet and smartphone penetration and ever-dropping data cost. According to research firm Media Partners Asia, India's online video market is expected to grow to USD 2.4 billion by 2023.

The market witnesses intense completion between home-grown providers such as Hotstar, SonyLiv, Jio, Voot, etc., and global players such as Amazon Prime and Netflix. While Hotstar continues to be the leader in the content space, Netflix and Amazon Prime Video have steadily grown their market share at the expense of local firms.

Key Trends

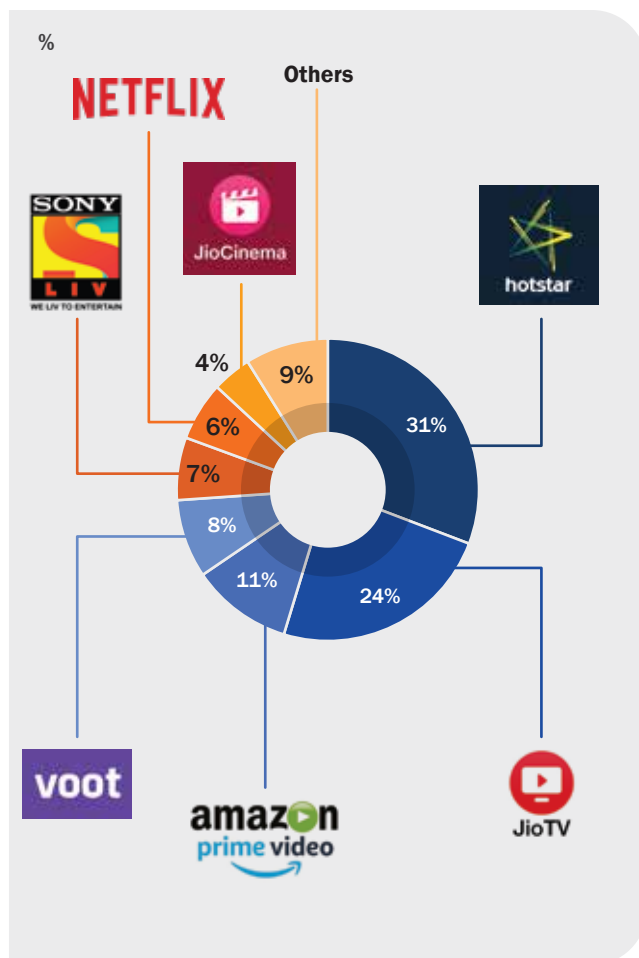
Indian smartphone users spend **1.1 hours** on an average on content related to entertainment every day

At **27.4%**, Entertainment is the largest category in mobile content consumption, followed by Sports and Lifestyle, which accounts for **18.6%** and **13.8%**, respectively

Texts and images account for **88%** of all entertainment content, whereas video accounts for **~11%** of all content consumed

Hindi remains the main language, accounting for **69%** of content, followed by regional languages accounting for **25%** users. English content accounts for **~6%**

Market Share by Installations (Oct 2018)



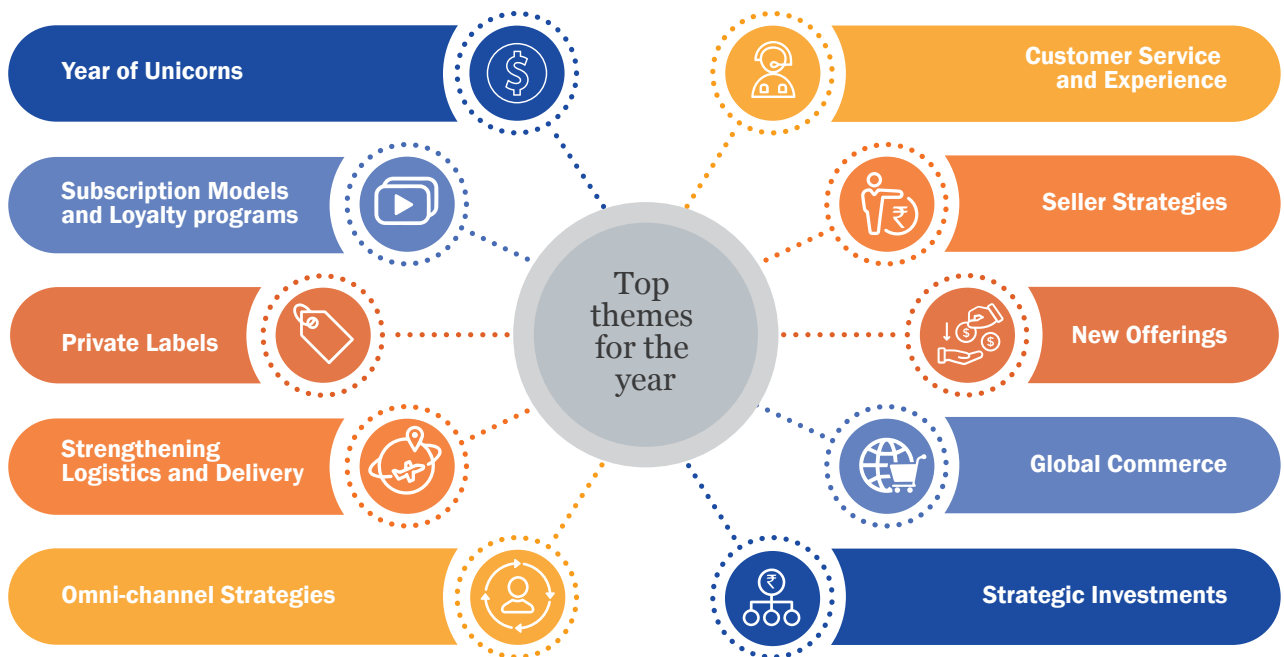
Market Share of Active Users

Illustrative

Service	Nov 2018 (%)	Service	Nov 2018 (%)
Hotstar	40.18	Netflix	2.08
Jio TV	17.60	Jio Cinema	1.86
Voot	11.76	Amazon Prime Video	1.43
Airtel Digital TV	4.59	Tatasky	0.89
SonyLIV	3.17	Alt Balaji	0.21

Sources: Secondary sources

2018, the year of eCommerce Unicorns



Year of Unicorns



2018 was the year of unicorns for the Indian start-ups as eight new start-ups joined the unicorn club, including six retail eCommerce start-ups. While the number of Unicorns in India (18) does not match that of other countries such as US (126) and China (77), the investments do bring-in positive business sentiments.

Valuation - USD 5 billion
Raised USD 1 billion led by SoftBank



Valuation - USD 3.3 billion
Raised USD 1 billion led by Naspers and Tencent Holdings



Valuation - USD 2 billion
Raised USD 450 million from SoftBank and Alibaba



Valuation - USD 1.1 billion
Raised USD 200 million from Ant Small and Micro Financial Services



Valuation - USD 1.1 billion
Raised ~USD 200 million from SoftBank and existing investors



Valuation - USD 1 billion
With total funding of an estimated USD 666 million, Byju's is the first Indian EdTech company to join the unicorn club



Personalization and Private labels driving demand

Subscription model/Loyalty program



Subscription-based paid memberships and loyalty programs became a new rage among customers. Apart from offering rewards, benefits and exclusive and early access to members, these programmes help eCommerce companies to segment customers efficiently, cut customer acquisition cost, identify buying pattern, retain customers, reduce cash-burn and dependence on deals and discounts.

Illustrative

Flipkart made a second attempt at customer loyalty programme to launch Flipkart Plus to take on Amazon's Prime subscription service. The company has set aside USD 173 million to spend on services under the programme for the next three years



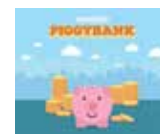
Myntra launched loyalty program 'Myntra Insider' to increase the traffic and engagement on its website and mobile app. Myntra partnered with companies such as Zomato, TataSky, BigBasket, PhonePe, BookMyShow, EROS NOW, Zoom Car, Gaana, etc., for users to redeem points



Swiggy launched its new paid membership programme 'Swiggy Super' to increase order volumes and compete with rivals such as Zomato and Uber Eats. The programme allows customers to get free deliveries and order food without any surge pricing



Zomato launched a new reward programme 'Zomato Piggybank' for its select users based on their loyalty and the geographic availability of partner restaurants. Zomato's existing programmes include 'Zomato Gold' and 'Zomato Treats'



Private Labels



Private labels gained popularity among eCommerce customers owing to good product quality and competitive price as compared to established brands. Private labels not only allow eCommerce companies to fill-in specific need gaps that are not being serviced but also offer new brands to differentiate from the competition. Most importantly, it allows companies to drive profitability.

Illustrative

ShopClues launched a new private label 'Code Yellow' to expand its fashion and lifestyle business



Grofers announced its foray into the FMCG segment with the launch of seven new brands under two categories - Budget and Popular G-Brands



Private labels account for about 34% of BigBasket's business which the company expects to reach about 40% in 2018, coming mainly from non-fruits and vegetables and non-staple



Offline-Online omni-channel model coupled with improved logistics

Logistics and Delivery



The growth in eCommerce has resulted in brisk growth of eCommerce logistics industry, driven mainly by increasing demand for same/next day delivery, last mile connectivity and growth of omni-channel model. 2018 witnessed significant investments and expansions by eCommerce players and eCommerce logistics service providers.

Illustrative

Amazon expanded its own delivery network in the North East to add the states of Arunachal Pradesh, Mizoram, Manipur, Nagaland and Sikkim to the existing states of Assam, Tripura and Meghalay. The company also opened its largest fulfilment center in Karnataka which is spread over around 350,000 sq ft



eCommerce logistics solutions provider Ecom Express expanded its services by 8,000 PIN codes in India to take the total to over 25,000 PIN codes



Rivigo announced to double its workforce to 3,200 in 2018, with a focus on hiring algorithm trading and AI talent to strengthen its technological capabilities and increase efficiency and lower operational expenditure



One of the largest eCommerce companies in India commands strong presence through 19 automated sort centers, 30 fulfilment centers, 44 hubs, 2,500+ direct delivery centers, 5,000+ partner centers and 14,000+ vehicles



Omni-channel



In order to control high marketing and customer acquisition cost and cater to diverse customer needs, Indian eCommerce players continued expanding their platforms to brick-and-mortar outlets which ensures that the eTailers do not lose their customers in any space, either online or offline. At the same time, offline players have also started to launch omni-channel initiatives to tap tech savvy online buyers.

Illustrative

Being Human announced its plans to launch eCommerce website and foray into Tier 2 and Tier 3 markets. The brand is already retailed across exclusive stores, shop-in-shops, distributor networks and eCommerce websites



Hero MotoCorp launched an eCommerce portal for its customers to enable them to purchase Hero Genuine Parts and Hero Genuine Accessories online directly from the company



Myntra announced its plans to set-up its first offline cosmetics store in Bangalore. The company plans to set up 100 offline stores over the coming two years



Online retail brand Jaypore expanded its offline presence by opening a store in Bengaluru. The company already has two offline stores in Delhi



Customer experience is king, Differentiated seller acquisition strategies

Customer Service and Experience



Customer service and customer experience has been among the top priorities for eCommerce brands and is considered to be one of the biggest tools for customer loyalty, retention and revenue growth.

Illustrative

Amazon and Flipkart rolled out a host of finance options including interest free credit up to ₹ 60,000, debit-card EMIs, no-cost EMIs and buy back guarantees to help more people make high-value purchases



In a bid to onboard the next wave of online shoppers and its first move in vernacular languages, Amazon launched a small pilot with a Hindi interface for its mobile website. Amazon has also set up captive centres in the NCR and Pune to handle some of its international and domestic customer and seller services



BigBasket entered into partnership with Xiaomi's operating software MIUI to enable its customers to complete their grocery purchases faster and with a better overall experience



Seller Strategies



Strengthening seller ecosystem has been one of the key focus areas for eCommerce companies. Slashing seller fees remains a key strategy for eCommerce companies as it improves seller's profitability and allows them to stock more products. In addition, eCommerce companies have also focused on streamlining sellers' operations by providing technology tools and access to seller-specific marketplaces for product procurement, loans, etc.

Illustrative

Azisst, an eCommerce sales acceleration company, launched an AI-driven promotional tool PPVisit for Amazon Sellers



Paytm Mall launched its connected PoS solution for retail stores to allow them to manage inventory, view their sales, pending orders, etc., on Paytm Mall's cloud



Snapdeal launched 'Instant Seller Sign-up' feature for sellers on its platform to facilitate a seamless on-boarding process



Swiggy launched 'Swiggy Packaging Assist', a marketplace for restaurant partners to access a variety of packing solutions that suit their menu needs at the right price points



Leverage capabilities and infrastructure to expand offerings



New Business Lines / Offering

After making significant in-roads into categories such as fashion and lifestyle products, smartphones, etc., eCommerce companies are trying to expand their existing offerings and at the same time crack other segments such as pharmacy, insurance, etc.

Illustrative

Swiggy announced its plans to diversify into carrying medicines and hyperlocal groceries to boost volume on its platform



OYO entered into upscale hotels category with 'Palette Resorts' to offer premium accommodations. It also forayed into relatively untapped segment of serviced apartments. Branded as OYO SilverKey, these are aimed at corporate clients

Nykaa launched an eCommerce platform exclusively for men called Nykaa Man



Amazon announced its plans to sell life, health and general insurance products, in India. Earlier, Flipkart also secured a corporate agent license to enter into the insurance segment



Global Commerce



According to KPMG, global cross-border B2C eCommerce trade is expected to reach USD 1.5 trillion by 2022, driven by increasing cross-border internet traffic, innovation in technologies enabling physical trade of goods, growing ease of cross-border payments, etc.

Illustrative

400 Things launched design-led fashion and lifestyle eCommerce shop for the UK and India

4 0 0
T H I
N G S

Carlton London partnered with Ace Turtle, an omni-channel platform company to ramp up its eCommerce business in India



Dubai-based eCommerce and direct marketing company, Phygicart.com announced its entry into India with an initial investment of USD 14.5 million



OLA expanded its presence to the UK, Australia and New Zealand. OYO entered the UK, China, and the UAE market. OYO also announced plans to enter Indonesia with more than 30 hotels and over 1,000 rooms in three cities Jakarta, Surabaya and Palembang



Accelerated innovation on AI and ML solutions



Increasing Investments in Technology and Business Expansion

eCommerce companies have been into fierce competition and are eyeing to capture a significant portion of consumer spending through investments in cognitive technologies and further expand their business operations.

Illustrative

Amazon, Flipkart and Paytm Mall are expected to have spent about USD 2.5 billion on cognitive technologies such as AI and ML in 2018



OYO announced to hire more than 2,000 engineers over the next two years to build its own suite of technology product



MakeMyTrip announced to invest in emerging technologies such as AI, chatbots, voice and national language to reach out to customers in smaller towns and grow its hotel reservation business. It also invested in Bengaluru-based Bitla Software Private Limited, a travel focused technology provider with SaaS, Cloud and mobile-based solutions to help expand its businesses



Myntra opened an office in Palo Alto to focus in the areas of data sciences, computer vision, NLP, speech, and deep learning



Ola rolled-out AI- and ML-based real-time ride monitoring system to strengthen ride safety of customers



Paytm partnered with Alibaba to launch AI Cloud computing platform 'Paytm AI Cloud for India' to offer suite of business-centric apps for developers, start-ups and enterprises

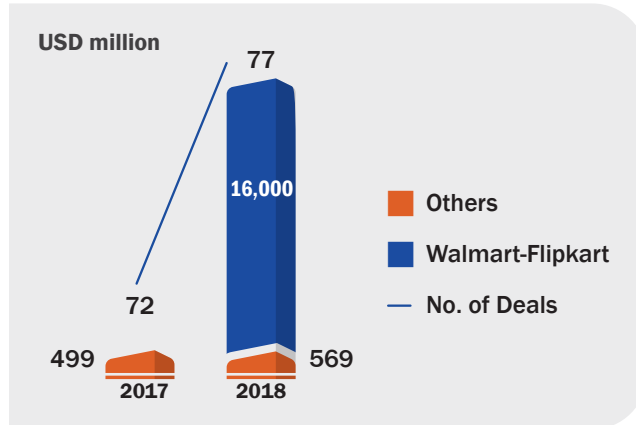


M&A for scale and tech innovation

Acquirer + Acquired

Illustrative

M&A Deal Value



The Deal of the Year



In the country's largest acquisition and the world's biggest purchase of an eCommerce company, Walmart acquired 77% stake in Flipkart for USD 16 billion. According to analysts, the deal is expected to result in strong growth of eCommerce in India

Technology-focused Acquisitions

<p>OYO Hospitality</p> <p>Strengthen AI- and IoT-based tech infrastructure for managing hotels and assets</p>	<p>ABLEPLUS IoT Technology</p>	<p>Myntra Fashion eCommerce</p> <p>Develop wearables for its in-house brands and leverage the technology to drive innovation and enhance consumer engagement</p>	<p>witworks Technology Start-up</p>	<p>Flipkart eCommerce</p> <p>Accelerate an end-to-end conversational shopping experience for its users</p>	<p>Liv.ai AI Start-up</p>
<p>Flipkart eCommerce</p> <p>Build advanced, data science-based intelligent solutions and strengthen selection and pricing capabilities</p>	<p>UPSTREAM COMMERCE Analytics Start-up</p>	<p>infi beam.com Fashion eCommerce</p> <p>Boost eCommerce enablement capabilities and create comprehensive eCommerce solutions</p>	<p>unicommerce eCommerce Enablement Software</p>		

Business Expansion / Strengthening

<p>UNITED SPIRITS Alcoholic Beverages</p> <p>Target business growth through eCommerce channel</p>	<p>HIPBAR Electronic Payment Platform</p>	<p>paytm eCommerce and Digital Wallet</p> <p>Strengthen its ticketing business</p>	<p>TICKETNEW Online Ticketing Platform</p>	<p>BYJU'S EdTech Start-up</p> <p>Enhance and strengthen offerings for K-3 learning programmes</p>	<p>MATH Adventures Learning Platform</p>
<p>OYO Hospitality</p> <p>Expand its play field to real estate sector</p>	<p>Weddingz.in Wedding Planning</p>	<p>zomato Food Ordering and Restaurant Discovery</p> <p>Expand into food at workplace segment</p>	<p>TongueStun Food-related Aggregator Start-up</p>		

Sources: Venture Intelligence, NASSCOM Analysis, Secondary sources

Partnerships and JVs for Market Access

Illustrative

Customer Experience



Co-develop new hotel formats and enhance customer experience



Furniture assembly service for better customer experience



Deliver an enhanced digital experience for its customers

Financial Solutions



Provide 'No-cost EMI' financing for its customers



Offer money exchange services, to its users in India



Launched deferred payments service to allow users pay for products later

Technology Tie-ups



Strengthen AI and Cloud technologies



Launch AI cloud computing platform Paytm AI Cloud for enterprises, developers and start-ups

Insurance-focused Products and Services



Provide in-trip insurance to its customers

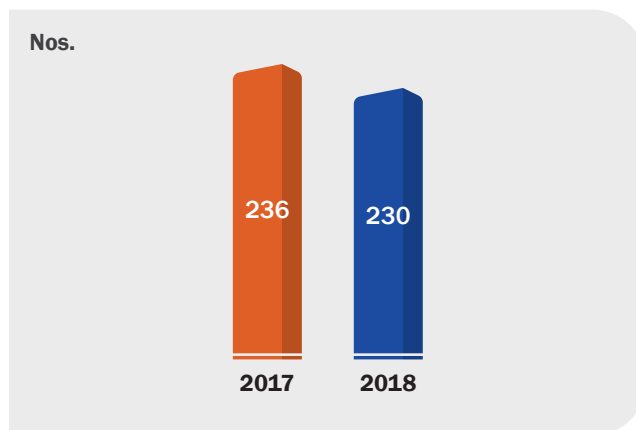


Insure mobile phones to cover loss or damage to mobile phone upon payment of premium of up to 10%

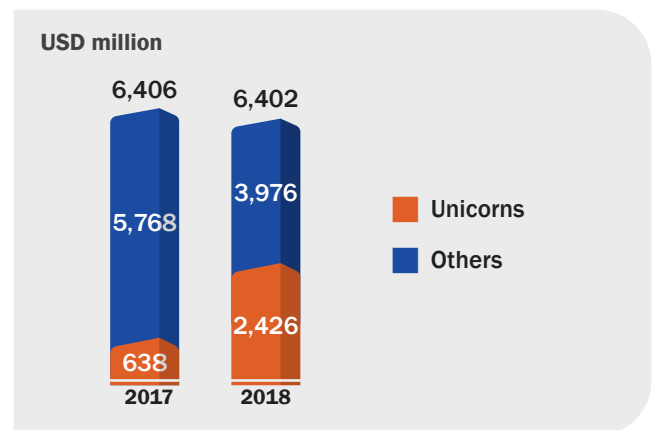
Walmart-Flipkart deal drove positive market sentiments and global investments

eCommerce investment remained almost flat in 2018. Despite marginal decline in number of deals and investment, average ticket size increased marginally from USD 31 million in 2017 to USD 33 million in 2018. Interestingly, investment in the unicorns grew more than 250% in 2018.

Number of PE/VC Investments



Total Investment



Illustrative

Swiggy raised **USD 1 billion** from Naspers and Tencent. With this Swiggy became the fifth most valuable startup in the country



Alipay Singapore, along with its affiliates, invested **USD 210 million** in Zomato. Earlier, Zomato received an investment of **USD 150 million** from the payment unit of Alibaba



SoftBank Group and Alibaba invested **USD 400 million** and **USD 45 million**, respectively, in Paytm



Nykaa raised **USD 11 million** in fourth funding round led by existing investors



ShopClues raised about **USD 16 million** from its existing investors



UrbanClap raised **USD 50 million** in Series D funding led by Steadview Capital and existing investor VV Capital



Amazon led a **USD 11 million** investment round in Shuttl to incorporate features such as booking a seat on a bus, hailing a cab and a host of other skills to Alexa, which would help it reach out to a new set of users

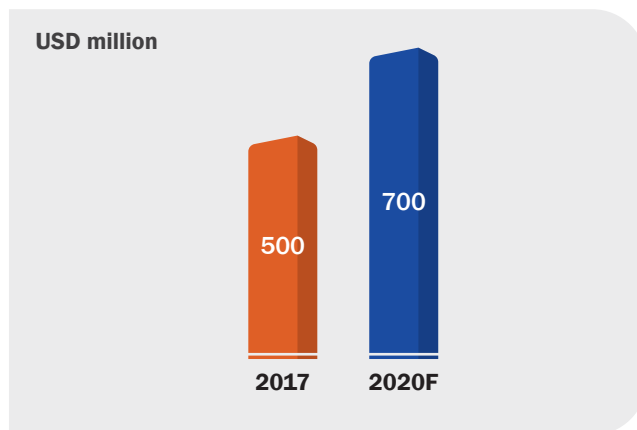


Backed by huge investments, B2B eCommerce is expected to gain traction in the country

B2B eCommerce is expected to witness a strong growth due to increasing investments and expansions by the stakeholders in the ecosystem. Most of the players operate on a marketplace model focusing primarily on SMEs and also large businesses to some extent. Majority of firms are highly verticalised, however, gradually expanding to other segments.

Unlike B2C buyers, B2B buyers' decisions are driven by profitability and price, buyers who are engaged primarily in rational purchase backed by multiple decision makers with high value and volum transactions.

B2B eCommerce Market



Leading categories within B2B segment



Key Developments

Illustrative

Business Expansion

Both global as well as home-grown B2B eCommerce players are strengthening their existing capabilities and also expanding their reach across multiple sectors.

Walmart announced its plans to open 50 B2B stores across the country to support its B2B eCommerce plans and provide support for Flipkart



Zomato acquired online caterer and office canteen aggregator TongueStun for USD 18 million to help restaurant partners to cater to a larger corporate market



Moglix expanded its geographical operations to enter Kolkata in East India. The firm is already present in Delhi-NCR, Chennai, Mumbai, Pune and Ahmedabad. It also added two new centers in Aurangabad and in Pant Nagar to feed into the Western and Northern centers



Amazon Business expanded its Global Selling programme, allowing Indian B2B sellers, manufacturers and exporters to reach business customers across Amazon's international marketplaces in the US, the UK, Germany, France and Japan

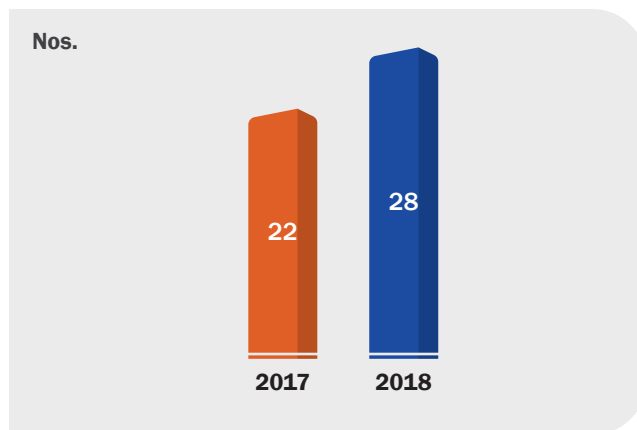


Investment size relatively small as compared to B2C eCommerce

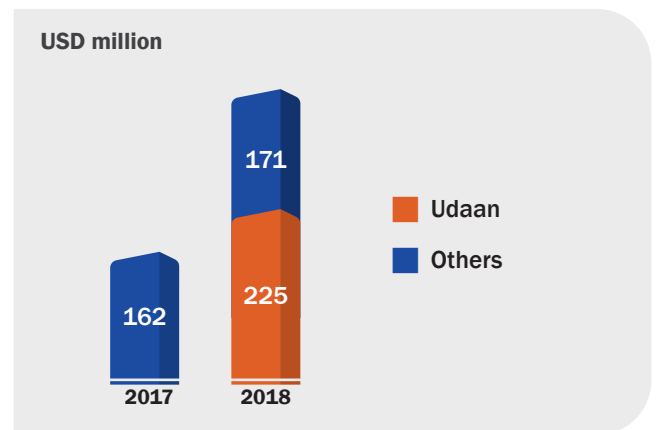
B2B Investment Scenario

2018 proved to be a great year for B2B eCommerce, especially from investment perspective. While the number of investments increased from 22 in 2017 to 28 in 2018, total investment grew over 140%, driven by huge investment in Udaan.

Numbers of PE/VC Investments



Total Investment



Illustrative

Udaan raised USD 225 million from DST Global and Lightspeed Venture Partners to enter the unicorn club



NinjaCart raised USD 35 million in Series B round from Accel and Syngeta Ventures to expand its operations to 10 cities and open 200 distribution centres



Medikabazaar raised USD 5 million in Series A funding led by HealthQuad and other investors, to strengthen technology and increase its team size including senior leadership



Shadowfax raised USD 22 million in Series C funding from NGP Capital, Qualcomm Ventures, Mirae Asset, and existing investor Eight Roads Ventures, to scale up and connect 400,000 delivery, business partners to its platform by 2021



ShopX raised USD 35 million from Fung Strategic Holdings to invest in its product and technology verticals and develop new offerings for small retailers



HungerBox raised USD 4.5 million from Neoplux and Sabre Capital to expand in India and Southeast Asia



Strong growth to continue through 2022

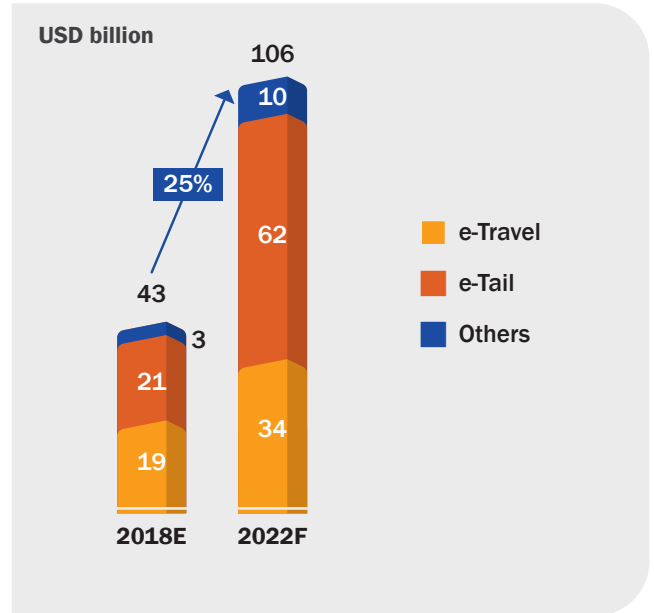
The Indian eCommerce market is expected to grow ~25% through 2022 to reach about USD 106 billion on the back of growing digital maturity, improved infrastructure and increasing business investment

With close to 60% market share, eTail is expected to lead the growth and capture larger market share due to increasingly strong ecosystem of other companies including multiple start-ups in the areas of last mile logistics, analytics, cognitive technologies, payment gateways, etc.

In addition, innovative push strategies adopted by eCommerce players such as introducing private labels, same day and next day delivery, subscription-based models and loyalty programmes, resulting in customer stickiness and cross-selling across categories would also play a crucial role in this growth

With high frequency usage and the highest wallet share of a consumer's budget, online grocery and food is likely to be stickiest category with the highest growth potential, followed by apparel and online content. Online travel and ride-hailing are expected to witness moderate growth, aligned with internet adoption and discretionary spending

Forecast - Indian eCommerce Market



Technology would play a pivotal role in the growth of eCommerce as it would help to:

Excel in vernacular technologies and offer regional languages and local dialects recognition capabilities to onboard non-English speaking shoppers

Stay informed about factors affecting the demand and predict buyer trends to efficiently manage inventory and supply chain

Offer dynamic pricing and deals that meet changing consumer preferences, at the same time taking into account the internal inventory, profit requirements and competitors' pricing

Personalize offerings based on strategic individualization to structure interaction, functionality, and content around real-time needs of individual customers

Enhance customer service and experience by leveraging AI-powered chatbots to resolve queries and help complete purchase

Offer tailored subscription services and promotions for better customer engagement and retention stickiness



IT-BPM Sector in India 2019

Digital@scale:

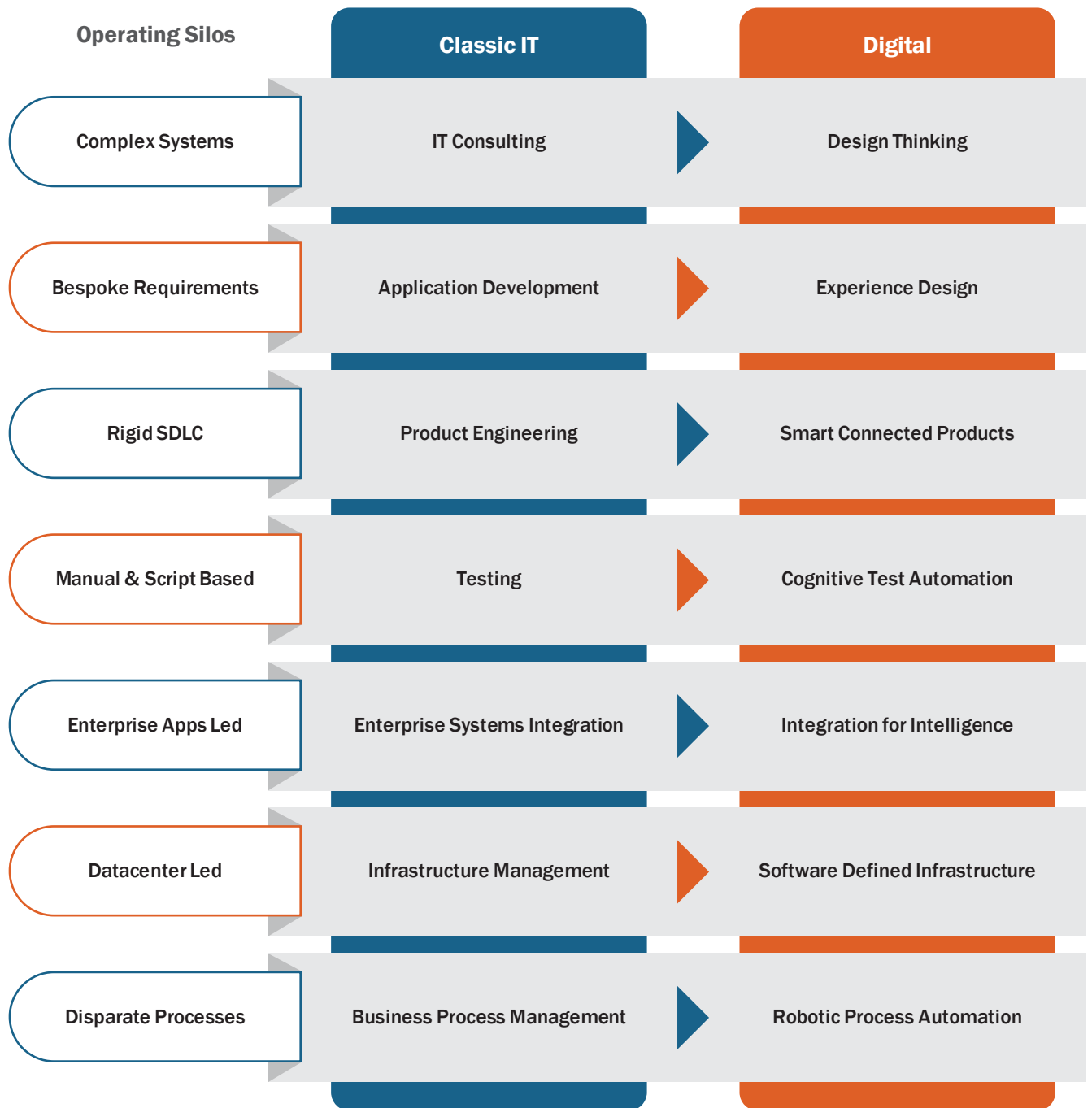
Deriving value from digital

Digital@Scale: At a Glance

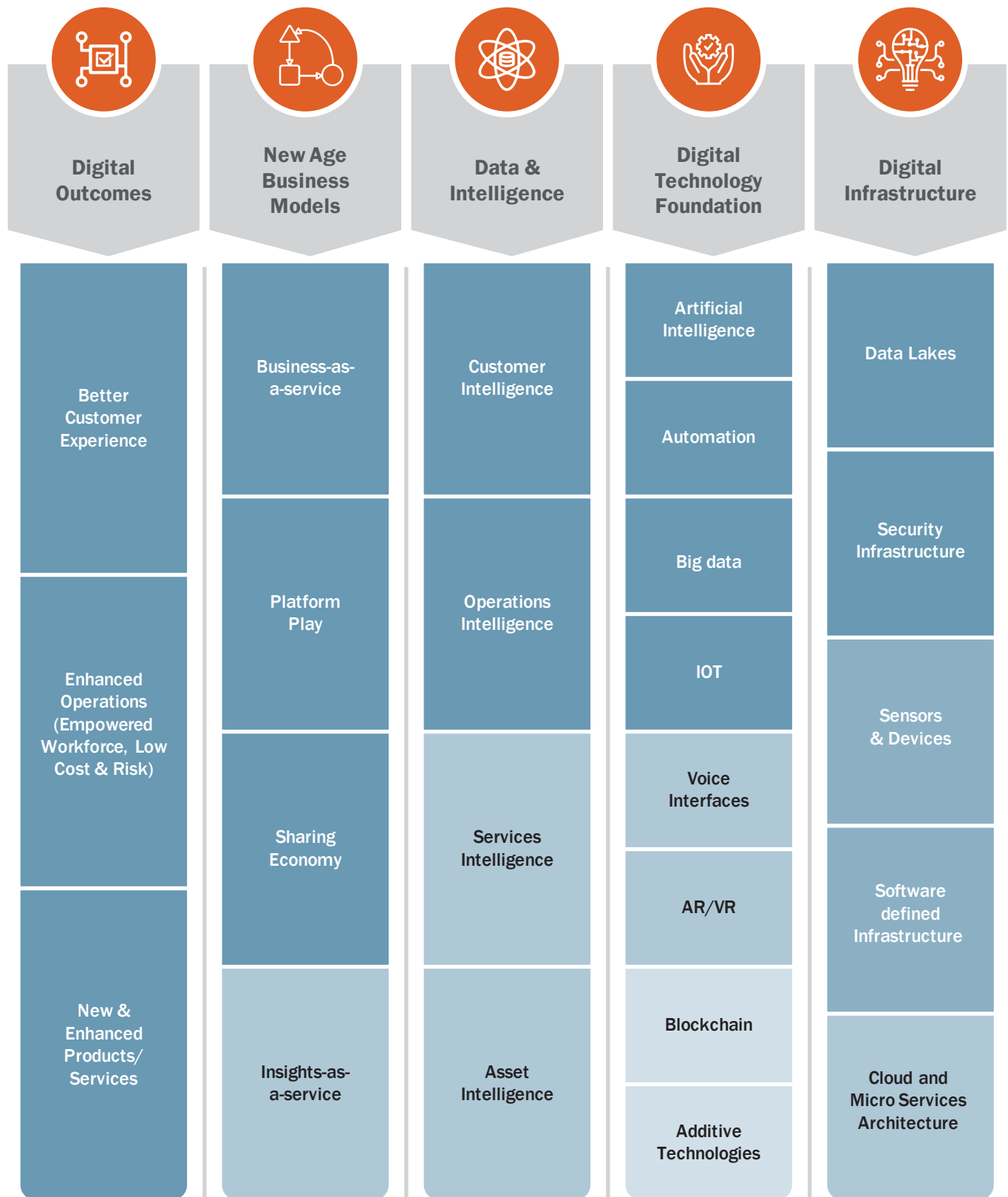
Measuring digital growth



Information Technology (IT) to give way to Digital



View of the Modern Digital Enterprise



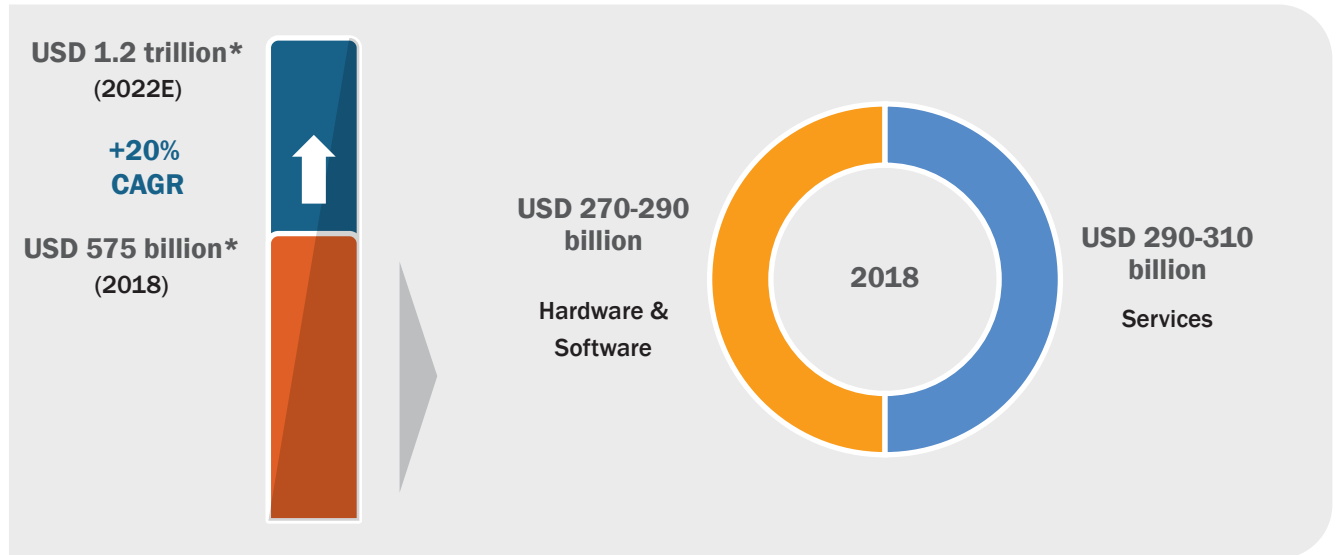
Adoption Maturity: Very Low/ Negligible Low Medium High

Notes: Asset Intelligence corresponds to both physical assets (plant, machinery, etc.) and human assets (workforce)

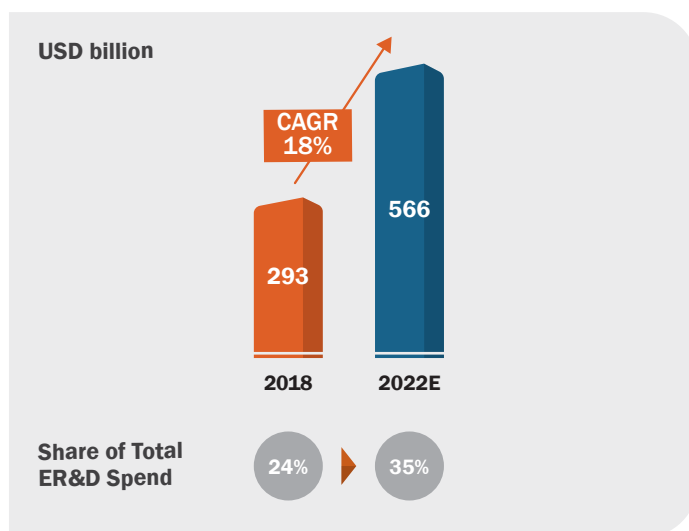
Source: Zinnov Research and Analysis

Global Enterprise Digital Spend to touch USD 1.2 trillion by 2022

Global Enterprise Digital Spend



Global Digital Engineering Spend

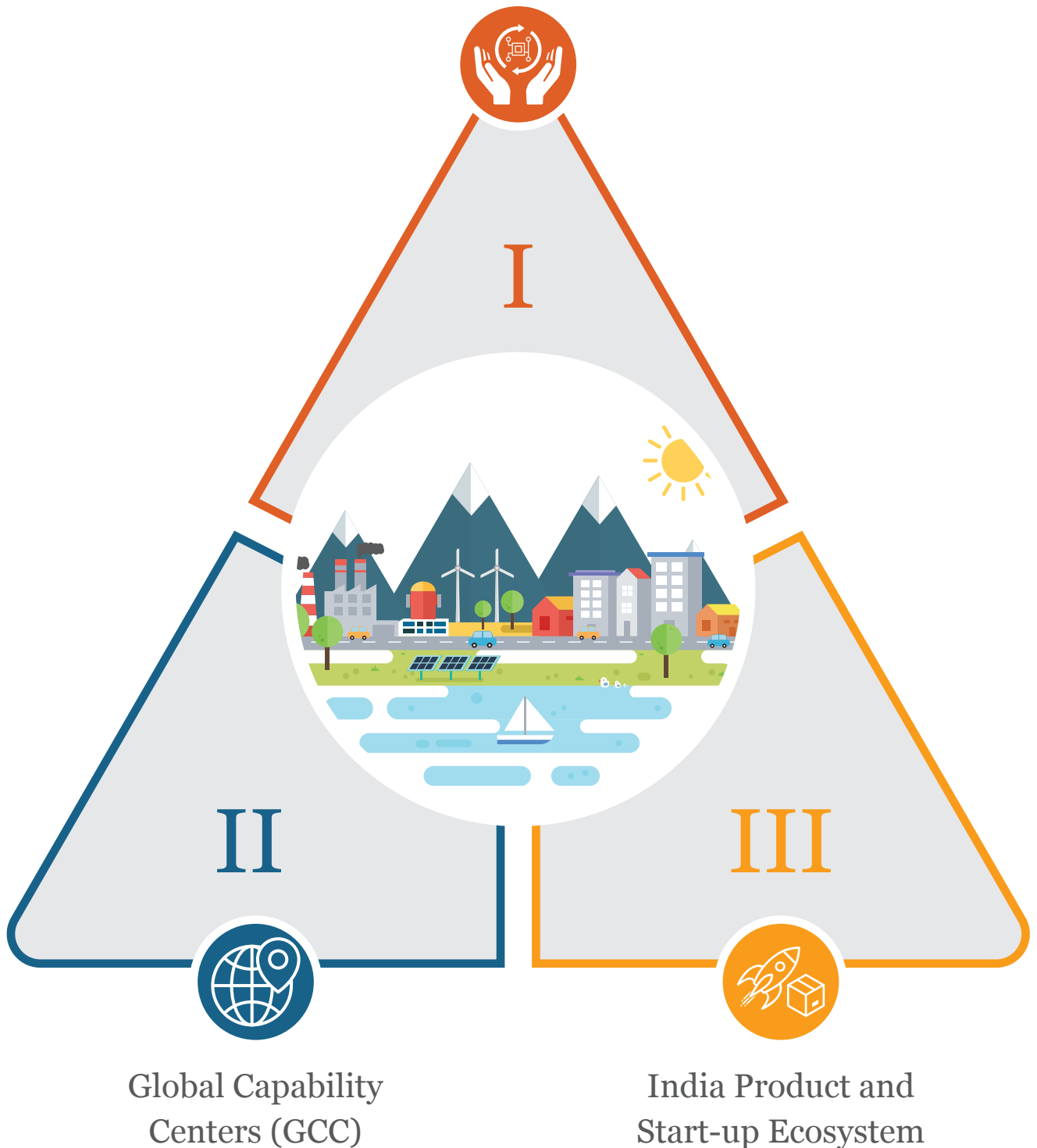


*includes investments in modern data driven technologies to help improve customer experience, drive higher order operational efficiencies and building new digital products & services; Includes R&D investments using digital technologies from both asset heavy & asset light industries (except Tech OEMs); Digital technologies & tools such as AI/ ML, RPA platform, IOT platform, Data & analytics tools, software development platforms, Data & analytics tools, software development platforms; Portions of Datacenter required to support digital use cases; Investments in digital focused M&A and alliances; Setting up of COEs and digital labs; People cost (people employed to run digital initiatives) + stock options cost

Source: Zinnov Research and Analysis

Digital@Scale being driven by 3 major ecosystems

Digital Service Providers (DSP)



Service Providers are leveraging 4 key strategic levers to scale in digital

I



A | Organization Strategy: Deep-dive

I

Rewriting the Narrative



PERSISTENT

Outsourced Product Development

Product engineering and sell-with partnerships with ISVs

Software 4.0

Enable software-driven transformation of enterprises

Cognizant

Professional Services Company

Help clients envision, build and run more innovative and efficient businesses

Digital Solutions to Advance Business

Advancement to smarter products, exceptional customer experiences, product people, profitable processes and powerful systems

Federated Structure



Restructured its Industry Solution Units (ISUs), giving almost **200 employees** control of them and quarterly target goals as it looks to free up senior executives to focus on long-term strategy

"We actually doubled down on our earlier strategy of ISUs and have created sub-ISUs. We pushed it one level down. We now have about 150 sub-P&L (profit & loss) heads who have been set up the same way the old ISUs were set up"

-Rajesh Gopinath, CEO (TCS)

Separate Digital Incubation



- Setup Lean Digital Innovation Center
- Dedicated towards digital transformation across the customer journey
- Program includes digital incubation program, co-innovation lab, and customer-focused design thinking workshops



- Setup as a separate entity to focus on digital product portfolio by Persistent
- Major products offered include ShareInsights, Rovius Cloud, Concert, and Sentient
- Strategy includes acquired low profile solutions from large vendors

Separate Digital Incubation



Jan 2019

Divested from its Australia, Middle East and India-based businesses to focus on its core markets of USA, Europe and South Africa that makes up 98% of total revenue

Oct 2017

Announced India business reorganization with carving out of India PSU & Government businesses from IT services segment



Jun 2018

Completed divestment of hosted data centres business; 8 data centres and ~900 employees transitioned to Ensono

B | Offerings and Solutions: Deep-dive

I

 <p>Comprehensive Digital Portfolio</p>	 <p>Enterprise Digital Platforms</p>	 <p>Verticalized Use-case Specific IPs</p>	 <p>Leveraging Platforms to Create Solutions</p>
<p>Infosys[®]</p> <p>Comprehensive digital offerings for clients, including:</p> <ul style="list-style-type: none"> • Accelerate: APIs, Legacy Modernization • Assure: Cyber security, Validation • Insight: Big Data, AI, Analytics • Innovate: Digital Product Engineering, Vertical Platforms • Experience: Digital Marketing, Content, Personalization, Omni-channel <p>HCL</p> <p>Organized entire company portfolio into 3 segments:</p> <ul style="list-style-type: none"> • Mode 1: Traditional services • Mode 2: Digital services • Mode 3: Products/ platforms 	<p>Customer Engagement</p> <p>wipro</p> <p>Digital Customer Experience Suite</p> <hr/> <p>Internet of Things (IOT)</p> <p>TATA CONSULTANCY SERVICES</p> <p>TCS Connected Universe Platform (TCUP)</p> <hr/> <p>Artificial Intelligence</p> <p>Infosys[®]</p> <p>Infosys NIA AI Platform</p> <hr/> <p>Intelligent Automation</p> <p>NIIT technologies</p> <p>Tron Smart Automation Platform</p>	<p>Retail</p> <p>Infosys[®]</p> <p>Retail PoS & Enterprise Device-as-a-Service</p> <p>wipro</p> <p>Loss Prevention Platform</p> <hr/> <p>Travel, Transport & Logistics</p> <p>TATA CONSULTANCY SERVICES</p> <p>TCS Cargo Monitoring Solution (Supply Chain Management)</p> <p>Cognizant</p> <p>PlanRight Solution (Inventory Management)</p> <hr/> <p>Healthcare</p> <p>Patient Monitoring Systems</p> <hr/> <p>BFSI</p> <p>wipro</p> <p>Telematics-based Insurance</p>	<p>Platform Partnerships for Customer-Specific Solutions</p> <p>PERSISTENT</p> <p>IBM</p> <ul style="list-style-type: none"> • Persistent systems partnered with IBM to build solutions leveraging Bluemix and Watson platforms • Dedicated 1000+ workforce for partnership to provide client solutions <hr/> <p>Development of IPs leveraging platforms</p> <p>accenture</p> <p>PREDIX</p> <ul style="list-style-type: none"> • Accenture jointly built the Intelligent Pipeline Solution with GE leveraging Predix platform • TransCanada first customer

Source: Zinnov Research and Analysis

C | Capabilities: Deep-dive (1/2)

I

Talent



External Hiring

Hiring based on skills instead of credentials, in some cases even without college degrees!



Hackathons to assess capabilities and recruit for different digital skills

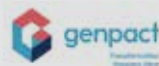


'Train Before You Hire' model to focus on training students on current technologies and platforms



Reskilling

Genpact Risk Academy to build talent for credit risk analytics in partnership with AIWMI



100,000 employees trained in digital tech through classroom and online training



Partnered with General Assembly for Digital Engineering Education Program



Launched campaign "Botify" which trained 90% of Tech M technical employees on digital tech



Partnerships



Design Thinking



Partnered with SAP to use design thinking along with SAP Leonardo for its clients



Experience Design



Partnering with Adobe to help clients scale experience design



Smart Connected Products



Partnership to jointly develop IOT solutions, connected products etc.



Test Automation



Partnered with UiPath to enhance its enterprise level capabilities for digital managed services



Integration for Intelligence



Integrated CAST's software intelligence in various solution offerings like ADPART-InDev



Software Defined Infrastructure



Partnership to extend VersaStack to hybrid cloud, software-defined infrastructure



Robotic Process Automation



Partnered with Blue Prism to help organizations automate wide range of business processes



C | Capabilities: Deep-dive (2/2)

I

M&A



Niche Digital Consulting



Acquired Noah Consulting, a digital strategy provider for the oil & gas industry



Design



Acquired Idea Couture, company specialized in design, services and business models based on digital technology



Big Data and Analytics



Acquired SCIO Inspire Holdings, providing healthcare analytics solution



Internet of Things (IOT)



Acquired IOT services company Cuppola Technology



Software Defined Infrastructure



Acquired SoftLayer for USD 2 billion



Robotic Process Automation



Acquired Genfour a Wales based RPA solutions provider in 2017



COEs



Industry Focused

Technology & Innovation Hub (I)
[Indiana (US), 2018]: Focus on insurance, healthcare and manufacturing sectors

Use-case Focused

Digital COE [Marseille (France), 2018]: Developing skillsets to improve Warehouse operations using Infosys AI-NIA

Technology Focused

Technology & Innovation Hub (III)
[Arizona (US), 2018]: Focus on autonomous technologies, IOT, full-stack engineering, data science and cyber security

Platform Focused

Industrial IOT Center [Bangalore (India), 2018] : Collaborated with PTCThingWorx IOT platform; Creating applications on PLM, SLM & AR experiences solutions

Market/ Geo Focused

Technology & Innovation Hub (IV)
[North Carolina (US), 2018]: Launched to better serve clients in North Carolina related to Life Sciences, Advanced Manufacturing, Financial Services and Clean Technology sectors

C | Global System Integrators and Advisory firms focused on building capabilities in India

I

Key Focus Areas

Transformation shift of India Centres into Innovation Centres

Increasing Investments and Hiring

High focus on leveraging India's Start-up Ecosystem

 **accenture**

- Accenture's India unit is creating Blockchain solutions for Oil and Gas industry
- Established several COEs across digital areas such as AI/ML, Analytics, Cybersecurity, etc. in India

 **Capgemini**

- Capgemini has a high focus to leverage India talent base as an Innovation hub to build valuable assets
- Made several key Leadership team hires in India including CEO for India unit

 **IBM**

- IBM hired Nipun Mehrotra as CDO, a first by IBM outside of US to head the DBG India unit which mirrors its global counterpart to oversee digital sales org, digital marketing, company's ecosystem and start-up groups

 **accenture**

- Accenture actively working with Indian Start-ups as a part of its innovation agenda
- Worked with more than 50 Indian Start-ups in creating pilots for its global clients
- Partnered with Microsoft to focus on B2B Start-ups in India

 **Capgemini**

- Capgemini actively taps local start-ups for solutions and products and take them to their clients acting as a global distribution channel

 **IBM**

- IBM Engaging with Indian Start-ups through its Global Entrepreneur Program by providing access to IBM platform and cloud credits
- Actively engaged with over 1200+ start-ups in India. Launched a cybersecurity awareness program for clients through co-innovation activities with Start-ups

 **Capgemini**

- Capgemini planning to hire over 20,000 resources in India

 **IBM**

- IBM investing around USD 6 billion in India to set-up new research facilities and expand outsourcing centres in India

 **EY**

- E&Y adding over 2000 employees in India to bolster its digital services offerings globally to its clients
- E&Y mainly looking to hire talent across areas of Analytics, Intelligent automation, AI, Blockchain

 **pwc**

- PWC India planning to invest ~USD 14 million towards development of digital solutions and hiring 1,000 digital technology experts over the next 4 years

 **KPMG**

- KPMG planning to hire 8,000-9,000 talent in India

D | Streamlined GTM: Deep-dive



PERSISTENT
Out-come-based revenue models
 expected to contribute for 20% of overall revenue by next fiscal year

Cognizant
Focus on out-come-based long term service contracts
 Leverage of automation for efficiencies

HCL
Consulting-led Digital Strategy
 Account-entry and digital deals orchestrated through consulting assignments

Mindtree
Welcome to possible
Influencer Networks
 Leverage of influencer networks, including analyst organizations, and vendor advisory firms
 Closed \$50M+ of deals

iLink Systems
Online Marketplaces
 Leveraging Azure Marketplace to sell digital services
 Offerings such as cloud modernization roadmap listed

QUEST
Customer-targeted Events
 Organized a roundtable with potential customers delivering thought leadership and understanding customer pain-points

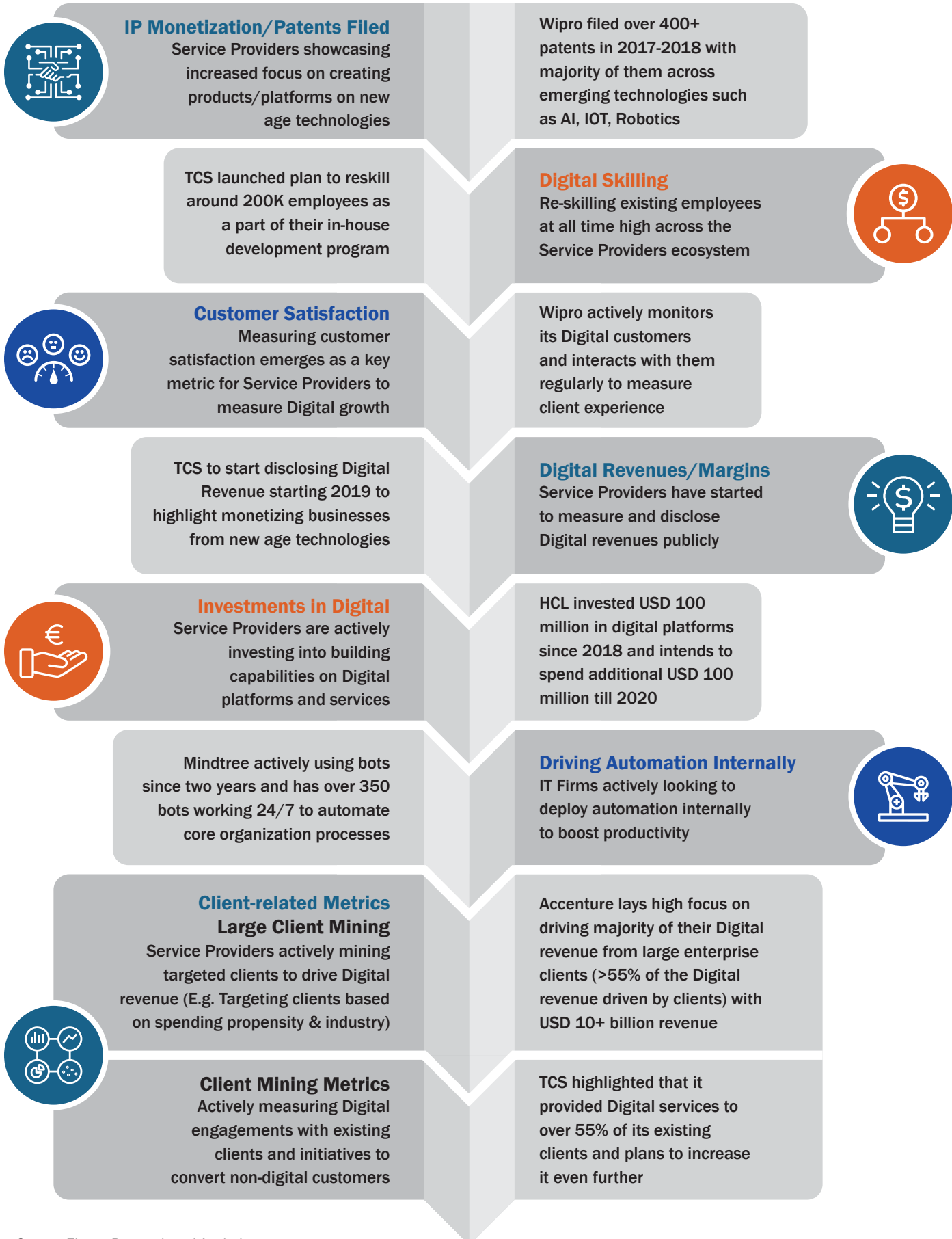
Focus on Growth of HiPA (High Potential Accounts)
 Revenue contribution of HiPA
 FY2016: 18%
 FY2018: 37%

Distributed ownership of digital engagements

CEO-42%
CIO-24%
CFO-20%
COO-13%
BU Heads-1%

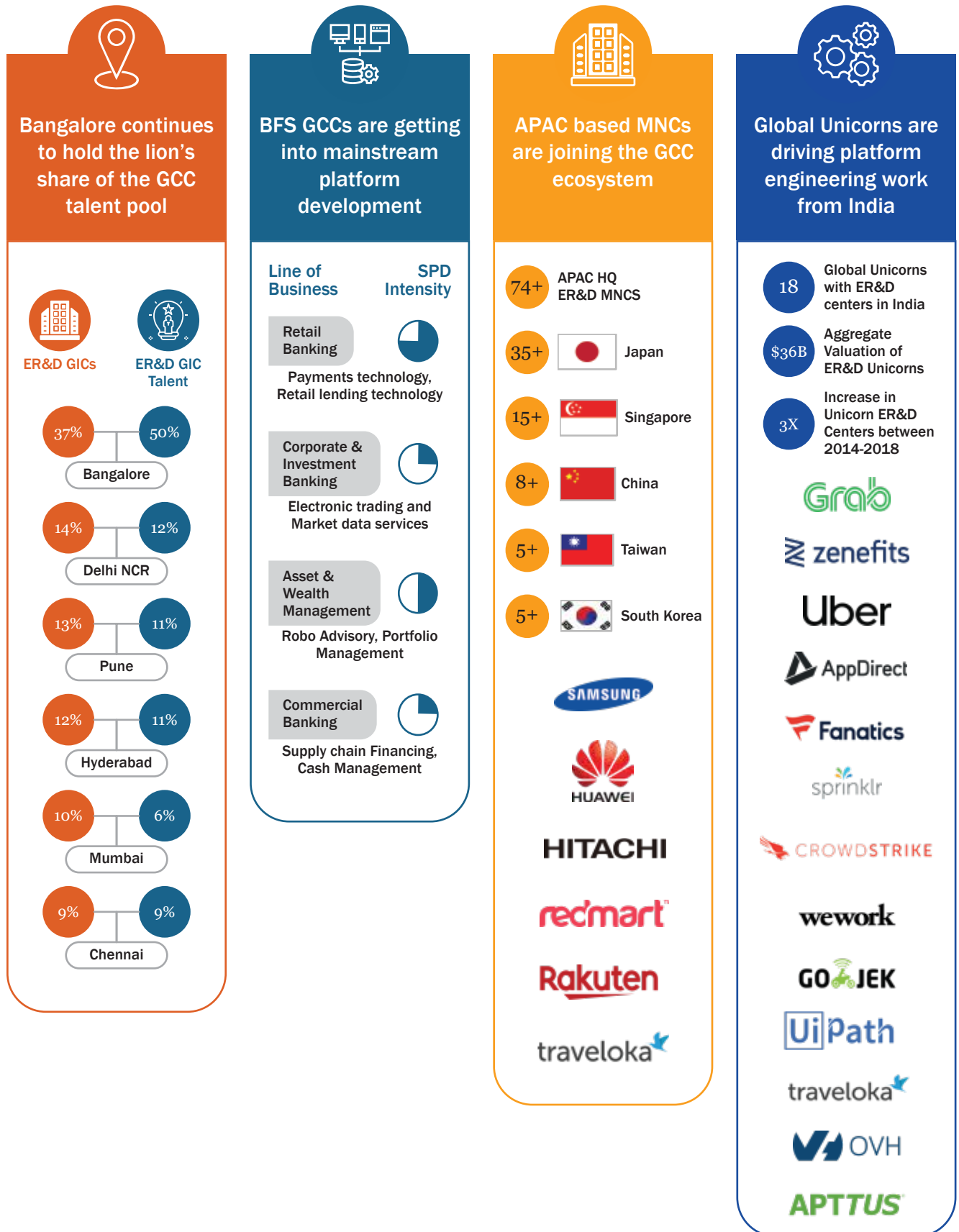
Services companies tracking key metrics for digital business

I



Source: Zinnov Research and Analysis

India has a base of over 1,250 GCCs setup by 900+ MNCs








Notes: GCC = Global Capability Centre

Source: Zinnov Research and Analysis

Indian GCCs are driving innovation for Indian and Global markets

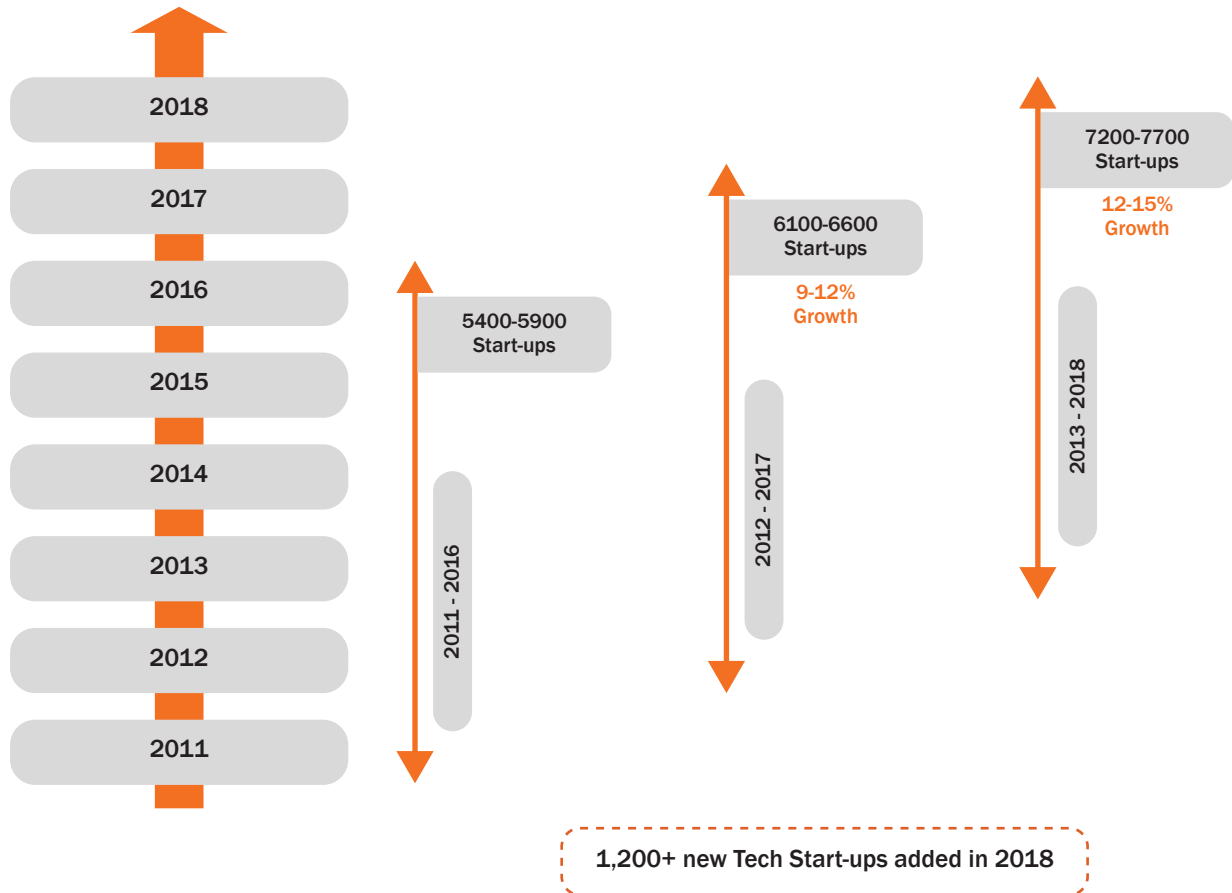
II

			
<p>Driving Innovation for global product from India</p>	<p>Reverse Innovation for developing local solution</p>	<p>Effective Mobile only Productivity solution</p>	<p>Engineered to thrive in emerging</p>
<p>Vmware with over 5,000 employees in Bengaluru and Pune is driving its core product R&D function from India</p>	<p>Philips' Efficia ECG100 device for Healthcare industry was developed end-to-end by the Philips Innovation Campus, Bangalore</p>	<p>Kaizala, a 'made in India' app designed for large group communications and work management even for remote locations with 2G optimisation. The idea was conceived from "Microsoft Garage"</p>	<p>Uber launched its Uber Lite Mobile app which was developed completely in India. The app was developed to support users with older phones and consumed 85% lower resources</p>
<p>Product R&D</p> <ul style="list-style-type: none"> India operations already help build and support every single product built by the company <p>Growth Plan</p> <p>Plan to invest USD 2 billion in India over next five years</p> <p>They aim to leverage three key areas in the ecosystem</p> <ul style="list-style-type: none"> Vendor partners Local universities Local start-ups Acquisitions 	 <ul style="list-style-type: none"> Philips identified the need for a frugal engineering approach to build solutions for local markets such as India A scalable solution which can send ECG to any off-the-shelf tablets/ smartphones Developers from India and China team collaborated to build the solution while Manipal hospital selected as a domain expert 	<p>Post success in India, Kaizala is being taken globally across emerging and developed markets</p> <ul style="list-style-type: none"> 1000+ Indian Org users just under a year Commercially available across 28 markets Supports over 18 languages Consistently adding new features such as Me Chat, Voice Chat, Web App support, etc. 	<p>Development Process:</p> <p>The Uber's Global Access Team executed extensive research to understand customer expectations in various emerging markets</p> <p>Current Status:</p> <ul style="list-style-type: none"> Uber Lite now available across 14 countries Available in 3 languages Already has 2.5 Mn+ downloads 1.6 Mn+ rides through the app in first 6 months

A whole new breed of Unicorns emerging out of India

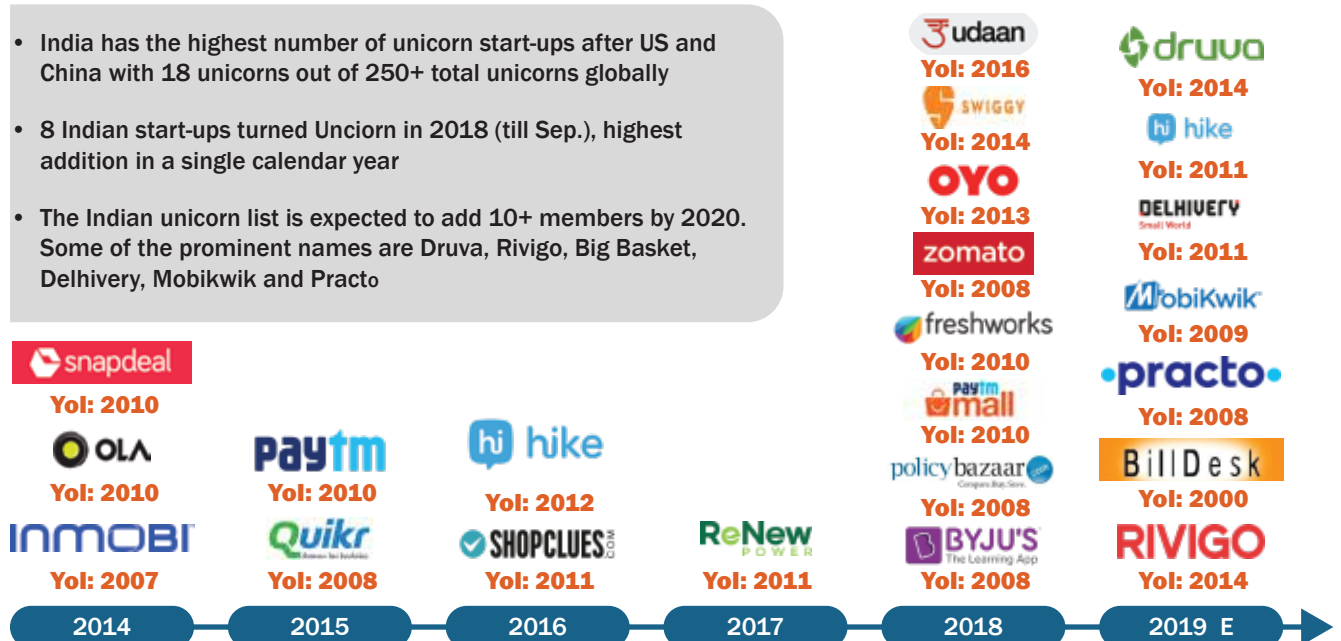
III

India Start-up Ecosystem



Growth of Unicorns in India

- India has the highest number of unicorn start-ups after US and China with 18 unicorns out of 250+ total unicorns globally
- 8 Indian start-ups turned Unicorn in 2018 (till Sep.), highest addition in a single calendar year
- The Indian unicorn list is expected to add 10+ members by 2020. Some of the prominent names are Druva, Rivigo, Big Basket, Delhivery, Mobikwik and Practo







Note: YoI is Year of Inception

Source: Zinnov Research and Analysis

Evolved Indian companies building products for India and Global markets

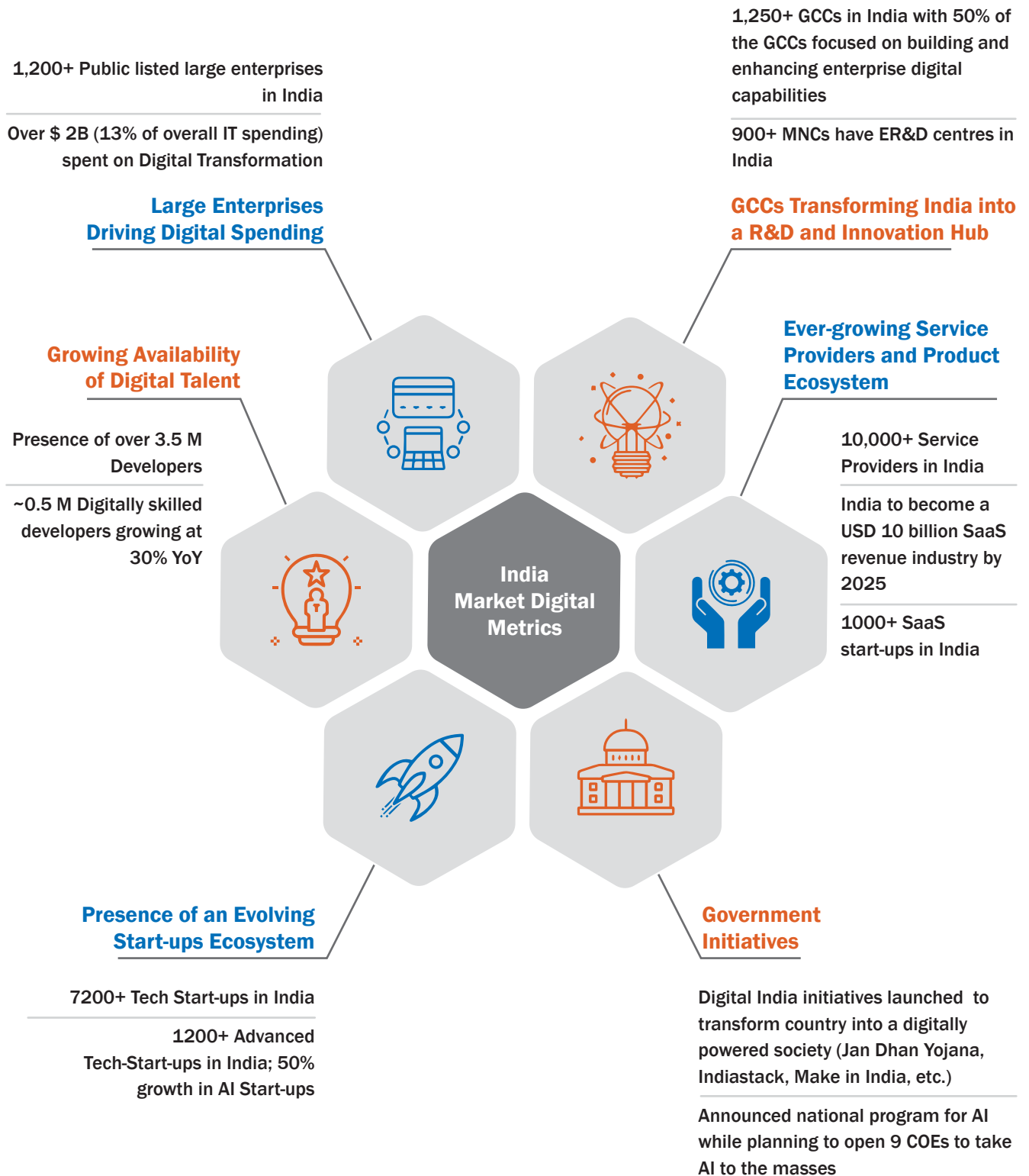
III

				
	<p>Inception Year 2005 HQ - Chennai</p> <p>Pushing through campaign “Made in India. Made for the World“. Has over 40+ applications under its Zoho One Cloud Suite</p>	<p>Inception Year 2008 HQ - Bangalore</p> <p>Prime focus was to address the biggest challenges that consumer brands were facing and offer them a 360 degree view of customer</p>	<p>Inception Year 1992 HQ - Chennai</p> <p>Part of the Ramco Group, it was spun off in 1997. Provides enterprise software in 3 categories - HCM, ERP and Aviation MRO</p>	<p>Inception Year 2012 HQ - Hyderabad</p> <p>The company identified the whitespace that occurred in availability of a solution able to manage end-to-end customer engagement</p>
Global Market Focus	<p>Relying heavily on AI to enhance its products for developed global markets. Working with partners in specific vertical segments and enabling them to resell customized versions of Zoho (Partnered with Kava CRM, an Australian software company)</p>	<p>Launching new locations solutions powered by AI/ML to expand into markets such as Thailand, Philippines and Turkey. Launched “Store Sense” for China market</p>	<p>Ramco’s HCM solution is being adopted globally across geos such as Australia, Europe, Middle East, etc. The MRO solution is used by leading private and public sector organizations in US and other countries</p>	<p>Focus on US and European markets and has them actively enhance their product features (Live Chat, GDPR Compliance, Automation, etc.) while adding integration capabilities with several other solutions</p>
India Market Focus	<p>India focus - India emerging as a major focus area for Zoho as a next potential market for customer base</p> <p>Launched Zoho Finance Plus, a GST compliant solution in 2017 to target Indian businesses</p> <p>Offer bundled solutions (Payments) targeted to empower the SMEs in India</p>	<p>Focused on expanding footprint in the CRM space in India. Bought minority stake in Noida based Exclusife, a provider of mobile first CRM solution for SMB retailers</p>	<p>Customer such as Indian Airlines and GoAir for Ramco’s MRO software. 20% of Ramco’s overall revenues come from India</p>	<p>The product was initially tested out in-house and on Indian clients with an intention to support the entire customer lifecycle of an SMB customer. Post product enhancement through extensive customer feedback sessions, they started marketing it globally</p>

Notes: HCM – Human Capital Management, ERP – Enterprise Resource Management, MRO – Maintenance, Repair and Overhaul

Source: Zinnov Research and Analysis

Digital Metrics: India as market scaling towards Digital maturity





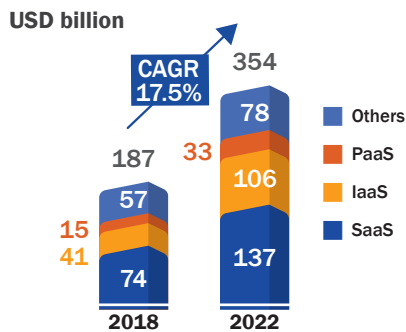
IT-BPM Sector in India 2019

Emerging technologies- Hype Vs Reality

Cloud Computing

CLOUD
COMPUTING

Global Cloud Computing spending to almost double by 2022



Industry Trends

- 90% Fortune 500 using cloud
- Growth of Cloud in Future Tech. (AI, ML etc.)
- Edge Computing taking firm shape

IaaS Spending

- IaaS spending is estimated at USD 41 Bn. (2018) and projected to grow at 25.5% p.a. to reach USD 102 Bn. in 2022

Preferred Delivery Mechanism

- High-power solutions such as Big-Data, Analytics, Machine Learning, Artificial Intelligence are emerging to be delivered through Cloud
- Agility in capacity enhancement as well as user licensing allowing businesses to deploy resources as required

MARKET ADOPTION

- New age companies are driving cloud adoption by adopting cloud first strategy and setting example for others to follow suit
- Cloud adoption levels are high for few industry verticals e.g. IT/ITeS, Communications, Media & Internet enabled companies
- Cloud systems is the obvious choice for handling large quantities of data hence drives adoption
- Distributed systems leading to higher demand for low/medium capacity cloud computing resources like distributed ledger, crypto currency etc.
- Hybrid cloud adoption saw a big rise in recent years, expected CAGR of 17%
- Cloud security becoming priority to safeguard and protect application data, infrastructure

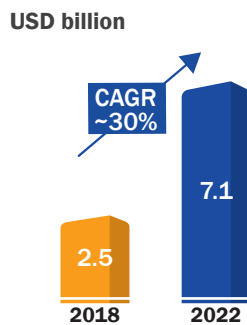
GROWTH DRIVERS

- Newer data types like video, voice etc. require computing resources near the end consumer
- Increased computing capabilities allows analysis of large quantities of data
- Higher computing capabilities allows to derive insights and acquire capabilities to forecast future actions

Source: Analyticsindiamag, EY Report, Businesswire, Gartner, techcircle, Zinnov Cloud Report

Cloud Computing India Scenario

Indian cloud market dominated by SaaS (39%) and IaaS (39%), has significant scope for growth



IaaS Spending

- Indian IaaS spending is estimated at only USD 1 Bn. (2018), forecasted to grow at 25% p.a. to reach USD 2.3 – 2.4 Bn. in 2022

Government Support

- GoI, NTP 2018 stated the vision for Cloud as 'Establish India as a global hub for cloud computing'

Emerging Areas

- Growing opportunities from world IT outsourcing market, increased awareness of cloud computing benefits, consumerization of IT, requirement of agile IT spending, proliferation of start-up ecosystem

MARKET ADOPTION

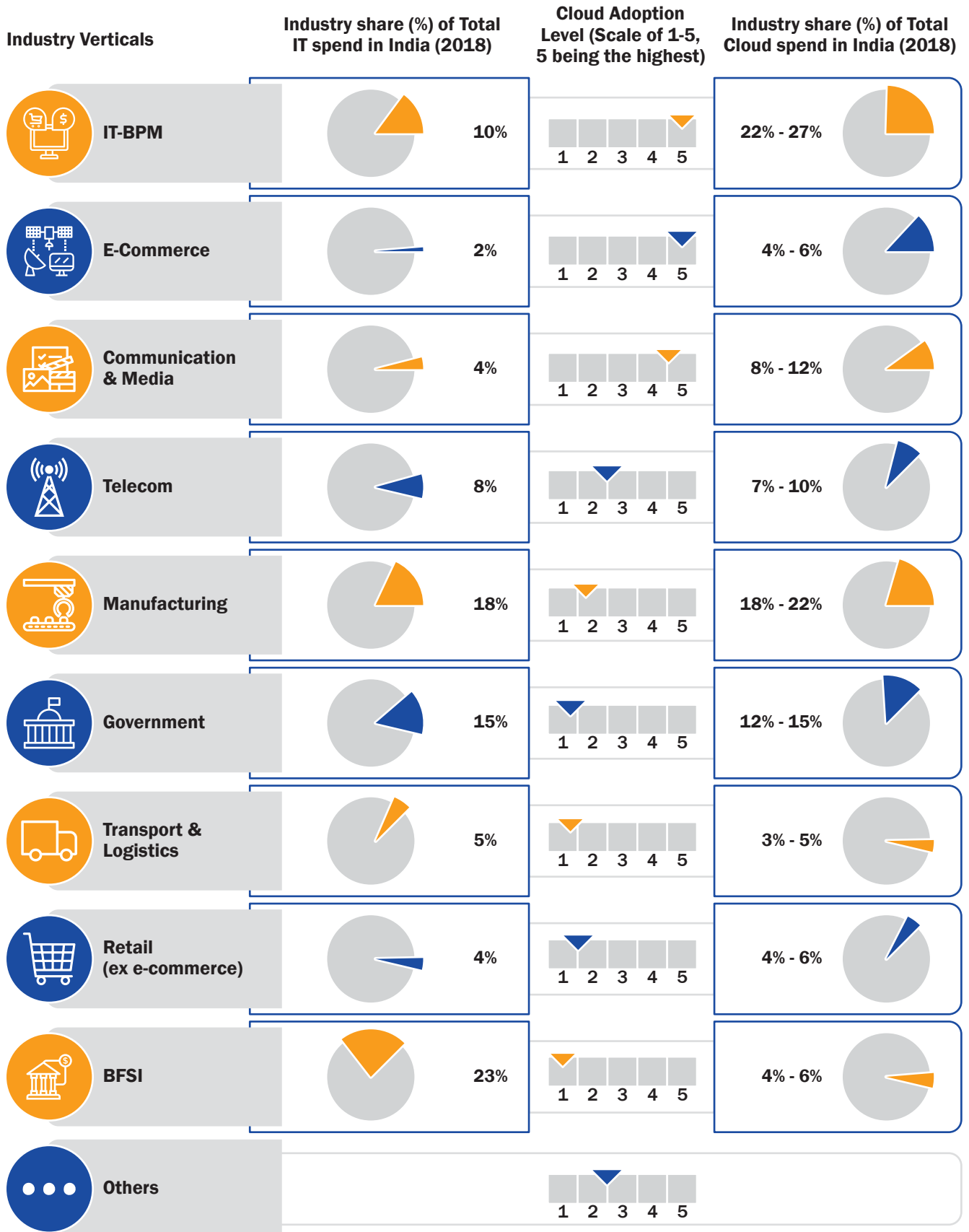
- Growing opportunities from world IT outsourcing market
- Increased awareness of cloud computing benefits
- ~30% y-o-y increase in public cloud services market in 2019
- Public cloud adoption is gaining momentum across leading verticals like IT/ITeS, Manufacturing, BFSI etc

GROWTH DRIVERS

- Requirement of agile IT spending
- Proliferation of start-up ecosystem
- Mature customer service and the Government initiatives

Demand Side Adoption

Cloud adoption levels are high for few industry verticals e.g. IT/ITes, Communications, Media & Internet enabled companies...



Source : NASSCOM Cloud Report, Gartner Verticals_Forecast_WW_2018Q1, Deloitte Analysis

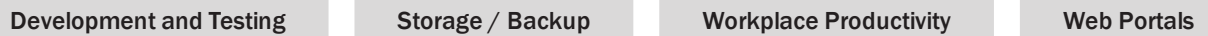
Cloud entering into Enterprise Business Operations

Processes



Cloud adoption is highly visible in multiple enterprise processes for faster and better management of workflow

Workloads



Workloads on cloud consists of transactional, analytical, high performance and database which require complex handling and real time computing

Use Cases



A US-based pharmaceutical company with a presence in more than 50 countries

Unified cloud infrastructure enhances digital marketing

Infosys cloud platform ensure 99.95% availability of the digital marketing infrastructure

Reduce time-to-market for new websites from six weeks to one week



A third-party logistics service provider with more than 120 locations in 20 countries

Remote office backup and recovery

Integrated management of the entire server backup and restore process across remote sites

Privacy controls to enable compliance with regional data protection regulations

Performance optimized for the cloud with transferring of data efficiently with minimal network impact



Manage and run the applications and infrastructure on AWS with Wipro's AWS Managed Services portfolio

Wipro's MFTaaS SaaS Platform Enables Connected Digital Enterprises on AWS

BoundaryLess Datacenters (BLDC) is a completely reimagined data center services framework to build, optimize, automate and manage data centers on AWS

The Digital Services Hub enables enterprises to consume an increasing diversity of Cloud services from different technology providers

Some Cloud Service Offerings by Indian Firms

Illustrative



Cloud Advisory and Strategy

- ~30% per annum YoY cost saving using relevant cloud deployment
- Developed a re-usable quantitative assessment and ROI model
- Create a re-usable framework for cloud assessment



Migration Implementation Support

- Increased productivity by moving to cloud
- Cloud hosting solution reduced operational costs by more than 30%
- Cloud infrastructure enabled rapid provisioning/on-boarding of business applications



Cloud Orchestration

- Orchestration platform to better manage public cloud infrastructure
- Reduce infrastructure cost by 40% by integrating virtual infrastructure
- 200% performance improvement by boosting life cycle of software applications



Cloud Native

- Created unified services platform and ONE delivery pipeline
- Establish carrier-grade containerized and serverless adoption platforms
- Setted up integrated data platform through agile analytics methodologies



Cloud Based Architecture

- Choosing configurations that address their targeted requirements and preferences
- Easier implementation and execution of disaster recovery services



Managed Security

- Offer unified control of distributed IT resources
- Combine multi-factor authentication protocols and role-based access control systems



Workload Assessment

- Select application for migration based on complexity, business value and sensitivity
- Select cloud destination based on application performance in different cloud environment




Cloud Management Platforms: A focus area of major cloud system integrators globally

90% of Cloud System Integrators investing in Cloud Management Platforms

CMP Feature Offerings

Automated provisioning	Predictive spend analytics	Metering and chargebacks	Contract management
Multi-cloud orchestration	Cloud service catalogs	Cloud brokerage	Monitoring and SLA management

CMP Products by Cloud SIs

Cloud SI	Developed in-house tools/platforms	Cloud SI	Developed in-house tools/platforms
	Accenture Cloud Platform (ACP)		NTT Cloud Management Platform
	Cloud 360		TCS Cloud Exponence
	MyCloud		Appirio Cloud Management Center
	IBM Cloud Brokerage Managed Services Store		Digi Hybrid Cloud Service Platform
	Infosys IMS Suite		Hybrid Cloud Management Platform

Cloud SI acquisitions for cloud capabilities



Source: Avasant Hybrid Cloud Radarview Report

Cloud Computing Outlook

Business Outlook

At an expected growth rate ~30%, India cloud market is expected to touch USD 7 Bn.+ i.e. 3-times of current levels

- Cloud spending in India expected to touch USD 2.5 Bn. by end of 2018, and only 1.3% of global Cloud spending
- Additionally, in 2018, Cloud spending is expected to be ~5% of the total IT Spending
- Growth rate of Cloud spending in India is 2nd highest in the world at 40.2% (CAGR) over 2016-18, second only to China
- Over 13% of India's workloads are expected to be moved to cloud driving up the adoption of cloud

Export Outlook

- The IT Exports market of India is expected to be buoyed by the consistent growth of cloud adoption globally
- Sectors such as SaaS are already driving the fastest growth in Packaged Software (Growth at 7.7%)
- Emergence of BPM products and services for the overseas clients of Indian IT Export firms, such as Robotics Process Automation, Chat Bots, Analytics etc. have created a surge in Cloud-based Solutioning as a preferred delivery mechanism
- Key segments identified for growth of Indian IT Exports remain Cloud (and software driven infrastructure)
- Transition of on-premise to on-cloud solutions as a means for enhancing value-added delivery to overseas enterprises

Providers focus areas for strategic investments to drive growth in India



Infrastructure

With increased demand for Cloud services in emerging markets, such as India, global and domestic CSPs are driving investments in R&D, Data Center Setup in focus areas etc.

CtrlS

netmagic
An NTT Communications Company

ZOHO



Talent

With increased demand for Cloud services in emerging markets, such as India, global and domestic CSPs are driving investments in R&D, Data Centre Setup in focus areas etc.

aws

Microsoft

G PLURALSIGHT



Partnership

CSPs are rapidly investing in strategic partnerships to acquire next-gen digital capabilities creating a focused COE and invocation hubs

Alibaba Cloud
Paytm Cloud

Azure
Walmart

amazon web services
HCL



Investments for Cloud Growth

Investments in the sectors such as SaaS are leading to the hyper-rated growth of the companies, backed by a strong offering and customer base

freshworks

BrowserStack

Chargebee

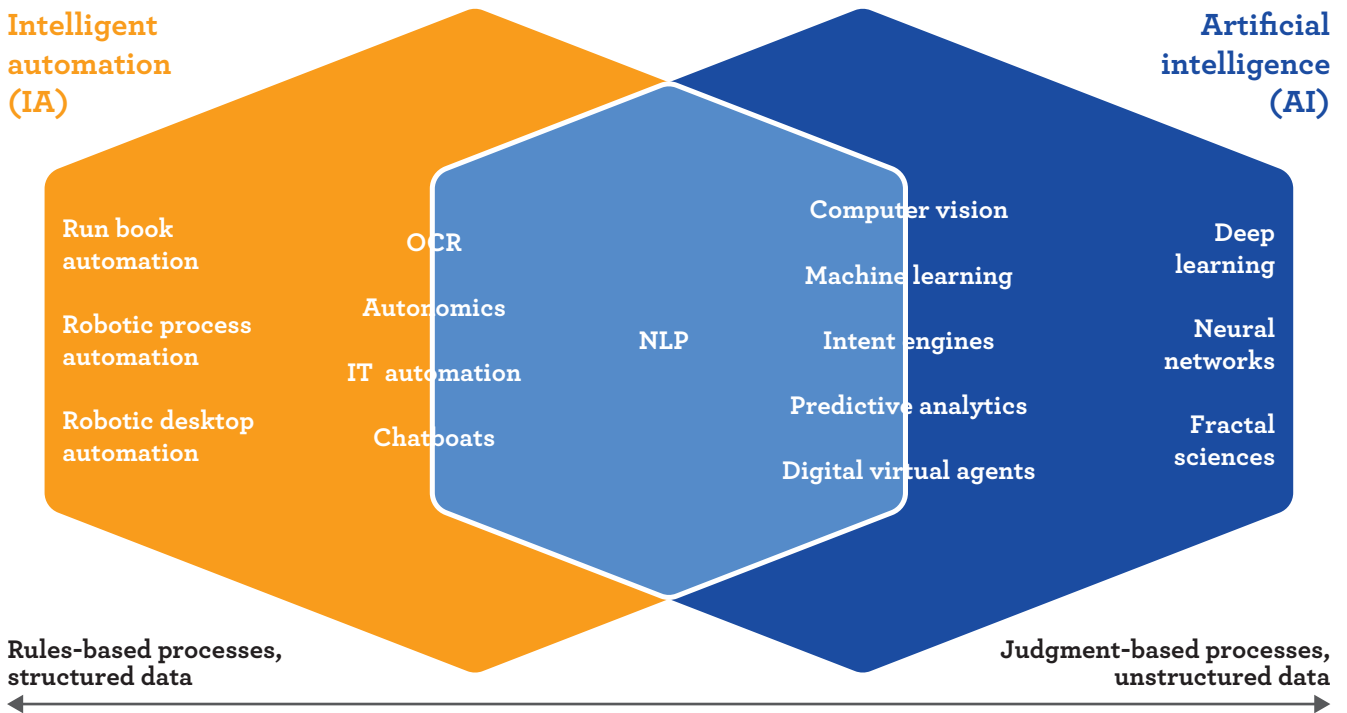
Intelligent Automation (IA)

Shift from basic process automation to cognitive automation

Cognitive technologies are leading to a shift away from traditional drivers such as cost reduction and efficiency gains, towards value-centric drivers such as compliance adherence, improved customer experience, autonomous processes, etc.

Intelligent automation (IA)

Artificial intelligence (AI)



Key Players

Illustrative

accenture

- Enterprise-wide automation platform and RPA solution

Capgemini

- Automation suite for prescriptive incident resolution, AI-led virtual assistant, service desk self-learning tool

Cognizant

- Suite of automation tools, data science machine learning as-a-service platform, virtual assistant with natural language capabilities

TATA CONSULTANCY SERVICES

- Neural automation platform for IT operations for enterprises
- Tools for robotics and human collaboration

NTT DATA

- Data intelligence and prediction engine
- Cognitive automation for document analysis
- Real-time bot performance monitoring

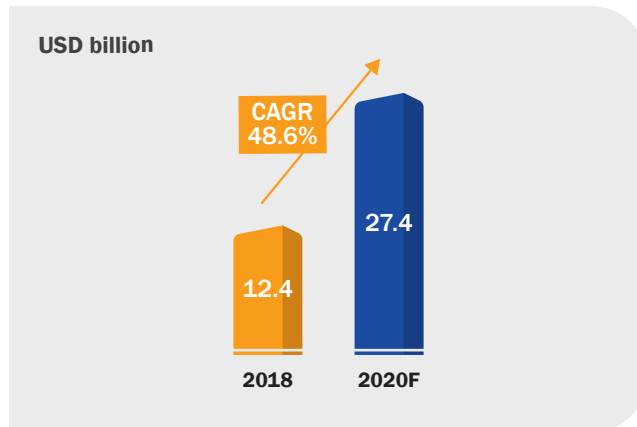
genpact
Transformation Happens Here

- AI-based platform for digital transformation and RPA platform

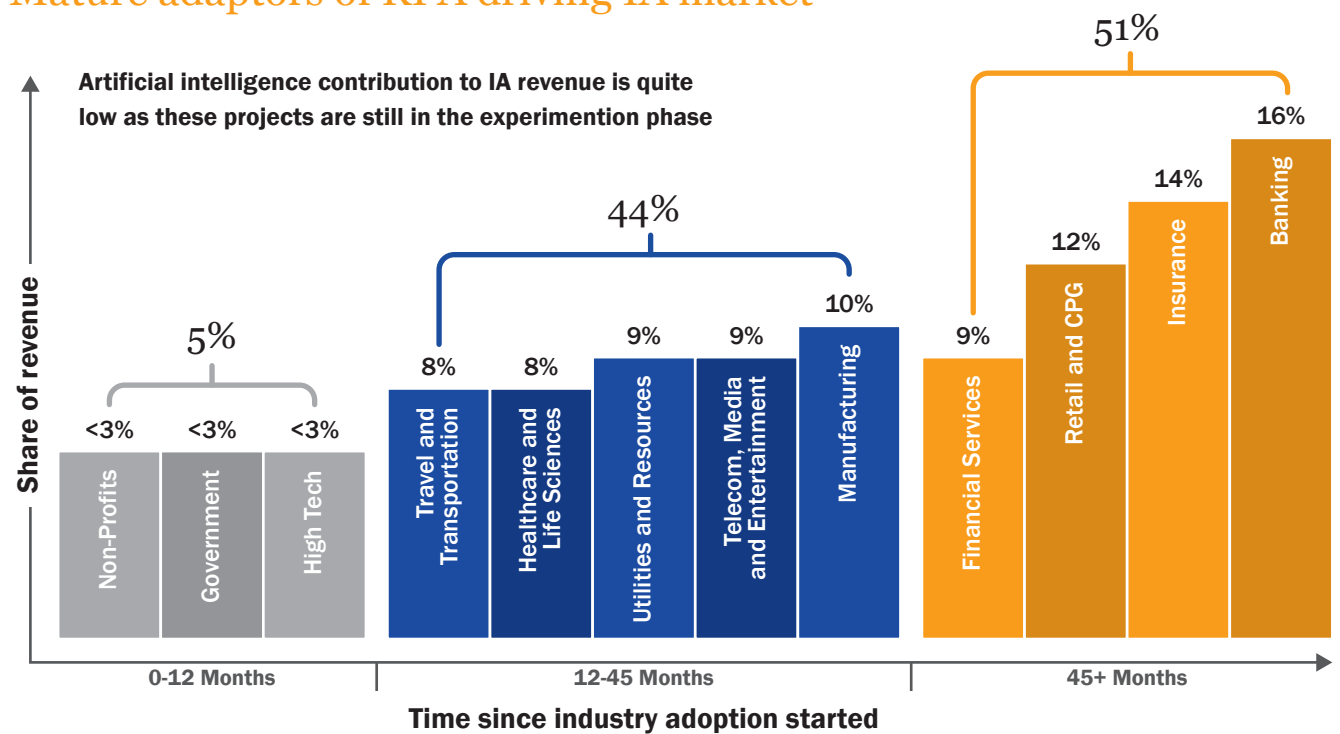
Source: Avasant

Global enterprises' investment in IA is on the rise with BFSI, Retail and CPG being the key driving sectors

IA Market on the Growth



Mature adaptors of RPA driving IA market



Key Trends

Enterprises with mature RPA engagements have started AI-enablement of business processes, with 40% of RPA adopters moving beyond experimentation with AI-enabled processes

AI-enabled chatbots, virtual assistants, are being used widely, while ML, predictive analytics and autonomies are moving up the maturity curve

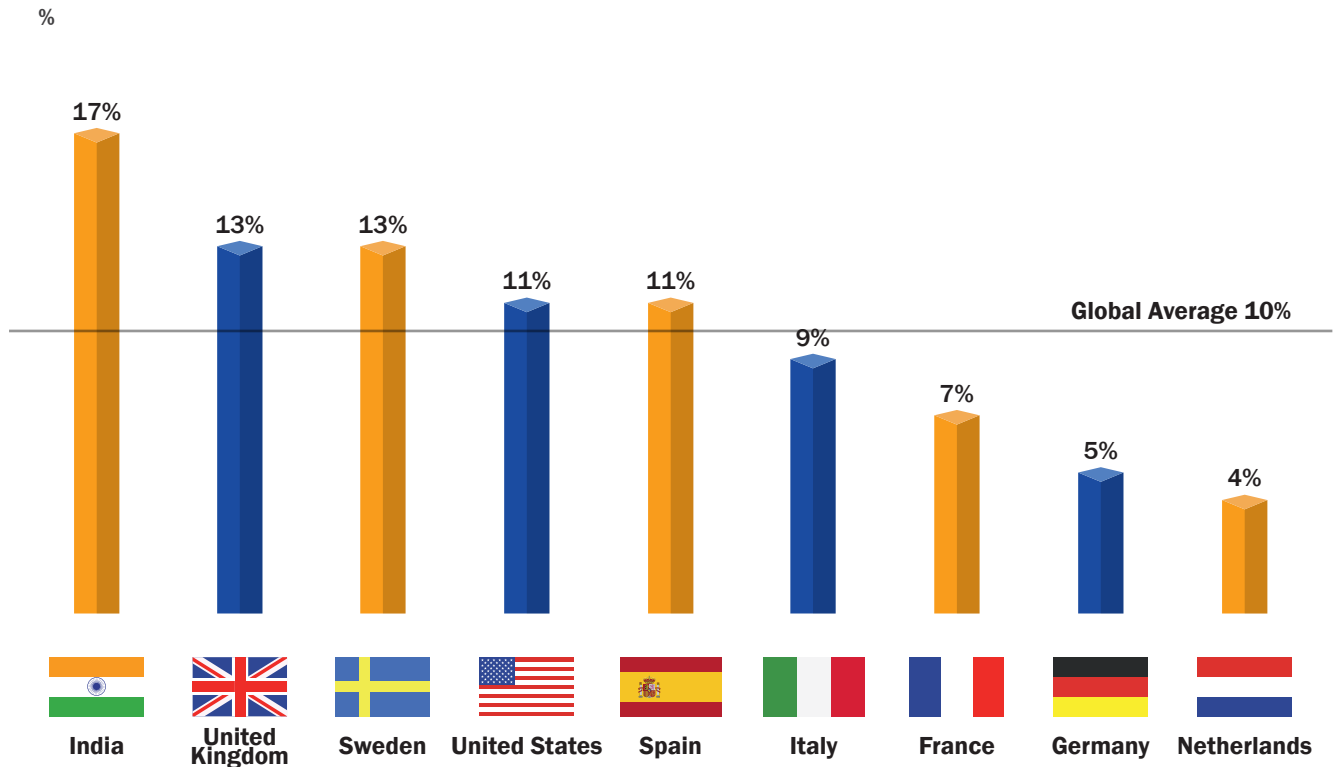
Enterprises are building in-house automation teams by creating new IA roles to strengthen their automation ecosystem

On the other hand, service providers are investing in in-house automation and AI tools; as well as partnering with RPA tool providers and training resources on third party tools

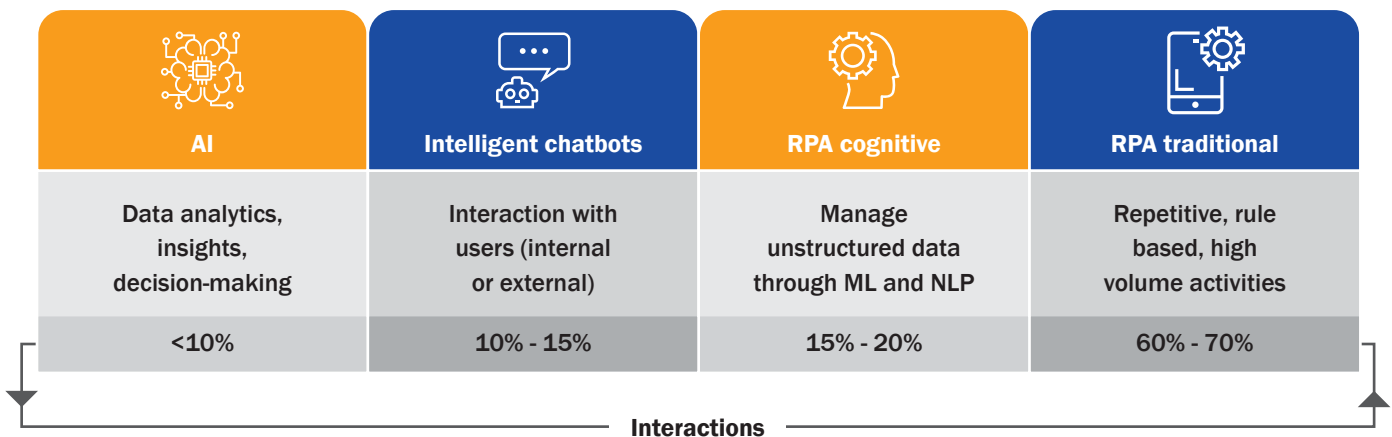
India on the growth trajectory to be a global leader in automation...

India leading the way in automation deployment

IA Implementation by Country



Volume of Enterprises' Robotized Process Activity



According to a research conducted by Goldsmiths, University of London, and Automation Anywhere, India leads developed countries such as the US, the UK and Japan in terms of deployment of AI-based and RPA-based technologies, especially in BFSI and manufacturing sectors

...with companies leveraging advanced analytics, computer vision and NLP for automation



Advanced Analytics

Personalized communication, customer content analysis, skill mix analysis among key focus areas



File suspicious transaction for fraud detection by using unstructured data pre-processing and similarity analysis-based AI techniques



To reduce time between diagnosis and intervention, used AI and ML concept to mimic what a cardiologist does after looking at an ECG scan



Created a scalable and self-service platform to run analytics on connected vehicles to understand vehicle usage patterns and reduce warranty claims



Computer Vision

Image based screening processes are increasingly used for faster and efficient output and anomaly detection



To remove subjectivity in physical quality standard check process, AI based inspection system was used for automated and strategic outputs



Provided an automated identification of defect type, damage counts and severity using drone images for casualty insurance sector to access roof top damages



Created an image classification, segmentation technique to provide accurate damage estimates through images of damaged vehicles



Natural Language Processing

Localization and mixed language use cases key focus areas for NLP solutions



Implemented NLP to automate manual effort of processing large information about investible companies and professionals, to manage corporate governance issues



Created a NLP-based Geocoding technique to code addresses corresponding to route number, replacing the manual shipment processing which has a high error rate



Created a NLP-based system to generate report and product heatmap on any company under a minute, replacing the need for large team of analysts

Indian technology companies leveraging new investments as well as partnerships to strengthen IA capabilities



Partnerships

Partnering with RPA tool and other technology vendors as well as start-ups

Illustrative

Indian tech companies partnering with RPA providers



Cognitive tool vendors, the next level



Start-ups for niche technologies



Intellectual Properties

Strengthening in-house AI-based platforms by building new technologies

Illustrative

Indian tech companies building AI-based platforms



Investments to access niche technologies



Innovation Labs and Academic Collaborations

Creating labs and collaborating with academic institutions to drive innovation

Illustrative

Innovation labs - Creating solutions based on new technologies

NTT DATA

IA lab focused on AI, OCR, text mining, process mining, chatbots and cognitive automation

TATA CONSULTANCY SERVICES

Analytics and automation labs focused on proprietary platforms and tools

Collaborations with academic institutions for R&D focused on various IA technologies



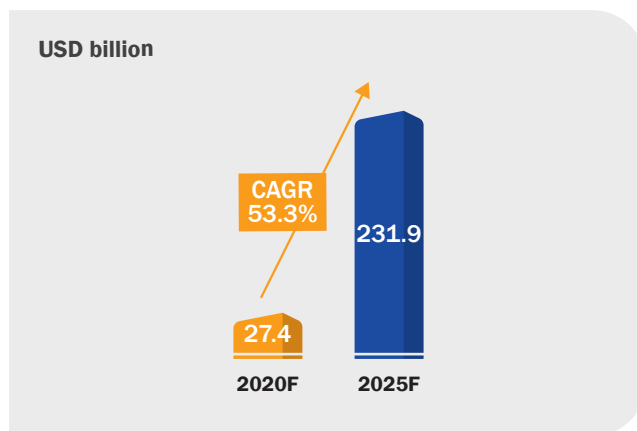
Going forward, value-centric activities to gain mindshare as cognitive technology deployments mature

Going forward, combining cognitive technologies would allow bots to work within more complex scenarios that would typically require human judgement or decision making

As RPA becomes a foundational tool for digitizing processes, it is expected to deliver higher business impact by coupling automation with cognitive technologies

IA market is expected to witness continued growth driven by increasing application across sectors

IA Market Forecast



BFSI

Reconciliation management system using machine learning for a bank
Automated service request framework for seamless user on-boarding experience for an insurance company



Retail and Manufacturing

Machine learning and computational linguistics to automate the review and processing of transportation contracts



Food and Beverage

AI-enabled classification and resolution of high-volume IT infrastructure tickets for a multi-location food service distributor



Healthcare and Life Sciences

Automated medical summarization using text analytics, machine learning and NLP to improve accuracy of clinical decision making and medical information extraction



Travel and Transportation

Dynamic workflows and AI across multiple business group and functions
Bots to manage client queries, facilitate additional bookings and special requests



Telecom, Media & Entertainment

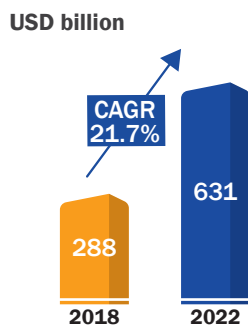
Robotics program delivering assisted (SAP activation, workbench, order to activation flows etc.) and unassisted (order entry, provisioning and cancellation) automation

Internet of Things



Driving Business Value

IoT Global Market size expected to double by 2022



Key Trends

- **Artificial Intelligence**
 - Connected things market to reach USD 25 billion by 2021, >31 billion connected IoT devices in 2018
 - IT vendors to invest heavily in AI
- **Technological Shift**
 - Moving from centralized to cloud edge architecture
 - New IoT user experiences requires new IoT designing
- **Sensor Applications**
 - Sensor market on the rise worldwide is expected to grow at CAGR of 24% till 2025
 - Affordability due to drop in prices
- **Chip Advancements**
 - Moving from conventional processor chip enabling new edge architecture
 - New chip to support capabilities like data analytics with sensor and speech recognition

MARKET ADOPTION

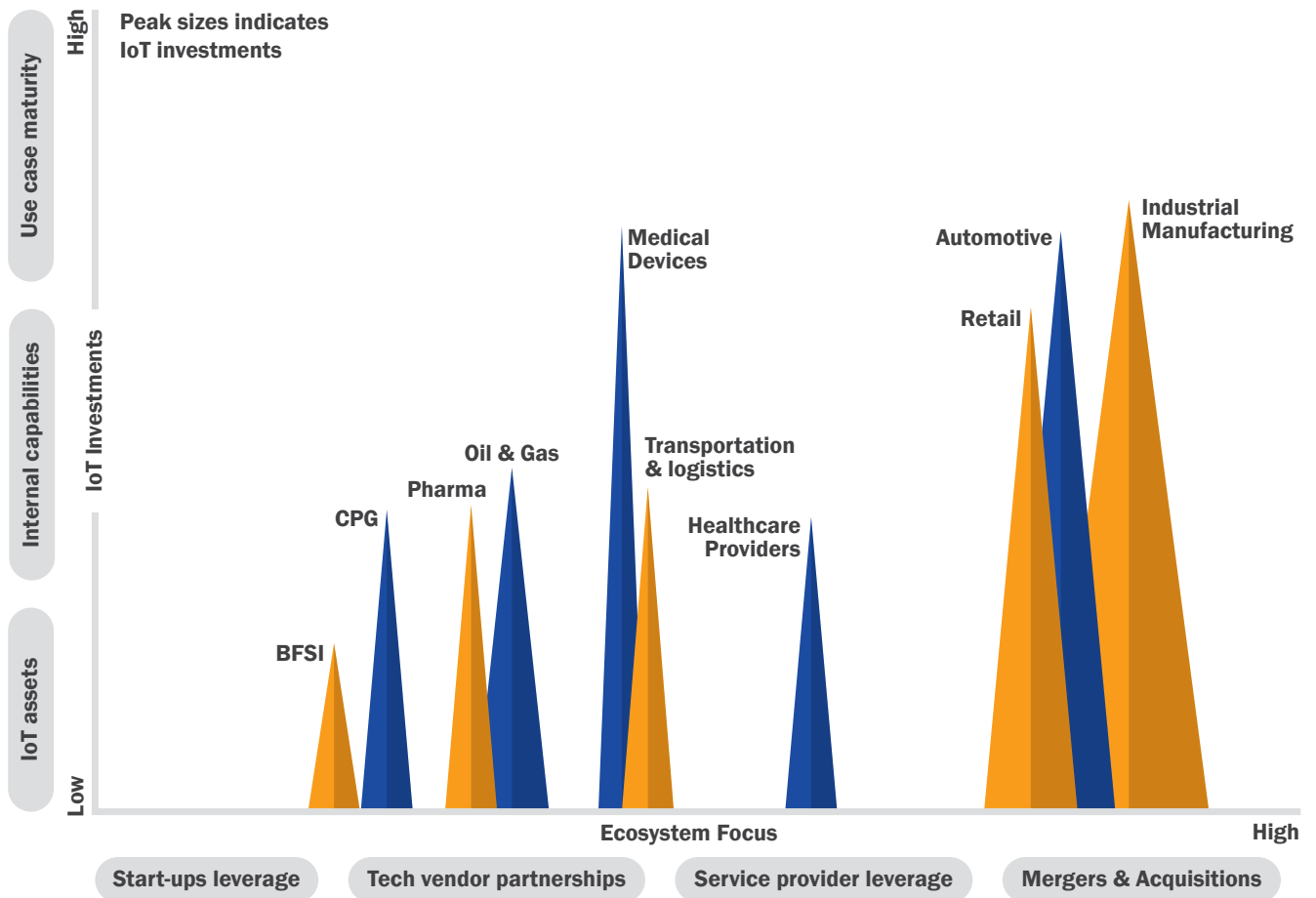
- Spending in IoT Technology Services growing faster than IoT products
- Cloud Service providers, analytics and infrastructure providers are driving the IoT solutions market
- Only 30% of enterprises that have launched pilots for IoT products and services have taken it to the next level
- Enterprises are implementing platforms that are compatible with technologies offered by external partners
- Security remains as the key concern for faster adoption of IoT solutions

GROWTH DRIVERS

- 5G roll-out and implementation
- Technologies maturing platforms, edge computing, blockchain, cyber security
- Focus on business value in key verticals

Source: Analyticsindiamag, Businesswire, Gartner, Globalnewswire, Grandview Research, EY Report, Bain, McKinsey Forbes, Hiotron, Techcircle, Zion Market Research

Industrial Manufacturing, Automotive and Retail sectors are driving IOT investments



Healthcare

- Remote patient monitoring
- Connected machine-to-machine (M2M) systems
- Hospital deployments of intelligent facility management systems
- Wearables, mHealth (mobile) and other health tracking applications

Retail

- Optimization of logistics and supply chain
- Short-range sensors such as beacons to track shopper behavior
- Using analytics to assess store traffic by hours, days and weeks

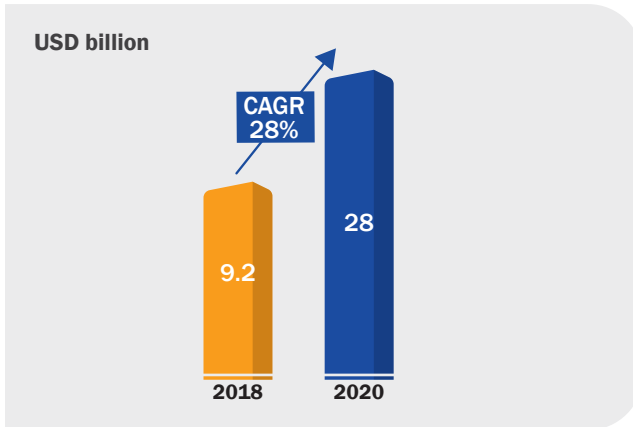
Connected Cars

- Connected infotainment systems that work with smartphones
- Remote maintenance alerts
- Ability to lock and unlock vehicles remotely
- Navigation, safety, entertainment and more

Source: ISG Quadrant Report, Zinnov

India well poised to leverage the IoT opportunity

The IoT market in India expected to witness high growth



Key Trends

20 billion devices predicted to be connected to IoT by 2021

Industrial IOT opportunity to surpass consumer internet by 2020

Enterprises are looking for IoT solutions to address gaps in internal capabilities

Perceptions on full impact of IoT still nascent and connected to smartphones

IoT is growing at a rapid pace and its adoption is getting increased in various industries like telecom, automobiles, manufacturing, supply chain, service operations etc.

	Telecom	Narrowband Internet of Things (NB-IoT) network			
	Automobiles/Transportation	Cloud based connected vehicle technology			
	Smart Manufacturing	Predictive maintenance of machines, testing and warning systems			
	Supply Chain	Real time inventory management, order processing			
	Service Operations	Data centre monitoring, machine fleet monitoring, card payments			
	Smart Cities	Technologies and connected data sensors			

Source: Analyticsindiamag, EY Report, Businesswire, Gartner, IoTIndiaCongress, Techcircle, NASSCOM Analysis, VCCircle

Government, Industry and Startups catalyzing the IoT ecosystem



Network based guided diagnostics platform Tele-Diagnostics for Remote solutions



Aligning IoT solutions with the real-time flow of user information, so that companies can offer new types of services based on innovative revenue models



Infosys offers easily deployable solutions for enterprises that gather data from sensors to provide actionable business insights

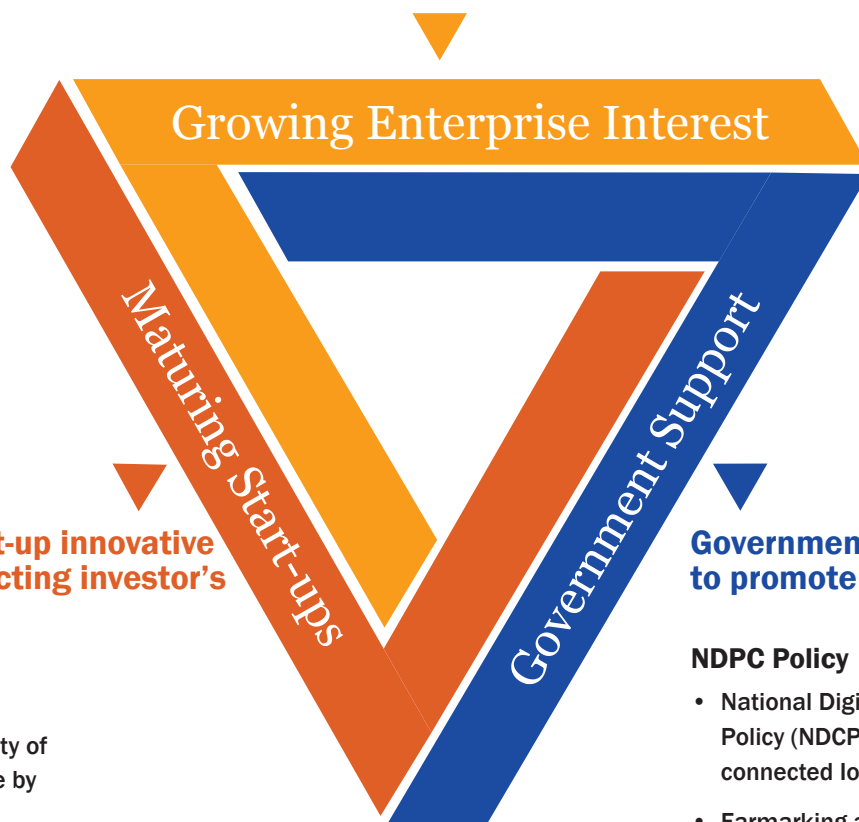


Partnerd with Samsung to roll out India's first narrowband Internet of Things (IoT) network



Focusing on NB-IoT (narrowband IoT) technology by helping the company tap into new areas like agriculture

Major companies developing IoT based solutions



IoT based start-up innovative products attracting investor's attention



Improving Productivity of Construction Job Site by leveraging IoT & AI



Offering IOT system capable of monitoring pipeline integrity at high temperatures



Identification of product damage due to mishandling and transit shock events



Protects assets from unsupervised access and theft



Connect clients field and factory assets to enable remote assessment, diagnostics, prognostics, and edge intelligence

Government continues to promote IoT

NDPC Policy

- National Digital Communication Policy (NDCP) target of 5 billion connected IoT ecosystem
- Earmarking adequate licensed and unlicensed spectrum for IoT

Budget Allocation

- Government allocated USD 480 million to promote Artificial Intelligence, Machine Learning and IoT under "Digital India" program

Infrastructure Plan

- 100 smart cities to be developed in the country
- Planned investment of USD 1 billion for smart cities

Industry investing in IoT Platforms

Platforms allows easy connectivity

Platforms allows usability, scalability, data security options, integration and interoperability

Platforms are specific to hardware, connectivity or IaaS related



Connected Devices

Tech Mahindra's telematics solution enables a leading electric vehicle OEM in India to offer engaging digital services to its consumers

IoT Platform to Connect Data

Leveraging Microsoft Azure and its specialized services for IoT to stores, manages and analyzes telemetry data from equipment and products

IoT Cloud Platform

A robust cloud platform for data storage and advanced analytics with easily scalable architecture and inbuilt device management capabilities

Use Cases

Illustrative



A Finnish cargo handling equipment manufacturer)

TCS and Cargotec co-create an IoT platform to collect, store, and analyze sensory data

Data Lake and Big Data platform, enabling storage and reporting of data in large quantities

Web portals and Business Intelligence (BI)-based reports for KPIs

Cloud-based automation, leveraging advanced Cloud PaaS services



Leading manufacturing company specialized in packaging films production

Altizon's Datonis MInt – Manufacturing Intelligence solution for analysis

Analyze critical machines parameters settings and establish a correlation with film production quality

Correlate the process and machine data with different types of quality failures

Reduce quality degradation and achieve predictable quality



A leading construction equipment manufacturer

Wipro cloud based IoT platform connect over 10,000 JCB India construction equipment machine

Allows remotely monitoring of real-time health and performance of JCB assets in the field

Ensuring operational availability of the asset

Prevents misuse and theft of assets, while allowing asset owners to enforce contract compliance

Industrial IoT adoption increasing

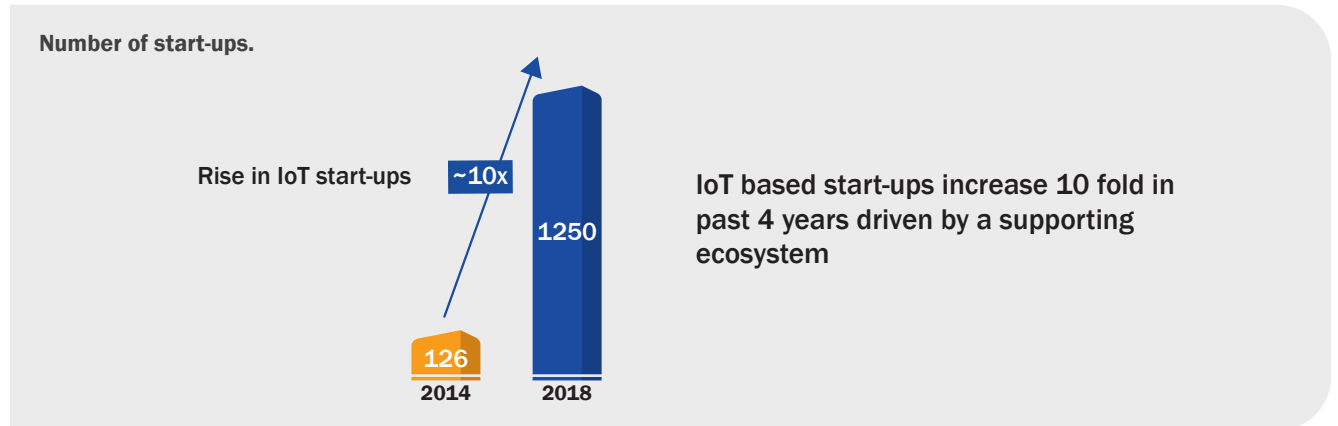
IIoT is a strategic priority for manufacturing companies as it allows them to give more value to their customers as well as improve cost-efficiency of their internal operations



Source: Company Websites, EconomicTimes, IIoT Demand Supply Report, IIoTIndiaCongress, VCCircle

Maturing IoT Startup Ecosystem

Optimization, efficiency improvement and monitoring based start-ups are thriving a lot and lead the IoT market in India



Optimization and Monitoring Solutions

Logos included: stellapps, zenatix, ecolibrium ENERGY, CYCLOPS™, COVACSYS, TERRABLUExT, HUG INNOVATIONS, OPEN, carsense, TYRE EXPRESS, IOTrek TECHNOLOGY, DETECT TECHNOLOGIES, TempoGO!, FACLON LABS, facilio, and TagBox.

Connected Platforms

smartron

Robotics

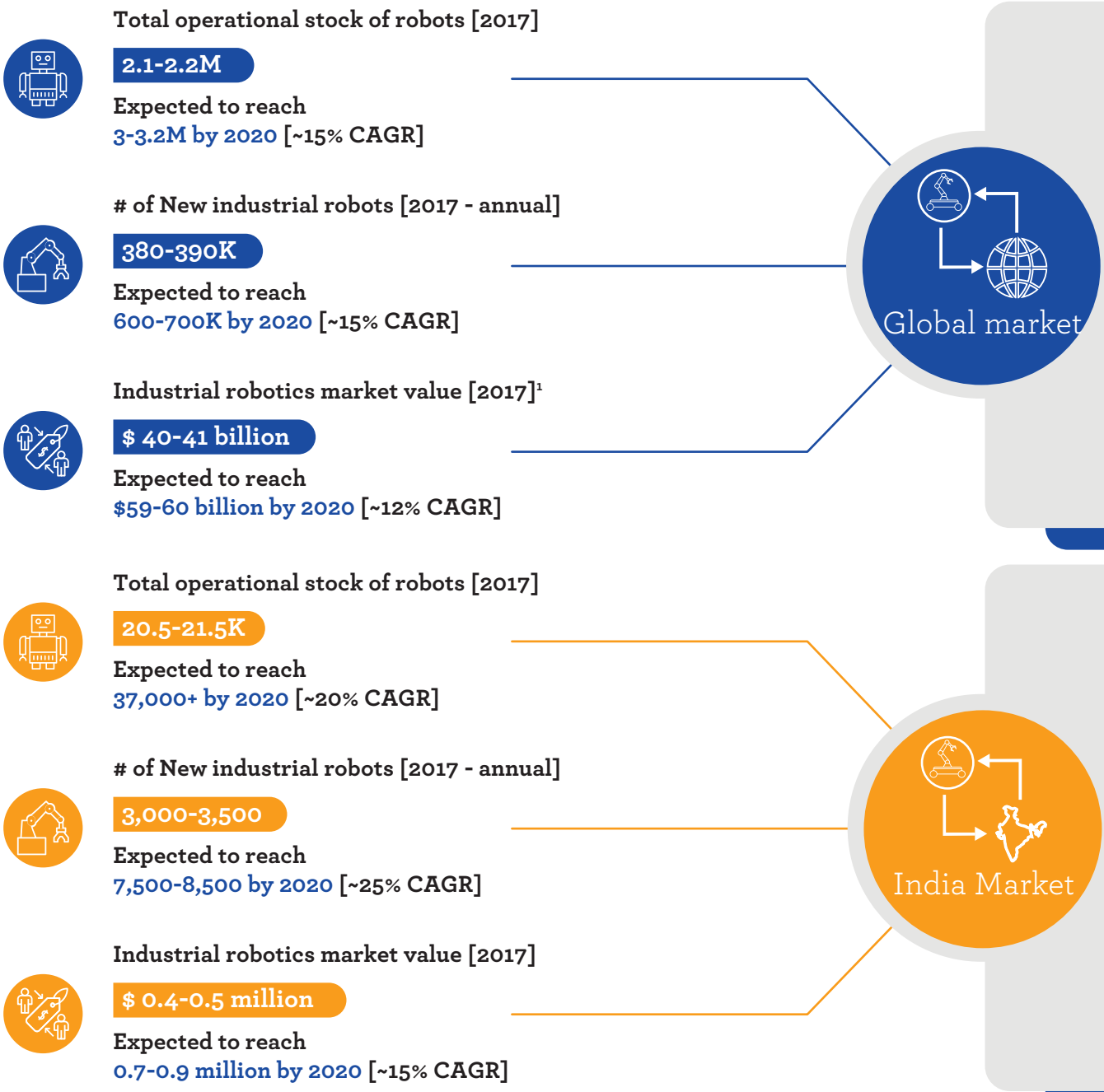
BRS BHARATI ROBOTIC SYSTEMS

Simulation and Modelling

AERXLABS

Source: Company Website, Indiaweb2, inc42, Your Story

Industrial Robotics



Globally, Asia represents the biggest market (~60% operational stock), followed by Europe (25%) and Americas (15%)

China is the biggest market for industrial robots with ~33% share of new industrial robots in 2017

Notes: 1. Market value excludes the cost of software, peripherals and systems engineering
Source: International Federation of Robotics (IFR) Report 2017, Zinnov Analysis

Industrial robotics in India: Key drivers

Reduced Cost of Industrial Robots

- Cost of industrial robots has gone down and **payback time is now around 1-2 years**
- **TAL Brabo Robots** are today available at a cost of only ~ \$ 8,000

Rise of Collaborative Robots (Co-Bots)

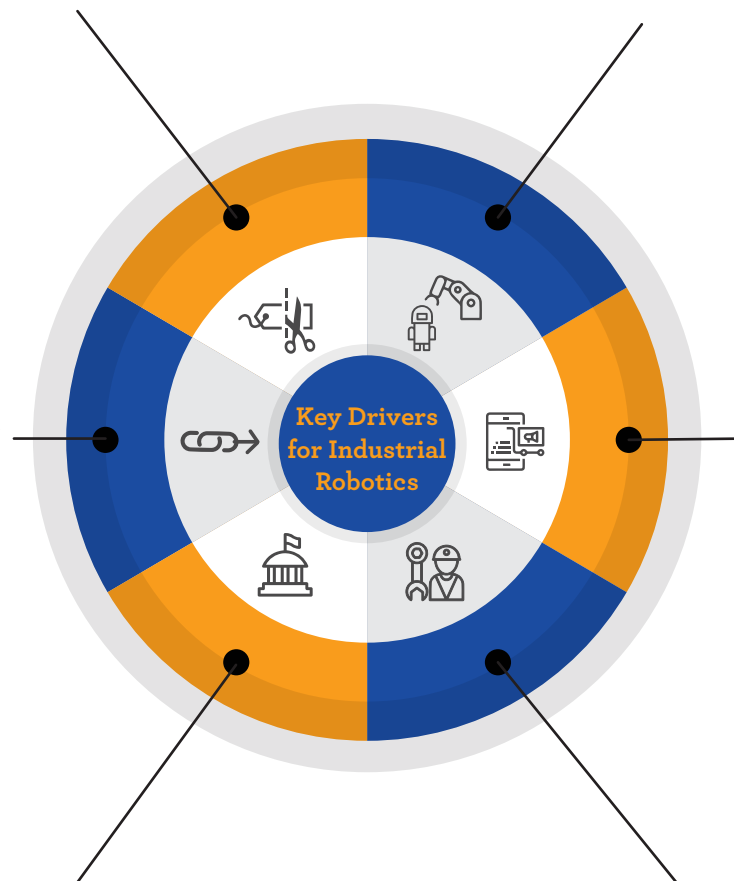
- Collaborative robots allow sharing of heavy payloads and improving cycle times achieving **optimal degree of automation**
- Universal Robots are expected to sell **1000 co-bots** within the next 5 years

Push from Original Equipment Manufacturers (OEMs) to Suppliers

- Automotive is one of the leading verticals for industrial robotics and recently **demand has been driven by tier 1/ tier 2 suppliers**
- OEMs are pushing suppliers to invest in robotics to ensure **better quality and faster production**

Growth of E-commerce

- Strong growth of e-commerce industry in India and of logistics subsequently has pushed automation to keep up with **high throughput requirements**
- E-commerce industry is expected to grow at **>30% y-o-y**



Government Schemes

- Government's **Make in India program** is expected to drive industrial robotics, with the 2nd phase having specific focus on robotics
- Various **Small & Medium Business (SMB) focused schemes** are driving technology uptake across small manufacturers

Increasing Labour Costs

- Cost of skilled labour has increased substantially in India over the last few years **improving the cost viability of robots** in industries

Industrial robotics: Use-case adoption across key industry verticals*

Segments		Use-cases	Industry Verticals					Overall Focus
			Automotive	Retail/ E-commerce	Transport & Logistics	Electronics/ Electrical	Metals	
Overall Focus								
WA Warehouse Automation	Sorting							
	Put/Pick							
	Weight & Volume Measurements							
	Packaging							
FA Factory Automation	Welding/Painting							
	Material Handling							
	Assembly							
	Finishing Operation							
Illustrative Examples								

E-commerce and Logistics driving usage of warehouse automation systems

Automotive leads in adoption of robots for factory automation

Welding/painting and Material Handling top industrial robotics applications

Robotics Adoption Intensity: Very Low/Negligible Low Medium High Very High

*Based on robotics implementation at ~50 firms across India

Source: Company Websites, News Articles, Press Releases, Vendor Case Studies, Zinnov Analysis

Warehouse Automation: Use-cases & industry example

Warehouse Automation

Sorting

**Profiling (Barcode scanning, etc.)
Sorting/ routing**

Invested ~\$ 8M in automating 8 hubs; Installed a robotic sorter at its Delhi hub that sorts packages at a speed of 3,600 items an hour



Put/Pick

Storage Retrieval

Started using GreyOrange Butler to bring the right order to the warehouse operator at the pick-put-station, increasing picking up accuracy to 99% and pick-up rate by 6X compared to manual operations



Weight & Volume Measurements

**Weight Check
Volume Dimensions Measurement**

Deployed Linear Sorters from GreyOrange with an in-built dimensioning and weighing system where the real volume, box volume and dead weight of each packet is captured

- Reduced sorting processing time by 50%
- Optimized warehouse space utilization with savings up to 2.5 times



Packaging

**Packaging
Unboxing/
un-packaging**

Global Parts Centre (GPC), Neemrana built with automated storage and retrieval system, automated packaging and sorting system, and on-line tracking of parts through Warehouse Management System (WMS)



Factory Automation

Welding/Painting

**Arc Welding
Spot Welding
Spray Painting
Plasma Cutting**

Robots present at framing station of the car plant to join roof and body sides using laser hybrid welding (brazing)



Material Handling

**Palletizing
Pick and Place**

Installed ~300 robots from Kuka on a single line in its Pimpri plant, including KR 210 for material handling applications



Assembly

**Screwing
Glueing/
Sealant Dispensing**

Using industrial robots from Kuka at its manufacturing plant for underbody sealing applications



Finishing Operations

**Turning
Milling
Polishing
Glass Glazing**

Installed 50 ABB robots at manufacturing plants to do applications such as sealing and finishing processes, as well as handle high-temp. items



Source: Company Websites, News Articles, Press Releases, Vendor Case Studies, Zinnov Analysis

Top India industrial robotics start-ups: Overview

Illustrative



Start-ups



Founded



HQ



Focus Verticals



Offerings

	Start-ups	Founded	HQ	Focus Verticals	Offerings
1	GREY ORANGE	2011	Singapore	E-commerce, Transportation & Logistics, Automotive	Designs, manufactures and deploys advanced robotics systems for automation in warehouses, distribution and fulfillment centers
2	FALCON AUTOTECH <small>COMMITTED TO EXCELLENCE</small>	2004	Greater Noida, India	Transportation & Logistics, Retail/ E-commerce, FMCG, Pharma, Automotive	An Indian OEM that is among the Top 20 global leaders in intra-logistics and warehouse automation solutions
3	SASTRA ROBOTICS	2012	Kochi, India	Automotive, Electronics/ Electrical, Aerospace & Defense	Builds and delivers robotic solutions for human-like automated functional testing of real physical devices; being used by OEMs and service providers to expedite test cycles and reduce time-to-market for their products
4	gridbots	2007	Ahmedabad, India	Retail/ E-commerce, FMCG, Pharma, Automotive	Develops robotic products for defense and industrial applications
5	DiFACTO ROBOTICS AND AUTOMATION	2007	Bangalore, India	Automotive, FMCG, Pharma, Aerospace & Defense, Electronics/ Electrical, T&L	Offers turnkey industrial automation systems and solutions with industrial robots
6	THE HI-TECH ROBOTIC SYSTEMZ LTD. <small>EVOLUTION THROUGH INNOVATION</small>	2004	Gurgaon, India	Retail/ E-commerce, T&L, Automotive, Aerospace & Defence	Developing products for revolutionizing man and material transportation with its Self Driving People Movers, Self Driving Logistics Vehicles for material handling and mobile robots for security & surveillance
7	SYSTEMANTICS	1995	Trivandrum, India	Aerospace & Defense, Transportation & Logistics	Designs and manufactures industrial robots that are used for screw fastening, soldering, electro chemical deburring, dispensing, CNC machine tending, pick and place automation, palletizing, press tending, etc.
8	GENIBOTICS	2015	Bangalore, India	Aerospace & Defence, Utilities	Designs and develops robotic exoskeletons with RC controlled humanoid robotic systems and artificial intelligence to find solution for social important issues
9	iFUTURE ROBOTICS	2008	Bangalore, India	Retail/ E-Commerce, Automotive, Transportation & Logistics	Industrial robotics company building cutting edge next generation of robots for smart logistics
10	BRS BHARATE ROBOTEC SYSTEMS	2015	Pune, India	Industrial, Aerospace & Defense, Agriculture	Developing robotic solutions for service, defense, industrial, agricultural and many other sectors

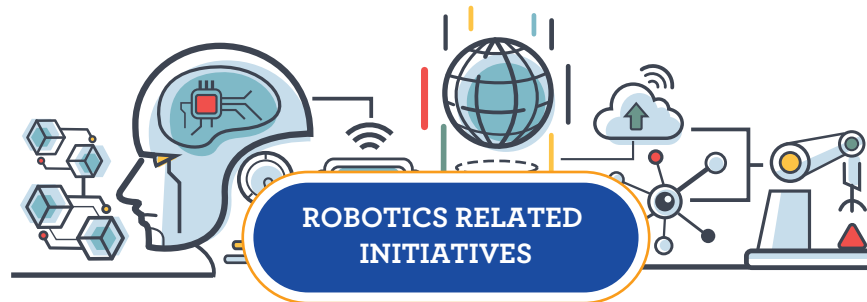
Notes: NIOT – National Institute of Ocean Technology, DAE – Department of Atomic Energy,

HAL – Hindustan Aeronautics Limited, T&L – Transportation & Logistics, IgnisNova Robotics not included as products still under development

Source: CrunchBase, LinkedIn, Company Websites, News Articles, Press Releases, Zinnov Analysis

Robotics-related work at IT-BPM firms and GCCs in India

Illustrative



Notes: ASRS - Automatic Storage and Retrieval Systems, PLC - Programmable Logic Controllers, AGV - Automatic Guided Vehicles

Source: Company Website, News Articles, Press Releases, Zinnov Analysis, NASSCOM

Robotics suppliers: India operations overview

Illustrative

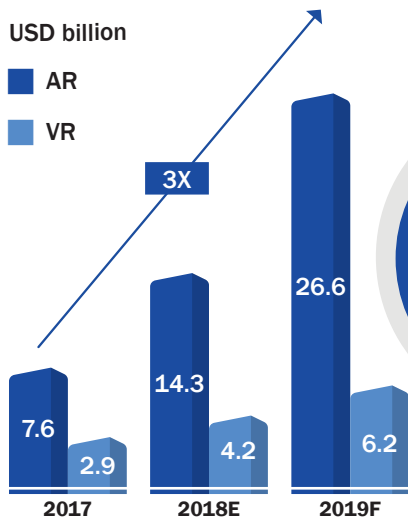
				Segments	
Products	Vertical Focus	COE/ R&D Lab	Partnerships	Factory Automation	Warehouse Automation
FANUC HQ: Global - Oshino-mura, Japan India - Bangalore					
Material Handling, Spot Welding, Arc Welding, Machine Tending, Press Tending, Die Cast Extraction & Spray, etc.	Automotive, Metals	Technology Centers (Bangalore, Pune, Manesar)	GI India Automation & Systems	✓	✓
ABB HQ: Global - Zurich, Switzerland India - Bangalore					
Articulated Robots, Parallel Robots, Paint Robots, YuMiv	Automotive, Electronics/ Electrical, FMCG, Metals	Corporate Research Center (Bangalore)	Kawasaki Heavy Industries, GI India Automation & Systems	✓	✓
YASKAWA HQ: Global - Kitakyushu, Japan India - Gurgaon					
Arc Welding, Handling, Material Removal, Press Tending, Painting, Palletizing, Spot Welding	Automotive, Metals	India R&D Center	Incite CAM, Sharp Tech, Controls India, AGIT, Caveri Textronics	✓	✓
KUKA HQ: Global - Augsburg, Germany India - Gurgaon					
LBR iiwa, Agilus, Quantec, LWR, Titan, Jet, Fortec, Cybertech, 60, 2000, 40 PA, 470 PA, 700 PA	Automotive, Metals	Service & Training Center (Pune)	Metallizing Equipment, Modtech, Rhythmsoft, Actemium, Grind Master, Keepsake, Gudel, Infosys	✓	✓
UNIVERSAL ROBOTS HQ: Global - Odense, Denmark India - Bangalore					
UR3, UR5, UR10	Automotive, FMCG, Metals, Electronics/ Electrical, Plastic & Rubber		Semyung India, GI India Automation & Systems	✓	✓

Notes: 1. ABB global robotics business headquarters was moved to Shanghai in 2005, HQ – Headquarters, COE – Centre of Excellence

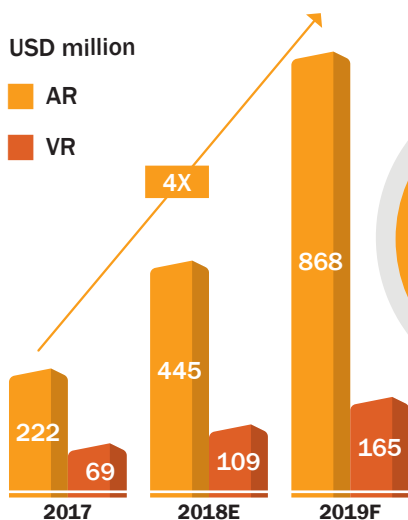
Source: Company Website, News Articles, Press Releases, Professional Networks, Zinnov Analysis

Immersive Media

Globally and in India Immersive media market driven by enterprise adoptions



- Global Immersive Media market estimated at USD 18.5 billion in 2018; to grow at 76% CAGR to reach USD 179 billion by 2022
- USA market leader with ~1/3rd share. China, Japan, Germany and UK to emerge as key spenders by 2022
- Attracted over USD 7.5 billion funding during 2013-17
- Enterprises contribute to 2/3rd and consumers to remaining 1/3rd of spending
- Automobiles, heavy industries, real estate and training key enterprise verticals driving growth



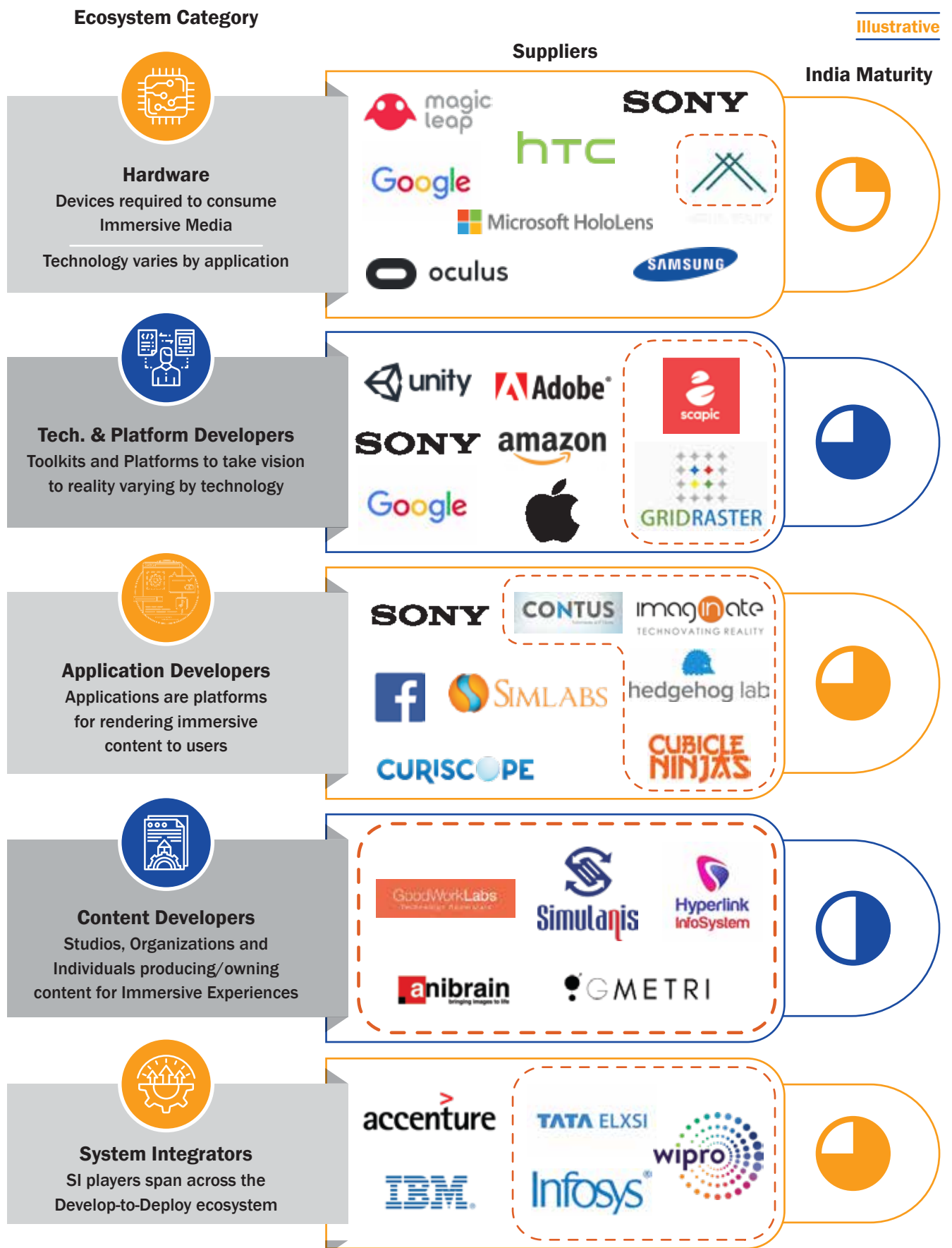
- Indian Immersive Media market estimated at USD 0.6 billion in 2018, to grow at 85% CAGR to reach USD 6.5 billion by 2022
- Supply landscape comprises of large and small players in Tech & Platform Development, App Development and System integrators
- Partnerships and collaborations key drivers for the ecosystem players e.g.. Facebook, Snapchat, Niantic foraging relationships with Indian firms
- Challenges: Prohibitive costs of devices, limited content availability and low awareness about the value

Key Drivers

Mobile edge computing	Higher processing speed	Customer controlled media consumption & production	Artificial Intelligence
Software Define Networking	24X7 mobile connectivity	Rise of profitable AR/VR developer ecosystem	

Source: NASCCOM Report on Immersive Media

Technology, platform & application developers and system integrators most mature ecosystem players in India



Source: NASSCOM Report on Immersive Media

Organizations founded in India ○ Low → ● High

Service providers playing the role of system integrators to industrialize services; start-ups growing in numbers

Illustrative

TATA ELXSI

Field force training, Product visualization, Manufacturing, In-store experiences, Product marketing, Remote collaboration



Solutions in Marketing, Retail, Fashion, Industrial training and maintenance, Utilities, Medicine etc.



IBM's Watson division working with Unity game engine creators on an open-source SDK to make video games smarter



Developed content management portal, Mobiliya AR360 to manage AR content consumed by device applications

Indian start-ups focusing on AR/VR steadily gaining momentum



AR/VR focused Start-ups during 2013-18

70 +



CAGR (2013-18)

26-28%

Hardware

Working on production devices such as the creation of the world's first pure VR camera



Tech. & Platform Developers

Delivering tools and platforms across the sectors ensuring high-quality content



Application Development

Indigenously developed applications across industry sectors



Content Developers

Supporting a large volume of content demand; gaming and entertainment most lucrative



Key Investment Strategies



Co-creation of IP along with clients and partners



Setting up centers of excellence and innovation labs



Collaboration with universities on joint research, skilling and recruitment



Investments in start-ups for co-innovation & partnerships with large technology firms

Academic Institutes

Bengaluru gets India's first AR/VR academic centre

Centre of Excellence for AR/VR to be set up at IIT Bhubaneshwar

Centre of Excellence (CoE)

Unity Technologies and Tata Elxsi launch Centre of Excellence

Capgemini and PTC launch Center of Excellence in Mumbai for smart connected products

Unity to launch Center of Excellence in partnership with Veative Labs

Tech Mahindra collaborates with Unity Technologies to open centre of excellence in Bengaluru

Illustrative



Partnership created to foster innovation in areas of AR & VR in 2018








Partnership established in late-2016 to launch AR-based game in India



Tyroo's platform to be used to generate higher ad-revenues across 9 million users in India



























Enterprises creating immersive experiences to improve and build customer access

Illustrative

 Enhancing experience in connectivity applications	 Immersive experiences supporting knowledge based tasks	 Immersive media in education, learning & skill development	 Immersive ways of experiencing an interest, purchase or location	 Entertainment through immersive technologies
Holo-Presence See-What-I-See Do-What-I-Do Remote Scribing Social Field Services	Medicine & Paramedical Manuals & Guides Design & Architecture Field Service Analytics & Big Data	Trainings Safety Compliances Certification Gaming Behavioral Analytics 3D Simulations	Immersive Mobility Travel & Hospitality Augmented Catalogs Augmented Shopping Events & Conferences In-Store Experience	Live Events Storytelling Gaming Location-based Entertainment 360° Video
Connectivity With access to manuals and guides in multi-media form, efficiency of the MRO operation potentially increases. 	Knowledge In the experience of being 'one with the data', and to be able to get a realistic visualization of the data, the users are able to explore virtually limitless datasets and take action/decisions 	Education Costs for trainings are lower as dependence on individuals conducting them and costs for logistics are lower. Immersive trainings are the closest to reality, and a robust methodology to ensure learning 	Exploration Seat selections and potential choices for superior experiences on the luxury airline were in standard desktop and smartphone offerings which the airline wanted to transform to enhance customer satisfaction 	Entertainment Whether Live Sports, Trade Shows, Product Launches or any other live setting, enhanced engagement with the audience is the ask of every participant organization 

Propensity to use immersive media in India focused on enhanced customer experiences and training...

Illustrative





























Industry	Illustrative Use Cases	Propensity to Deploy Immersive Media
 Automobile	<ul style="list-style-type: none"> • Manufacturing operations • Car sales & service • Visualization of products 	
 Defense	<ul style="list-style-type: none"> • HUD in military aircraft, vehicles and boats • Special forces gear & training across AR & VR 	
 Education	<ul style="list-style-type: none"> • Learning through live-like systems • Learning/training in safe environments 	
 Gaming	<ul style="list-style-type: none"> • Mobile hand-held gaming using AR & VR • Console & computer gaming using VR 	
 Hospitality & Travel	<ul style="list-style-type: none"> • Customer experience & revenue uplift • Learning, training & development • Virtual tours 	
 Media & Entertainment	<ul style="list-style-type: none"> • Advertising & revenue generation • Media consumption 	
 Real Estate	<ul style="list-style-type: none"> • Showcase of property/real-estate product, • Virtual tour 	
 Retail	<ul style="list-style-type: none"> • Shopping experience enhancement • Product launches/support • Visualization of products 	
 BFSI	<ul style="list-style-type: none"> • Customer experience (electronic banking) • Learning, training & development 	
 Healthcare	<ul style="list-style-type: none"> • Learning & training/education • Surgery, patient care etc. 	
 Logistics & Supply Chain	<ul style="list-style-type: none"> • Asset tracking/supervisory control • Customer service/support 	
 Oil & Gas	<ul style="list-style-type: none"> • Manufacturing • Training & development 	
 Telecom	<ul style="list-style-type: none"> • Telecom/TowerCo setup/maintenance • Sales/customer service 	

Source: NASSCOM Report on Immersive Media



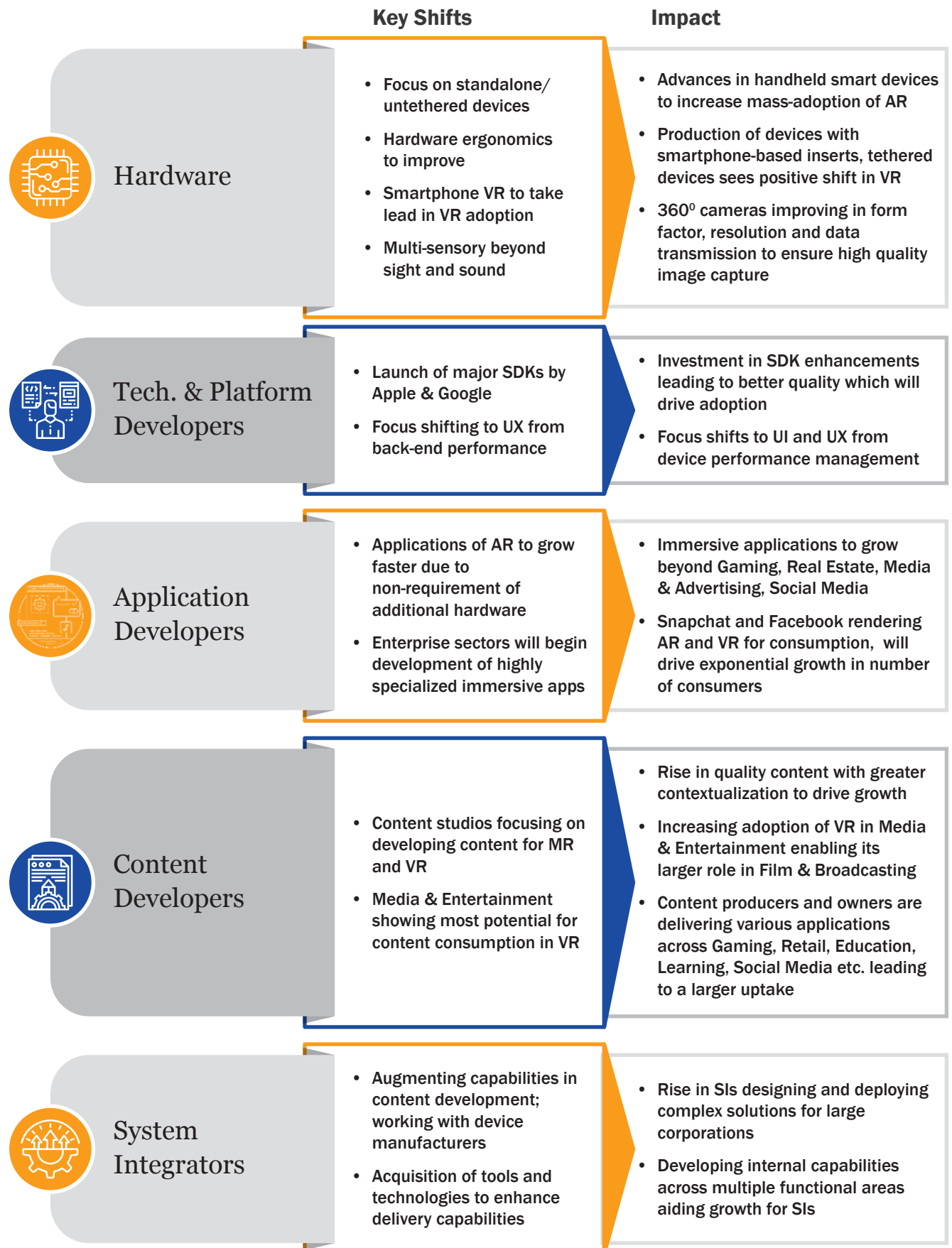
...creating positive business outcomes

Illustrative

Top AR/VR adopters	Automobile	Education	Hospitality & Travel
Applications	<p> Sales & Marketing Vehicle experience in the form of product variations (AR), driving experience (VR)</p> <p> Maintenance & Repair Guided repair and maintenance of vehicles for service staff</p> <p> Manufacturing Process Support through AR and trainings for crew members</p>	<p> Live Learning Course material using immersive multi-media through smart devices</p> <p> Safe Learning In specific scenarios where the live environment is dangerous to learn in, trainings and education can be imparted using VR leading to safe learning</p>	<p> Sales & Marketing Room experience for guests while booking a type of accommodation within selected property</p> <p> Tourism Activities Enabling guided-tours using personal devices to attract audiences</p>
Impact	<p> Value Creation Across the product value chain from R&D through manufacturing to sales and support</p> <p> Product Experience Enhanced CX through user interactions creating product differentiation</p> <p> Driving Assists Assisting drivers using digital overlays of specific information like speed, turns etc. through HUD</p>	<p> Changing Methods of Learning Gamification and demonstrations using smart devices is an effective way of learning</p> <p> Pupil's Comprehensive Growth Value Education and overall learning through immersion</p> <p> Entertainment-based Learning Paradigm Change rote-based learning and retain pupil attention and interest</p>	<p> Selection Life-like interaction enabling guests to experience what they buy before they buy it</p> <p> Access to Information Aids in increasing footfall and revenue</p> <p> Enhancing Experience Using technologies like Beacon, hoteliers enhance customer experience, increasing revenues</p>
Case examples	   	  	    

Source: NASSCOM Report on Immersive Media

Outlook: Disrupter of traditional and creator of new markets



SDK: Software Development Kit

Source: NASSCOM Report on Immersive Media

Blockchain

Globally and in India blockchain at different levels of maturity



Traction

50+ countries developing standards

50+ countries working actively to develop standards to integrate blockchain in their economies



Leader

Europe Leads

Nearly half of the leading and enabling blockchain jurisdictions in the world are located in Europe



Investment

Investments surge in 2018

A tipping-point year for investments with over \$20 billion raised from VCs and Initial Coin Offerings (ICOs)



Blockchain 3.0

Blockchain 3.0 and real business value

Newer opportunities for blockchain to be deployed at scale and create real business value



Adoption

Experiment-centric to business-case centric adoption

Over 70% of enterprise implementations expect benefits of cost savings or operational efficiencies



Traction

Indian Public Sector driving interest in Blockchain

About 50% states in India are involved in various initiatives driving blockchain adoption



Leader

BFSI leads adoption at 55%

BFSI at 55% leads adoption; growth opportunities in retail, logistics, manufacturing and healthcare



Start-ups

Significant growth headroom for start-ups

With less than 0.2% of global investments, start-up ecosystem in India is yet to take off



Regulations

Need for regulatory certainty

India needs to adopt a proactive and consultative regulatory approach to bootstrap growth



Investment

'Blockchain service providers to the world'

Need to invest rapidly in talent development, IP and asset creation and process framework advancement

India's promising Blockchain ecosystem









Illustrative











Source: NASSCOM AVASANT India Blockchain Report 2019

Service providers and start-ups form the crux of the Indian ecosystem




Service Providers

 Focus Area	 BFSI	 Healthcare	 Manufacturing	 Telecom
 Usecases	<ul style="list-style-type: none"> • Trade Finance • Supply Chain Management 		<ul style="list-style-type: none"> • Cross Border Payments • Digital Asset Management 	
 Trends	<p>Mid and large service providers in India have <5% projects in India vis-à-vis their projects in other geographies</p>		<p>Collaborating with startups to jointly develop enterprise solutions through co-investment and co-innovation</p>	
 Examples	<p>Infosys automates trade finance for 7 bank consortium in India</p>		<p>IBM implementing supply chain solution in Logistics and land registry management in public sector</p>	

Start-ups

 Focus Area	 BFSI	 Healthcare	 Logistics, Retail & Manufacturing	 Public sector
 Usecases	<ul style="list-style-type: none"> • Land registry • Employment verification • Anti-counterfeiting 		<ul style="list-style-type: none"> • Supply chain • Medical record maintenance • Supply chain traceability 	
 Trends	<p>More than 50% of the start-ups generate solutions specific to BFSI and 15% is focused on supply chain solutions</p>		<p>India accounts for <2% of all blockchain startups globally that are actively developing consumer and industry solutions</p>	
 Examples	<p>Blockchain startups like Statwig (supply chain), Kare4U (healthcare), Nucleus Vision (retail) and Springrole (HR) are building specialized blockchain based innovative solutions</p>		<p>Zebi Data working with Andhra Pradesh government on land registry use case</p>	

Ecosystem players investing extensively in capability building and research

	 Skill Building & Research	 CoEs, Labs, Innovation centers	 Co-creation & Co-investment
TRENDS	<p>Collaborating with academic and research institutes on technical, application and policies guidance</p> <hr/> <p>Partnering with the Government and building innovative cross training programs</p>	<p>Investing in blockchain specific CoE labs to build solutions and accelerators</p> <hr/> <p>Investing in specialized labs to research on blockchain applications in different industries</p> <hr/> <p>Start-ups, service providers and public sector are collaborating to build India specific Blockchain platforms</p>	<p>Collaborating with start-ups, government bodies and enterprises to jointly develop enterprise solutions through co-investment and co-innovation</p> <hr/> <p>As part of consortiums partnering with platform providers like Ripple, R3 Corda and Hyperledger to develop and enhance platform capabilities</p>
EXAMPLES	<p>Wipro with UC Berkley is conducting technical research in smart city initiative for Andhra Pradesh government</p> <hr/> <p>Tech Mahindra with Telangana government through "Blockchain district" building skills</p>	<p>NIIT Tech has set up a blockchain CoE to build blockchain specific solutions</p> <hr/> <p>Zensar has set up Zenlabs to conduct research in technology</p> <hr/> <p>Hexaware has set up Fintech labs in Chennai, Mumbai and Pune to explore blockchain application</p> <hr/> <p>Eleven01 protocol is built collaboratively by state government of Telangana and Tech Mahindra</p>	<p>Tech Mahindra with Nucleus Vision providing technical expertise in blockchain applications</p> <hr/> <p>Oracle jointly with Apollo hospitals and NITI Aayog building solutions in healthcare</p> <hr/> <p>NITI Aayog, is developing India Chain, a nationwide Blockchain platform that will host blockchain based applications</p>

Government the most critical stakeholder and enabler; while BFSI leads adoption in India



Public Sector

Priority use cases

- Land registry
- Governance
- Records management
- IP protection

Currently 40+ blockchain initiatives are being executed by public sector in India with ~92% in pilot/POC phase and ~8% projects in production phase

50% states in India involved in blockchain related initiatives; Telangana and Andhra Pradesh are leading adopters

Key Examples

Andhra Pradesh with Tech Mahindra and a Swedish startup Chroma way is implementing a database for government records

Karnataka with PwC is building an online idea marketplace to safeguard intellectual property

Telangana is working with IBM to build a solution for land registry



BFSI

Priority use cases

- Trade finance
- Cross company data sharing
- KYC
- Claims management
- Cross border remittance

At nearly 50%, BFSI has the maximum production level implementations in India

Specialized consortiums like Bank Chain & Insurance Consortium are driving nation wide initiatives

Key Examples

Infosys is working with 7 private Indian banks to build a solution "India Trade Connect" for document tracking systems in trade finance

Cognizant is working with a consortium of 15 life insurance firms to build a solution that reduces reliability on data intermediaries and aggregators for obtaining customer and policy details



Logistics, Retail & Manufacturing

Priority use cases

- Supply chain management
- Anti-counterfeiting
- Digital provenance
- Inventory control
- Cargo track & trace

Logistics, retail and manufacturing account for nearly 25% of blockchain implementations

Almost 15% of start-ups are addressing supply chain problems; building solutions for agriculture, fisheries, medicine and trade

Key Examples

IBM is working with logistics company JM Baxi to build blockchain enabled Port Community System (PCS) connecting 12 major ports to ensure a single, robust messaging platform

Apollo Enterprises is collaborating with Strides Pharma, Oracle and NITI Aayog to build drug supply chain in the country to eliminate counterfeit drugs in the market

Outlook: Implementation to shift from experiment centric to business case centric

Service Providers are shifting from experiment centric to business case centric model which will result in more projects moving to production phase where over 70% of implementations will deliver cost savings or operational efficiencies



Service Providers will focus on conducting cross training blockchain programs for inhouse employees. Focus on developing abstraction layers on top of existing platforms to enable employees skilled in widely used languages to develop on blockchain platforms



Large member consortiums will be created across different industry sectors like BFSI, transportation and energy etc. with cross industry consortiums emerging rapidly



A consultative and enabling regulatory approach towards blockchain will be required to drive the growth of Blockchain ecosystem and innovation in India



Growth of blockchain start-ups have led to the development of a new wave of decentralized applications. An increasing number of Decentralized Applications (Dapps) will be built by startups to solve challenges in different industries



Newer forms of fundraising such as Security Token Offerings (STOs), where the digital tokens are backed by tangible assets, equities, profits or revenue of the company is increasingly gaining traction among investors



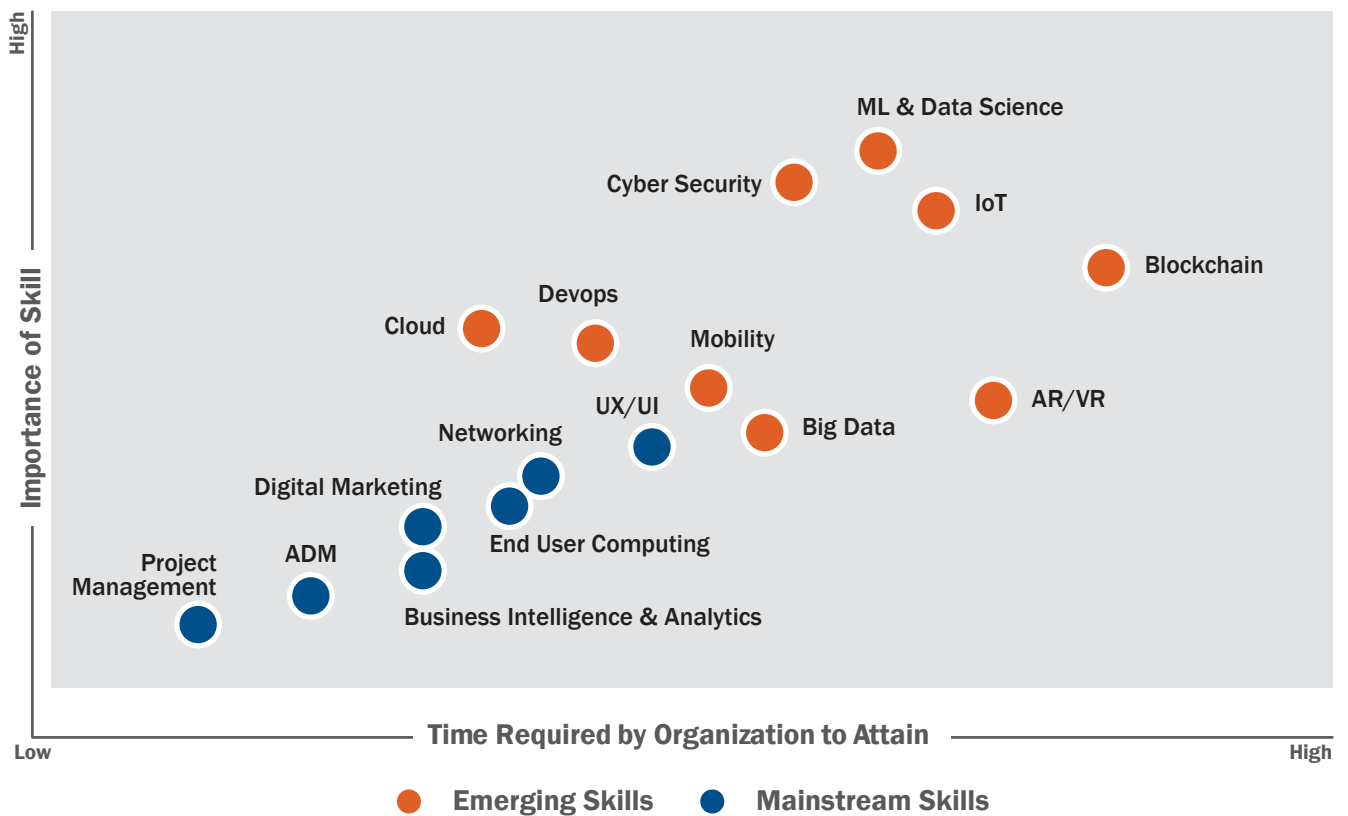
IT-BPM Sector in India 2019

Talent: Skilling for Digital

Talent: Skilling for Digital

Emerging skills take precedence as organizations are transforming digitally

Digital Disruptions Leading to Demand for Skills Around Emerging Technologies



Key Highlights

~80% organizations including service providers and GCCs plan to make significant investments to build talent in AI and Data Sciences domain, followed by Cyber security

Technologies such as Blockchain are still in exploratory phase; pulled down primarily by lack of talent

Skills in IoT and Devops are considered critical, however, not expected to disrupt hiring and expansion plans

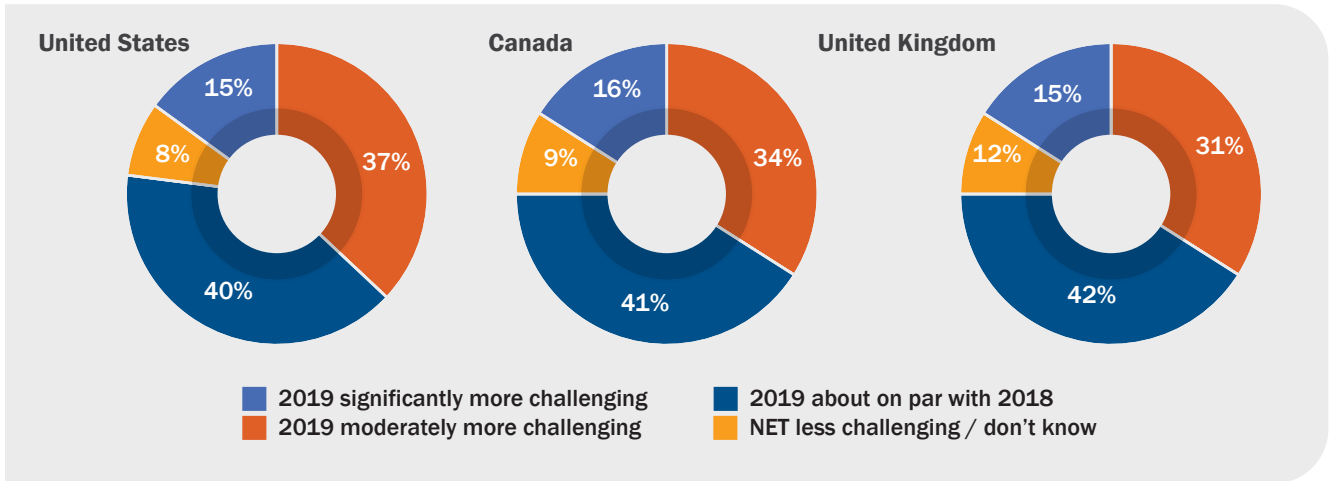
Rather than hiring, organizations aspire to build in-house skill base around emerging technologies

Learning and development programs around emerging technologies comprise a mix of instructor-led programs and online courses and certifications

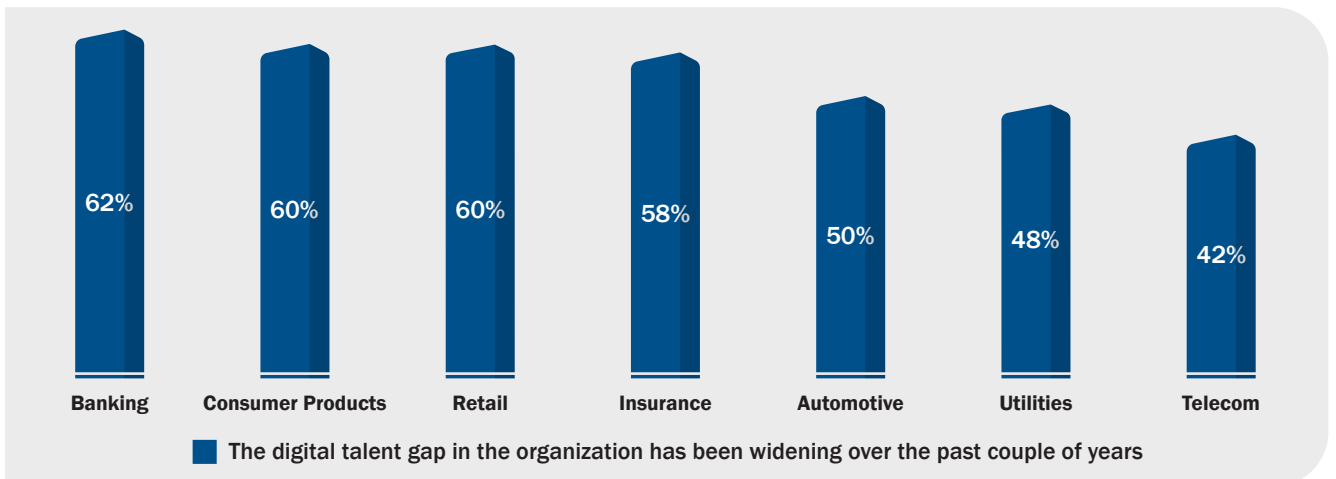
Source: Zinnov, Pluralsight

Digital skills key to digital transformation, but there is a gap

Tech Hiring Challenges Expected to Persist in 2019



Percentage of Organizations Responding to Widening of Digital Talent Gap, by Industry



Global Skills Shortage

IDC's Worldwide CIO Agenda 2019 Predictions reveals that 30% of high-demand roles for emerging technologies will remain unfilled through 2022

According to LinkedIn Workforce Report (August 2018), more than 151,000 data scientist jobs are going unfilled across the US

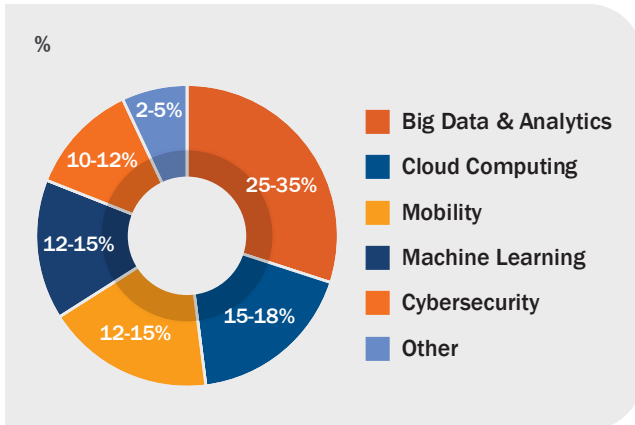
Research by (ISC)² estimates shortage of cyber security professionals at 2.93 million, with ~500,000 of those positions in North America

By 2020, over a third of the core skills needed for most jobs will need skills that are currently not considered crucial to the job

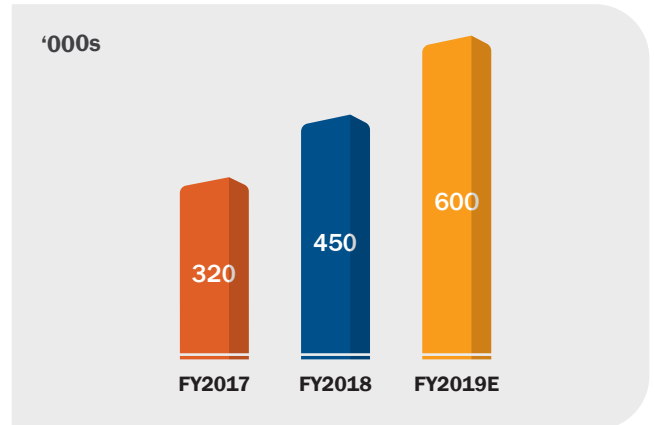
As per PwC CEO Survey 2019, more than 55% of CEOs affirmed that availability of key skills is impacting the ability of their organization to innovate effectively

Big Data & Analytics leads the demand in terms of net employment outlook in India

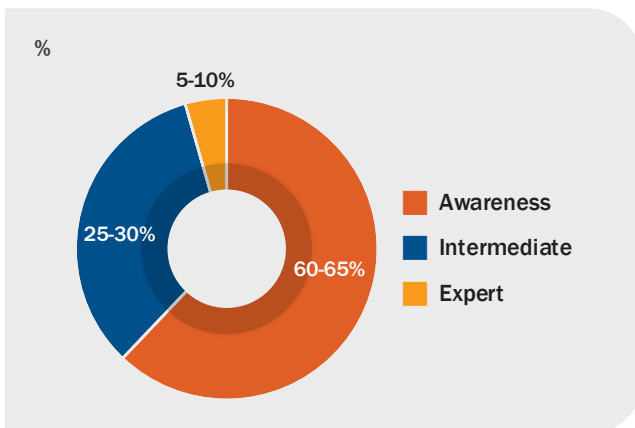
Top Practice Areas in Demand



Digitally Skilled Employees



Digitally Skilled Employees by Skill Level



Key Highlights

India features ~600,000 digitally skilled workforce that accounts for USD 33 billion in revenue, growing at ~30% YoY

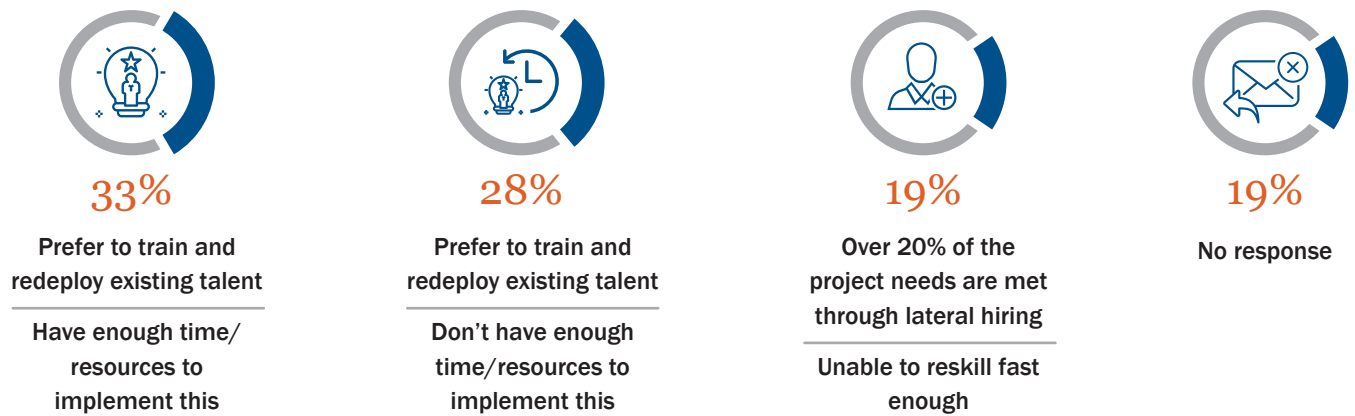
~65% of Fortune IT companies and enterprise are investing heavily and spending more on digital initiatives

7 out of every 10 large IT service companies and GCCs have established or spun off their digital capability into a digital CoE/digital labs

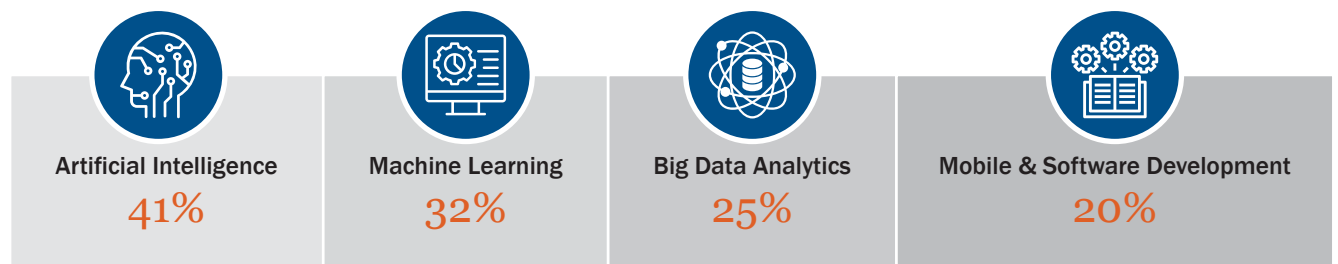
~74% of the digital workforce is concentrated across Bangalore, Delhi/NCR, Pune and Hyderabad

Enterprises prefer to make in-house investments to train employees on digital technologies

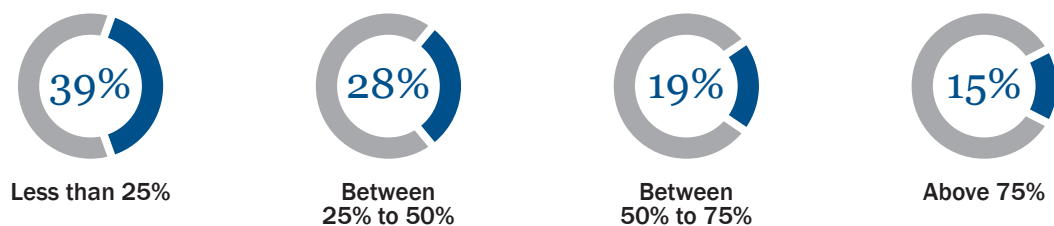
Acquiring Skills vs. Acquiring Talent



Top Technologies with Highest Re-skilling Need



Online Course / Certification Completion Rate Among Employees



Key Highlights

More than 60% organizations prefer to acquire skills by training and redeploying existing talent, instead of hiring skilled talent from outside

Major demand for re-skilling will be in areas such as AI, ML and Big Data & Analytics

Online courses and certifications are the preferred learning and development channels for organizations. However, challenged by a low completion rate

In addition, enterprises are all set to re-skill their employees on emerging technologies

Illustrative



**TATA
CONSULTANCY
SERVICES**

As of December 31, 2018, TCS has trained over 292,000 employees on Digital technology and over 318,000 employees on Agile methods



Over 125,000 employees across Wipro are digitally aware out of which ~55,000 employees have covered at least one digital skill beyond awareness



In 2018, EXL had trained ~3,000 employees in Analytics and ML and ~1,000 employees in Robotics



In 2018, over 4,000 employees at Mindtree completed close to 6,500 courses in areas such as Cloud, algorithms and programming languages, web technologies and emerging technologies such as IoT, Blockchain, AI, etc.



Mphasis certified ~3,000 employees in digital technologies. Further, it plans to re-skill 5,000 employees on digital skills in 2018



Tech Mahindra plans to train ~115,000 employees on digital skills in 2019



WNS targets to reskill over 11,000 employees through a structured digital educational program in 2019

Increasing collaborations among industry, academia and government to reskill existing and fresh talent

Illustrative

FutureSkills, a NASSCOM initiative, has set a target to up-skill 2 million current technology professionals and skill another 2 million in technologies such as RPA, IoT, Big Data Analytics, etc.

NASSCOM®

futureSkills
A NASSCOM initiative

Simplilearn partnered with Automation Anywhere and UiPath to offer RPA certification course

simplilearn
Get Certified. Get Ahead.

AUTOMATION ANYWHERE

UiPath

UiPath rolled-out Academic Alliance Program; Announced partnerships with ICT Academy of Kerala, Bennett University, NTTF, and Trident Academy of Technology

UiPath

ICT ACADEMY KERALA

BENNETT UNIVERSITY

NTTF
Securing your future with your own hands

BENNETT UNIVERSITY
SCHOOL OF TECHNOLOGY

Cyient signed an MoU with the Telangana Academy for Skill and Knowledge (TASK) to collaborate on skill-building and to improve employability for engineering students by imparting technical and soft skills trainings

CYIENT

TASK
TELANGANA ACADEMY FOR SKILL AND KNOWLEDGE

Rocheston partnered with Pearson VUE to launch Professional Certification programme. Rocheston offers courses in Innovation, IoT, Big Data and Business Leadership through online, classroom and blended formats

Pearson VUE

ROCHESTON

National Programme on Technology Enhanced Learning (NPTEL) collaborated with IBM to offer a 12-week online course focused on blockchain architecture, design and use cases

IBM

NPTEL

IIIT-H partnered with TalentSprint to offer AI/ML executive program that witnesses 400 participants from 127 leading technology companies. IIIT-H plans to equip 10,000 industry professionals with expertise in AI/ML by 2021

INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY
HYDERABAD

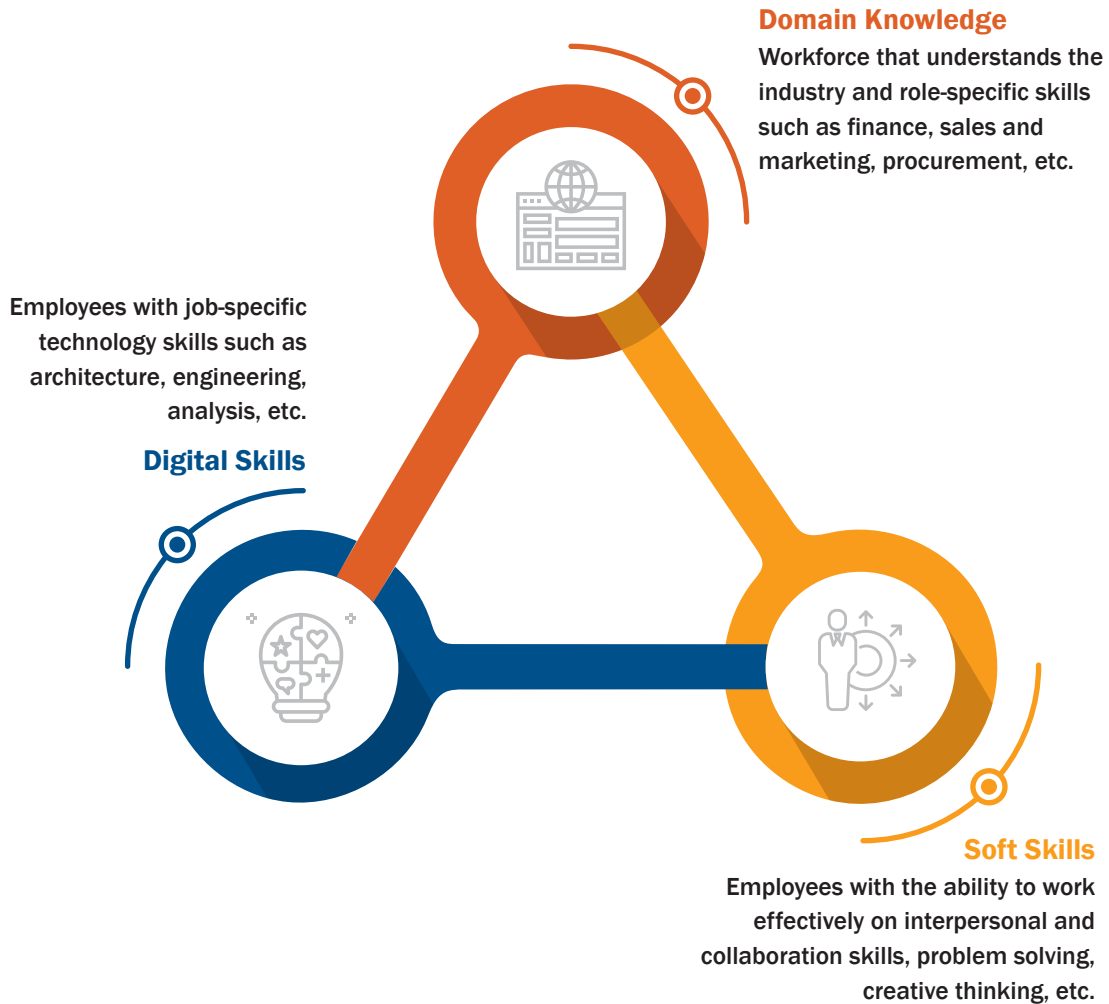
talent sprint

Microsoft announced Intelligent Cloud Hub program to equip selected research and higher education institutions with AI infrastructure, build curriculum and faculty capability to skill students in AI and Cloud technologies

Microsoft

The future belongs to tri-lingual experts who excel not only in digital skills, but also soft skills and domain knowledge

Triad for the Skills of Future



Key Highlights

As enterprises are moving towards digital transformation, new job roles are evolving that demand blend of various other skills

According to industry experts, cross-training is the key to up-skill the existing workforce by providing trainings on domain knowledge and soft skills, in addition to digital skills



IT-BPM Sector in India 2019

Appendix

Glossary

Artificial Intelligence

Artificial intelligence (AI) makes it possible for machines to learn from experience, adjust to new inputs and perform human-like tasks.

Augmented Reality

A technology that superimposes a computer-generated image on a user's view of the real world to enrich interactions

Big Data

A term that describes the large volume of data – both structured and unstructured – that inundates a business on a day-to-day basis.

Blockchain

A decentralized, consensus-based, tamper-proof data structure, comprised of unchangeable, digitally recorded data in packages called blocks. Each block is then 'chained' to the next block, using a cryptographic signature. This allows block chains to be used like a ledger, which can be shared and accessed by anyone with the appropriate permissions.

Business Intelligence (BI)

A way to reveal actionable insights in your data.

Business Process as a Service (BPaaS)

A version of software as a service (SaaS) where buyers receive standardised business process services sourced from the cloud by accessing a shared set of resources at each delivery level (people, application, infrastructure) from a single service provider and constructed for multi-tenancy. Services are often automated, and accessed via Internet-based technologies.

Business Process Management (BPM)

Erstwhile BPO; now re-branded as BPM - includes processes that may be IT-enabled, do not necessitate on-shore presence and are hence, offshoreable.

Cloud Computing

The delivery of computing services—servers, storage, databases, networking, software, analytics, intelligence and more—over the Internet ("the cloud") to offer faster innovation, flexible resources and economies of scale.

Cloud Infrastructure

Cloud infrastructure is no different from typical data centre infrastructure except that it's virtualised and offered as a service to be consumed via the Internet. Servers, storage, compute resources and security are all key components of cloud infrastructure.

Cloud Management Platform

Cloud management platforms are integrated products that provide for the management of public, private and hybrid cloud environments.

Cloud Orchestration

Cloud orchestration refers to the arrangement and coordination of automated tasks resulting in a consolidated process or workflow.

Consortium

A blockchain where the consensus process is controlled by a pre-selected set of nodes. The right to read the blockchain may be public or restricted to the participants.

Custom Application Development (CAD)

CAD services focus on delivering customized (to client requirements) development of software applications and interfaces as well as enhancements to existing packaged applications or pre-engineered templates and support and provision of custom applications.

Customer Interaction & Support (CIS)

CIS includes all forms of IT-enabled customer contact; inbound or outbound, voice or non-voice based support used to provide customer services, sales and marketing, technical support and help desk services.

Glossary

Data Lakes

A data lake is a centralized repository that allows you to store all your structured and unstructured data at any scale.

Decentralized Ledger Technology

A decentralized ledger is a digital logbook that uses some protocol to enable computers in different places to continuously update the shared information store

eCommerce

Commercial transactions conducted electronically on the Internet by businesses and consumers is called eCommerce. eCommerce is divided into Business to Business (B2B), Business to Consumer (B2C) and Consumer to Consumer (C2C).

Edge Computing

Edge computing enables connected devices to process data closer to where it is created.

Engineering Services and Research & Development (ER&D)

Engineering services are those that augment or manage processes that are associated with the creation of a product or service, as well as those associated with maximizing the life span and optimizing the yield associated with a product or asset. This not only includes design elements of the product or service itself, but also encompasses the infrastructure, equipment and processes engaged in manufacturing/delivering them.

R&D services involve providing research and development for hardware and software technologies, as well as development of software running on embedded systems. This includes computer-aided design (CAD).

- **Product Engineering Services (PES)/Offshore Software Product Development (OSPD):** Outsourced development of the customer's product, thereby taking up the responsibility of all aspects of the product lifecycle -

R&D, prototyping, development, testing, maintenance, support and development of next generation of the products. The development can be outsourced to either a GIC (global in-house captive) or to a third-party vendor.

Going forward, this segment would be clubbed with ER&D and would be referred to as **Product Engineering Services (PES)**.

Finance & Accounting (F&A)

F&A includes activities such as general accounting, transaction management (account receivables and payables management), corporate finance (e.g. treasury and risk management, and tax management); compliance management and statutory reporting, etc.

Global Capability Centers/Captive units

Captive units include both MNC-owned units that undertake work for the parents' global operations and the company owned units of domestic firms.

Global Sourcing

Services sourced from a country/countries different from the country where the firm receiving the services is located. It includes both offshoring and near-shoring.

Hardware Deployment and Support

The hardware deployment and support service pertains to the installation and support of a specific hardware device. The service is focused on the device and its components rather than on software that is running on the device. Installation activities can include hardware staging and configuration, testing and debugging, site preparation, and physical installation of the device.

Horizontal-specific BPM services

Services that are reasonably similar across industries. Horizontal BPM services include Customer Interaction and Support (CIS), Finance and Accounting (F&A) and other related processing services, Knowledge Services, Human Resource Management (HRM), Procurement BPM, etc.

Glossary

Human Resource BPM

HR BPM, involves services that are delivered during the initial design and implementation of the solution as well as on a continuous and ongoing process improvement basis. Services such as business consulting, IT consulting, systems integration, application outsourcing (AO), training and education, and change management are typically involved in HR BPM engagements

Human Resources Processing

HR processing services includes services that support the core HR activities plus talent management activities and associated business processes such as benefits, payroll and talent management.

Intelligent Automation

Intelligent automation is a more advanced form of robotic process automation (RPA). It is a combination of robotic automation with one or more AI technologies

Initial Coin Offerings (ICOs)

ICOs, or Initial Coin Offerings, are a form of company financing. In most jurisdictions due to regulations these “tokens” don’t represent shares or real economic rights over the company that issues the ICO. Instead of shares and the shareholders have the option of trading tokens with other users, or using them to pay for services from the issuing entity.

Independent software vendor (ISV)

An ISV makes and sells software products that run on one or more computer hardware or operating system platforms.

Internet of Things (IoT)

A network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment.

Infrastructure Services

It involve a long-term, contractual arrangement in which a service provider takes ownership of and responsibility for managing all or part of a client’s information systems operations or department based on a service level agreement. It usually includes data centre operations and may also include services such as desktop management, local and wide area network operations management, help desk support, application development and maintenance, disaster recovery services and related consulting and systems integration activities.

IT Consulting

IT consulting includes IS strategy, IT and network planning, architectural assessments, IS operational analysis, technical system and network designs, product-specific consulting, supplier assessment and maintenance planning.

IT Education and Training

Encompasses education to enhance the knowledge of information technology and expand its use. Training represents training content, delivery solutions, and learning services of IT/technical and desktop applications training delivered to the corporate market by an external provider.

IT Services

IT services involve a full range of engagement types that include consulting, systems integration, IT outsourcing/managed services/hosting services, training, and support/maintenance.

Knowledge Services

It comprises outsourcing of knowledge intensive processes, which includes services such as business research, market research, data management, data analytics, legal and intellectual property services.

Glossary

Machine Learning

Machine learning refers to ability of computer systems to improve their performance by exposure to data without the need to follow explicitly programmed instructions

Natural Language Processing

Natural language processing (NLP) is a branch of artificial intelligence that helps computers understand, interpret and manipulate human language.

Nearshore/Near-site

Country near to client country.

Network Consulting and Integration

Network consulting and integration services are the activities and skills associated with planning for and building data networks. Network consulting services include activities such as operations assessment, network planning and design, capacity planning, and maintenance planning. Network implementation includes services such as installation, configuration, custom software development, testing and debugging, project management, staging, and security implementation activities.

Offshore

The transferring of a complete business process to a different country that is significantly geographically separated from the country or countries where the firm receiving the services is located.

Outsourced/Offshore Software Product Development (OSPD)

SEE: Engineering Services and Research & Development (ER&D).

On-site

Client site

Outsourcing

Outsourcing is a type of engagement, such as consulting and integration that can be sourced from any of the lower-cost regions.

Packaged Software

SEE: Software Products.

Platform-based solutions

Solutions where the software platform is provided (owned or maintained) by the provider.

Product Engineering Services (PES)

SEE: Engineering Services and Research & Development (ER&D).

Procurement services

Procurement services are the transfer of ownership of some or all procurement processes or functions to providers. This could include administrative, delivery, or management-related processes or functions.

Robotic Process Automation (RPA)

It refers to automation which interacts with a computer centric process through the User Interface (UI) / user objects of the software application supporting that process. A robot is usually a runtime environment on which different processes/tasks can be executed. RPA can process structured and semi-structured data.

Small and Medium Businesses (SMB)

Demand side enterprises with average employees of less than 1,000 who are potential users of IT-BPM services.

Glossary

Small and Medium Enterprises (SME)

Supply side enterprises that offer IT-BPM services and have annual revenues of less than ₹ 500 million.

Smart Enterprise

An enterprise configured to deliver maximum strategic and operational value from established and emergent technologies and associated shifts in customer behaviour and competitive landscape. It uses technology to redefine customer experiences, improve operational efficiency, and embed digital advantages throughout its business model.

Software-as-a-Service (SaaS)

A model of software development where an application is hosted as a service provided to customers across the Internet. By eliminating the need to install and run the application on the customer's own computer, it alleviates the customer's burden of software maintenance, ongoing operation and support.

Software Deployment and Support

Software deployment and support services are activities, expertise, and systems providing the customer with proper installation and configuration of all packaged software products as well as appropriate ongoing support, access to resources, and distribution of software product releases, updates, and upgrades.

Software Products (Packaged software)

Packaged software is programs or code sets of any type, commercially available through sale, lease, rental, or as a service. Packaged software revenues typically include fees for initial and continued right-to-use packaged software licenses.

Systems Integration

Systems integration (SI) includes the planning, design, implementation, and project management of a solution that addresses a customer's specific technical or business needs. It involves systems and custom application development, as well as implementation and integration of enterprise package software.

Third-party units

Third-party units are essentially service vendors that are mostly independently owned units (i.e. no single client has a controlling stake in the vendor entity). Third-party vendors also include a small section of MNC-owned independent third-party vendors, such as Cognizant, IBM, Convergys, SITEL, Vertex and Sykes, having a significant part of their global operations based out of India.

Vertical-specific BPM services

Vertical-specific BPM services refer to offerings that require a high degree of vertical specific knowledge that is not easily replicable across industries (e.g. insurance claims processing).

Virtual Reality

An artificial, computer-generated simulation of a real life environment or situation that surrounds a user and responds to that individual's actions in a natural way, usually through immersive head-mounted displays and head tracking.

List of Abbreviations

3D	Three Dimensional	CEE	Central & Eastern Europe
A-CMS	Alliance Connected and Mobility Services	CERT	Computer Emergency Response Team
ACV	Annual Contract Value	CES	Customer Effort Score
ADAS	Advance Driver Assistance Systems	CIN	Challan Identification Number
ADK	App Development Kit	CIO	Chief Information Officer
ADM	Application Development Management	CIS	Customer Interaction Services
ADSL	Asymmetric Digital Subscriber Line	CLM	Contract Lifecycle Management
AECS	Autonomous, Electrification, Connectivity, Shared Mobility	CInO	Chief Innovation Officer
AEPS	Aadhaar Enabled Payment System	CMO	Chief Marketing Officer
AGV	Automated Guided Vehicle	CMOS	Complementary Metal-oxide Semiconductor
AI	Artificial Intelligence	Co-Bots	Collaborative Robots
AML	Anti-Money Laundering	CoE	Centres of Excellence
AMRUT	Atal Mission for Rejuvenation and Urban Transformation	COIN	Co-Innovation Network
AP	Accounts Payable	COLE	Center of Lending Excellence
APAC	Asia Pacific	CPDM	Centre for Product Design and Manufacturing
API	Application Program Interface	CPG	Consumer Packaged Goods
AR	Augmented Reality	CRM	Customer Relationship Management
ASRS	Automated Storage and Retrieval System	CRO	Chief Restructuring Officer
AWS	Amazon Web Services	C-SAT	Customer Satisfaction
B2B	Business to Business	CSC	Common Service Centres
B2C	Business to Consumers	CSEC	Cyber Security Engagement Centre
BFSI	Banking, Financial Services and Insurance	CSR	Corporate Social Responsibility
BHIM	Bharat Interface for Money	CTO	Chief Technology Officer
BI	Business Intelligence	CTS	Concept To Shelf
BOYD	Bring Your Own Device	CX	Customer Experience
BPaaS	Business Process as a Service	CXO	Chief Executive Officer/ Chief Experience Officer
BPL	Below Poverty Line	DACH	Germany, Austria, Switzerland: German speaking countries
BPM	Business Process Management	DBT	Direct Benefit Transfer
BPS	Business Process Services	DEC	Digital Experience Centres
BSE	Bombay Stock Exchange	DevOps	Development + Operations
BU	Business Unit	DFM	Design for Manufacturability
CAD/M	Custom Application Development/Management	DIN	Director Identification Number
CAGR	Compounded Annual Growth Rate	DMS	Digital Managed Services
CAIO	Chief Artificial Intelligence Officer	DoT	Department of Telecommunication
CC	Constant Currency	DPP	Defence Procurement Policy
CCC	Content Communication & Collaboration	DX	Digital Transformation
CDO	Chief Data Officer/Chief Digital Officer	ECG	Electrocardiogram
CEC	Customer Experience Centre	ECU	Engine Control Unit

List of Abbreviations

EDF	Electronics Development Fund	HCM	Human Capital Management
EDT	Enterprise Digital Transformation	HEV	Hybrid Electric Vehicle
EHRs	Electronic Health Records	HIMS	Hospital Information Management System
eKYC	Electronic Know Your Customer	HIS	Hospital Information System
EMEA	Europe, Middle East and Africa	HMD	Head Mounted Devices
EMI	Equated Monthly Instalments	HQ	Headquarters
EMR	Electronic Medical Records	HRO	Human Resource Outsourcing
eNAM	An e-trading portal for agricultural commodities	HUD	Heads-up-Display
EPFO	Employee's Provident Fund Organisation	HVAC	Heating, Ventilation, Air-conditioning
ER&D	Engineering Research & Development	IA	Intelligent Automation
ERNET	Education and Research Network	IaaS	Infrastructure as a Service
ERP	Enterprise Resource Planning	IAP	Infosys Automation Platform
EU	European Union	IC	Integrated Circuit
EV	Electric Vehicles	ICOMC	Intelligent City Operations and Management Centre
F&A	Finance and Accounting	ICT	Information and Communications Technology
FDI	Foreign Direct Investment	IDS	Intrusion Detection Systems
FMCG	Fast Moving Consumer Goods	IESA	India Electronics and Semiconductor Association
FMS	Financial Management System	IFC	International Finance Corporation
FP&A	Financial Planning & Analysis	IIoT	Industrial Internet of Things
FTE	Full Time Employee	ILC	Immersive Learning Centre
GCC	Global Capability Center	IMPS	Immediate Payment Service
GDP	Gross Domestic Product	INR	Indian Rupee
GE	General Electric	IoT	Internet of Things
GEN's	The Global Entrepreneurship Network	IoT OS	IoT Operating System
GIC	Global In-house Centre	IP	Intellectual Property
GIS	Geo-Spatial Information System	IPS	Intrusion Prevention Systems
GL	General Ledger	ISL	IoT Service Line
GMS	Gross Merchandise Sold	ISO	Infrastructure Services Outsourcing
GMV	Gross Merchandise Value	ISP	Internet Service Providers
Goi	Government of India	ISV	Independent Software Vendors
GPC	Global Parts Centre	IT	Information Technology
GPs	Gram Panchayats	IT OPEX	Information Technology Operating Expenses
GRC	Governance, Risk & Compliance	ITES	IT-enabled Services
GRU	Gated Recurrent Units	ITIs	Industrial Training Institutes
GSPs	GST Suidha Providers	ITO	IT Outsourcing
GST	Goods and Services Tax	ITS	Information Technology Services/Intelligent Transport System
GSTN	Goods and Services Tax Network	IUC	Interconnect Usage Charges
GTM	Go-To-Market		
HAS	Hardware Assisted Security		
HBM	Human Body Modelling		

List of Abbreviations

IUX	Intelligent Urban Exchange	MSMEs	Micro, Small & Medium Enterprises
JAM	Jan Dhan-Aadhar-Mobile	MTCoE	Marketing Technologies CoE
JV	Joint Venture	NA	North America
K	Thousand ('000)	NB-IoT	Narrowband Internet of Things
kbps	Kilobits per second	NCR	National Capital Region
KBS	Knowledge Based Services	NDCP	National Digital Communication Policy
KMRL	Kochi Metro Rail Limited	NDLM	National Digital Literacy Mission
KPIs	Key Performance Indicators	NEBPS	North East BPO Promotion Scheme
KPO	Knowledge Process Outsourcing	NeGP	National e-Governance Plan
KYC	Know Your Customer	NFV	Network Function Virtualization
LAN	Local Area Network	NGN	Next Generation Network
LATAM	Latin America	NHDC	National Handloom Development Corporation Ltd.
LED	Light-Emitting Diode	NLG	Natural Language Generation
LEO	Low Earth Orbit	NLP	Natural Language Processing
LTE	Long-Term Evolution	NOFN	National Optical Fibre Network
LTL	Less than Truck Load	NPCI	National Payments Corporation of India
M&A	Mergers & Acquisitions	NPS	Net Promoter Score
M2M	Machine to Machine	NPSDE	National Policy for Skill Development and Entrepreneurship
mbps	Megabits per second	NSDM	National Skill Development Mission
MBRDI	Mercedes-Benz Research and Development India	NTA	New Technology Accelerator
MCU	Micro Controller Unit	NUUP	National Unified USSD Platform
MDM	Mobile Device Management	NXPs	Consumers' "Next Experience"
MDR	Merchant Discount Rate	OCR	Optical Character Recognition
ME	Middle East	ODC	Offshore Development Centres
MeitY	Ministry of Electronics and Information Technology	OEM	Original Equipment Manufacturer
MEM/S	Micro-Electro-Mechanical/Systems	OLAs	Operational Level Agreement
MES	Manufacturing Execution Systems	OPD	Out Patient Department
MICE	Meetings, Incentives, Conferences and Exhibitions Space	OSPD	Outsourced Software Product Development
MIS	Management information system	OTAs	Online Travel Agencies
ML	Machine Learning	OTC	Over The Counter
MMP	Mission Mode Projects	OTT	Over the Top
MNC	Multi National Company	P&L	Procurement & Logistics
MOM	Manufacturing Operations Management	P2P	Peer-to-Peer
MOOC	Massive Online Open Courses	PaaS	Platform as a Service
MoU	Memorandum of Understanding	PE	Private Equity
MPE	Media, Publishing and Entertainment	PES	Product Engineering Services
MR	Mixed Reality	PLC	Programmable Logic Controller
MRO	Maintenance, Repair, and Overhaul	PLM	Product Lifecycle Management

List of Abbreviations

PMGDISHA	Pradhan Mantri Gramin Digital Saksharta Abhiyan	SOA	Service Oriented Architecture
PMJDY	Pradhan Mantri Jan-Dhan Yojana	SOC/SoC	Security Operations Centres/System on Chip
POS	Point of Sales	SON	Self Optimising Network
PPC	Pay Per Click	T&L	Transport & Logistics
PPP	Public Private Partnership	T&M	Time & Material
PSTN	Public Switched Telephone Network	TAP	Target Accelerator Program
QA	Quality Assurance	TCoE	Testing Center of Excellence
q-o-q	Quarter on Quarter	TCV	Total Contract Value
R&D	Research & Development	TEaaS	Testing as a Service
RAILIPT	Robotic Artificial Intelligence Language – Integrated Product Technology	TIE	The Indus Entrepreneurs
RBI	Reserve Bank of India	TNGA	Toyota New Global Architecture
RFID	Radio-Frequency Identification	TPV	Third Party Vendor
RFP	Request for Proposal	TRAI	Telecom Regulatory Authority of India
RoI	Return on Investment	TS	Technical Support
RoW	Rest of the World	TSSC	Telecom Sector Skill Council
RPA	Robotic Process Automation	UAE	United Arab Emirates
S&M	Sales & Marketing	UI	User Interface
SaaS	Software as a Service	UIDAI	Unique Identification Authority of India
SAP	System Applications and Products	UK	United Kingdom
SCADA	Supervisory Control and Data Acquisition	UMANG	Unified Mobile Application for New-age Governance
SCM	Supply Chain Management	UPI	Unified Payments Interface
SCOR	Supply Chain Operations Reference Model	USA	United States of America
SDI	Serial Digital Interface	USD	US Dollars
SDK	Software Development Kit	UX	User Experience
SDL	Smart Device Link	V&V	Verification & Validation
SDN	Software Defined Networking	V2V	Vehicle to Vehicle
SDS	Self-driving system	V2X	Vehicle to Everything
SDx	Software-Defined Everything	VC	Venture Capitalist
SEM	Search Engine Marketing	VLE	Village Level Entrepreneurs
SEO	Search Engine Optimisation	VoLTE	Voice over Long Term Evolution
SI	System Integration/System Integrator	VR	Virtual Reality
SIAM	Society of Indian Automobile Manufacturers	VSAT	Very Small Aperture Terminal
SiC	Silicon Carbide	WEF	The World Economic Forum
SKU	Stock Keeping Unit	WMS	Warehouse Management System
SLA	Service Level Agreement	XaaS	Everything as a Service
SMAC	Social, Mobile, Analytics, Cloud	XR	Extended Reality
SMB	Small and Medium-sized Business	Y-o-Y	Year-on-Year
SME	Small and Medium Enterprises		

List of Sources & Contributors

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Business Wire	INSEAD	Techinasia
Boston Consulting Group	ISG	Tech Sci Research
Capgemini	KPMG	Tracxn
Cognizant	LinkedIn	TRAI
CompTIA	Marketresearchfuture	Transparency Market Research
Constellation Research	McKinsey Global Analysis	UNCTAD
CLSA	Ministry of Electronics & Information Technology (Meity)	ValueNotes Research
CrunchBase	Morgan Stanley	VCCircle
Deloitte Research	Motilal Oswal	Venture Intelligence
DIPP	National Payments Corporation of India	WIPO
Dimension Data	NelsonHall	Wipro
E-marketer	Niti Aayog	WNS
Ernst & Young	Offshore Insights	World Bank
Everest Group	People Matters	Yourstory
Experis	Pluralsight	Zinnov Research
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