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# FUTURE SKILLING

## FOR THE DIGITAL ECONOMY

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INDIA'S TECH INDUSTRY

Getting Future Ready

FEBRUARY 2020



**NASSCOM**<sup>®</sup>



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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 with over 2,800 members. 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 FutureSkills® is an industry driven learning ecosystem to get India accelerated on the journey to become the global hub for talent in the emerging technologies. With NASSCOM as the enabler, it was launched as an industry-led response to quickly adapt to the changing job environment driven by technological shifts and changing stakeholder expectations.

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कौशल विकास और उद्यमशीलता राज्य मंत्री  
भारत सरकार

Minister of State (Independent Charge)  
for Power and New & Renewable Energy and  
Minister of State in the Ministry of Skill Development  
and Entrepreneurship  
Government of India

### FOREWORD

In 2015, the government of India launched its flagship program 'Digital India' with a vision to propel our country on the path of technological advancement. This, in turn, ensured our movement towards digital economy' and 'knowledge-based society'. Consisting of three essential components— the development of secure and stable digital infrastructure, delivery of government services digitally, and the achievement of universal digital literacy— the program charted out the trajectory for eliminating the digital divide in one the largest democracies of the world.

Our visionary Prime Minister, Shri Narendra Modi is committed to make India 'the Skill Capital of the World'. Inspired by his vision, we at MSDE launched PMKVY (Pradhan Mantri Kaushal Vikas Yojana) in order to equip our youth with industry-relevant skills making them financially independent. The government aims to build the digital talent stack, essential to fuel both GDP growth and entrepreneurship. Leveraging our world-class IT talent combined with industry 4.0 technology, we can shape the India of tomorrow— technologically advanced, economically developed, and tremendously skilled.

Digital technology brings to mainstream, the marginalised sections of society. With digital integration happening at a pace as never before, now we see entrepreneurs coming from the remote corners of the country. India is at the doorstep of the entrepreneurial revolution, ready to usher in!

I appreciate NASSCOM IT-ITeS Sector Skill Council for their initiative in bringing out this timely and detailed report, providing us with insights. It sure will help the government, IT organisations, academia and entrepreneurs alike, in shaping and accelerating their skilling initiatives.

(Raj Kumar Singh)



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# Foreword



**Debjani Ghosh**

President,  
NASSCOM



**Amit Aggarwal**

CEO, IT-ITeS Sector Skill Council  
NASSCOM

The Indian IT-ITeS industry is at the cusp of fundamental technological shift towards emerging technologies and evolving its product and service portfolios. Digital technologies are ingrained in the industry value chain and the demand for talent in these technologies is increasing at highest-ever rate. The industry was at the forefront of experiencing the impact of this as end-user experience and interactions started changing dramatically, primarily because Artificial Intelligence (AI), Big Data, and Cloud transformed how companies were designing solutions. Under the aegis of NASSCOM, the industry put together a work group to discuss how these changes had an impact on each NASSCOM member firm. A consensus emerged that talent was going to be the biggest hurdle if we as a nation are to remain competitive. The skills of the future workgroup, formed in 2017, created a goal statement to ‘accelerate India’s journey towards being a global hub of talent in emerging technologies’.

While NASSCOM partnered with BCG to identify what the talent landscape for skills in the emerging technologies would look like. This report called out the job roles of the future based on the way technology was impacting the workplace. Other research reports have referred to the impact of the changing job landscape needing large scale reskilling inside organisations to stay relevant and capitalise on the opportunity presented by this transformation. With just more than 4 million people employed in the industry and research indicated that 50 percent of them will need to be reskilled, the challenge before us is huge.

This report’s scope is limited to the IT-ITeS industry. However, with every company turning into a technology company, it will not be long before the priorities of IT-ITeS organisations become relevant to every organisation. The government is well aware of the key role technology will play for India to stay globally competitive. Digital India is the rallying cry around which all government initiatives are aligning because there is a realisation that building the digital talent stack is core to GDP growth plans and increase jobs.

This was the background to conducting some research on where our industry is on its digital skilling journey. As technologies evolve and tools to use these technologies evolve at an even faster pace, skilling is being seen quite differently. The primary signal of this change is how digital talent development is at the top of every CEO's agenda. Companies now acknowledge that they need to go on the digital skilling journey, however, they are at different stages in their journey.

The report used digital technologies highlighted in the NASSCOM BCG Skills of the Future report, based on which the IT-ITeS industry's FutureSkills initiative was built as a starting point. These include AI, Big Data and Analytics (BDA), Internet of Things (IoT), Cloud Computing, Robotic Process Automation (RPA), Cybersecurity, Blockchain, 3D Printing, Social and Mobile, and Augmented Reality/Virtual Reality (AR/VR). These technologies have already begun to disrupt the current business models but the talent supply with these technology skills is not enough to be able to meet the present and projected demand. Defining and sizing the problem is the first step to addressing this issue.

This report tries to capture insights on digital skill development; talent demand-supply gap and its root cause; learning in the digital age and collaborations within the ecosystem for digital skilling. In view of the increasing need to institutionalise a maturity model to assess the industry's readiness with respect to digital skilling initiatives, the report proposes a digital skilling maturity scale in the form of the Digital Skill Development Maturity Index (DSDMI). The report has been developed with inputs from many IT-ITeS companies, skill providers, and experts from academia in India. It seeks to become a definitive reference for anybody looking for a thoughtful and in-depth assessment of skilling trends in emerging technologies for the IT-ITeS sector.

Given the importance of talent development (for a future-ready workforce), this report and the DSDMI will be updated at regular intervals. In this process, we welcome your feedback at [research@nasscom.in](mailto:research@nasscom.in).



# Acknowledgement

We would like to thank members of the Governance board, Manmeet Singh, President, Experis, ManpowerGroup India; Nishchae Suri, President - Asia Pacific, Middle East & Africa, EdCast; Saurabh Govil, President and Chief Human Resources Officer, Wipro and SV Nathan, Partner and Chief Talent Officer, Deloitte India, who guided us through the duration of the project.

Special gratitude towards IT-ITeS Sector Skills Council NASSCOM (SSC NASSCOM) Governing Council for their valuable insights on the key findings of the report.

We are also grateful to Debjani Ghosh, President, NASSCOM, Amit Aggarwal, VP & CEO, IT-ITeS Sector Skills Council, Sangeeta Gupta, Sr. VP & Chief Strategy Officer, NASSCOM and Achyuta Ghosh, Head, NASSCOM Research for their strategic leadership and support towards this report.

Our heartfelt thanks to industry leaders for sharing their valuable insights. Without their support, this report would not have been possible. Detailed list of participants has been mentioned in the Contributors list.

A special thanks to Deloitte, our Knowledge Partner for this report.





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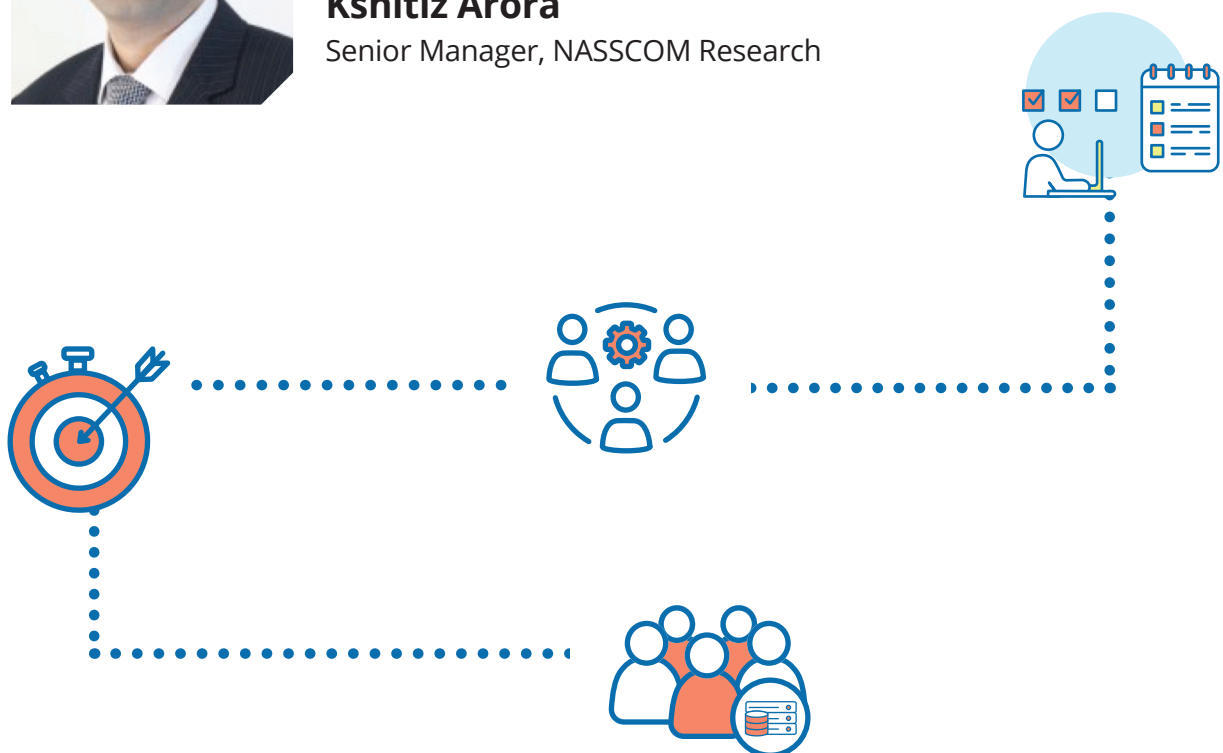
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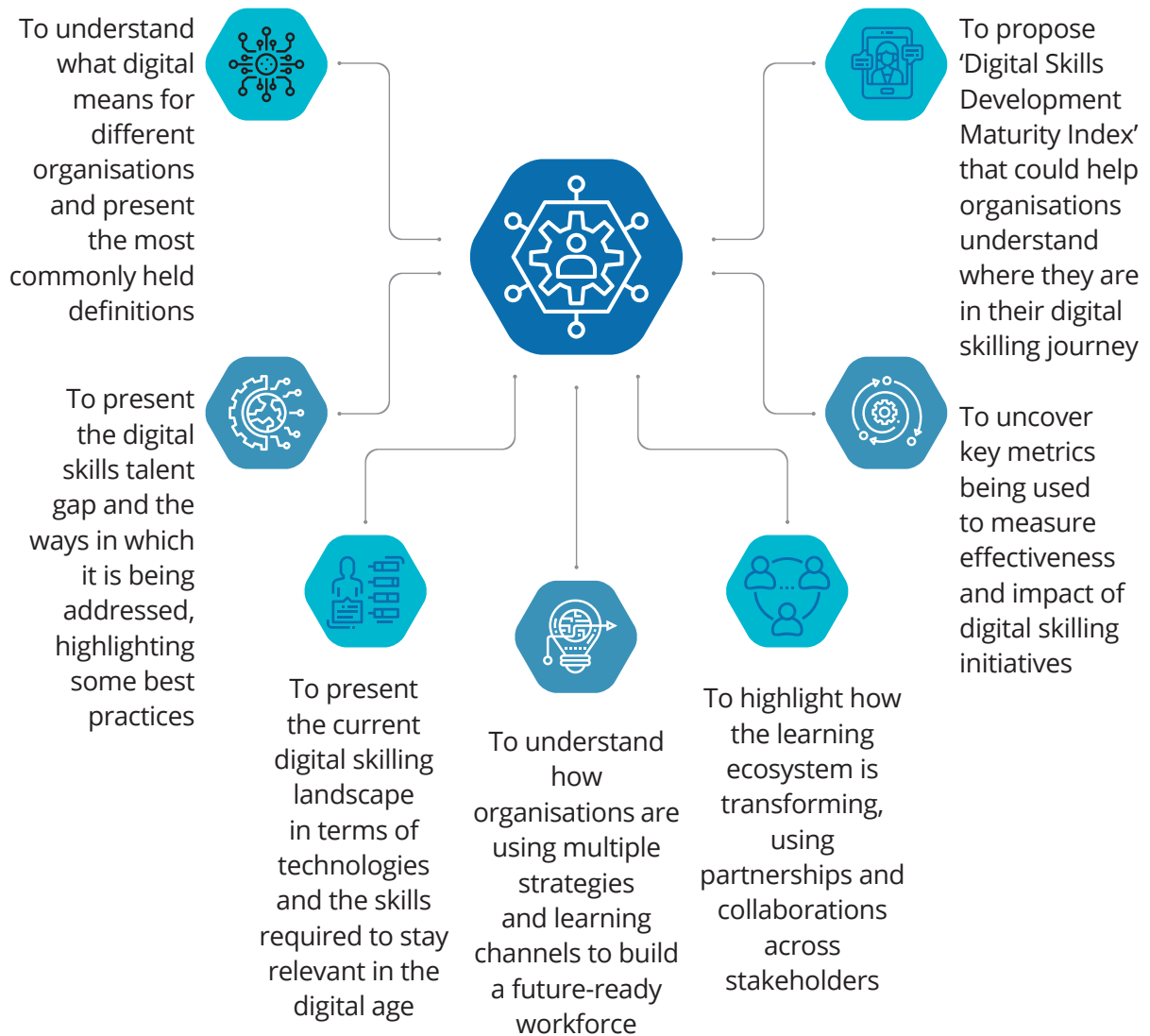
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# Objectives of the study



This report’s objective is to paint a picture of the digital talent landscape in India. The report discusses the facts around how companies are dealing with the impact of the disruptive technologies on their talent development strategies. In addition to defining what digital skills are, the report covers how people are learning these skills, what tools are being used for skilling, and how key skilling metrics are measured. The report will help key stakeholders within the digital ecosystem to understand changes and ongoing trends, and the ways to learn from them. To retain its competitive advantage, India needs to be viewed as the global hub for digital talent. This report will help us understand where we are on this journey and how the collective actions by organisations, academia, and government and technology providers will get us there.

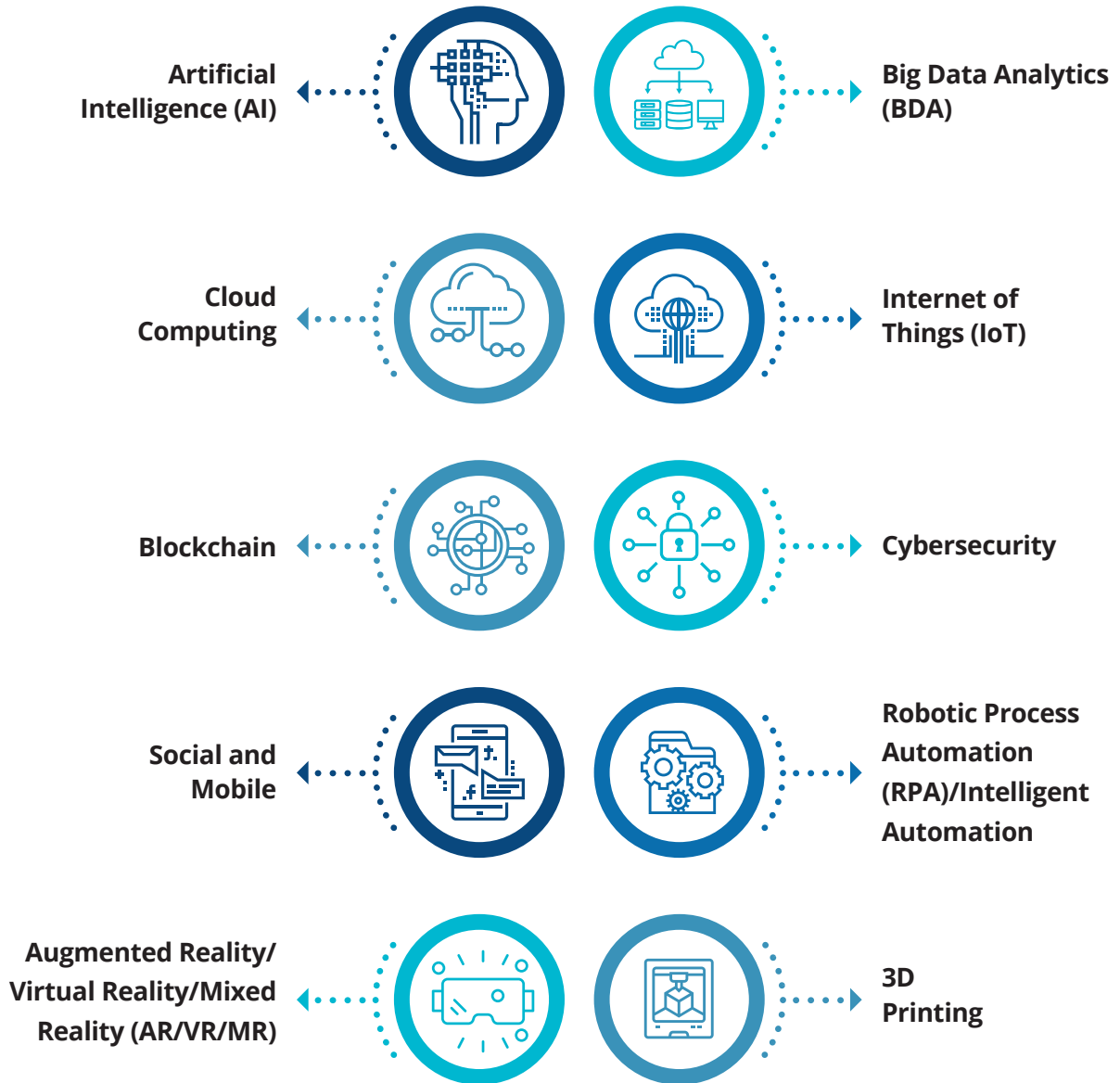


# Scope and methodology



**Scope**

This report's primary focus is on below mentioned digital technologies that were highlighted in the NASSCOM BCG Skills of the Future report (on which the IT-ITeS industry's FutureSkills initiative was built).





The report also touches upon below mentioned professional skills that complement these digital technologies. Changing technology disrupts business models, affecting organisational structure and ways of working. How to work effectively in this environment is as important as knowing what to work on. The report also asks how companies are developing the following skills in their organisations.



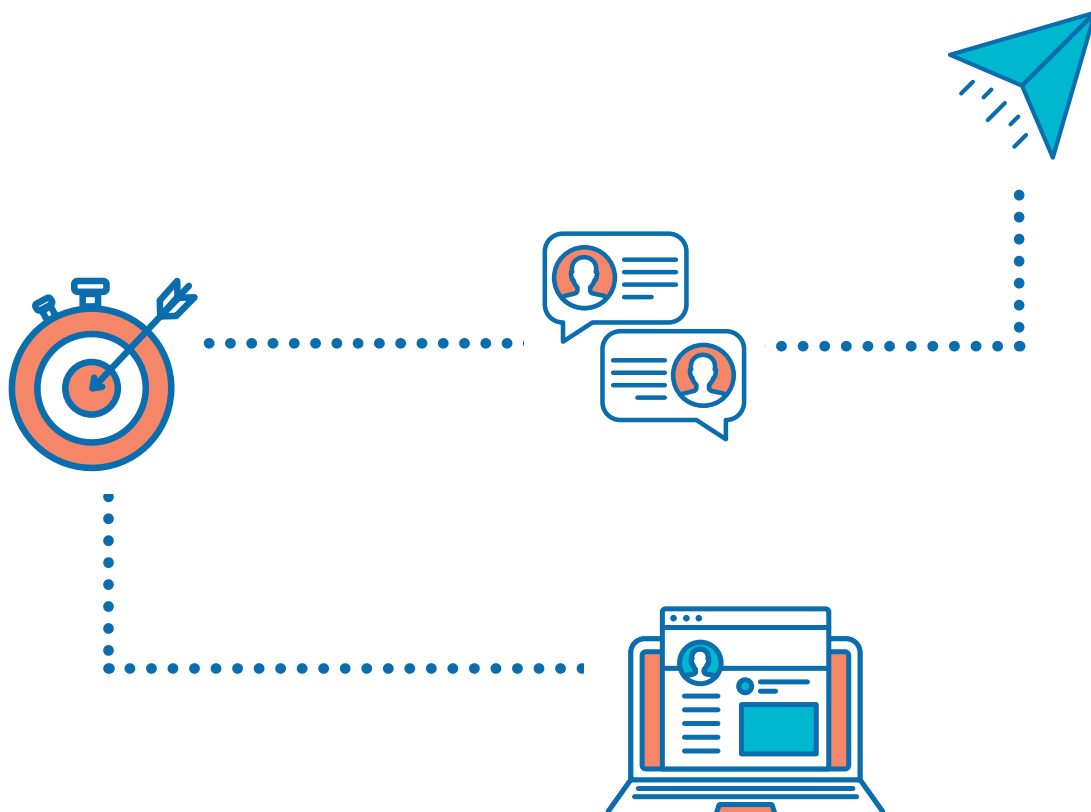
The participants of this study comprise the technology industry, including IT services, business process management (BPM), engineering research and development (ER&D), and product organisations. Data has been collected from respondents spread across different industry segments, geographical locations, and organisation size.



## Methodology

NASSCOM followed a multi-pronged methodology comprising both primary and secondary research. Primary research sources included:

- » Consultations with industry experts that formed the governance board for this study
- » Nearly 50 in-depth one on one interviews with subject matter experts (SMEs) from the technology industry that include Chief Human Resource Officers (CHROs), Chief People Officers, Learning & Development (L&D) leaders, talent acquisition heads, founders of start-ups, and SMEs with similar profiles
- » Online survey of approximately 50 organisations to gather quantitative insights (NASSCOM Future Skills survey 2019) and to build the framework for assessing digital skilling maturity
- » SMEs from academia and providers of MOOCs were also consulted to ensure comprehensiveness of the study



# The 'Digital' imperative







*Despite its seeming ubiquity, digital technology has only begun to penetrate industries. As it continues to advance, the implications for revenues, profits, and opportunities will be dramatic*

.....  
McKinsey

### ■ Decoding 'digital'

In today's digital age, technology is used as a strong lever for business growth. Organisations use digital technologies to revamp business processes, optimise resources, and enable data-driven decision making. Those that are not using these technologies at present are thinking of using digital technologies across business and service delivery. Despite the buzz around 'digital', there is no comprehensive and clear definition of 'digital'. The Deloitte 2019 Tech Trends Report attempts to decode 'digital', tracing it back to its earliest use in correspondence with the SMAC stack (Social, Mobile, Analytics and Cloud), where mobile app development, responsive web, social listening, and cloud were termed as 'digital'. However, in line with our discussions with SMEs, digital in the current age could mean much more than just technologies.

*Digital is the main reason just over half of the companies on the Fortune 500 have disappeared since the year 2000.*

– Pierre Nanterme  
Former CEO, Accenture

For most of the organisations, digital cuts across the 'people', 'culture', and 'process' as technology is at the core, acting as a catalyst to transform these three. For some leaders, 'digital' is the new way of engaging with clients either through AI-driven sales tools or data-driven insights or solutions that disrupt the way something is done using technology and data. We heard statements such as "digital is technology-agnostic, and cuts horizontally and vertically across different business sectors and functions" and "digital is a mindset". However, when we look beyond these statements and how digital transformation is taking place across organisations, we find technology is the common factor. AI has changed customer experience; data is being gathered at every point of interaction between man and machine, or machine and machine. As machines become more 'intelligent' with the underlying digital technology, people are working with machines in different ways. The way of doing a task is changing. Workflows are














also changing, leading to changes in team and organisational structures. Therefore, we have concluded that the original hypothesis (identifying 10 technologies and 10 professional skills required for the future world of work where human and machines will work as extensions of each other) is valid. The identifying technologies are exponential in nature. They have an impact that is far higher than the existing technologies. We see the digital mindset being powered by the knowledge of digital technologies and digital enabling skills. Therefore, we have framed our questions and their outcomes around these.

### Digital skills talent availability in India: Overview

The Indian IT-ITeS industry is undergoing a paradigm shift due to advent of digital technologies, a shift that is touching all aspects of business, including talent. In the rapidly evolving technological landscape, the demand for talent is determined by mapping digital skills with evolving business needs. With advancements happening at a fast pace in emerging digital technologies, the nature of jobs and the skills needed to perform them are also changing. As new roles emerge and skills required to meet them evolve, the size of the existing digitally skilled workforce currently employed will not be enough to meet demand. According to NASSCOM's demand-supply analysis, existing installed talent base of digitally skilled professionals in India across emerging technologies stood at **6,80,000** in **FY2019** and is expected to reach **8,84,000** in **FY2020**.

#### Installed Talent by Technology (FY 2019)

Digital Technologies	Installed Talent (FY2019)
 IoT	150k – 170k
 AI & BDA	165k – 185k
 Cloud Computing	240k – 260k
 3D Printing	5k – 10k
 AR / VR / MR	15k – 20k
 Social and Mobile	165k – 185k
 Cybersecurity	140k – 160k
 Blockchain	5k – 10k
 RPA	10k – 15k
<b>Total unique digitally skilled talent</b>	<b>~640k – 680k*</b>

NASSCOM Zinnov demand-supply analysis

\*There is a **30 percent** overlap where some roles may be classified in multiple classifications, i.e., someone working in cloud could also be working on AI. Hence, the installed talent base is not a summation of talent employed in individual technologies.

### The talent paradox

India is facing an interesting talent paradox. It can be called a 'talent abundant' country as it is expected to have about **8,84,000** digitally skilled professionals by FY2020. It is also 'talent deficit' as the proportion of digitally skilled workforce is only about **20 percent** of the total workforce employed in the IT-ITeS industry.



*Talent availability is a big challenge today primarily because of decreasing shelf-life of the learned technical skills for working professionals and difficulty in scouting for ready-made talent from the industry and academia. While people talk of knowing digital, in a live environment requiring practical implementation of skills, it is often difficult to find the right talent.*

– Saurabh Pandey

VP Engineering, Country Leader, SHL

### Increasing digital talent gap – Top concern among CEOs

The concerns around increasing demand for skills, especially in emerging technology areas, are no longer limited only to HR, but have become an organisation-wide challenge. About **77 percent** of the CEOs of the NASSCOM CEO Survey 2019 mentioned lack of digital capabilities and skills among top three risks that can be a hindrance to the IT-ITeS industry's growth.

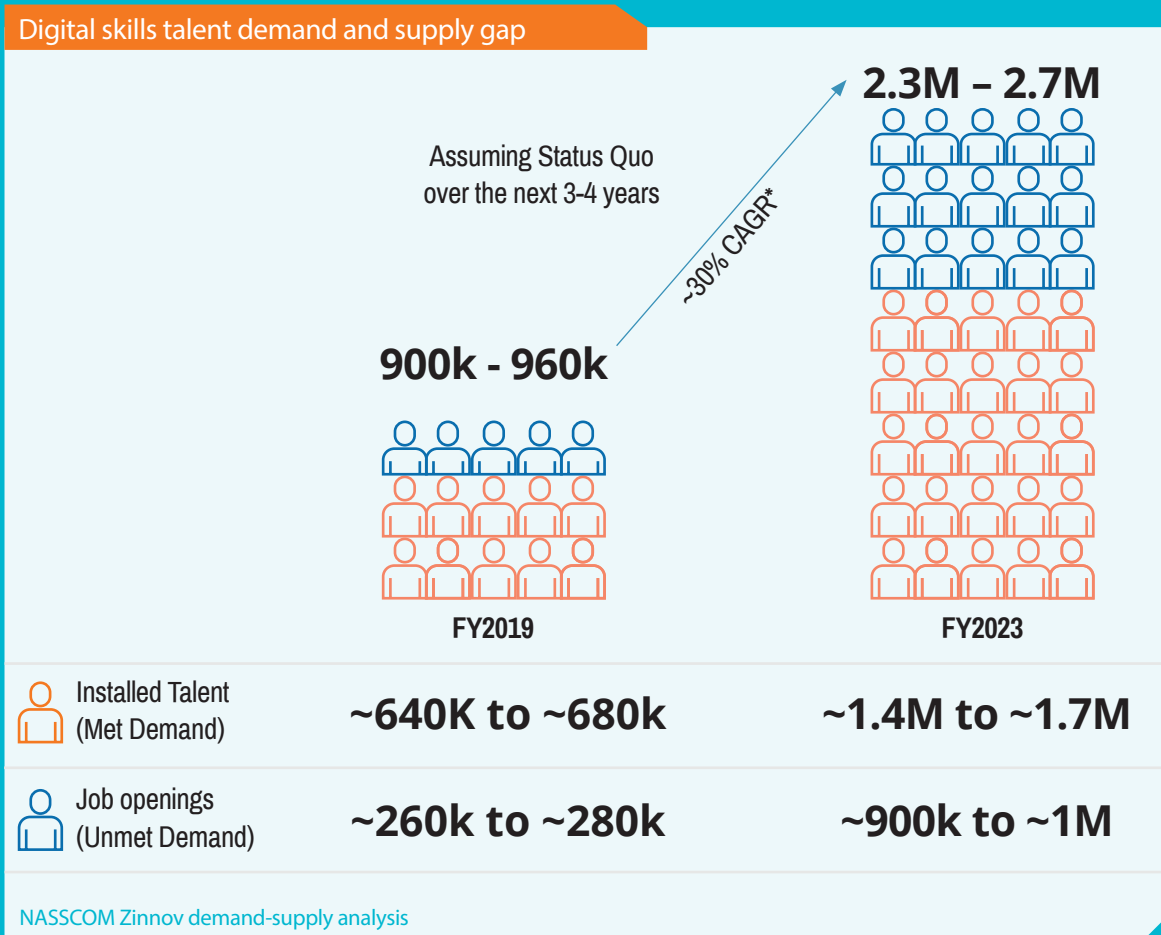
Lack of digital skills emerged as a key concern for CEOs

Amongst  
**TOP 3**  
priorities for  
more than **75%**  
of CEOs

NASSCOM CEO Survey 2019

**The demand for digital talent is surpassing the supply, making lack of digital skills a key concern for CEOs**

According to NASSCOM's demand-supply analysis, the installed talent base of digitally skilled professionals in India across emerging technologies stood at **640,000–680,000** in FY2019. The installed base is expected to increase to about 1.4–1.7 million by FY2023, assuming status quo over the period. The demand, comprising the installed talent base and job openings, is projected to increase at **30 percent CAGR** to reach about 2.7 million by FY2023.



To stay ahead of the curve, the industry has acknowledged the importance of skilling. It is undertaking proactive measures and massive efforts to upskill/reskill workforce.

# Staying relevant in the digital era – need for upskilling/ reskilling





In FY2019, about **74 percent** organisations upskilled/reskilled more than **20 percent** of their workforce.

Digital skilling is increasingly becoming core to organisations' business strategy. About **94 percent** organisations mentioned that digital skills development is a part of their overall strategy at various levels.

About **89 percent** organisations report digital skills development in business review meetings quarterly, biannually, annually or based on business needs.

**80 percent** of the organisations have either specific digital skilling policies or extended existing L&D policies to include digital skills.

*When it comes to translating technological innovations into real business results, technology is relatively easy to come by; it is talent that is often the limiting factor*

.....

**World Economic Forum**

With the ever-evolving digital landscape, businesses around the world are experiencing a rapid shift in jobs and the skills required to perform them. A research by the World Economic Forum indicates that by 2022, about **54 percent** of the employees would require significant reskilling and upskilling in the near future. Of these, about **35 percent** employees require additional skilling for up to six months, **9 percent** will require reskilling for 6–12 months, and **10 percent** will require additional skills training for more than a year.





*Skilling is core to the digital transformation of the IT-ITeS industry and requires a strategic focus to ensure employees are able to acquire the skills that are relevant, both for their careers and for addressing the business needs of the organisation.*

– Krish Shankar  
Group Head HR, Infosys



The technological shift in the digital landscape is expected to displace some job roles and at the same time will create new opportunities. The 'Future of Jobs in India' report indicates that **9 percent** of the total workforce would be deployed in new jobs that do not exist today and **37 percent** would be deployed in jobs that would need new skill sets. Hence, it becomes essential for organisations to focus on skilling their employees to build capabilities in emerging technologies. With about 8,84,000 digitally skilled talent base expected by FY2020 the Indian IT-ITeS industry is accelerating its efforts to to upskill/reskill its workforce.

**'Reskilling' refers to building employees' capabilities to prepare them for different job roles as their current skill sets become obsolete due to technological advancements.** For example, organisations have reskilled their analysts and data engineers to be proficient in skills required to perform AI-related work.

**'Upskilling' entails skill development to enhance employees' expertise in the existing job role without changing their jobs.** For example, organisations are upskilling their workforce to use advanced tools and concepts required in their current roles to develop in-house experts in a particular technology/domain.

Reskilling and upskilling have become an imperative for organisations, as many positions remain vacant for months because of lack of "right talent" in the job market. The time to hire suitable talent for these emerging technologies has also increased compared with the average hiring time for mainstream skills. Low 'employability' of fresh graduates, coupled with a tight labour market for skilled workers, has made it increasingly difficult for organisations to hire "ready-made" talent in a timely manner (with the average lead time to fill an open job being 42 days) per the Deloitte Global Human Capital Trends 2019 report.

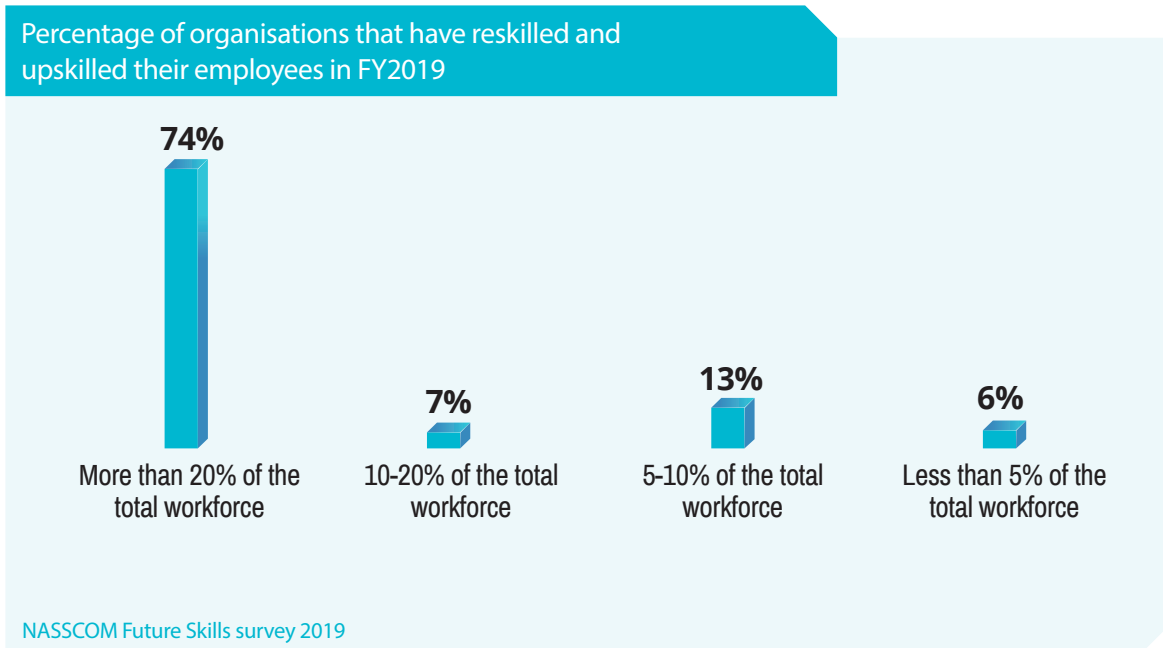
Reskilling offers a win-win solution to both organisations and their employees. While employees build capabilities that help them stay relevant, organisations get access to a future-ready pool of employees who can fulfil dynamic business needs. However after reskilling their workforce, organisations' expectations also increase. They expect

reskilled employees to demonstrate competencies at a higher level almost immediately with tangible outcomes.



Upskilling involves training employees while keeping them in the same job roles. It is an extension of people’s capabilities and employability, making them more proficient to help them keep pace with changing technologies and gain skill sets required in their current work.

Organizations across the ecosystem acknowledge the importance of reskilling and upskilling their workforce, hence they are making significant efforts to train their people.



These days it is difficult to forecast which skills will emerge even next year. As a result, emphasis on skilling has increased substantially. Both employees and organisations should constantly identify the skills in demand to prepare themselves for roles of the future.



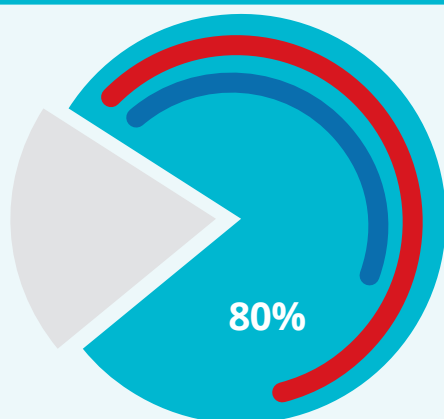
### Digital skilling at core to organisations' business strategies



Digital skilling has become an integral part of the IT-ITeS industry's overall business strategy and organisations are making efforts towards seamless execution of strategies. As a part of the **NASSCOM Future Skills survey 2019**, about **94 percent** respondents mentioned that digital skill development is part of their overall strategy. Of these, **59 percent** had digital strategy at the core of their company-wide strategy, while **35 percent** organisations have digital skilling as a part of key business functions. About **89 percent** organisations report digital skill development in business review meetings quarterly, biannually/annually, or based on business needs.

With the increasing importance of digital skill development for building workforce capabilities, L&D policies have also evolved. The **NASSCOM Future Skills survey 2019** highlighted that almost **80 percent** of the organisations have L&D policies for digital skills. Some organisations have devised specific policies for digital skilling, while others have extended their existing L&D policies to include digital skills. Keeping in mind the dynamic nature of digital skills, organisations review their policies to keep pace with changing trends and industry requirements.

80% organisations have learning and development policies focused on digital skills

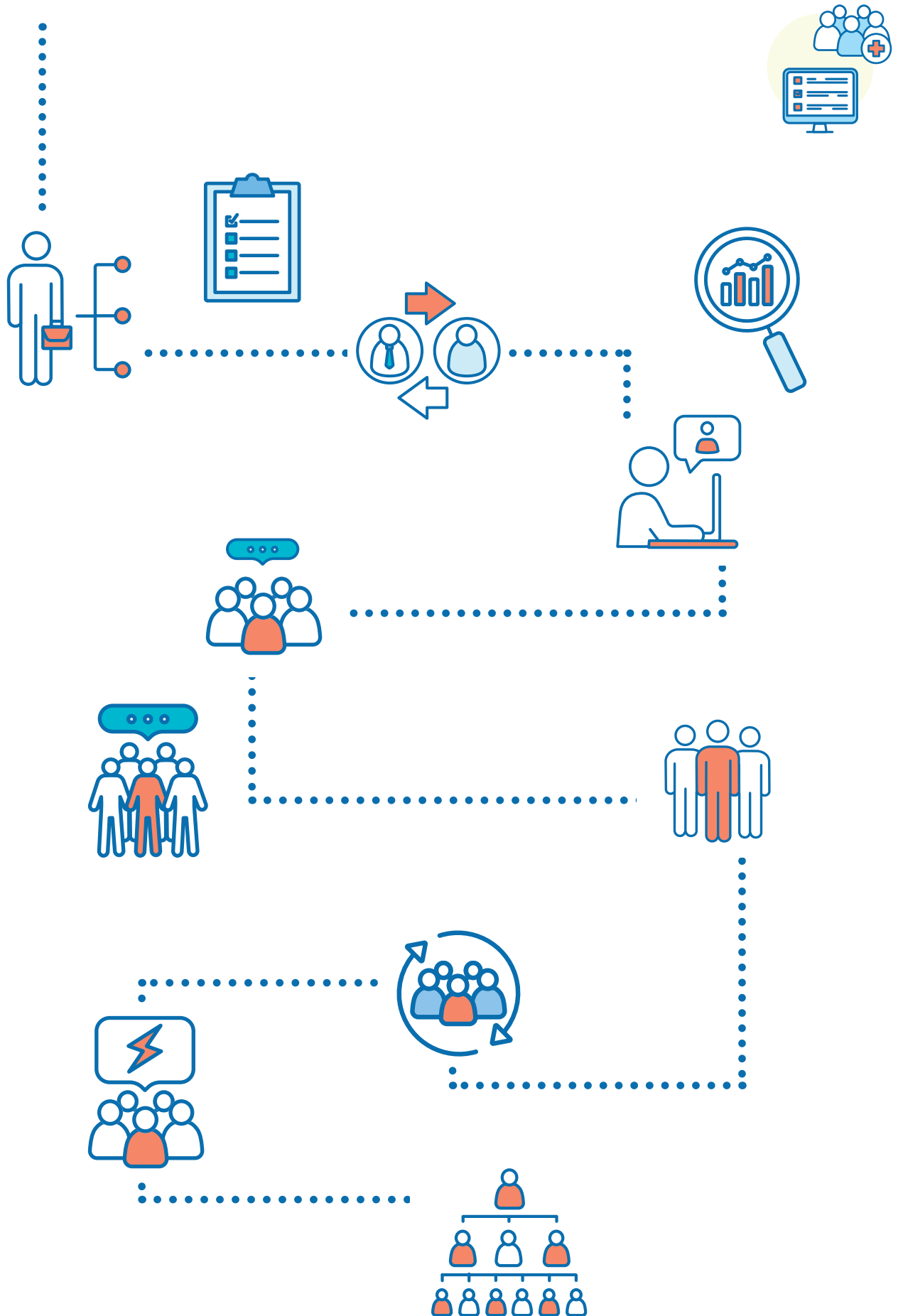


- 20% No clearly defined policies for digital skills development
- 33% Specific policies focused on digital skills Learning & development exist
- 47% Existing Learning & development policies are extended to digital skills

NASSCOM Future Skills survey 2019

*Given the pace of technological change, digital transformation is paramount today and will continue to be so in the coming years with a need to build organisational strategies and systems to support it.*

– Piyush Mehta  
CHRO, Genpact



# Exploring the talent landscape for bridging the demand-supply gap







Organisations use a healthy mix of 'build' and 'buy' approaches to fulfil their talent needs. About **77 percent** organisations prefer building talent internally unless demand is short term and urgent.

Awareness around gig workers and freelancers is increasing with **38 percent** organisations exploring opportunities to engage with them over time to fulfill talent needs.

Acqui-hiring is emerging as a smart way of enhancing parent organisations' talent pool by adding skill sets to create a fully functional team and **21 percent** organisations are looking at acqui-hiring for fulfilling talent needs.

*In today's rapidly changing digital landscape, companies that understand their talent needs and know how to meet them have a competitive edge.*

.....

**McKinsey**

The Indian IT-ITeS industry is adopting multi-pronged strategy for fulfilling talent needs. Organisations have found it conducive to use a mix of 'build' and 'buy' to fulfil their talent needs. However, decision to build, buy or use a mix of both is aligned with organisations' business needs. If the skills in demand are needed to fulfil long-term business goals and easy to scale, organisations usually prefer building competencies internally. However, when demand is short term, organisations prefer hiring lateral talent (including freelancers) or acqui-hire.



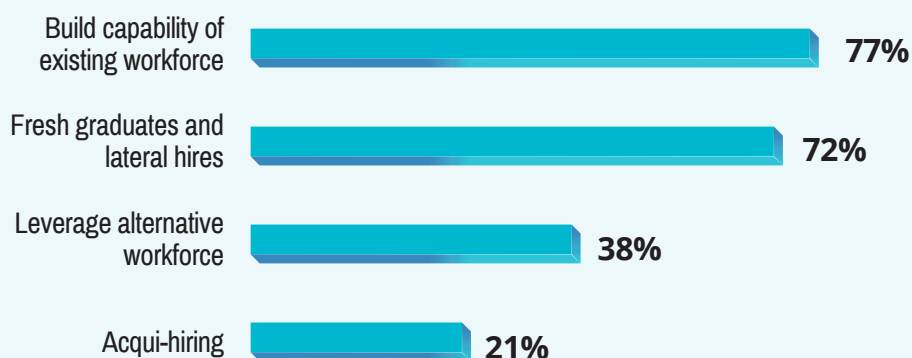
*There is not just a talent war – it's a famine. To succeed, companies must hire, develop, and retain talent better than their competition. As enterprises progress in their digital journeys, the winners will be those who utilize multiple hiring sources and reskill workers in a culture of lifelong learning – invest in their people, who are the ultimate differentiator in a commoditised world. This is further validation of Infosys' commitment to continuous learning and reskilling that has been a bedrock of our success for over three decades.*

– Pravin Rao

Chief Operating Officer, Infosys



### Adoption of multi-pronged strategies for fulfilling talent needs



NASSCOM Future Skills survey 2019



*To close the skill gap in emerging technologies, it has become an imperative to experiment with multiple workforce arrangements. It is time we tap into various demographic segments for recruitment which have for long been ignored.*

– Md. Sohail

Head – Talent Acquisition, Zohocorp

## Deploying a mix of 'build' and 'buy' approaches

Indian IT-ITeS organisations prefer a healthy mix of 'develop' and 'acquire' approaches to fulfil their workforce needs. The **NASSCOM Future Skills survey 2019** highlights that organisations equally prefer building capability of their existing workforces and

hire from the external job market to fulfil evolving business requirements. However, the decision to build or buy is usually based on the demand of the skill the organisations need. If a particular skill is needed to fulfil long-term business goals and is easy to scale, organisations usually prefer building the competency internally. However, when demand is short term, organisations prefer buying or acquiring trained talent from outside.



**The decision to 'build' or 'buy' is based on the demand for the skill that organisation needs. Organisations usually prefer building talent internally unless demand is short term and urgent.**

**Genpact has launched an upskilling framework called 'Genome', which will deliver customised learning and development opportunities designed to keep skills relevant. The framework combines in-depth understanding of the science of learning and new operating models to offer customised reskilling paths for employees.**

The following are examples of how organisations are building capabilities of their existing workforce to make them future-ready in digital technologies.

- » Zensar has invested heavily towards its Digital Training Academy, and every employee has to go through four levels of mandatory training in areas such as AI, AR, and ML.
- » Infosys has created more than 75 new courses to make its employees future ready. The company has adopted several strategies, including creating a full stack workforce, power programmers, enabling niche design skills, and domain skills.
- » Cognizant has reskilled and upskilled its associates through Cognizant Academy, equipping them with high-end skills in areas such as data science, design thinking, cybersecurity, interactivity and gamification, IoT, automation, analytics, cloud technologies, AI, ML, and enterprise technologies (such as Salesforce and SAP).
- » Wipro has TrendNxt, a skill-based learning framework, which aims at enhancing employees' technical knowledge year on year. It follows a credit point approach wherein credits are earned by undertaking technical certifications and attending technical training.

### ■ Acqui-hiring – Route to get access to tech and talent



Acqui-hiring has been a successful way to hire talent, and get access to technology and domain expertise in the sector. It has emerged as a smart way of enhancing parent organisations' talent pool, adding skill sets to create a fully functional team. The biggest advantage is that this workforce is unlikely to require any training and is already exposed to working on required tools, technologies, and frameworks. This approach is primarily popular when skills in emerging technologies are required where large organisations usually acqui-hire start-ups working in niche domains. It enables them to shore up on the high-quality talent available in the country to build new products and services. While tech giants such as Facebook, Twitter, and Google, are at the forefront in such talent acquisitions, the trend is also catching up in the Indian ecosystem.

- » Swiggy acquired AI start-up Kint.io in February 2019 to boost its computer vision technology and enhance consumer experience.
- » Retail giant Walmart acquired Appsfly in 2018 that had built a system for micro apps to get hosted and streamed on any platform.
- » Airtel acqui-hired AuthMeID Services, a Bengaluru-based start-up, focused on AI-based solutions. As a part of this deal, AuthMe will join Airtel X Labs that builds solutions in the areas of AI, IoT, AR, and VR.
- » Google acquired Halli Labs in India that worked in the area of AI and ML techniques to offer better solutions. As a part of the deal, the start-up is providing advanced AI and ML technologies to the company to upgrade older domains and a platform for better performance.
- » Myntra, the fashion e-commerce player, acqui-hired Bengaluru-based InLogg in 2017, to strengthen its supply chain capabilities.
- » Ixigo, one of the leading travel-search marketplaces, acqui-hired a team of mobile content sharing app 'Reach', to help enhance Ixigo's already existing products by providing travelers utility, consumable content, and entertainment.

**Acqui-hiring is emerging as a smart way of enhancing parent organisations' talent pool, adding skillsets to create a fully functional team.**

### ■ Using alternate workforce arrangements

The increasing demand-supply gap in digital technologies has also transformed the definition of 'workforce'. Earlier full-time employees on organisation payroll were considered a part of the workforce. However, organisations are now exploring alternate workforce arrangements, such as engaging with freelancers, gig workers, and crowd sourcing work solutions, to fulfil their requirements.

Based on our discussions with industry experts, organisations highlighted that they have explored the gig economy and considered the option of working with freelancers in the past.



**There is increasing awareness around employing gig workers and freelancers, although their integration into mainstream work arrangements is still at nascent stages.**

Despite the increased awareness about gig economy, the reason for the lower adoption of gig workers and freelancers is typical challenges and risks associated with managing this work arrangement. These challenges include:

- » Legal, security, and privacy concerns
- » Client apprehensions
- » Limited oversight and control over their ways of working
- » Integration with other talent arrangements
- » Adjustment in organisations' values and culture

Further, to make the best use of their available talent, organisations are transitioning from having 'teams' to having agile squads and tribes. A squad typically has developers, and design, development, testing, and delivery employees. A collection of squads constitutes a 'tribe', where each 'squad' works on a specific business area. Organisations prefer hiring or moving complete teams to different projects instead of individual employees.

**HCL uses an innovative way of on-boarding people, where they use hackathons to hire entire teams popularly referred to as "squads". The Holy Grail for digital for them is to form agile squads and move the entire team from one project to another.**

**Organisations are transitioning from teams to agile squads to make the most from their available talent.**

# Digital skills – The driver for digital transformation





There is a shift from traditional job roles to building 'Composite' capabilities that require an-interplay of technical skills, professional skills, and domain knowledge.

AI/BDA, cloud computing, and intelligent automation are among the top three technologies in terms of learning importance and certifications completed by employees in FY2019. This trend is expected to remain unchanged over the next two-three years.

Communication, and problem solving are among the top professional skills that organisations want to inculcate in their employees.

Considering the importance of continuous learning, organisations need to embrace learning as a critical driver for success and evolve into what is known as a 'learning organisation'.

In the future, 'learnability' will be a key skill that organisations will look for while hiring employees.

*Technological change demands stronger and more continuous connections between education and employment*

.....

The Economist

### Focus on 'Composite' capabilities

With the advent of emerging digital technologies, the nature of jobs is evolving. For the past few years, organisations and employees around the globe have been alarmed by studies predicting that emerging technologies, such as AI, automation, and robotics,

will replace humans. About **64 percent** respondents of Deloitte's Global Human Capital Trends Survey 2019 cited AI and robotics as important areas of consideration in any discussion on human capital. Only about **26 percent** of the respondents across the globe stated that their organisations were ready to deal with the mega-impact of these emerging technologies.



*Business operations are undergoing massive digital transformation. Companies are looking at technologies that help to scale their existing business and make it easier to operate. Automation is here to stay and automate mundane, repetitive tasks and let the employees focus on further insight-driven activities. Organisations that skill their workforce on RPA will benefit tremendously and leverage the most out of RPA. 🗨️*

– Arvind Thothadri

VP Global Training and Certification,  
Automation Anywhere

With the changing nature of jobs, the skills needed to perform these jobs are transforming. Organisations' focus is on building 'Composite' capabilities that requires employees to possess a combination of three different capabilities, including technical skills, professional skills, and domain knowledge.

*To create value, we need to prepare our teams in several areas including domain skills, professional skills and technical skills. It is this combination that the organisations need to focus on for truly leveraging the digital opportunities. Finally it's about having the right attitude and being change ready that will take us through this transition. 🗨️*

– Pankaj Phatarphod

Former MD and Country Head of Services, RBS

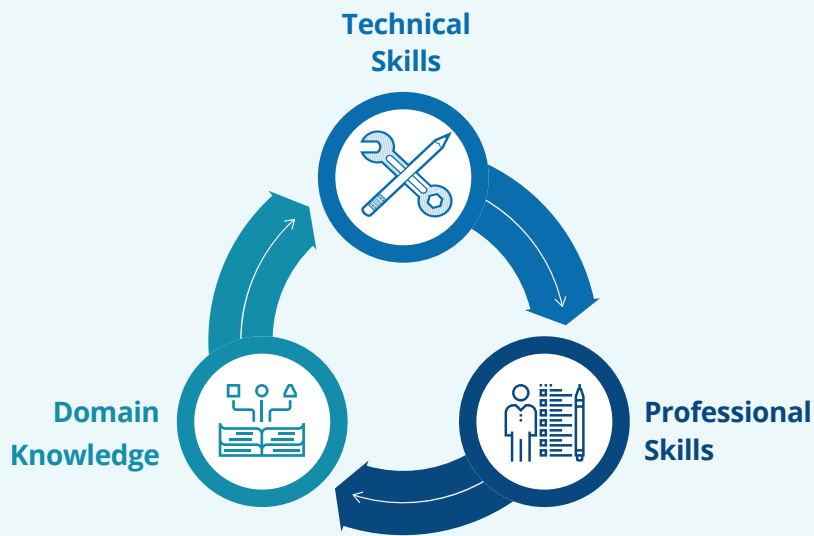
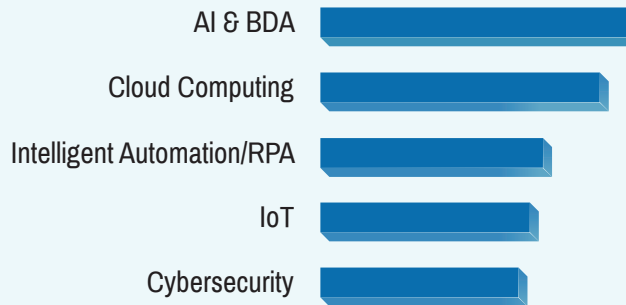
**There is a shift from traditional job roles to 'Composite' capabilities, requiring an interplay of technical skills, professional skills, and domain knowledge.**



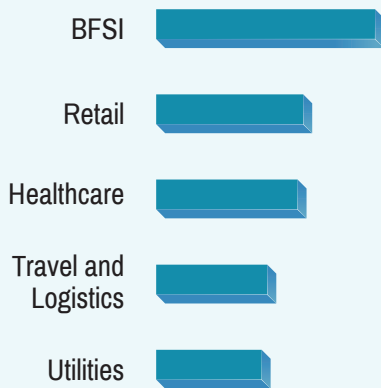
Composite Capabilities



Learning Priorities-Technical



\*Learning Priorities-Domain



Learning Priorities-Professional



\*depends on organisations' business needs

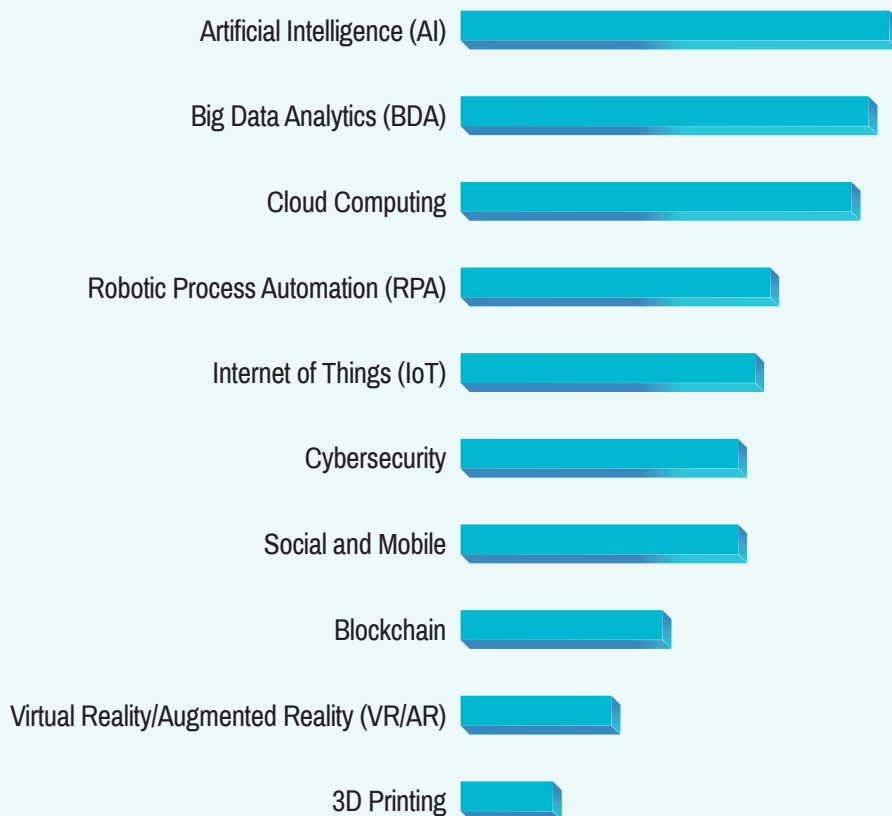
NASSCOM Future Skills survey 2019

### Emerging technologies and technical skills



According to the **NASSCOM Future Skills survey 2019**, AI, BDA, cloud computing and intelligent automation (RPA) have emerged as top technologies (in the same order) for organisations when it comes to learning importance. These technologies' learning importance vary on the basis of organisations' business needs. Moreover, these technologies, especially AI, will continue to be among top priorities through the next two-three years. This is because AI when combined with other technologies could find adoption across business verticals and functions, and potentially become the deciding factor for enhanced production and increased growth.

#### Technical learning priorities



Further, discussions with industry experts revealed that the commercialisation of AI-powered solutions will be on the rise during next two-three years and technologies such as cloud and blockchain will act as enablers. The increasing focus on blockchain in the next 2-3 years could be a result of its growing importance as a strong facilitator for decentralised cloud solutions, which would require skilled talent.

*Digital skills are dynamic in nature and their relevance needs to be continually evaluated and socialized in the organisation to stay relevant.*

– Susan Cutinha  
Head- Learning and Development, Atos Syntel



Although these technologies will continue to dominate the landscape through the next two-three years, skills required to use these technologies may evolve over time. The tools and platforms that are popular now may be replaced with new ones that do not even exist at present. The table in the appendix depicts indicative core skills specific to the emerging technology areas. The list of skills comprises technology concepts, protocols, programming languages, tools, and platforms that are currently relevant for working in these technologies at core positions.

According to the **NASSCOM Future Skills survey 2019**, cloud computing, AI, BDA, and intelligent automation also emerge as the top technologies where employees in the IT-ITeS industry have completed certifications in FY2019. This is also aligned with the industry’s training needs as these technology areas are among organisations’ current and future top priorities. Based on the consultations with industry experts and responses to the survey, an indicative list of industry-preferred certifications and certificate providers in emerging technologies is shared in the appendix.

## Professional skills in the digital age

In the current business environment, professional skills have evolved to complement skills across technologies and domains. Communication, and problem solving emerged as the top professional skills that organisations are focusing on while acquiring and building talent. Additionally, continuous learning must be inculcated as a part of an organisation’s overall culture. Research also corroborates that there is a need for ‘lifelong learning’, which primarily comprises continual learning, unlearning, and relearning to stay relevant in today’s VUCA (Volatile, Uncertain, Complex, Ambiguous) environment. **‘Learnability’** is a key skill that organisations look for while hiring employees.



*It's time to take a fresh look at how we motivate, develop and retain employees. In this environment, learnability is the hot ticket to success for employers and individuals alike.*

– Mara Swan

Executive Vice President, Global Strategy and Talent, ManpowerGroup



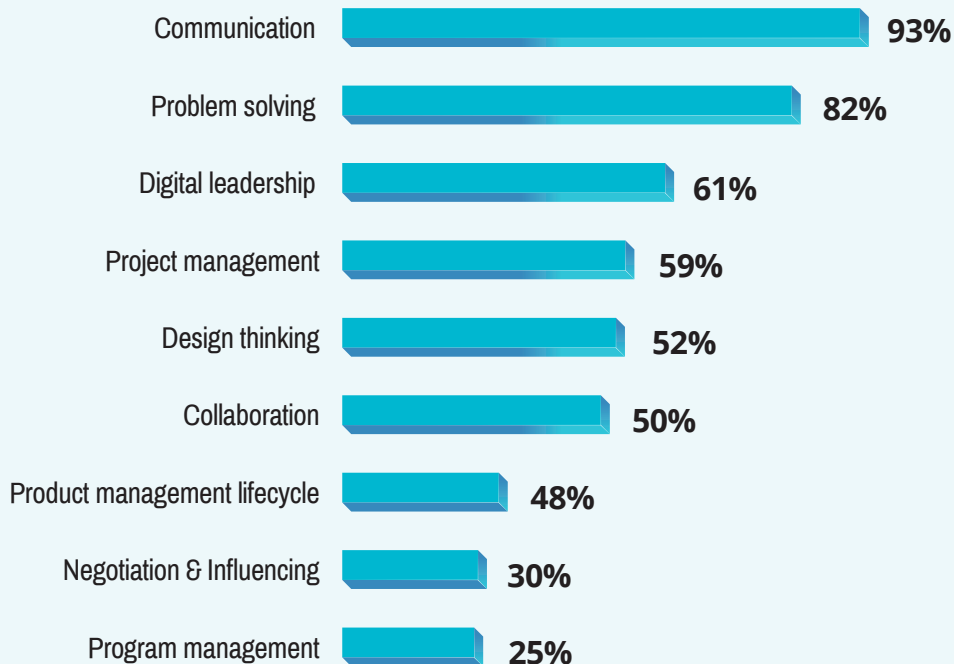
At present, organisations need to embrace learning as a critical driver for success and evolve into what is known as a **'learning organisation'**. They need to encourage their employees to continuously hone old skills and learn new ones to reinvent themselves and contribute to organisations' growth. A research by Deloitte indicates **'learning organisations'** are **92 percent** more likely to innovate and experience **37 percent** greater employee productivity. As a result, most successful organisations and business leaders agree that continuous or lifelong learning is the key to staying competitive in today's fast-changing world.

*Continuous learning is the way of life at HCL. We believe that learning is the shared responsibility of employees and the organisation.*

–Shyam Enjeti

SVP, Digital & Analytics, HCL Technologies

### Top professional skills for organisations



NASSCOM Future Skills survey 2019

*In today's VUCA business environment, continuously acquiring new skills to stay relevant is one of the key drivers for employees. It is simple - grow or perish, continuous learning is the way forward.*

– **Subramanian MS**  
Head of Analytics, BigBasket



## ■ Importance of domain and institutional knowledge

Although focusing on technical skills in the age of digital transformation is important, acknowledging institutional knowledge and developing a business model that integrates new digital talent with domain knowledge is also essential. In addition to institutional knowledge, gaining knowledge of verticals (including BFSI, retail, healthcare and life sciences, agriculture, education, automotive, FMCG, energy, manufacturing media and telecom, and government and public services) that organisations cater to is also important for the jobs of today.

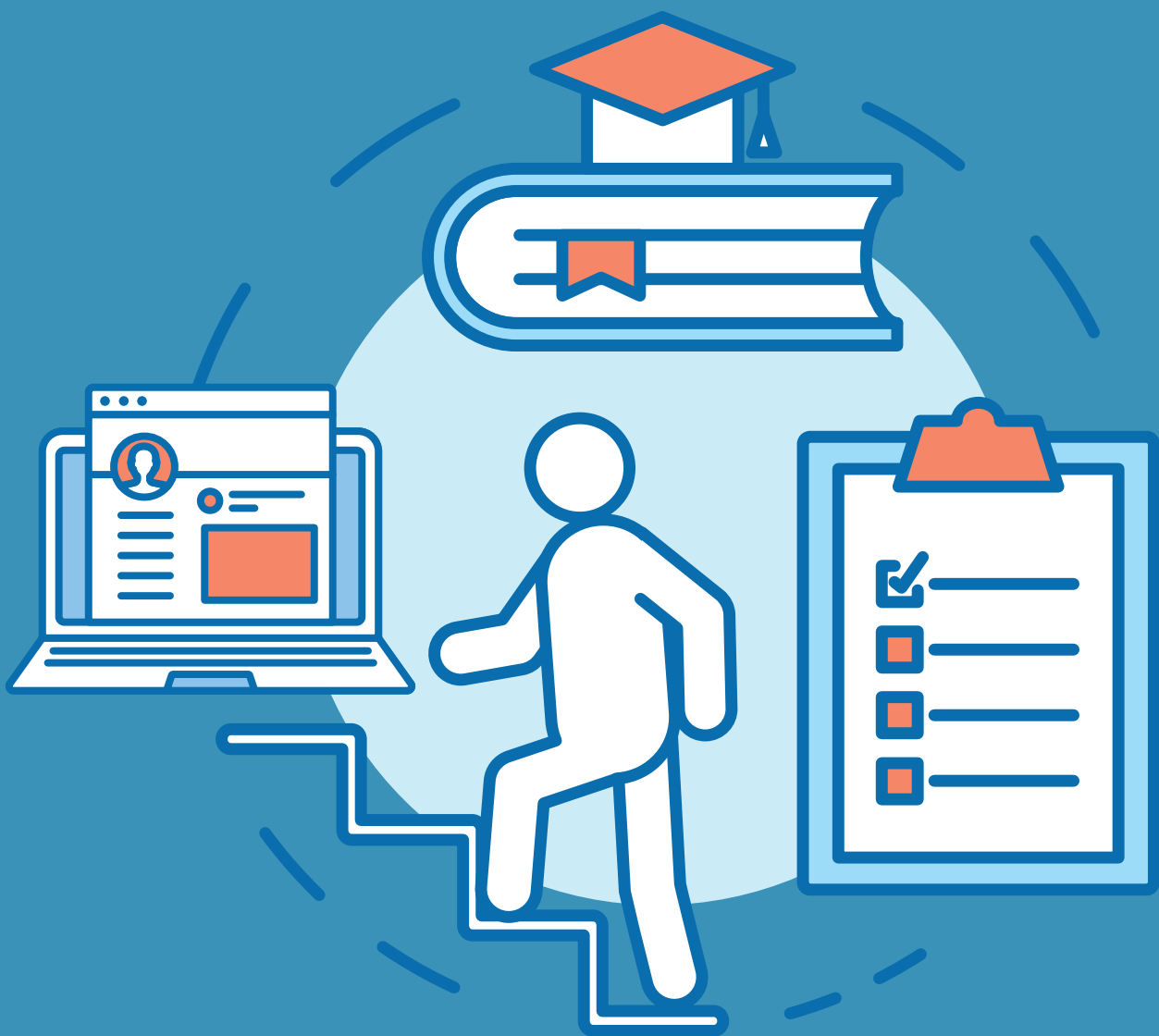
*The digital economy needs that employees, particularly in software development, have deep understanding of not just the domains and technologies but also possess proficiency to apply them together using approaches such as DevOps and Agile.*

– **Sunil Goyal**  
COO, Sopra Steria

– **Shalini Mishra**  
Head of Digital Transformation, Sopra Steria

The world of work is changing faster than ever before and employers are looking for individuals that can thrive in a constantly changing work environment. Organisations are realising the need to focus on building employee skills and competencies. In addition to the increasing importance of the concepts of 'Composite' capabilities requiring an interplay of technical, domain, and professional skills, organisations highlighted the importance of agile and scrum.

# Evolution of career paths in digital



Increasing focus on building skills and competencies vis-à-vis job roles is resulting in evolution of career paths from a linear ladder to a multi-dimensional career lattice.



About **62 percent** organisations have defined career paths for their employees. Moreover, employees also have visibility of these career paths, providing them with a holistic picture of their career progression.

The top three ways in which organisations motivate employees are offering more challenging projects horizontal movement at the same level and vertical movement in the same role.

*When highly engaged employees are challenged and given the skills to grow and develop within their chosen career paths, they are more likely to be energised by new opportunities at work and satisfied with their current organisation*

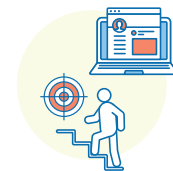
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McKinsey

### Transition from career ladder to career lattice

The changing nature of jobs, evolving skills landscape, and focus on building 'Composite' capabilities, has resulted in the transformation of career pathways in the digital age. The focus on building skills and competencies vis-à-vis job roles is resulting in the evolution of shape of career paths from ladders to lattices.

The focus on role-based career paths is giving way to building employee skills and competencies, and non-linear non-traditional career movements.



### Career ladder

follows a hierarchical structure that governs the way information flows in organisations, defining career success as a linear climb to the top with increasing expertise in skills possessed by employees as they progress to different roles.



### Career lattice

is meant to represent multiple paths to advance an employee's career. It provides opportunity and flexibility to switch job roles entirely, and make cross-functional movements to different roles that are not necessarily a level higher or even in the same domain.

Career ladder's one-size-fits-all approach assumes that employees are more alike than different, and want as well as need similar things to deliver business outcomes. However, organisations are shifting towards flexible, open career models that offer enriching experiences rather than time-bound, role-based career progression.

The career lattice model is an adaptive one and therefore, better suited to align organisations with the changing needs, norms, and expectations of today's workplace. This helps both organisations and employees identify their progression through the lattice with changing skill requirements. Career options in the 21st century need to be viewed as a series of developmental experiences, each offering an opportunity to acquire new skills, perspectives, and judgements.

**Based on the customer and market landscapes, WNS has an associated learning path for each role that is a convergence of domain, technology, and analytical application. This forms the part of learning design framework. At the beginning of the year, every employee has visibility to this learning path, enabling them to equip them with various skills that they need to get the desired roles.**

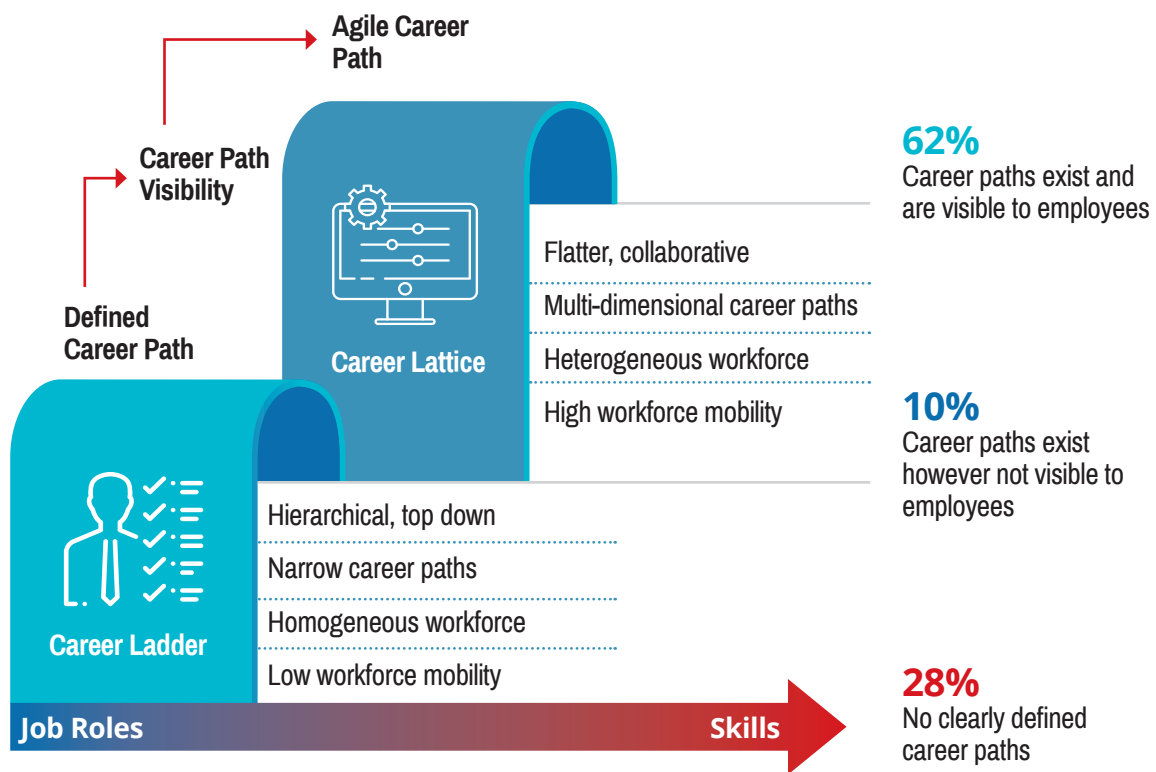


These examples show how employees have visibility to their career paths. Most **'learning organisations'** chalk out career paths for their employees to provide them a holistic picture of their progression. Having a clear idea about future positions, job responsibilities, both horizontally and vertically, help employees and organisations work towards identification of skilling needs. According to the **NASSCOM Future Skills survey 2019**, almost **62 percent** respondents mentioned that career paths in digital are visible to employees at their organisations and employees are aware of the potential roles/levels that they can assume.



**The key to a career lattice approach is to provide visibility to growth opportunities available to employees and shifting much of onus of career growth to employees, once resources have been provided.**

Evolving career paths

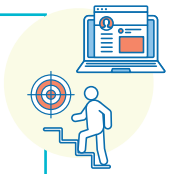


NASSCOM Future Skills survey 2019

**HCL uses a career planner tool that employees can access to see job openings in different verticals and skills needed for that. It also helps evaluate learning path that employees need to follow to reach a particular position.**

*It is important to ensure that employees see what top skills are needed in the emerging jobs in order for the organisations to prepare a digitally ready workforce.*

– Saransh Agrawal  
Head Learning Solutions,  
Culture and Communication, Cognizant



### **Career agility is paramount in the digital age**

Interactions with business leaders highlighted that agility in career progression is becoming increasingly acceptable to organisations. Due to the hyper-dynamic nature of skills associated with the emerging digital technologies, organisations no longer look to restrict the development of people with a specific skill set. There is a greater acceptance of horizontal career movements based on acquisition of skills that are not directly related to the individuals existing job role.

**Horizontal movements have become acceptable and are even encouraged in digitally aware organisations.**

*Providing career visibility to employees goes a long way in building a digitally skilled workforce which is adaptable to new technology areas and is open to learning.*

– Aakrit Vaish  
Co-founder and CEO, Haptik

The Indian IT-ITeS industry is still evolving continuously to establish a mechanism to provide defined career paths, specifically in digital technology domains considering the dynamic nature of skill requirements.

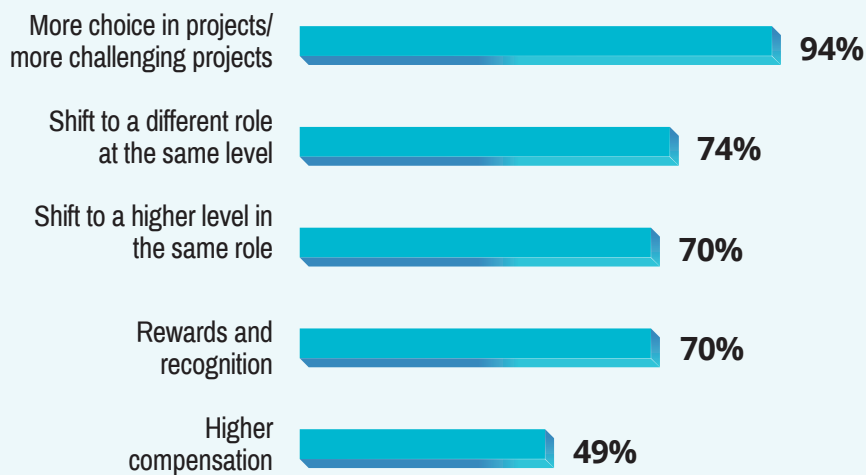
**Sopra Steria has defined learning paths for people with digital skills. It uses a competency matrix for different technologies. Levels of competency span across 'beginner', 'practitioner,' and 'expert'. Employees aspiring for a role or level change need to complete mandatory exercises and assessments for the learning path.**

Organisations are working towards mapping skills to employees' career lattices where skills and their applications are mapped to identify employees' proficiency, which is further linked to their career paths. They also use this model to motivate their employees, which is almost a necessity given the shorter shelf lives of skills and constantly changing business needs.



**The top three ways in which organisations motivate employees are offering more challenging projects, horizontal movement at the same level, and vertical movement in the same role.**

Accelerating employee's skilling journey

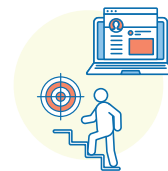


NASSCOM Future Skills survey 2019

*AXA XL promotes continuous learning and innovation at work. To achieve this vision, the organisation has many training, forums, recognition programmes, and innovation zones that help create the right culture.*

– Sumit Chadha

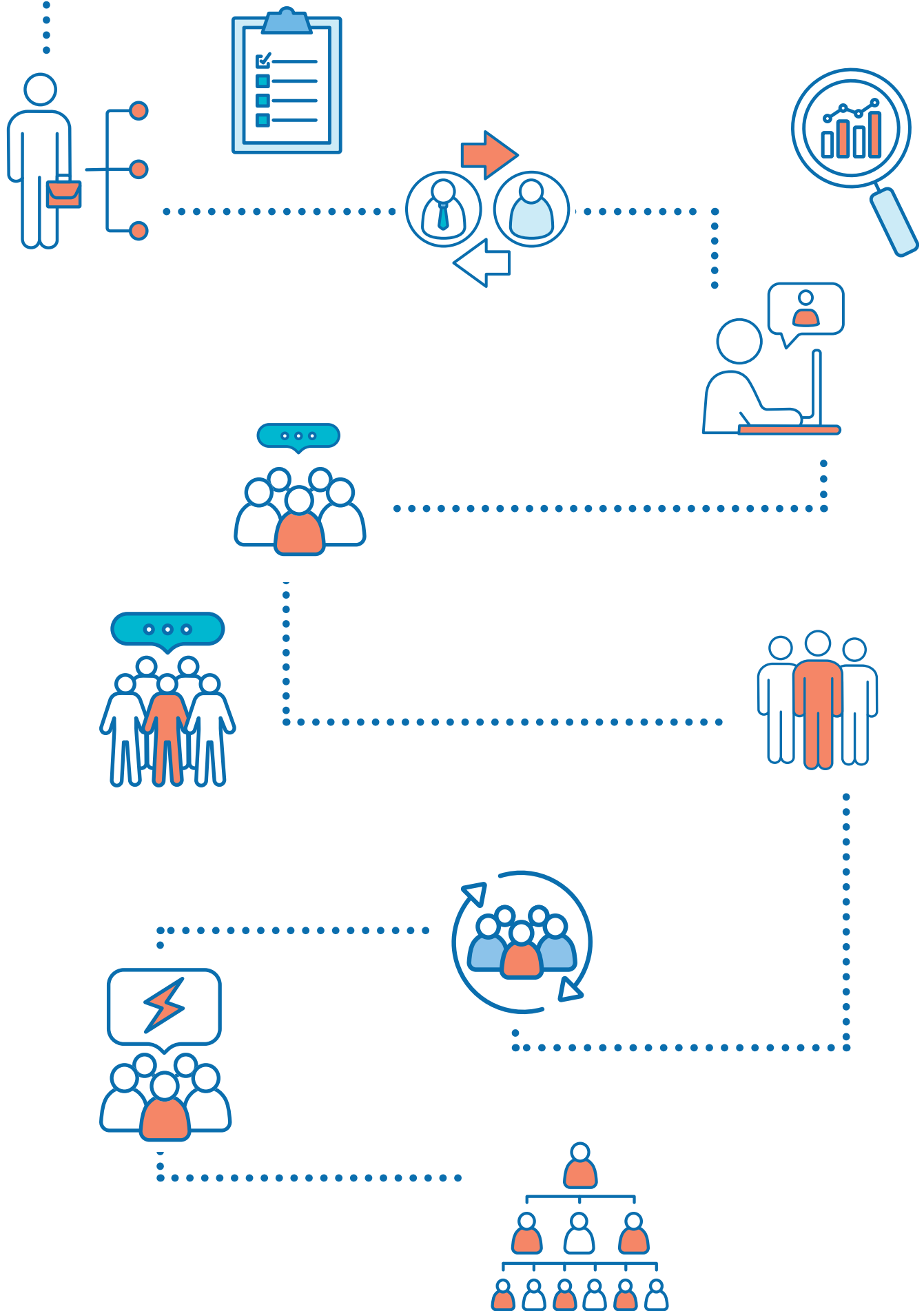
Head of Enterprise Shared Services, AXA XL



**Atos Syntel has a forward-looking approach to skill identification through a structured “Technology Relevance Index”, which is reviewed biannually by a council. The council considers the industry trends in technical skills, along with inputs from client-facing stakeholders and voice of customers, to estimate current and future demands that is categorised for investment and learning focus. The index is subsequently published and visible to every employee. The concept of ‘continuous dialogue’ enables periodic interaction and discussions by managers with their teams, to use insights from the index towards catering to an individual’s aspirations and the associated learning path.**

**Mphasis has designed a skill matrix comprising both technical and soft skills. The matrix integrates the skill and its application at different levels in a 4X4 grid. It can be used to assess learners’ proficiency in various skills and is linked to their career paths.**

Organisations consider expanded career options as critical levers to attract and retain talent. Changes in how career pathways are defined and built are of equal importance to employees as they acknowledge that staying relevant is pivotal for job security in the digital age. The Indian IT-ITeS industry should focus on continuously evolving and establishing a mechanism that could provide dynamic career roadmaps for employees and the resources to upskill themselves and make the desired career choices.



# Transformation of Learning & Development (L&D) in the digital age





About **58 percent** organisations offer digital skilling programmes personalised at a job role level, whereas nearly **17 percent** organisations offer digital skilling programmes personalised at an individual level.

Nearly **40 percent** organisations have a dedicated digital skills development team that is aligned to the CEO or business head.

About **1-1.5 percent\*** of L&D budget as percentage of revenue

About **40 percent** organisations allocate more than half of their L&D budget for digital skills related activities.

Only **19 percent** organisations have shifted to a LMS-predicted process of training needs identification that is aligned with manager recommendations and employee aspirations.

*To build the workforce of the future,  
we need to revolutionise  
how we learn*  
.....  
**World Economic Forum**

\*based on ISG data analysis of the 10 major listed IT companies (Includes both large and medium companies) for 2019

### ■ Evolution of L&D in the digital world



The changing digital landscape is placing huge pressure on learning in the digital age, making companies search for L&D alternatives that can cope with a variety of training needs. Most organisations are still in the early stages of this transformation. Traditionally, learning was more of a scheduled instructor-led classroom session format. Although e-learning has seen a resurgence in the past few years, learning needs to become virtual with anytime anywhere access in the present day context. This is due to the variety and speed of training delivery, and the way we consume content. Everyone has a smartphone these days, and a whole generation has grown up with access of what they want and when they want.

This is an advantage from one point of view as the organisation can use technology to deliver training directed at specific needs instead of batch processing. From another point of view, this is a problem as infrastructure and L&D policies and processes need to change appropriately to deal with the new reality.

*L&D is undergoing transformation along with other digital and technological changes....Digital and social learning is becoming the norm. Co-creation of learning through research and crowdsourcing is shaping how people will consume information going forward. To sum it all up, it is about learning becoming more personalized and dynamic.*

– Sandhya Nagee

Director Talent & Development  
MENA, Thomson Reuters

With the launch of Google, LinkedIn, YouTube, and several MOOCs, learning has become more pervasive and omnipresent. L&D has become more flexible over the years and provides tools to meet organisations' training requirements. The skills in demand are now forecasted. As a result, learning has become more proactive than reactive. Further, with laptops and handheld devices becoming ubiquitous, on-the-go learning gained popularity leading to byte-sized content consumption and micro learning. Apart from digital learning becoming a norm, social learning is gaining popularity with increasing emphasis on collaboration at workplaces. Social learning has picked up in the past five years driven by the proliferation of collaborative and peer-to-peer sharing platforms.



## Shift from LMS towards LXP



*Learning must be managed through competent technology platforms that do not just host content but provide some level of analytical capability to assist learners in their development journeys.*

– Atul Mehta

Vice President Practice, Thirdware

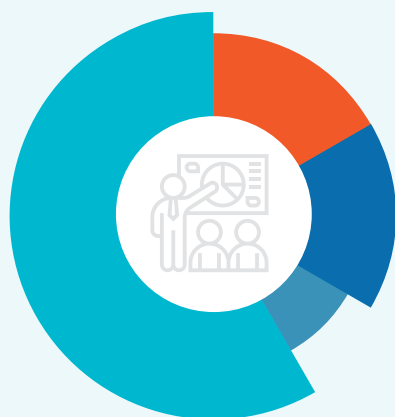


A new term, 'LXP', has entered the L&D vocabulary. LMS has historically focused on business rules, compliance, and catalogue management. However, the need for learning content is increasing faster, making it difficult for the LMS to keep up. Often, teams have to rely on informal, open source content to meet their training needs. The LXP is a tool used to organise this informal, curated content before storing, sharing, and improving it. Users can share and rate content, leave comments, and receive recommendations (using dynamic social settings), making LXP much more flexible than LMS.

**'Talent Next', the learning platform of Mphasis, curates skills at different levels of expertise and generates automatic dashboards that capture training effectiveness against predefined parameters. 'New Age Delivery' is a learning platform created by Tech Mahindra that focuses on providing content on an identified set of digital technologies. Mindtree has created 'Yorbit' that uses micro-learning and personalised learning recommendations for its employees. Infosys has built learning platform 'Lex' that provides a single view of skill maps, career lattices, and learning recommendations at an individual level. The NASSCOM FutureSkills platform is an industry resource that any NASSCOM member can use to access open-source content, content curated by industry expert, and a marketplace of training providers for digital technologies and professional skills that are required in the present work environment.**

About **17 percent** organisations stated that they personalised digital skilling at an individual level, while **58 percent** mentioned the personalisation of digital skill development initiatives is at a role level. Considering varying skilling needs, the Indian IT-ITeS industry is gradually shifting to employee-centric digital skill development.

### Personalisation of digital skill development programs



NASSCOM Future Skills survey 2019



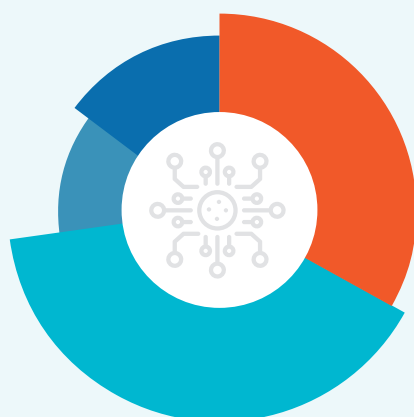
### L&D in digital ecosystem

*Organisations must build employee capabilities and prepare them to lead digital businesses of the future. L&D is increasingly occupying the central stage in enabling businesses to succeed in the present VUCA-driven, digitally intense world.*

– Capt. Hari Krishna  
Head- L&D, Allstate India

Acknowledging that relevant digital skills will enable organisations to take advantage of the opportunity created by digital transformation, organisations are creating dedicated digital skill development teams. Almost **40 percent** organisations of the **NASSCOM Future Skills survey 2019** stated that they have specialised teams, aligned with CEO/ business heads that are responsible for digital skill development.

### Dedicated team for digital skill development



NASSCOM Future Skills survey 2019

Almost **40 percent** organisations allocate more than half of their L&D budget for digital skills related training activities.



### Allocation of L&D budget for digital skills related activities



● **40%** Greater than 50% budget

● **60%** Less than 50% budget

NASSCOM Future Skills survey 2019

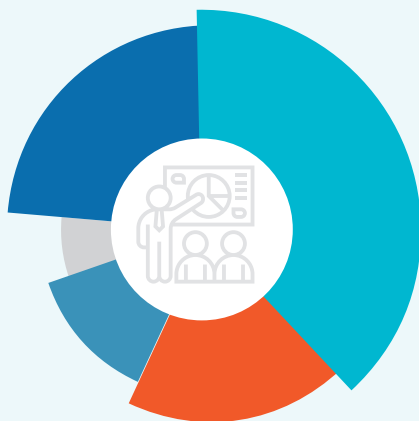
**Thirdware follows an approach where a core team works on developing new and innovative technology solutions. The team subsequently identifies what to adopt and then eventually trains the larger group. They use a mature LMS that manages the entire learning cycle starting from hosting training and creating a competency framework to providing career guidance to employees.**

Organisations have also started focusing on developing a skill development process in the digital era, including training need identification, followed by the creation of an employee's career paths, content development, and delivery. Measuring the effectiveness, outcome, and impact of these skilling interventions is also becoming essential for organisations. Organisations must adapt to agile learning strategies and mechanisms for each of the steps involved in their learning initiatives.

### ■ Training needs identification

In the digital age, if half-life of a skill is five years, it is only half valuable now compared with its value five years ago. With the shelf life of skills decreasing, organisations must periodically review skills that are important for their employees to stay relevant.

### Identification of digital skilling training needs



- **24%** Identified by employee, subsequently approved by Manager/HR Business Partner
- **38%** Nominated by Manager / HR Business Partner, in consultation with employee
- **19%** LMS-predicted, and in-line with manager recommendations and employee aspirations
- **6%** Nominated by manager/ HRBP alone
- **13%** Through standardized training calendar



NASSCOM Future Skills survey 2019

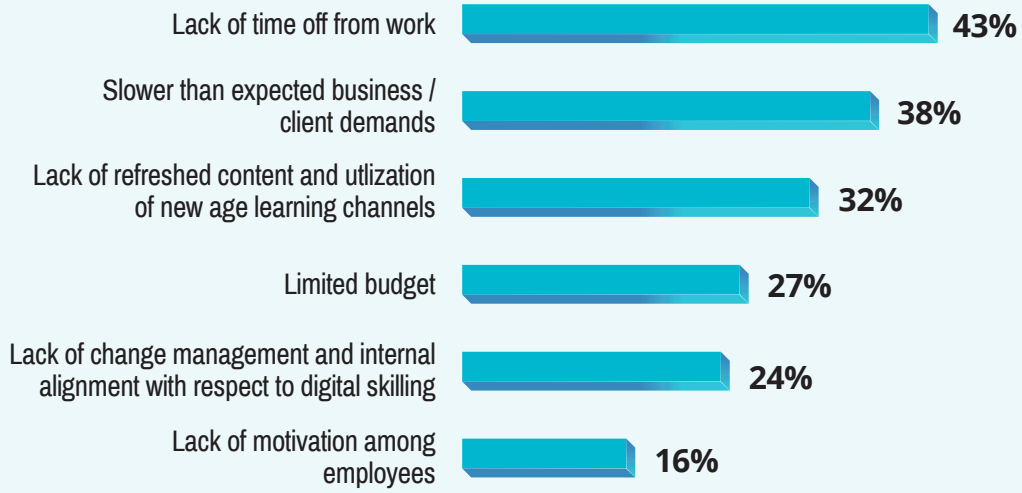
Infosys has an internal talent portal called 'Compass' that has employee details, pertaining to their projects, experience, and training undertaken. The portal identifies the adjacent skills that an employee could learn and provides recommendations. 'Accelerate' offers a platform for employees to pick up relevant skills, providing them opportunities to work on short-term projects for enhanced learning.

The X.O. framework at Atos Syntel provides employees visibility to skills they are currently using at work, and the skills they aspire to acquire. Employees can match them to the business and industry needs, and choose programmes to upgrade skills.

### ■ Challenges faced by organisations in digital skilling

The pace of digital skilling adoption in an organisation is a function of employees and the L&D unit, and depends on leadership and organisations' business needs. Even with the increased awareness among organisations and employees about the importance of digital skills, organisations and L&D professionals face many challenges while skilling their employees in digital technologies. The **NASSCOM Future Skills survey 2019** indicates that lack of time off from work, slower-than-expected business demands, lack of refreshed content relevant to the organisational context, utilisation of new age learning channels, and limited budget are among the top challenges organisations face in their digital skilling initiatives.

Challenges organisations face while skilling their workforce



NASSCOM Future Skills survey 2019



# Using multi-modal ways of learning





Organisations feature a healthy mix of in-house and curated content from learning partners.

The adoption of online and technology-powered learning has moved closer to traditional classroom-based training.

**86 percent** organisations use project-based/hands-on learning for skilling their workforce.

With anytime anywhere access to content and need for on-the-go learning, micro-learning and nano-learning are being adopted by **71 percent** organisations for training their workforce.

Social learning is becoming a norm with **85 percent** organisations look at using peer-to-peer learning as their go-to learning channel.

*It's time to move beyond traditional approaches to executive education. To successfully meet the challenges of today's business world, organisations and the individuals who steer them should take more advantage of online learning resources and networking opportunities.*

.....

**Harvard Business Review**

The explosion of high-quality content and the availability of multiple learning channels are offering organisations ready access to the tools to enable a continuous learning culture. Over the years, the proportion of online and technology-powered learning has

moved closer to traditional classroom-based training. Among many reasons, ease of access and the self-paced nature of online courses have been the primary interest areas for learners. With anytime anywhere access to content and need for on-the-go learning, micro-learning and nano-learning are also being widely adopted by organisations for training their workforce.

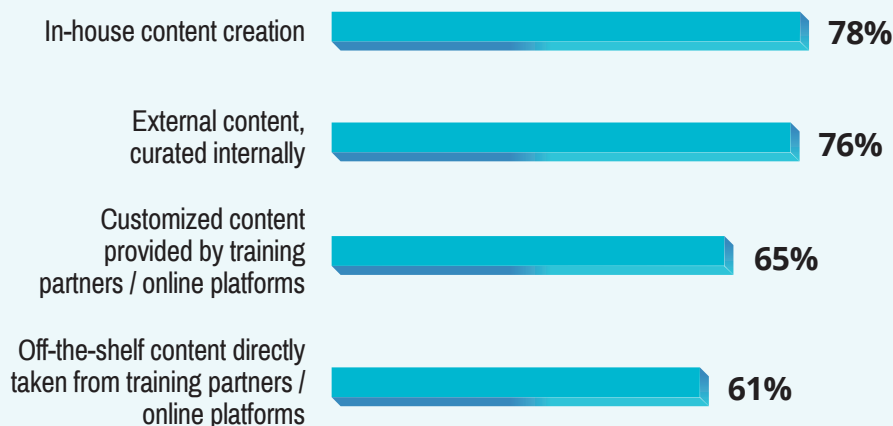


Discussions with industry leaders highlighted that based on the type of skills and the temporal need of the skill, organisations use a mix of different channels for preparing their workforce. Academic degree and short-term courses are not quite prevalent when it comes to digital skilling. One of the reasons could be that employees need to take time off or spend extra hours to complete these courses.

### ■ Content sourcing preferences

Creating a learning environment that enables continuous learning means that organisations have to ensure that their employees have access to content pertaining to emerging technologies to learn and stay relevant for the future. Organisations are resorting to possible ways to provide right content to their employees, ranging from in-house content creation and curation to content customisation by learning providers.

Established corporate L&D function features a healthy mix of in-house and curated content from learning partners



NASSCOM Future Skills survey 2019

Consultations with leaders highlighted that in most of the cases, organisations prefer developing content on traditional technical areas and domain in-house, while content for niche skills and emerging technologies is curated externally or taken from training partners. Further, developing in-house digital training capability vis-à-vis partnering with third-party vendors is no more an HR-led decision. This decision is led by the function that is core to the business model and organisational strategy. Mature organisations with an established corporate L&D function feature a healthy mix of in-house content and curated content from learning partners. Small and newly incorporated organisations



with the L&D function (still not mature enough) prefer partnering with external vendors for content development across skills.



**Organisations usually prefer developing content on traditional technical areas and domain in-house, while content for niche skills and emerging technologies is curated externally or taken from training partners.**

**Simplilearn has a well-defined learning content development process for the courses they offer. To decide and design content, the product management team uses information from the industry, sales, trainers, and most importantly end-users on the industry trends. Then, it puts together its point-of-view for the next 4-6 quarters, which fuels the roadmap. Thereafter, it identifies leading tools and capabilities that the IT sector market leaders are bringing in. In addition, the team makes one-to-one customer calls to gauge learners' expectations and use a combination of qualitative and quantitative surveys to understand demand and trends in the industry. After taking the collective inputs from these sources, content is subsequently developed and tested. The curriculum team at Simplilearn works as a software team that carries out activities ranging from problem identification to design thinking, to product management and agile delivery.**

## ■ Learning channels in the digital age

Learning technology has also evolved to keep pace with the changing needs. It enables organisations to drive a culture of learning using multiple strategies and learning channels in the digital age.

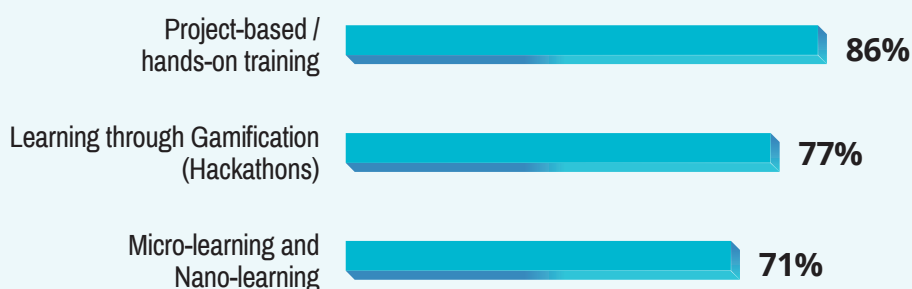
**The adoption of online and technology-powered learning has moved closer to traditional classroom-based training. Online and MOOC-based learning is being used to supplement classroom learning solutions.**

With ongoing technological shifts, technology-enabled learning is gaining popularity. Organisations give a higher preference to project-based learning, which provides hands-on learning experience to employees. Gamification in learning is an emerging trend and hackathons are a perfect example of how organisations are driving learning through gamification. Gamification has proven to be beneficial for both employees

and organisations. On one hand, it helps employees pick relevant and focused skills through knowledge sharing. On the other hand, it is a successful mechanism to solve business problems through innovative solutions. With anytime anywhere access to content and need for on-the-go learning, micro-learning and nano-learning are also being widely adopted by organisations for training their workforce.



Technology is enabling new ways of content delivery; hands-on learning, hackathons, and byte-sized learning are gaining popularity



NASSCOM Future Skills survey 2019

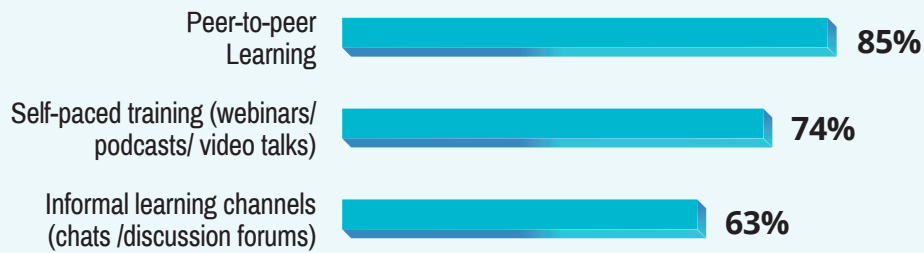
**Gamification in learning is an emerging trend with more than 75 percent of the organisations using gamified skilling for their employees.**

An interesting trend that emerged during the interactions is the popularity of social learning. Channels such as chats and discussion forums are used to facilitate knowledge sharing and skill development among employees in digital skills. Peer-impacted learning, 'think tanks' as means for collaborative solution development, and internal platforms, such as Yammer, are also gaining importance. The following are some findings from the **NASSCOM Future Skills survey 2019**:

- » **63 percent** organisations stated that they encourage informal and collaborative learning channels.
- » **85 percent** organisations use peer learning as their go-to learning channel.

With the accountability of learning being transferred to learners, self-paced learning is becoming a trend. Employees can learn at their own pace and certifications do not play an essential role unless the employees can showcase their knowledge. According to the **NASSCOM Future Skills survey 2019**, **74 percent** organisations stated that learning happens through webinars, podcasts, and video talks.

Shift in learning culture has made social learning a norm, making peer-to-peer learning and use of informal learning channels popular



NASSCOM Future Skills survey 2019

**Social learning is becoming a norm with organisations encouraging informal and collaborative learning channels, including chats and discussion forums, to facilitate knowledge sharing.**

**BigBasket adopts a model where it selects learning channels based on business needs. Formal learning channels cater to long-term learning needs in areas that are core to organisations, requiring continuous capability building. On the other hand, informal learning channels, such as hackathons, learning through online communities and industry forums cater to skills that are needed in the immediate future.**

*It is an age today where people will either upskill or be replaced. Or get relegated to lower paying mundane tasks in the interim. The time to kick-start is NOW and the ownership of learning must move to the learner to make these digital skilling initiatives a success. To motivate employees to take the onus of learning on themselves, organisations must have rewards and recognition practices in place. 🗣️*

**–Piyush Jha**  
VP, Digital, GlobalLogic

# Creation of learning ecosystems





Organisations are realising the need to collaborate with MOOCs, training providers, academic institutes, other enterprises, and government for building a future-ready workforce.

**79 percent** organisations collaborate with online platforms or MOOCs to train their employees.

Nearly **64 percent** organisations partner with EdTech enterprises and training providers, **60 percent** organisations engage with technology and product vendors, and about **53 percent** organisations have alliances with academic institutes.

Collaborations within the ecosystem are also used for the purpose of providing certifications, in addition to building capabilities.

**73 percent** organisations prefer certifications from enterprise training providers. Apart from enterprise provider certifications, **67 percent** organisations also look at certifications from MOOCs and online platforms.

*Digital technologies are revolutionising competitive dynamics across industries and the right partnerships are crucial to make game-changing impact.*

Although companies have created extensive in-house skilling programmes for both existing workforce and campus hires, these initiatives might not be enough to meet business needs. Therefore, organisations are collaborating with other stakeholders in the ecosystem to manage large-scale upskilling/reskilling initiatives, and prepare for a better digital future.

*Multi-stakeholder convergence is the key to reskilling and upskilling for a future ready workforce. IT-BPM organisations need to collaborate with stakeholders in the ecosystem, including academic institutes, learning service providers, technology partners, government and specialist practitioners.*

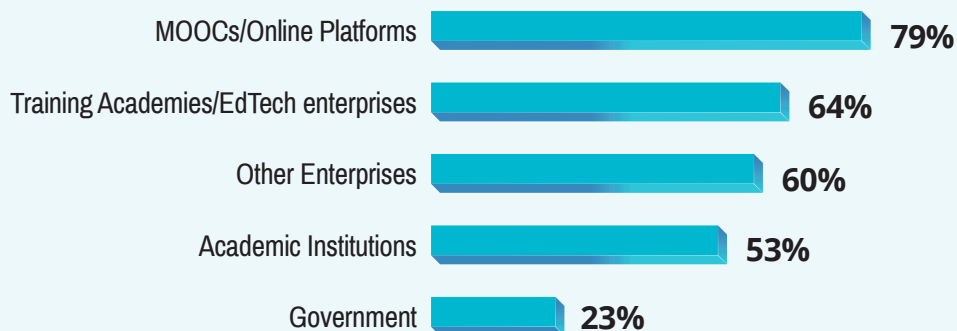
–Swaminathan R  
Chief People Officer, WNS



**ZOHO University has found a novel method to fill the internal talent gap. It trains high-school students on specific technologies used in organisations through classroom sessions and on-the-job training. Upon the successful completion of training, students are inducted as full-time employees.**

Organisations are creating a learning ecosystem through collaborations with online learning platform providers, alliances with other companies in the industry, engagement with training providers, partnerships with government, and engagements with academic institutes.

### Organisations are creating a learning ecosystem through collaborations



NASSCOM Future Skills survey 2019

Following are some findings of the **NASSCOM Future Skills survey 2019**:

- » **79 percent** organisations stated that they partner with online platforms or MOOCs to provide training and certifications to employees on specific capabilities that the organisation aims to acquire and develop.
- » **64 percent** organisations reported having partnered with training academies and EdTech enterprises to create and curate content, and disseminate programmes on specific skills and technology areas.

- » **60 percent** organisations collaborate with other enterprises for sharing skills that complement each other's capabilities.
- » **53 percent** organisations collaborate with academic institutes for niche and high-end research partnerships, design in-house training curriculum, and gain access to experts who could contribute to learning initiatives.



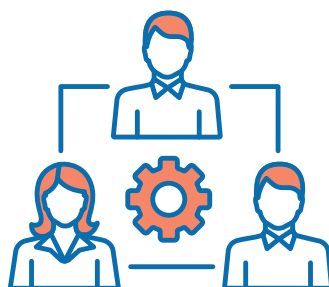
## ■ Collaboration between the industry and training providers

Partnerships with MOOC providers, EdTech enterprises, and training academies allow organisations to have a skilled workforce that can be used on live projects. These partnerships also help organisations reduce post-recruitment training cost and lower churn rate as learners develop more ownership in their roles. The following are examples of such collaborations:

- » Wipro has entered into a partnership with NASSCOM FutureSkills to train 10,000 engineering students across 20 colleges on five digital technologies – AI, big data, cloud computing, cybersecurity, and IoT. First learners will be given a test to assess their aptitude and problem solving skills. Then they will be offered courses and certification in these technologies. The TalentNext FutureSkills initiative is a CSR project that will create a future-ready talent pool for Wipro as well as the whole industry.
- » IBM and Simplilearn are collaborating to introduce four master's degree programmes in the fields of AI and data science. Through this collaboration, professionals can access live virtual classrooms and self-paced video courses that combine Simplilearn's seamless training experience and world-class instructors with IBM's state-of-the-art labs and course content.
- » Multiple organisations have partnered with Udacity. They encourage college graduates to take up specific nano-degree programmes in AI, machine learning (ML), and data science to prepare them for the job they have been hired for.

*Partnerships with EdTech firms help students hone their skills and become relevant to the ecosystem. Our campus recruits are taken through courses on machine learning, IoT, cloud security ,etc.*

–Chaitanya Sreenivas  
HR head, IBM India



### ■ Collaboration between organisations and academia



IT-ITeS organisations have established alliances with academic institutions on specific initiatives, including faculty upgrading, internships, curriculum revision workshops, and research incubation. Companies actively collaborate with premier academic institutes for sponsored long-term (2-4 years) full-time/part-time PhD courses and short-term (one year) master courses. In addition, organisations undertake research collaborations with academia, wherein they allocate R&D funds for projects led by professors. Organisations use these collaborations to develop innovative solutions for their clients in emerging digital technologies. Some industry academia collaborations are as follows:

- » Microsoft and the Indian School of Business announced a partnership to set up an AI digital lab to conduct research in the areas of AI and ML. The two entities also introduced a new executive programme, “Leading Business Transformation in the Age of AI,” to empower business leaders with tools and strategies to transform their respective organisations to AI-driven organisations.
- » Wipro and the Indian Institute of Technology Kharagpur (IIT Kharagpur) have collaborated on high-impact, industry-focused applied research in the areas of 5G and AI. This collaboration’s focus will be on AI research applicable in the healthcare, education, and retail sectors, as well as in domains such as climate change and cybersecurity. Wipro will use research outcomes to develop solutions for its customers across industry verticals.

Organisations also engage with institutes to improve digital skills pedagogy by co-developing course content and funding critical research projects. Companies also help students in studies by sending their employees to academic institutes for training programmes, which eventually help companies improve the quality of skills in entry-level graduates. Additionally, academic institutes also run customised workshops, weekend or evening part-time programmes, and customised executive programmes for employees and executives/business leaders who want to reskill/upskill but continue working.

**AXA XL has partnered with academic institutes to design learning curriculum. Under their 'education at work' initiative, employees undergo training a few days every week. They also take up assignments, projects, and assessments. This has allowed them to upskill themselves and get ready for the workforce of the future.**





## Collaborations between industry, technology enterprises, and training providers

The industry partners with other technology enterprises or product vendors that offer training programmes in digital technologies. Some industry partnerships, including IBM, Automation Anywhere, CISCO, Amazon, Microsoft, Salesforce, VMWare, Oracle, and SAP, focus on one or more technology areas. These partnerships are similar to collaborations with training providers for the purpose of skilling their employees, along with certifications in technologies. Some partnerships are also through training providers. The following are some examples of such partnerships:

- » More than 700 institutions and organisations have collaborated with Microsoft to help customers make efficient use of AI to bridge the skill gap, improve employee productivity, make businesses more agile, enhance customer engagement, and encourage innovation.
- » Wipro's digital transformation programme focuses on including cloud, data science, workplace and IT automation, and cybersecurity. As part of their digital transformation programme, cloud skill courses (to work with cloud services, such as Amazon Web Services) are one of the most popular courses for Wipro employees. After taking AWS courses, many employees enrol themselves in courses listed on Udemy for Business.

**Automation Anywhere has achieved a high level of engagement by establishing 75 bot labs across 300 colleges in India to train the Indian IT-ITeS industry on using automation and building bots.**

## Collaborations between industry, industry bodies, and the government

The IT-ITeS industry plans to collaborate with the government and other industry bodies to upskill and reskill students, working professionals, and aspirants in the country. Some of the collaborations are listed below:

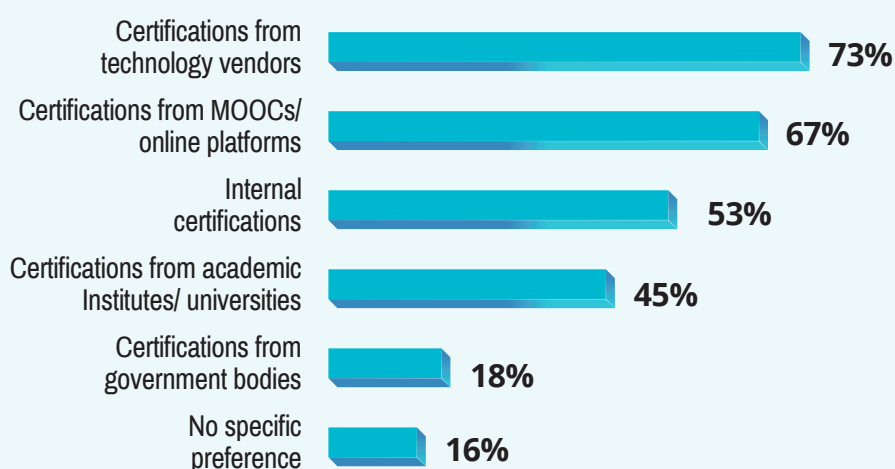
- » Intel India is collaborating with the government, NITI Aayog, and other local partners to design and build “tinker labs” within schools and community organisations. These labs give youth an opportunity to learn technology skills, develop a design mindset, and be inspired to innovate. The plan is to use the first 10 prototype labs as the model for building hundreds more across the country.
- » With NASSCOM as the enabler, the IT-ITeS Industry has stepped up to address the reskilling challenge with its FutureSkills Initiative – an industry-driven learning ecosystem. FutureSkills focuses on more than 155 skills spanning across over 70 job roles on 10 emerging technologies. It has partnered with more than 30 content partners to provide curated content to learners. Over 100 companies have embarked on their skilling journey through FutureSkills.

### Collaborations to provide certifications and credentials



Learning in the digital world is evolving rapidly to match with the pace of digital disruption. In addition to collaborations for fulfilling talent needs and upskilling/reskilling their workforce, organisations use the ecosystem to provide certifications and credentials. The majority of large organisations consider certifications as alternatives to assess employees' skills in a domain. However, small organisations, specifically start-ups, consider demonstrable working knowledge to be more important compared with certifications.

#### Certifications and credentialing preferences



NASSCOM Future Skills survey 2019

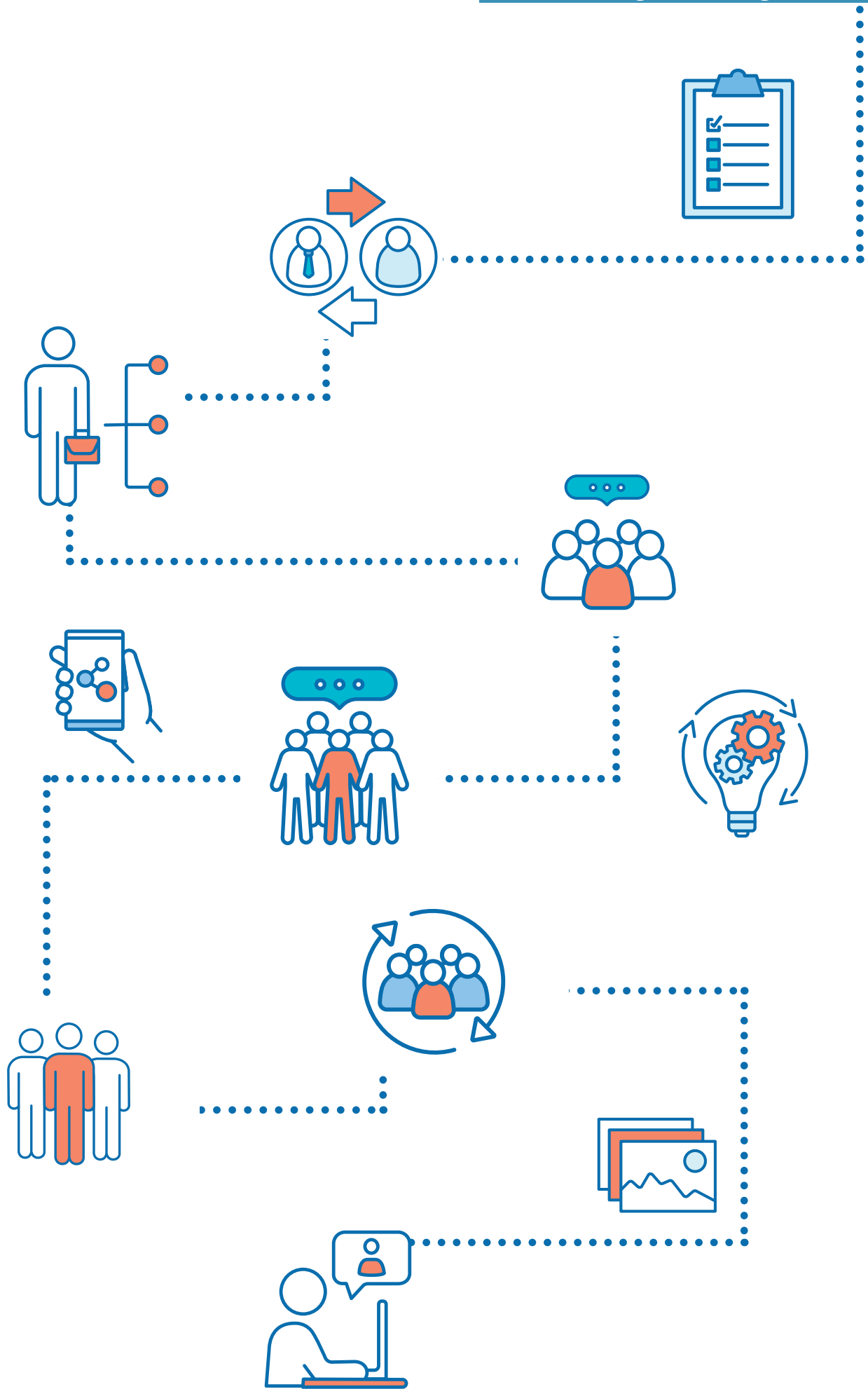
**Organisations prefer partnering with other enterprises or product vendors that offer certifications in digital technologies.**

The following are some findings from the **NASSCOM Future Skills survey 2019**:

- » **73 percent** organisations prefer their employees to get certification from technology vendors, such as CISCO, Microsoft, Amazon, IBM, etc.
- » **53 percent** organisations also prefer internal certifications.

*Certifications are the currency on which skill development works and are, therefore, progressively gaining pace and being preferred both by organizations and individual learners for skill development in the emerging technologies.*

– Anand Narayanan  
Chief Product Officer, Simplilearn



# Measuring outcomes of digital skilling initiatives



Organisations are realising the need to revamp their skilling evaluation models and adopt metrics that could link digital skilling efforts with tangible employee and business-focused outcomes, along with conventional training measures.

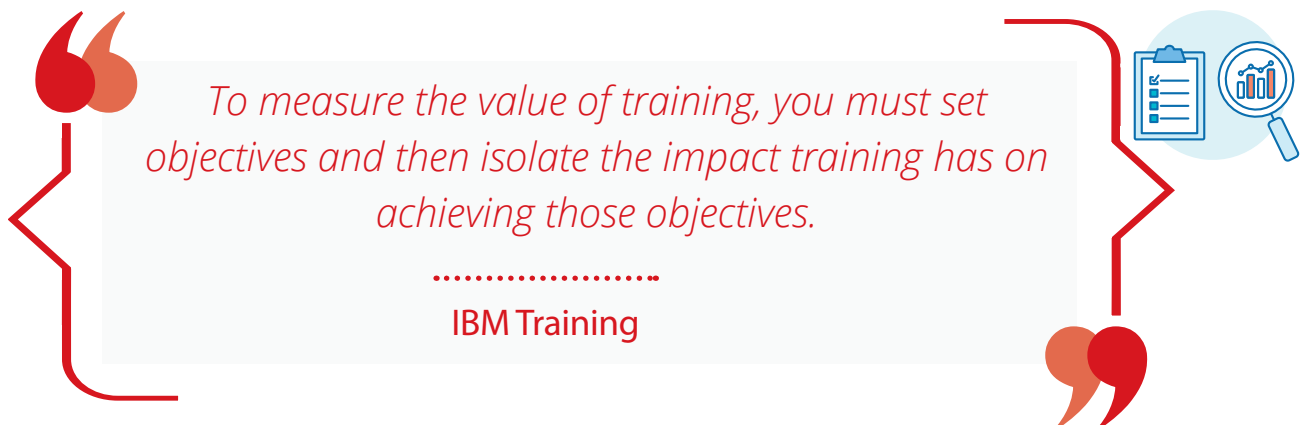


Organisations measure output against investment in terms of budget used, total training time, and resources trained.

Organisations also track some outcome-oriented impact metrics, including employees working in technologies that they have been skilled on, open positions filled internally after reskilling/upskilling employees, and percentage increase in employee utilisation after skilling programmes.

Overall, **21 percent** organisations track the investment that goes into digital skilling initiatives, **17 percent** measure output against investments, and more than **35 percent** track impact metrics.

**76 percent** organizations periodically track and report the metrics for measuring the effectiveness of their digital skilling initiatives.



The close alignment of an organisation's digital skill profile to its business strategy indicates that the way digital skilling efforts are measured is evolving.

**Organisations realise the need to recalibrate their skilling evaluation models and focus on metrics that could map digital skilling efforts with tangible employee-centric and business outcomes.**

Organisations have been keeping a track on inputs (in terms of investment of time, budget, and resources) that go into digital skill development. They highlighted that measuring output against investment in terms of budget used, total training time, and resource trained is critical for them.

*For digital skilling to be successful, we need a set of outcome-based metrics that enable us to evaluate the impact of skilling on business. Some of the business metrics that Mphasis regularly tracks with respect to digital skilling include measuring employee productivity post skilling, time to deployment in relevant project, level at which deployed and attrition post training, amongst others. 🗨️*

– Srikanth Karra  
CHRO, Mphasis

Companies are developing and tracking 'Impact' metrics that are more outcome-driven to find out the impact of their skilling initiatives on business outcomes. Employees working on technologies they have been skilled on, open positions filled internally after reskilling/upskilling employees, and a subsequent percentage increase in employee utilisation are some employee-centric outcome metrics that organisations track.



Per the **NASSCOM Future Skills survey 2019**, organisations mentioned the following points:

- » Organisations feel that digital skilling can help them acquire up to **20 percent** additional new projects
- » Organisations filled more than **20 percent** job openings pertaining to digital technologies internally, through digital skilling
- » Organisations feel that digital skilling can lead to up to **15 percent** increase in employee utilisation

Digital skilling metrics tracked by organizations		
Frequency Of Adoption	Measuring Output	Measuring Impact
High	<ul style="list-style-type: none"> <li>» Employees trained in digital technologies in a year</li> <li>» Employees completing assessment/ certification</li> </ul>	<ul style="list-style-type: none"> <li>» Employees working in technologies that they have been skilled on</li> <li>» Open positions filled internally, post skilling</li> </ul>
Medium	<ul style="list-style-type: none"> <li>» Training hours completed in digital technologies</li> <li>» Training programs completed in digital technologies</li> </ul>	<ul style="list-style-type: none"> <li>» Percentage increase in employee utilization post skilling</li> <li>» New project acquisition post digital skilling</li> </ul>
Low	<ul style="list-style-type: none"> <li>» Digital training budget utilization</li> </ul>	<ul style="list-style-type: none"> <li>» Percentage increase in revenue per dollar spent on training</li> <li>» Employees utilization as subject matter experts (tech talks, peer learning, whitepapers)</li> <li>» Time gap between training completion and deployment on project</li> <li>» Attrition among digitally skilled employees</li> </ul>

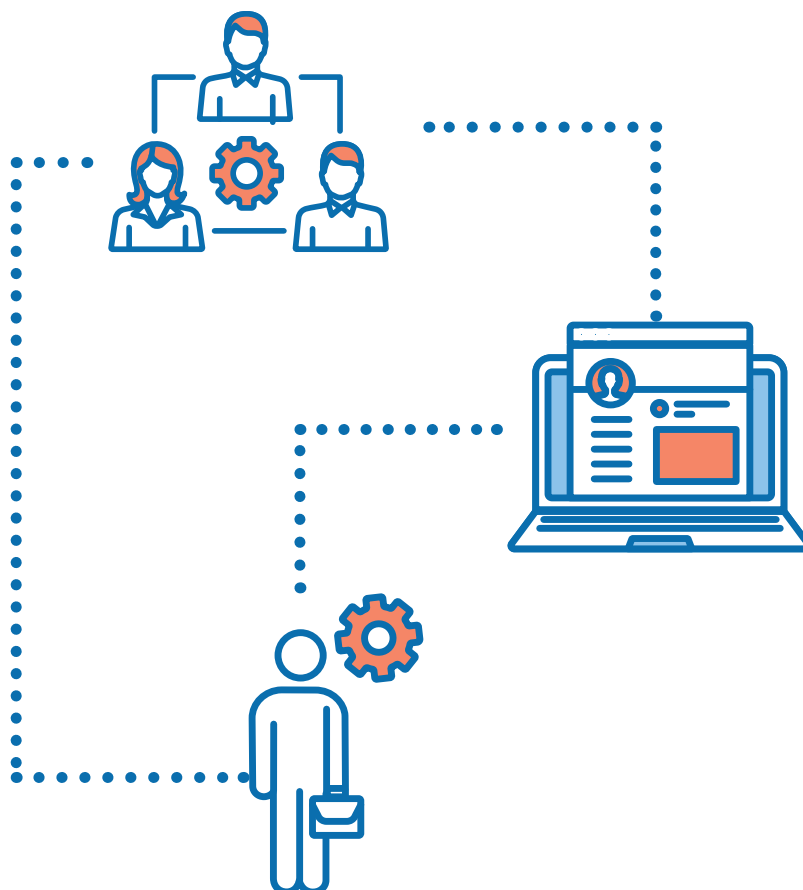
An important skilling metric that Sopra Steria tracks is free time from projects; this time is mapped separately. The free time could be used for either skill development initiatives or working on new ideas.



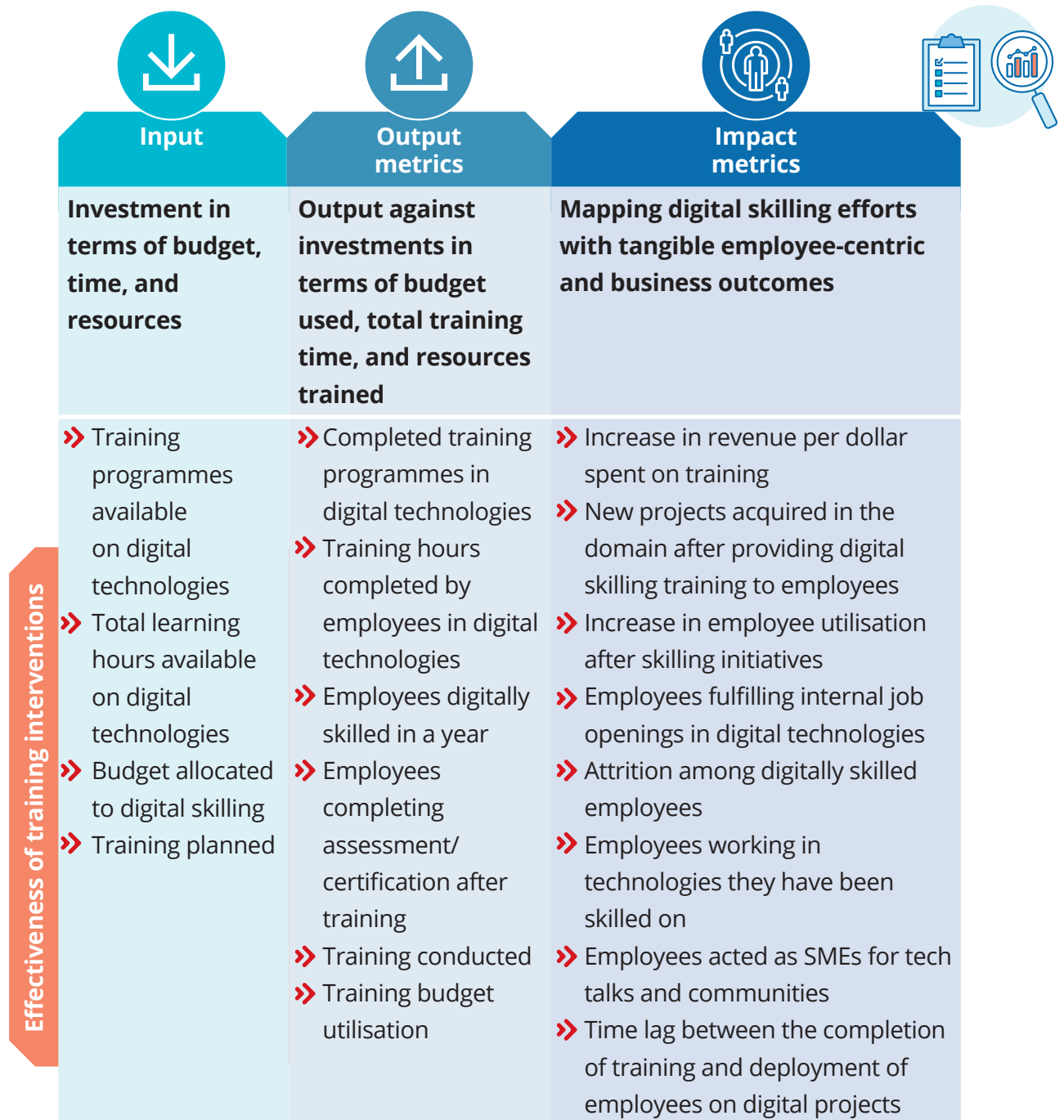
To provide a holistic view of the effectiveness of their digital skilling interventions, Organisations must track inputs, and measure both output and long-term impact of their digital skilling initiatives for gauging the overall effectiveness. The following are some findings from the **NASSCOM Future Skills survey 2019**:

- **21 percent** organisations track investment that goes into digital skilling initiatives.
- **17 percent** organisations measure output against investment.
- **35 percent** organisations track impact metrics.
- **24 percent** organisations do not track any of the above three input, output, or impact metrics.

To provide a holistic view of the effectiveness of the organisations' digital skilling interventions, organisations must track inputs, and measure both output and long-term impact of their interventions.





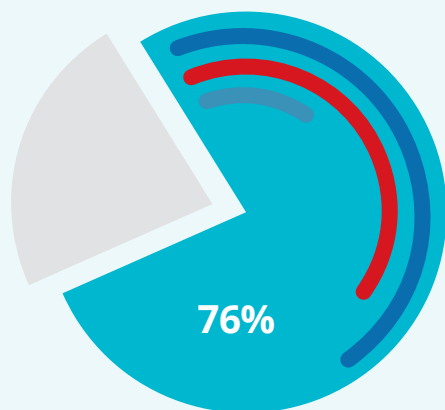


Reviewing these metrics periodically is also important.

» **76 percent** organisations regularly track and report the metrics for measuring the effectiveness of their digital skilling initiatives either monthly, quarterly, or annually.



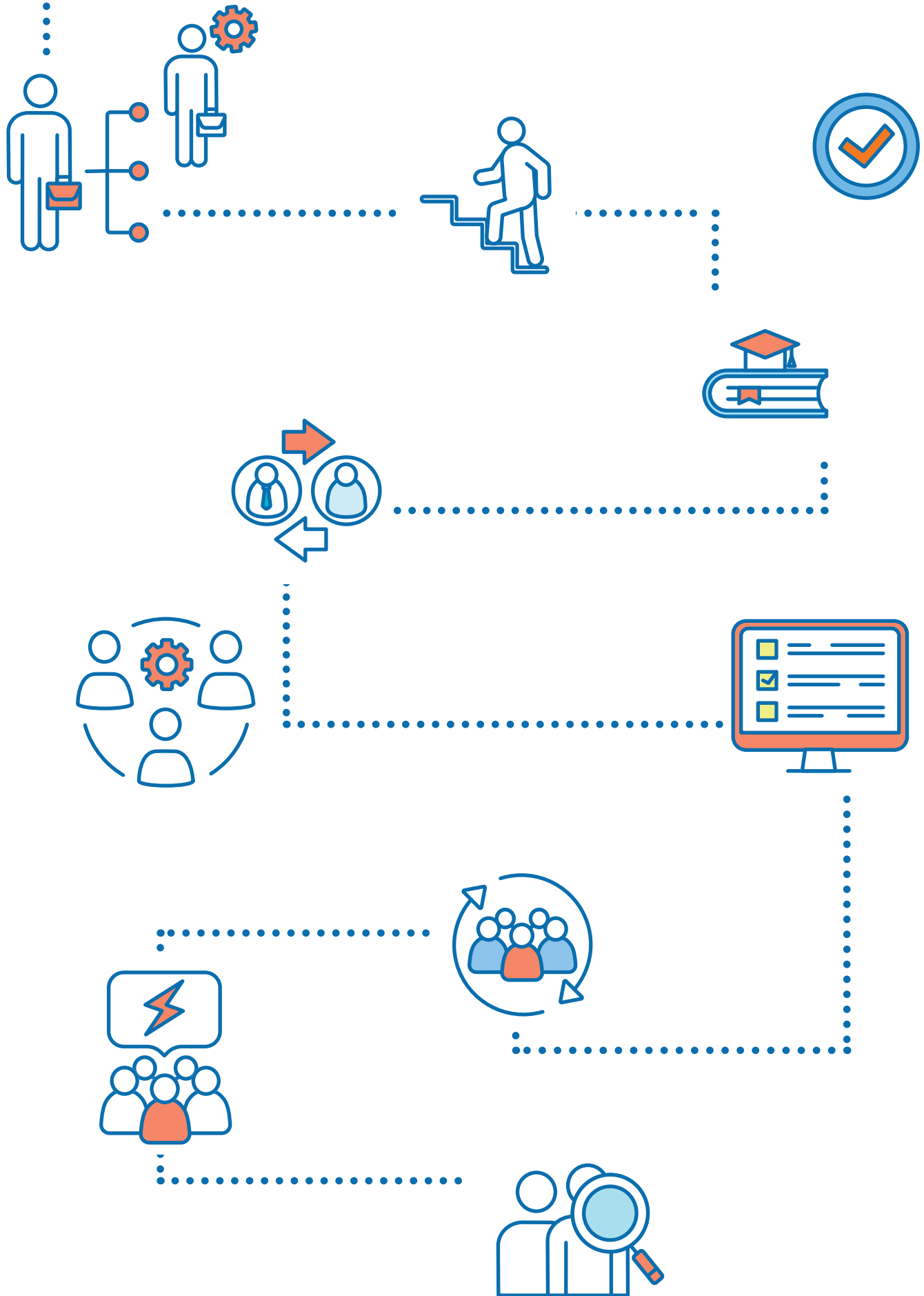
**76%** organisations track the effectiveness of digital skilling initiatives



- **24%** Do not track metrics
- **35%** Monthly
- **31%** Quarterly
- **10%** Annually

NASSCOM Future Skills survey 2019

The **NASSCOM Future Skills survey 2019** highlighted a set of metrics that various organisations use to measure the effectiveness of digital skilling initiatives. However, L&D leaders and business heads need to identify the set of metrics relevant for their organisations. Then, they need to create a framework and process to measure the effectiveness of that set. Tracking metrics and reviewing them periodically will require a big change in organisations' L&D infrastructure. Technology platforms, organisational structure, changes in key responsibility areas, and governance processes will need to be put into place to keep pace with an ever-changing digital landscape.



# A pilot framework to assess organisations' digital skilling maturity



NASSCOM proposes the Digital Skills Development Maturity Index (DSDMI) that comprises four constructs: strategic imperative, systemic drivers, people enablement, and outcomes delivered.



The DSDMI helps the industry understand its maturity level with respect to skilling initiatives.

While the overall industry scores well on the DSDMI, a significant gap exists between leading skilling organisations and late adopters.

Through this report, NASSCOM proposes the use of DSDMI that will enable organisations to understand the maturity of the Indian IT-ITeS industry with respect to digital skilling initiatives. The current maturity level is measured using the pilot data from the DSDMI. The DSDMI framework comprises four broad constructs focusing on strategy, execution, employees, and the outcomes delivered from these interventions. Each of the four constructs is further divided into five sub-dimensions that contribute towards the overall maturity of that construct.



## Digital Skills Development Maturity Index (DSDMI)



### STRATEGIC IMPERATIVE

Understand whether digital skilling is at the core of the organization's digital strategy



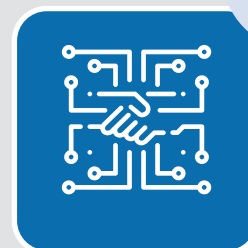
### SYSTEMIC DRIVERS

Analyze how companies organize their efforts around digital skilling



### PEOPLE ENABLEMENT

Understand the extent to which organizations empowers its employees for digital skilling



### OUTCOMES DELIVERED

Measure the outcome/impact of digital skilling on business

## Sub-Dimensions

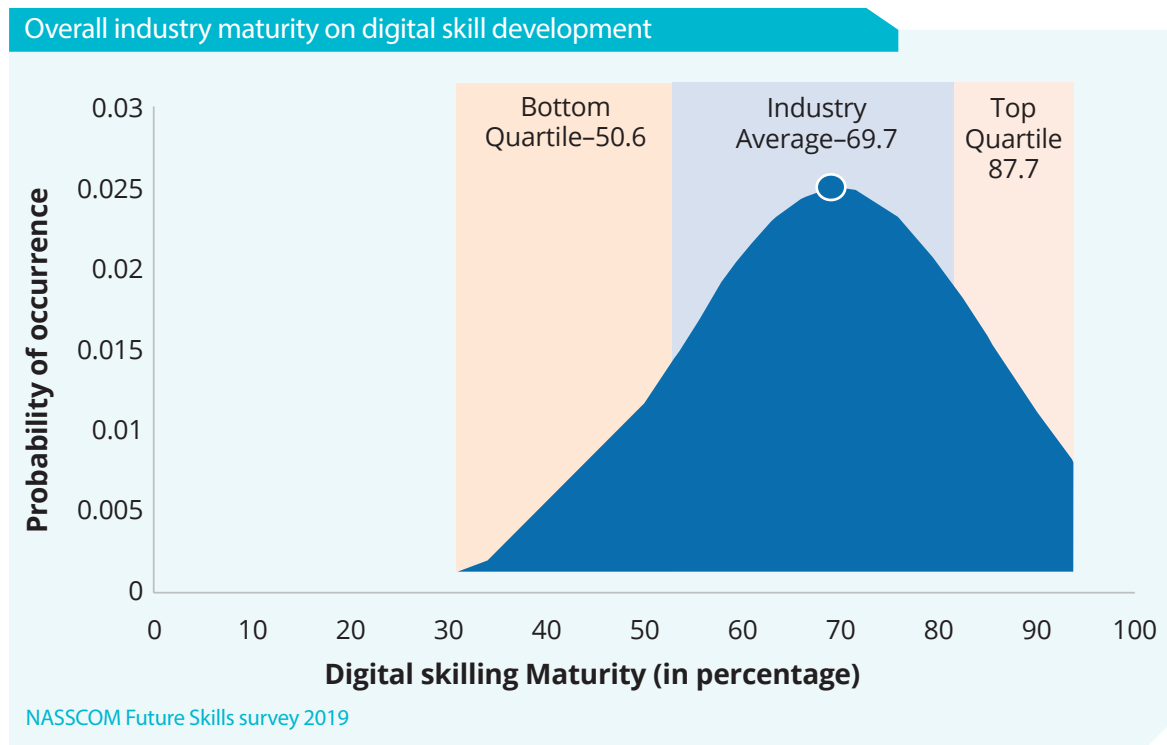
- » Digital skilling strategy
- » Top management reviews
- » Policy development
- » Periodic policy review
- » Digital skilling budget in total L&D budget

- » Dedicated teams
- » Training needs identification
- » Personalization of trainings
- » Digital skilling metrics
- » Metrics tracking

- » Employee awareness
- » Digital skill trainings identification
- » Career path visibility to employees
- » Employee motivation
- » Digital skilling programs completed

- » Employee charge-out
- » Share of digital revenue in total revenue
- » Digitally skilled workforce
- » Fulfilment against vacancies
- » Newly acquired projects/ clients

The proposed framework attempts to present the maturity of the industry digital skilling initiatives at both the overall industry and construct levels. In addition, maturity by quartile is computed to compare top and bottom quartile organisations for each construct. Eventually, best practices from top-quartile organisations are used as benchmarks to guide bottom quartile organisations.

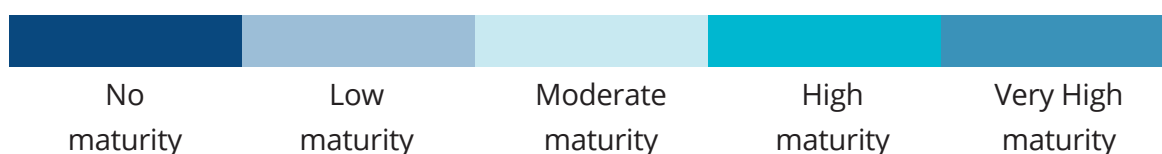


The normal distribution curve or bell curve is used to describe the distribution of the variables. The overall maturity of the industry sample indicates that the industry average for digital skilling maturity stands at **69.7 percent**. However, the standard deviation of 16 is indicative of the fact that organisations are distributed between **50 percent** maturity and **90 percent** maturity with respect to their digital skill development initiatives. It means that there is a stark difference between digital skilling maturity of the companies in the top and bottom quartiles. The companies in the top quartile have, an average of **87.7 percent** maturity, while those in the bottom quartile are at an average of **50.6 percent**.

## 1. Strategic imperative

This construct aims to identify the extent to which digital skilling of employees is at the core of organisations' overall business strategies. It comprises five sub-dimensions to measure the strategic imperative with respect to digital skilling. While digital skilling is a primary focus area for organisations in their overall business strategy, execution of strategies, including focused L&D policies, periodic reviews, and budget allocation for digital skilling, lacks maturity.

Parameters	Industry maturity
Digital skills development as a part of the overall business strategy	High maturity
Reporting digital skill development in business review meetings	Very High maturity
Establishing L&D policies focused on digital skills	Moderate maturity
Reviewing digital skilling policies periodically	Moderate maturity
Allocating L&D budget for digital skills related training	Moderate maturity

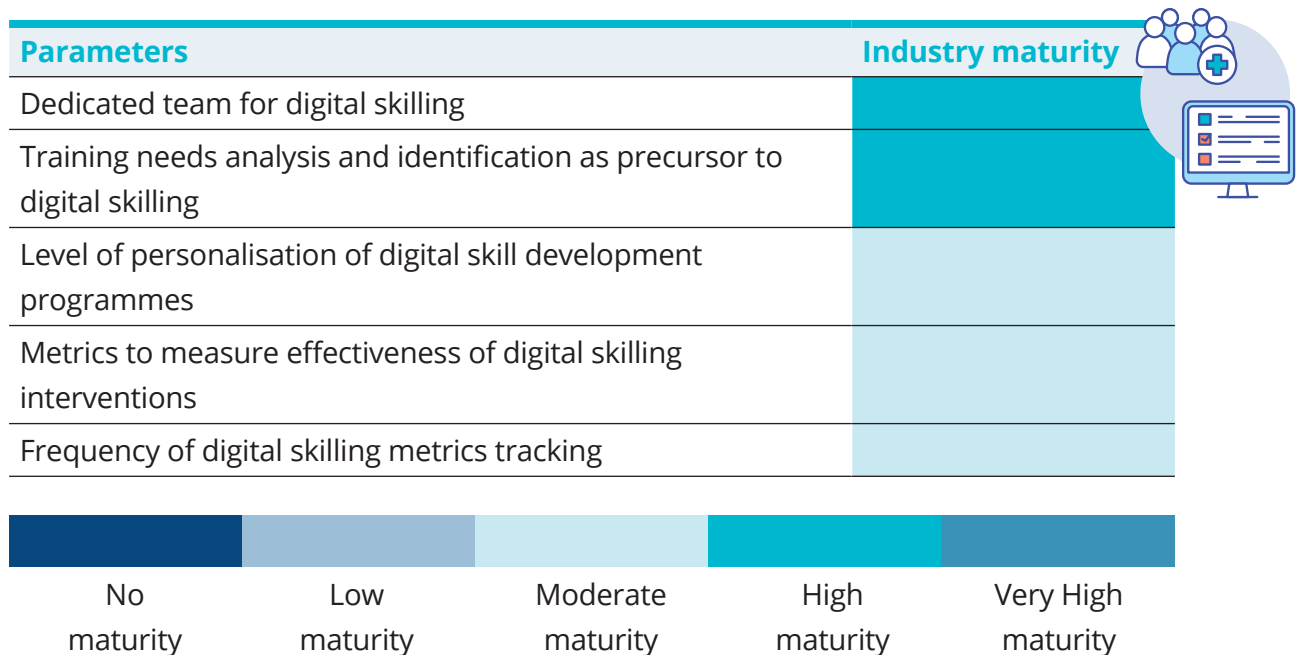


Although organisations in both top and bottom quartile consider digital skilling as a strategic imperative, the difference between the organisations in the top and bottom quartiles exists while executing these strategies (in terms of establishing L&D policies focused on digital skills, conducting periodic reviews, and reporting digital skill development in business review meetings).

## 2. Systemic drivers

This construct aims to identify how organisations organise their efforts around digital skilling, specifically from a structured execution perspective, to implement the defined digital skilling strategy. The Indian IT-ITeS industry has high maturity in terms of setting up dedicated teams catering to digital skills development, and identifying employees' training needs. However, organisations are still at a moderate maturity level in terms of personalising digital training programmes aligned with employee needs, defining and tracking the effectiveness of digital skilling metrics.





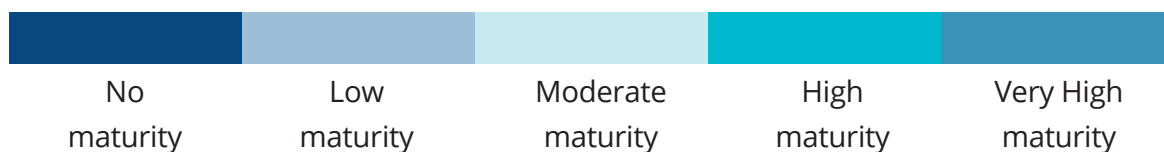
The systemic digital skilling efforts differ largely for organisations in the top and bottom quartiles. Those in the top quartile have dedicated digital skilling teams, and a well-defined process of identifying training needs, delivering personalised training at an individual level, and putting in place metrics to measure the effectiveness of digital skilling (tracked periodically).

### 3. People enablement

This construct aims to identify the extent to which an organisation empowers its employees for digital skill development. Keeping learners at the core of digital skilling around which the strategy and drivers work, this construct attempts to understand the extent to which an organisation creates a learning environment and a culture of continuous learning. The Indian IT-ITeS industry is significantly mature in terms of ensuring that employees are aware of available digital skilling opportunities and undertake these programmes in a year. However, when it comes to making the career paths visible to employees, the maturity is lower compared to the employees' awareness parameter. The process of identifying digital training interventions and motivating employees to take up these initiatives is still not mature enough.



Parameters	Industry maturity
Employees' awareness of digital skill development opportunities available	High maturity
Identification of training focused on digital technologies	Moderate maturity
Visibility of individual career paths to employees	High maturity
Employee motivation for digital skill development	Moderate maturity
Percentage employees undertaking specific number of digital skill development programmes in a year	High maturity

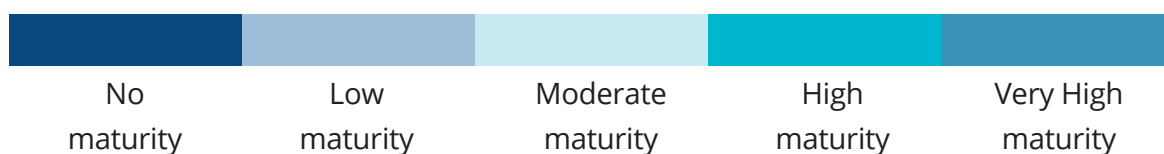


Organisations in the top quartile provide greater visibility to career paths, digital skilling opportunities, and incentives for digital skill development, resulting in more employees undertaking digital skilling courses.

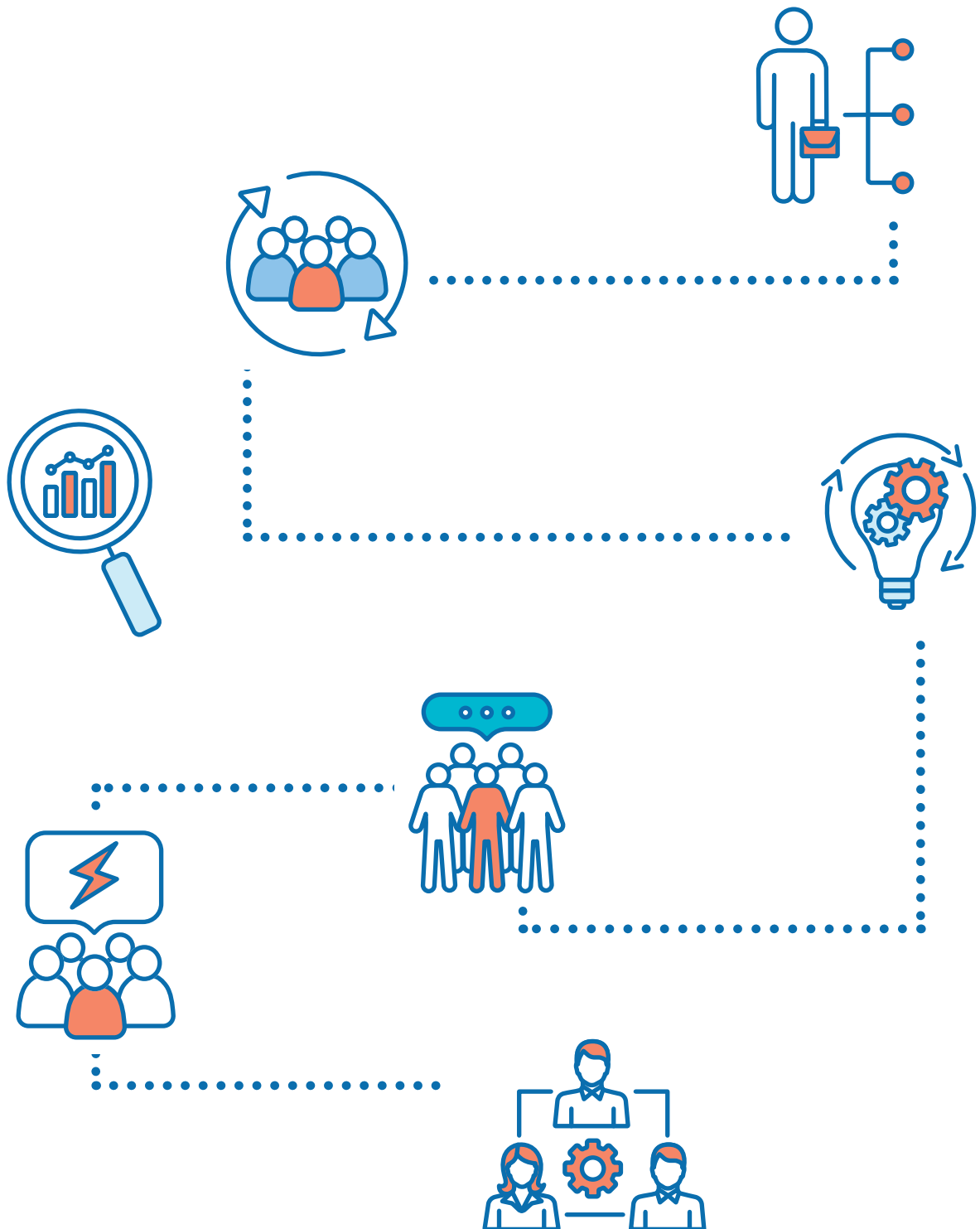
#### 4. Outcomes delivered

This construct aims to measure the outcome or impact that digital skilling initiatives have on business. The industry maturity is high when it comes to potential enhancement in employee productivity in the form of employee charge out and digital revenue as part of total revenue. The industry is still working towards increasing the proportion of digitally skilled workforce, closing job openings in digital technologies internally by upskilling existing and acquiring new projects as an outcome of their digital skill development initiatives.

Parameters	Industry maturity
Possibility of enhancement in employee charge out after digital skilling	High maturity
Digital revenue as a percentage of total revenue	High maturity
Percentage workforce digitally skilled	Moderate maturity
Filling open job openings through digital skilling interventions	Moderate maturity
Acquiring new projects/clients as an outcome of digital skilling	Moderate maturity



Organisations in the top quartile have a greater number of digitally skilled employees, potential to enhance employee charge out and digital revenue. The newly acquired projects and filing of job openings as an outcome of digital skilling are also higher for these organisations.



# Key takeaways and way forward



## ■ Stay relevant in the digital age



Several factors have made digital businesses a high-value growth opportunity for the IT-ITeS industry. The evolving strategic business imperatives and changing trends are driving a radical shift in the way Indian IT-ITeS industry operates. This has led to a transformation in how the future of work would emerge, focusing on work, workforce, and workplace. India is currently facing an interesting talent paradox. On one hand, India can be referred to as a 'talent abundant' country with a unique digitally skilled talent base of about 8,84,000 by FY2020. On the other hand, it also faces 'talent shortfall' as the proportion of digitally skilled workforce is only about 20 percent of the total workforce employed in the IT-ITeS sector. Some of the key reasons that can be attributed to the increasing talent gap include low employability of fresh graduates, traditional teaching methods and curriculum, and decreasing shelf life of learned skills due to advancements in digital technologies.

The technological shift in the digital landscape is expected to displace some job roles. However, at the same time, it will also create new job opportunities. Organisations adopt a mix of approaches to fulfill their digital talent needs, ranging from deploying a mix of both 'build' and 'buy', to tapping into a wider pool of colleges, acqui-hiring, and using alternative workforce arrangements. In the future, organisations should continue collaborating with ecosystem players, including training providers, the government, academic institutes, and other enterprises to skill their existing workforce and fresh graduates.

The emphasis on skilling has substantially increased over the past few years with the changing nature of jobs and emergence of digital skills that are difficult to forecast even a year down the line. It will thus become imperative for both employees and organisations to constantly identify skills in demand to upskill/reskill employees for being prepared for roles of the future. The concerns around the increasing demand for skills, especially in emerging technology areas, are thus no longer limited to only HR but have also become an organisation-wide challenge. Organisations have started devising L&D policies for digital skills. In the future, a periodic review (at least quarterly) of these policies would be critical to keep pace with changing trends and industry requirements.

## ■ Digital skills – drivers for digital transformation

The future of work will entail routine and administrative tasks to be performed by technology-powered machines requiring employees to learn to use these technologies. While the emerging technologies in demand will continue to dominate the landscape in the next 2-3 years, skills required to work in these technologies will evolve over time. The tools and platforms that are popular now may be replaced with completely

new ones that do not even exist. This will make continuous learning a must for employees. Jobs will evolve to require new combinations of human skills and capabilities, making jobs roles more service oriented, entailing problem-solving, communication, collaboration and critical decision making skills. The concept of “Composite capabilities”, an interplay of technical skills, professional skills, and domain knowledge, is the future. Organisations will need to evolve to become ‘learning organisations’ by inculcating lifelong learning as a part of their overall culture.



The changing digital landscape has also affected employees’ career paths and traditional career ladders have transformed to multi-dimensional career lattices, giving an opportunity to employees to take up cross-functional roles. It will be critical for organisations to map out employee career paths with changing digital skills, ensuring that employees stay relevant and progress in their career. In the future, it will be important for employees to have visibility of their career paths. Organisations embracing a culture of learning chalk out career paths for their employees to provide them a holistic picture of their career progress over the years. Acceptance to agility in career progression would be the differentiator for organisations in attracting and retaining talent. On the other hand, employees with high ‘learnability’ would be the ones that organisations require.

### ■ Learning in the digital age

Organisations have also started focusing on developing a skill development process in the digital era with a specific focus on identification of training needs, content development, and new age learning channels, as well as measuring the impact of their digital skilling initiatives. Adapting to agile learning strategies and mechanisms for each step involved in their learning initiatives will be imperative for organisations. LMS/ LXP predicated identification of training needs based on both employees’ aspirational needs and aligned with organisations’ business needs, would be a key to provide personalised focused digital skill development.

With the adoption of online and technology-powered learning moving closer to traditional classroom-based training, self-paced learning has gained popularity. Employees will have to be accountable to ensure that they are equipped with skills relevant for the future. Gamification in learning is an emerging trend. Organisations are often using gamified skilling in the form of hackathons to train their employees; this will be one of the many ways for organisations to ensure hands-on learning in the future.

In the digital age, learning is being re-imagined and re-calibrated in organisations. There is a greater focus on developing relevant curriculum to maximise return on investment.



With an increasing focus on skilling in digital technologies, various certifications on these technology domains have gained popularity. These certifications are proxies to assess the workforce on the knowledge they possess in specific domains. Organisations are also transforming training delivery by deploying new age learning mechanisms for digital skill development. However, factors such as slower-than-expected business demands force organisations to re-think and re-purpose their digital skilling strategies to suit their business needs.

## ■ Measuring digital skilling effectiveness

As digital disruptions are changing job roles and associated skills, the ways in which skilling efforts are measured are also evolving. Traditional skilling metrics are no longer effective for measuring success of skilling efforts. It is critical for enterprises with digital at their core, to recalibrate their skilling evaluation models and focus on metrics that could map skilling efforts with tangible employee-centric and business outcomes. The DSDMI proposed in the report will enable organisations to understand the Indian IT-ITeS industry's maturity with respect to digital skilling initiatives by focusing on constructs that are strategy, execution, employees, and the outcomes delivered.

Recommendations and action points for organisations to scale their digital skilling efforts and enhance effectiveness are mentioned in the table below:

### Digital skilling as a strategic imperative

#### Action points for improvement

- » Focus on developing enterprise-level digital skilling strategy with CEO-level visibility and CXO-level accountability.
- » Align L&D and HR strategies with business units and functions, establishing dedicated teams to streamline digital skilling initiatives.
- » Introduce digital skilling metrics as a part of assessment scorecards at all levels, including leadership, and middle and senior management.
- » Conduct a quarterly review of business needs for aligning relevant digital skilling initiatives.
- » Formulate a council of experts responsible for reviewing digital skilling policies to track progress at frequent intervals keeping in mind the speed of change in these technologies and their interplay with each other.



### Systemic efforts for digital skilling

#### Action points for improvement

- » Make the process of skilling more collaborative with participation of L&D leaders, trainers, and employees to streamline the process of training needs identification, delivery, and evaluation.
- » Tailor digital skilling interventions to address both business needs and employee aspirations by customising training delivery to each individual.
- » Chalk out a multi-year plan for allocation and subsequent utilisation of L&D budget for digital skilling related activities.
- » Use multi-modal ways to learning and focus on creating a learning ecosystem by collaborating with relevant stakeholders for fulfilling skilling needs.
- » Identify relevant metrics to measure digital skilling effectiveness by creating an agile framework and establishing a mechanism to track and assess the impact of digital skilling

### People enablement for digital skilling

#### Action points for improvement

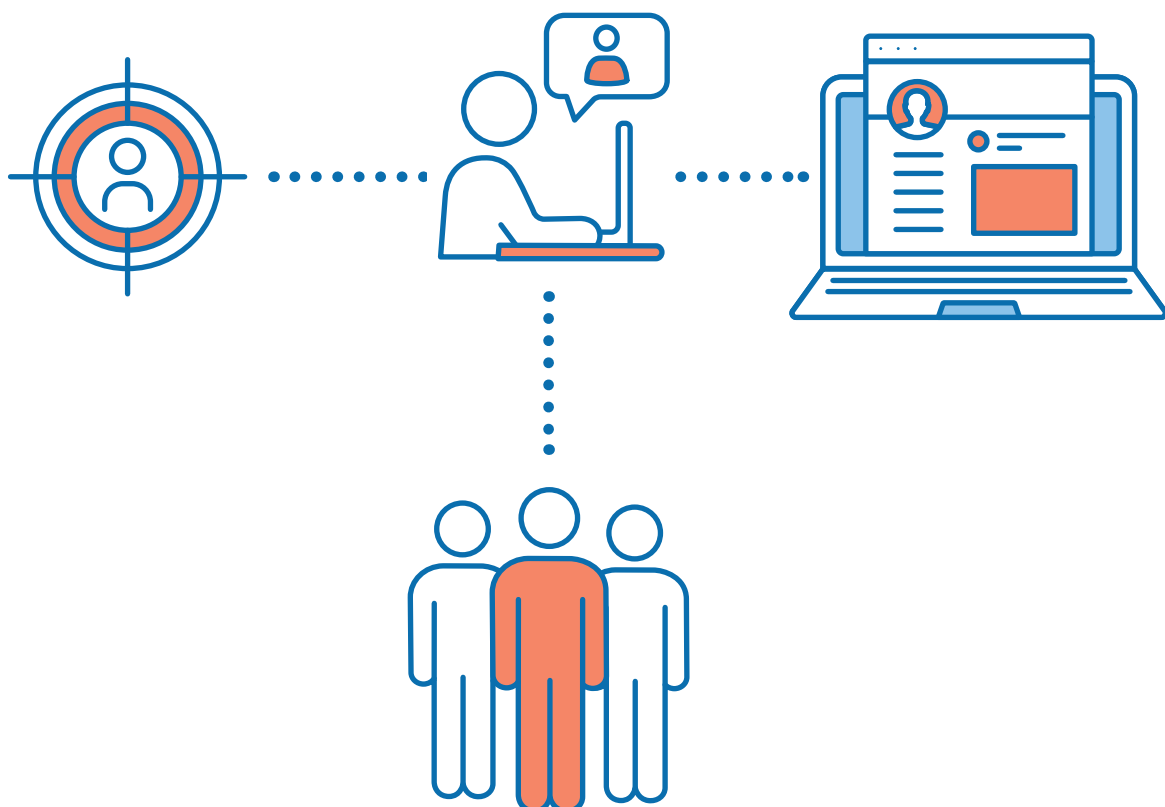
- » Identify relevant metrics to measure the effectiveness of digital skilling initiatives by creating an agile framework, and establishing a mechanism to track and assess the impact of digital skilling.
- » Create a targeted plan detailing out content and delivery channels to communicate digital skilling opportunities and associated incentives.
- » Establish a mechanism that provides dynamic career roadmaps for employees ensuring career path visibility and agility to move to different roles.
- » Build and deploy a system that can predict and recommend digital skills required by business and employees collaboratively with their managers and the HR function.



Focus on digital skilling outcomes

Action points for improvement

- » Target a larger percentage of employee base in alignment with functional and business heads for skill development every year.
- » Encourage business heads to identify technologies that bring high volume and margin businesses, and focus on building talent within those digital technology areas.
- » Enhance effectiveness of the resource management process in terms of matching employee requisition after digital skilling.
- » Explore new project avenues and clients in technologies and domains where employees have been skilled.
- » Map digital skilling investments to digital revenue and employee charge out for the identification of future investments in skilling employees on digital technologies.



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# Appendix








## Indicative list of technical skills

Indicative Lists of Technology Concepts, Protocols, Programming Languages, Tools and Platforms



Technology	Indicative Technology Concepts and Protocols	Indicative Programming Languages, Tools and Platforms
<b>AI/BDA</b> 	Deep Learning, Big Data, neural networks, machine learning, clustering, regression, data science, decision science, Natural Language Processing, voice recognition, image processing	Python, R, Keras, pyspark, scikit, numpy, scipy, Cloudera, Sisense, MapR, MongoDB, dynamoDB, Hadoop, TensorFlow
<b>Cloud Computing</b> 	Cloud technology, cloud application development, cloud native, cloud data integration, cloud integration, cloud scaling, cloud deployment, PaaS, SaaS, service-oriented architecture	AWS, Azure, Microsoft cloud, Google cloud, IBM cloud, workday, leonardo, Dropbox, Docker, Jenkins, Kubernetes, Puppet
<b>IoT</b> 	Edge Computing, NFC, NB-IoT, Bluetooth/BLE, 5G, Wi-Fi, GSM, GPRS, RIP, OSPF, EIGRP, BGP and IP services (QoS, NAT etc.) and L2/L3 VPNs	Node-RED, BeagleBone, Windows Embedded, LightBlue, Bean, LynxOS, VxWorks, BeRTOS, ThreadX, OpenWrt, PikeOS, eCos, Fusion RTOS, Altium, Orcad, Arduino, Windows CE, PSpice, Proteus, EasyEDA, Raspberry Pi, OTA, M2MLabs
<b>Blockchain</b> 	Peer-to-peer computing, p2p network, Cryptocurrencies, Distributed Ledgers, Hashing, Dapps, Smart Contracts, DPoS, PoS, PoW	Eris, Hyperledger, Hyperledger Fabric, Hyperledger Composer, web3.js, corda, Neo, Bigchain DB, ether-sql, Multiledger, EOS.io

Technology	Indicative Technology Concepts and Protocols	Indicative Programming Languages, Tools and Platforms
<b>Cybersecurity</b> 	Identity Access and Management, Threat detection, Endpoint protection, encryption, COBIT, COSO, CISSP, CEH, ISSAP, ISSEP, CompTIA Security+, SIEM, UEBA	Diameter, IBM Tivoli Identity Management, RADIUS, Metasploit, Symantec Endpoint Protection, HP WebInspect, Portswigger BurP Suite
<b>Robotic Process Automation</b> 	High-volume repeated tasks, virtual system integration, automated report generation	Automation Anywhere, UI Path, Blueprism, UIPath, WorkFusion, softomotive, pega robotic automation, kofax, g1ant, contextor, jacada, kryon, nice, onvisource
<b>Virtual Reality</b> 	Virtual Reality, Augmented Reality, Auditory Feedback, Video Feedback, Haptic Technology, Computer Graphics, Computer Vision, Head Mounted Displays	Google Cardboard, google daydream, WebVR, OSVR, PS4VR, Durovis, Dive, oculus rift, google vr, oculus vr, playstation VR, steamVR, react vr, cry engine, unity, unreal, 3ds max, zbrush
<b>Social &amp; Mobile</b> 	Application development Framework— MEAP, MADP, Cordova, UI/UX Development, Native App Development, Cross-Platform Development, Hybrid App Development	Objective C, Swift, Android Java, Ionic, Angular, Xamarin, Appcelerator, PhoneGap, Ionic
<b>3D Printing</b> 	Tolerance, Maximum Size, Overhang, Bridging, Supports, Polygons, Infill	3D Slash, TinkerCAD, AutoCAD, 123Design, Blender, SolidWorks, Rhino3D, Inventor, DesignSpark, Maya, 3DS Max, Cinema 4D, OpenSCAD, Modo, Fusion 360, Mol 3D, Wings3D, K-3D, BRL-CAD, NetFabb, Repetier













NASSCOM Zinnov demand-supply analysis



## Indicative industry preferred certifications and certificate providers



Technology	Illustrative preferred certifications	Illustrative certificate providers
<b>Artificial intelligence (AI)</b> 	IBM AI Engineering Professional Certificate, IBM Applied AI Professional Certificate, Udacity Nanodegrees (the school of AI), Microsoft Certified: Azure AI Engineer Associate, The AWS Certified Machine Learning – Specialty	IBM, Coursera, Udemy, Google AI courses, RapidMiner, Pluralsight, GCP ML
<b>Big data analytics (BDA)</b> 	IBM Big Data Architect, IBM Certified Data Architect - Big Data, IBM Certified Data Engineer - Big Data, Associate - Data Science Version 2.0 (DELL EMC), AWS Certified Big Data - Specialty, Big Data Hadoop Certification Training, MongoDB DBA Certificate, MongoDB Developer Certificate, Informatica Big Data Developer, Specialist Certification, HDP-certified Spark Developer by Hortonworks, Azure Data Certifications	IBM, Coursera, Udacity Nanodegrees, Intellipaat, Oracle NoSQL, Cloudera, Google
<b>Cloud computing</b> 	Amazon AWS Certifications, Microsoft Azure Certifications, CCSK, Certified Cloud Security Professional (CCSP), Cisco CCNA-Cloud	Simplilearn Cloud Architect (AWS & Azure), Coursera, Udacity Nanodegree
<b>Robotic process automation (RPA)</b> 	Automation Anywhere Certified Advanced RPA Professional, Blueprism RPA Developer Certifications	UI Path Academy, Coursera, Udacity Nanodegree
<b>Cybersecurity</b> 	Certified Information Systems Auditor (CISA), Palo Alto Networks Certified Cybersecurity Associate (PCCSA), Certified Information Security Manager (CISM), Certified Ethical Hacker (CEH), Rad Hat Certified System Administrator (RHCSA), NSD Training and Certification (NCPT), AWS Certified Security – Specialty	Institute of Information Security, Udemy, Coursera, ISAC

Technology	Illustrative preferred certifications	Illustrative certificate providers
<b>Blockchain</b> 	Certified Blockchain Expert, Certified Corda Expert, Certified Hyperledger Fabric Administrator, Certified Hyperledger Sawtooth Administrator, R3 Corda	Blockchain Council, IBM Blockchain certificates, Coursera, Udacity Nanodegree, Edureka
<b>3D printing</b> 	CADx 3D printing courses	Udemy, Makerbot, Coursera, LinkedIn, Skillshare
<b>Social and mobile</b> 	Certified Usability Analyst (CUA) and Certified User Experience Analyst (CXA) by HFI, Xamarin Certified Mobile Developer, Android Certified Application Developer	Google Digital Unlocked, Coursera, Udacity Nanodegrees, Pluralsight
<b>Internet of Things (IoT)</b> 	ACIP-Axelta Certified IoT Professional, Excellence Certification in IoT by Cognixia, Star Expert IoT Security (SEIS), IOT Professional Certification by JIGSAW Academy, Internet of Things Foundation (IoTF) Certification by Cloud Credential Council, IoT-Inc Certified IoT Professional Programme	Coursera, Edureka, Udemy
<b>VR/AR</b> 	Augmented and Virtual Reality Certification Course by VR/AR Association	Coursera, Udemy courses, EdX, Udacity Nanodegree



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EXL Service	Fermion Infotech Private Limited
Fillion Solution Pvt. Ltd.	Flatworld Solutions Pvt. Ltd.
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Genpact	GlobalLogic
Haptik	Hays Business Solutions Pvt. Ltd.
HCL Technologies	Headway.AI
Heracles Solutions Pvt. Ltd.	Hewlett Packard, Inc.
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Siddhan Intelligence	Simplilearn
Silver Touch Technologies	Skillmine Technology Consulting Pvt. Ltd.
Sopra Steria India	Sprinriver Technology Pvt. Ltd.
StockHolding DMS	StratLytics
Stride.AI	Sun Life India Service Center Pvt. Ltd.
SuperConcepts	Synechron Inc
Synoptek	Tech Mahindra BPS
Techno Developers Group	Temenos India
Thirdware Solution	TransSys Solutions
Triazine Software Private Limited	UiPath
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