WITH HYPER-LEARNABILITY COMES HYPER-PRODUCTIVITY

The next evolution of the manufacturing workforce

Jasmeet Singh and
Thirumala Arohi Mamunooru

Infosys
cobalt

Infosys®
Navigate your next

Abstract

Industry 4.0 requires talent 4.0. The smart factory needs smarter people. Digital transformation in the manufacturing world seems to be moving on two divergent paths: the technology curve and the human curve. Today the former is an ascendant exponent and the latter is a linear crawl. How then, could the twain meet?

Even as the current global crisis seems to portend the acceleration of a digital normal, the manufacturing future cannot be imagined as the stuff of science-fiction, where bots and drones run the shop floor. Now is the time to pull the human curve upwards and converge it with the pace of digital technology. What will bend this curve is learning: the great equalizer which ensures manufacturing remains a distinctly human frontier.

Learning, once upon a factory…

One could say that we learn to romanticize the past. The past is painted as prosperity, and the present is always disruption. The state of manufacturing is no different. And for good reason: manufacturing has been the backbone of economies, the harbinger of change for over three centuries. It provided livelihoods for millions, it secured futures and made the modern world. A job in manufacturing meant you were set for life: you had to master your craft once and reap the rewards as long as the assembly line kept rolling.

But manufacturing has always been marked by change. From the steam engine to Henry Ford's production line to computerized automation, whether in Manchester, Michigan or Macau, change has always been the natural order. And with each change, the manufacturing worker has learned to master the craft

of the day. Irrespective of the technological breakthrough and contrary to what the newspaper headlines then may have touted or predicted, humans have always stayed in the factory and likely always will.

The current upheaval, though, is no doubt more complex: could there be one too many crafts to master in the age of Industry 4.0? The factory workforce of the past was able to keep pace with the shifts because the shifts were fewer and simpler to learn. Therein is the biggest difference between learning then, and now.

> **"Learning in the now is markedly a new order. The what is every digital skill that can keep you relevant, the where is a multitude of phygital platforms, the when is constant, and the how is experiential."**

Then was a time of singularities and simplicities: the what, where, when, and how were all relatively straightforward. The what was the task at hand, the where was in the factory, the when was any time a process change came into effect, and the how was observing your shop floor supervisor. Learning in the now is markedly a new order. The what is every digital skill that can keep you relevant, the where is a multitude of phygital platforms, the when is constant, and the how is experiential. This may sound overwhelming, but if broken down into a framework with the right technology, lifelong learning will become second nature to the manufacturing workforce.

Casting the new worker for the new normal

Before one can reimagine how to learn, the first step is to imagine the 21st century manufacturing worker. We are in the midst of a generational sunset, where those among the factory floor from the 20th century Industry 3.0 era – and maybe a few from 2.0 – will soon leave the workforce. That presents the first big challenge: finding tomorrow's talent.

Before the industry rushes to fill factory positions, it must first reposition what it means to work in manufacturing. Who's to say it can't be as fulfilling a pursuit – or maybe bearing the same coolness credentials – as a start-up Silicon Valley job? What is seen as staid and repetitive must be replaced with stimulating and innovative. The Lean principles of the past must co-exist with the Agile philosophy of today.

The zero-room-for-error credo needs to co-exist with a drive towards room-for-experimentation.

From being a one-way street, the career path must be made more multi-directional than before.

One of many possible manifestations of the factory worker of the future is this: the worker is also a digital mentor, an orchestrator of things, a data scientist, and a customer experience maven – all from the very same shop floor that one imagines to be a confine of dreariness. If the job description put forth appears to be one that is seen through rose-tinted glasses, it really isn't. It is the reality of the day, and it will beas challenging as it could be interesting.

> **"One of many possible manifestations of the factory worker of the future is this: the worker is also a digital mentor, an orchestrator of things, a data scientist, and a customer experience maven."**

Acquiring multiple digital skills to mentor others, learning how to work with a new world of machines, constantly studying data to respond with productivity gains, and optimizing everything around changing customer expectations: all of these define the mentor-orchestrator-engineer-designer mix that the future demands.

And the new avatars of the worker will be enabled by hyper-learnability on digital platforms: that's where a diversity of new skills will be acquired and honed.

As much as it is a tall order, it presents a bottom-up view of what's possible in a manufacturing job. Now that the factory worker's career is flipped more towards the top of Maslow's pyramid, where there is as much self-actualization in the job as meeting of basic needs, the next step is to find new talent wells. Two possible reservoirs are in the offline and online worlds.

The offline strategy is going to the community where the industry exists: the universities where talent can get a hands-on experience of what it's like to have the skills to succeed in the factory of the future. This is vocational learning contextualized for new needs. The online hook to find potential manufacturing talent is all about creating experiential views of the job and all its facets in an immersive, gamified online experience: where you get transported into a real-world simulation of the next industrial revolution.

Unlearning how we learn, and relearning it

The trouble with learning can broadly be categorized into three areas of discomfort: cultural, technological, and generational.

The cultural challenges largely stem from historical attitudinal hangovers: that we were done learning once we entered the workforce, that learning had no real value, and that there was no time in an already-packed 8-hour shift. Between these attitudes were the worker being subjected to mixed messages between the management and the union. The management wanted change but missed out on filling the implementation gaps. Grand visions would be unveiled, but rarely seen through with effective change management that nurtured learning. On the other side, the union could meet change with resistance: learning could be seen as another burdensome task for an already burdened factory worker.

"The larger problem is context: that of just-in-case learning versus just-in-time learning. Why learn everything now only to forget it later, when you can learn that something which you really need to right now."

Technologically, learning remains absent of interventions and experiences. Corporate or industrial learning programs are largely seen as too theoretical with bundles of folders to sift through. While the volume itself can turn away workers, the larger problem is context: that of just-in-case learning versus just-in-time learning. Why learn everything

now only to forget it later, when you can learn that something which you really need to right now. This marrying of context with content should be the primary design for the digital learning platform.

Let's assume a maintenance technician is looking to fix a machine on the factory floor: should he then draw from his memory well of what he learned ages ago as part of his induction, or should he be able to enact a voice command on his mobile device that guides him with a video tutorial of the troubleshooting process on a learning app? While also finding an expert who's done this before within the same app? The correct answer seems obvious, and that's where the final consideration comes in: the generational one.

The contours of learning must be plotted for the needs and adoption nuances of two kinds of workers: the digital immigrants, and the digital natives. One is eased into it, and the other is plunged deep. The path of the immigrant is sequential and defined by enablement, while that of the native is non-linear and marked by self-advancement.

"Whatever the structural and social order, one thing is clear: learning is designed not just to bridge the generational gap, but to ensure that both immigrants and natives upskill themselves in a symbiotic world that amplifies their respective strengths."

Facilitating the learning for both immigrants and natives calls for empathetic design based on their needs: while the immigrant might need more of a conventional classroom learning approach in a digital skin, the native might like a playground approach instead with a multitude of skins: digital, virtual, augmented. The immigrant might respond well to order that is facilitated by traditional instruction and organizational incentive. The native might thrive in an environment that is built to be more peer-collaborative and personal goal oriented. This multivariate learning universe should be served through a singular experience on the same platform, which is capable of delivering personalized journeys.

- **Instructor-led sessions on digital platform (live and/or recorded)**
- **Seamless access to call/contact educators/coaches**
- **Pair with digital native buddy**
- **"Design thinking" orientation**

- **Learning badges and incentives**
- **Use-case driven learning paths and assessments**
- **Learning and knowledge content creation by SMEs**
- **On-the-floor learning devices**
- **Learning to work with tools and technology**

Digital Immigrants
Digital Natives

- **AR/VR and simulator driven learning**
- **Performance management linked learning goals and analytics**
- **Digital literacy (ABCDE) learning programs**
- **Alternative career learning paths**

- **Skill and role competency/ proficiency**
- **Visual learning content**
- **Interactive, gamified, adaptive learning**
- **Byte-sized and mobile-oriented**
- **Social/collaborative learning**
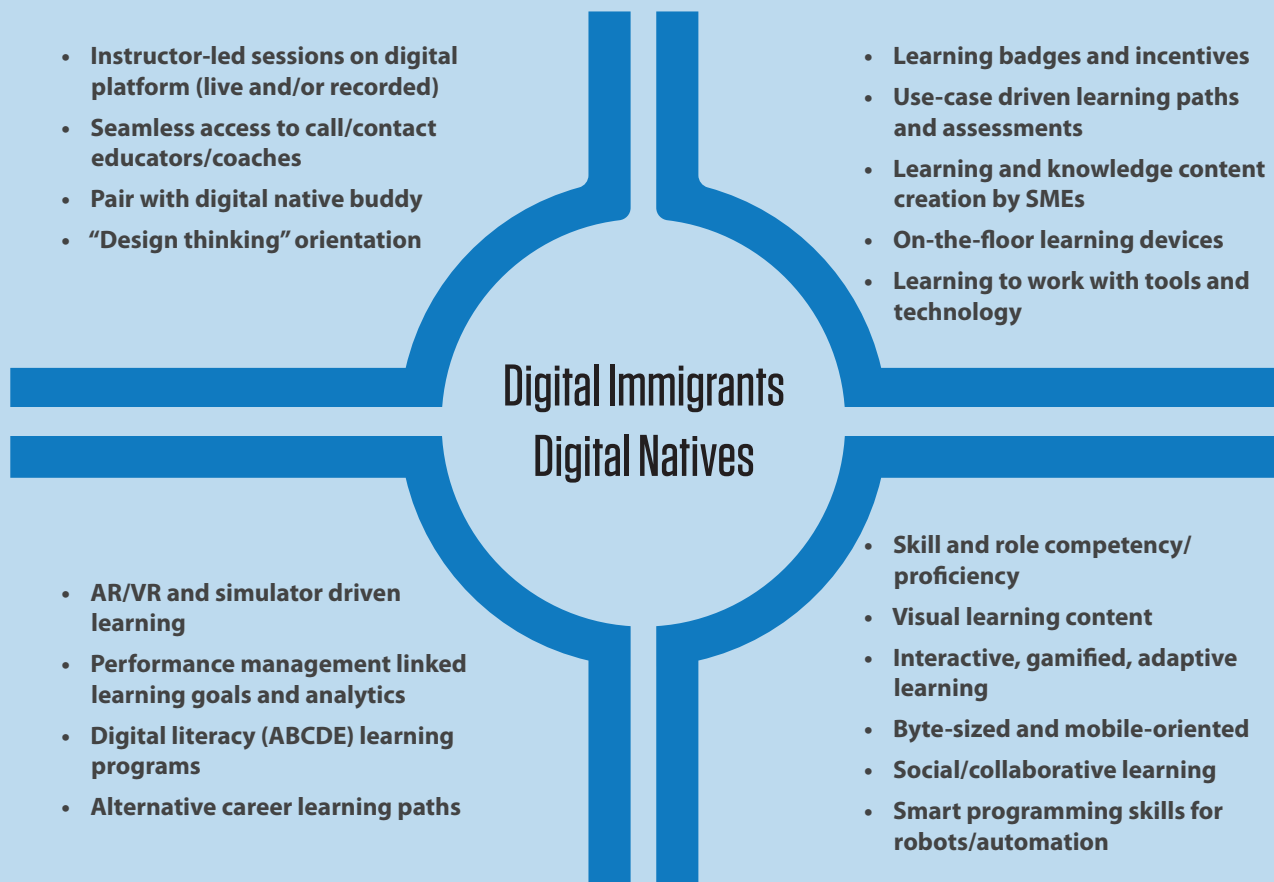- **Smart programming skills for robots/automation**

Fig. 1. The hyper-learnability matrix for digital immigrants and natives

Whatever the structural and social order, one thing is clear: learning is designed not just to bridge the generational gap, but to ensure that both immigrants and natives upskill themselves in a symbiotic world that amplifies their respective strengths. Because both ultimately seek the same outcome: becoming better at what they do while they become perpetually relevant.
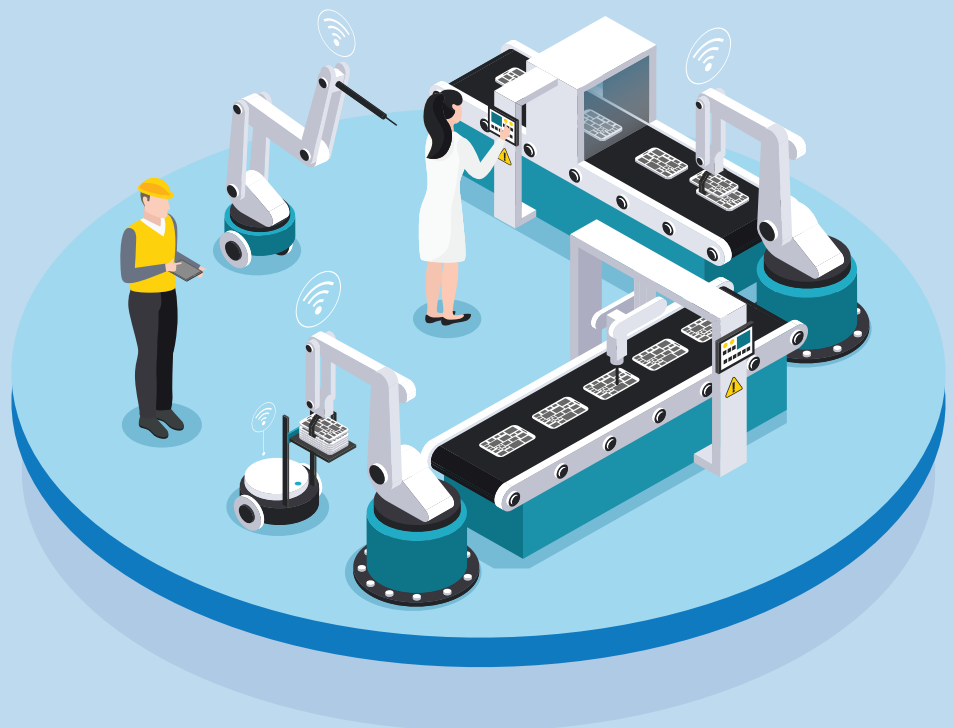
In faster pursuit of perfection

The quest for manufacturing perfection is one that is driven by narrowing already-narrowed apertures of error and delay. Anything that can be accelerated will be accelerated, and so will most of what can be automated. As new operational technologies make their way to the factory floor in the Industry 4.0 normal, the people on the floor must keep pace with the machines. This requires an intense focus on the speed-to-competency and speed-to-productivity of each worker.

Where competency used to take longer to achieve in the past, it must be achieved in weeks, days or even minutes today, depending on the magnitude of complexity or simplicity of the task. This will be enabled by observation and guided practice – where repetition meets supervision in a digital world. What this essentially means is simulation of a physical task in a digital environment, or the act of observing a physical task being performed from a remote location by a mentor with digital access.

"Where competency used to take longer to achieve in the past, it must be achieved in weeks, days or even minutes today, depending on the magnitude of complexity or simplicity of the task. This will be enabled by observation and guided practice – where repetition meets supervision in a digital world."

One school of thought surrounding mastery is that it is attained over 10,000 hours of practice, as espoused by leading thinkers like Matthew Syed in Bounce, and Malcolm Gladwell in Outliers. But what happens when you don't have 10,000 hours? How do you capitalize on the experience of those that already have the 10,000 hours and transfer it to those in the nascent stages of their hour count? A digital learning platform emerges as the medium of transfer, and might we say, a subtractive medium where we cut down the hours required for achieving mastery.

The platform that unifies learning and doing

The digital medium of learning must be viewed as a multi-sided learning platform with knowledge creators (trainers, coaches, workers, third-party partners), knowledge consumers (workers), and insights consumers (HR, managers, coaches). Having these personas in the same digital ecosystem accelerates learnability.

The faster one gets feedback, the closer one gets to going from amateur to expert practitioner. Think of it like every factory worker having their very own competency coach, like a pro tennis athlete has a performance coach. Just as the tennis coach would find breakthroughs in the minutiae such as the right degree to bend the arm for a perfect return, the manufacturing competency coach could identify equally important game-changers in efficiency across the board – from fixing a machine to handling pick-and-place robots to managing the goods transfer for the distribution units.

These processes will be learned physically and optimized digitally, with each worker having a personalized insights dashboard for areas of improvement alongside a list of manager-guided goals to achieve. To deeply embed this behavior into the organizational fabric, the learning platform will be integrated with the learning management system and the HR systems.

Another important feature will be modeling learning-from-failure into the platform: where failure is not penalized but treated as an opportunity for improvement. And the learnings of these valuable marginal gains can be shared not just within a team in the learning app, but with the wider organization across the globe. With this 'black box thinking' of failure as the pathway to better outcomes, the manufacturing enterprise can change its perception from being overly mechanized to being creatively oriented as well. This new digital learning model

no doubt creates a relentless focus on criticalities of the now. But what of the necessities of next? Must this same workforce not be empowered with the skills and tools to succeed in the future? How does one ensure that the question of what's-in-it -for-the-factory is aligned to what's-in-it-for-the-worker? And can it be done on the very same learning platform?

> "Just as the tennis coach would find breakthroughs in the minutiae such as the right degree to bend the arm for a perfect return, the manufacturing competency coach could identify equally important game-changers in efficiency across the board – from fixing a machine to handling pick-and-place robots to managing the goods transfer for the distribution units."

The bridge from productivity to purpose

To the 10,000-hours rule has emerged a corollary in recent times: that generalists will triumph in a world of specialists. David Epstein implores us to start 'thinking outside experience' in Range, an exploration of the 21st century world of work.

Now is the time for super-skilling the factory worker in the new tools of the trade: digital twins, drones, data, and any other disruptive force we can possibly imagine. The three enabling beacons of this change will be personalization, collaboration, and immersion, and all three can be delivered in multiple states within the learning platform.

> **"Now is the time for super-skilling the factory worker in the new tools of the trade: digital twins, drones, data, and any other disruptive force we can possibly imagine."**

Personalization is sensing all that a factory worker can do and all that she can be. A learning graph can pinpoint her aptitude for a new skill based on her mastery of an old one, creating upward and alternative career paths that evolve with changing market contexts and technological upheavals. This can be viewed in a current or future state by the worker on the app, transforming the job into an always-visible career trajectory. And while this eliminates the angst that comes with perceived lack of purpose, the app also simplifies the organizational or managerial task of making purpose visible for each worker.

Socializing learning is also one of the key mandates for any organization looking to build a growth mindset culture. Collaboration comes in both human and machine forms here: what the learning app must do is intuitively connect any learner with a task expert in the very moment. Rather than depending on structured corporate learning programs, learning should be peer-driven and instant with easy discoverability of expert peers. This social learning architecture will make the learning process more democratized, tapping into what is commonly known as tribal wisdom and preserving it digitally once it is captured.

To augment or capture the human knowledge from each of these interactions, the platform must leverage the power of virtual assistants that can search vast libraries of knowledge on-demand, with the cognition and intuition to understand the context of the knowledge seeker. Pushing the boundaries of robotics further are advancements made in the science of cobots, or collaborative bots. When paired with humans for tasks like machine tending, cobots could deliver greater floor efficiency. But of course, first we must enable workers to learn about working with their cobots.

The final frontier is when learning is no longer a task, but a natural state of being. This is a state where people aspire to become digital sponges, seeking out new skills like a Boy Scout would collect skill badges and wear them proudly on his sleeve. Envisioning this reality is easier than implementing it. One way to create this enthusiasm for learning would be to enrich it – could a virtual reality simulation of fixing a machine be an addictive experience? And could putting on an augmented reality pair of glasses with real-time data feeds create an analytical and insight-driven culture? The paths to immersion are many, as varied as the changing faces of technology. Whatever the path, the destination is the same for the manufacturing worker: purpose with relevance and self-realization.
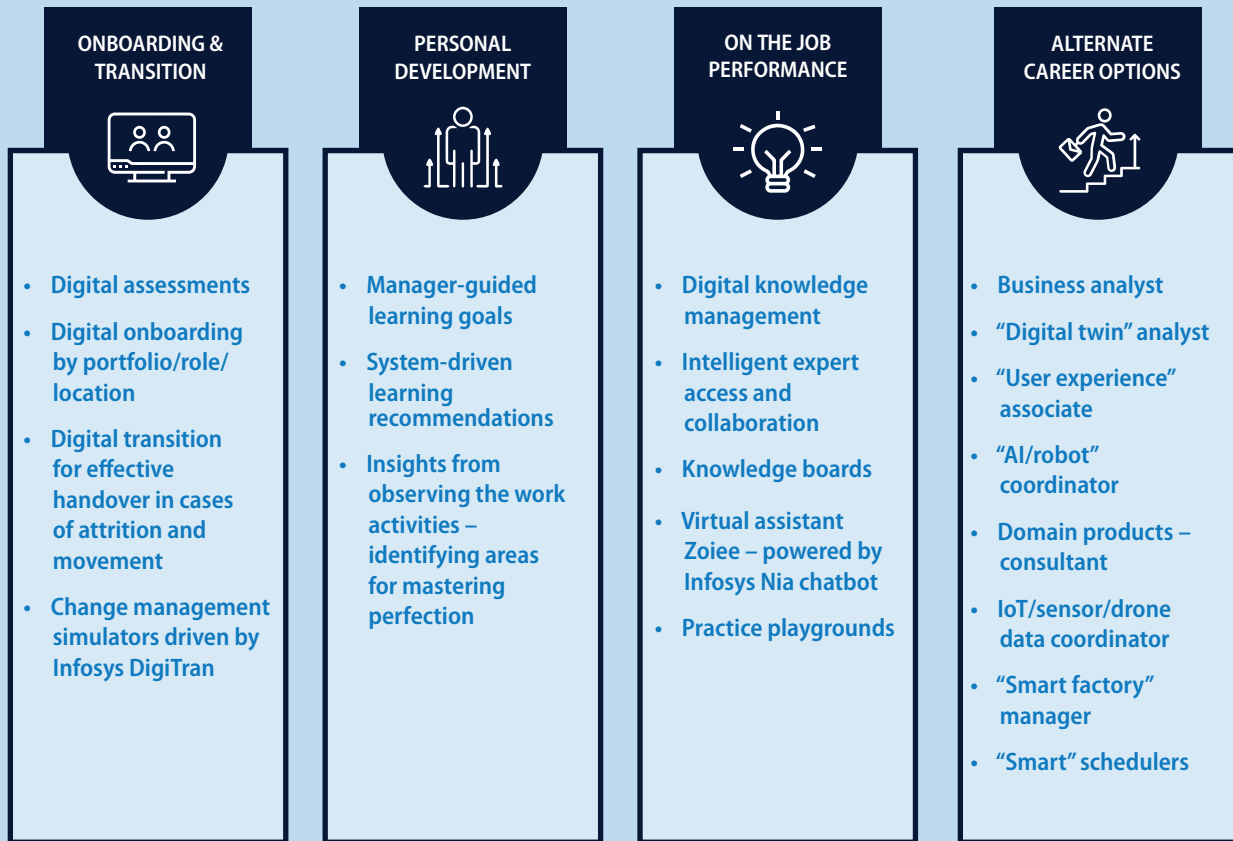
ONBOARDING & TRANSITION

- Digital assessments
- Digital onboarding by portfolio/role/location
- Digital transition for effective handover in cases of attrition and movement
- Change management simulators driven by Infosys DigiTran

PERSONAL DEVELOPMENT

- Manager-guided learning goals
- System-driven learning recommendations
- Insights from observing the work activities – identifying areas for mastering perfection

ON THE JOB PERFORMANCE

- Digital knowledge management
- Intelligent expert access and collaboration
- Knowledge boards
- Virtual assistant Zoiee – powered by Infosys Nia chatbot
- Practice playgrounds

ALTERNATE CAREER OPTIONS

- Business analyst
- "Digital twin" analyst
- "User experience" associate
- "AI/robot" coordinator
- Domain products – consultant
- IoT/sensor/drone data coordinator
- "Smart factory" manager
- "Smart" schedulers

Fig. 2. Upskilling dimensions for manufacturing workers in the Infosys Wingspan learning platform

To be resilient is to keep learning

Disruption is inevitable, and it sometimes exacerbates existing system vulnerabilities. The ongoing global health pandemic is no different. New operating realities are constantly being configured with each passing day, and what's standard now will not be the standard tomorrow. Embracing digital learning is now imperative, as knowledge remains the shield against the productivity loss that arises when workers are unable to familiarize themselves with the needs and processes of the hour. Learning is the cornerstone of any live enterprise.

The aftermath of the disruption is shifting gears from adaptation to evolution. At Infosys, we are working closely with our clients to enable this change, molding the Infosys Wingspan learning platform to the needs of now and next. One of our areas of focus is boosting productivity for the field workforce through effective knowledge management, practice playgrounds, and virtual assistance. And while we sculpt new paths and newer efficiencies

for the field force, Wingspan is architected to be an experiential learning platform for the entire workforce. Siemens is leveraging Wingspan to empower 385,000 of its people in 200 countries with interactive learning from A to digital Z. From automation to additive manufacturing, access to learning has been democratized enterprise-wide. The platform, named My Learning World, is a window to navigate the digital future while rapidly upskilling in the immediate context.

There's never been a better time to learn. Over the years, productivity has grown, but the pace of productivity has room for growth. The technology change that earmarks Industry 4.0 will push this pace towards the realm of hyper-productivity. And it

cannot be realized without hyper-learnability. Where one exists, the other will. At the heart of this change is the human in the factory – learning, doing, evolving – the worker who built the past, now building the future. The tools may have changed, but the purpose remains unchanged.

The Authors

Jasmeet Singh
Executive Vice President and Global Head of Manufacturing, Infosys; Member of the Board, Fluido and Panaya

Jasmeet is responsible for overseeing and growing client relationships in the automotive, aerospace, defense, and industrial manufacturing sectors. Jasmeet is also on the Board of Fluido, a Finland-based digital transformation leader and Salesforce platinum consulting partner. He is also on the board of Panaya, a leader in change acceleration across SAP, Oracle and Salesforce based ecosystems. Prior to his current role, Jasmeet led the financial services business as the SVP & Industry Head for Americas at Infosys. With over two decades of experience in IT and technology driven business transformation, Jasmeet brings a deep appreciation of business processes and the usage of technology as a strategic differentiator for clients. He has a keen interest in the business value the manufacturing industry can derive from the intersection of technologies like Industrial Internet of Things, automation, and machine learning.

Thirumala Arohi Mamunooru
Vice President and Head – Education, Training and Assessments

In his tenure at Infosys, which spans 20+ years, Thirumala Arohi (known as Thiru) has managed many vital client relationships for financial services clients in Europe before taking on the current role of Head of Education, Training and Assessment (ETA). The ETA department is one of the key business enabling departments at Infosys. Thiru drives various learning interventions to enable the workforce to be future-ready. In this journey of creating next-gen learning experiences, ETA has progressed well in establishing and enhancing digital learning platforms that enable 'anytime, anywhere, on any device' learning. Several partnering agreements are in place with universities and MOOCs like Udacity and Coursera in leveraging their programs. Along with driving content digitally, the learning and development arm of ETA also focuses on developing holistic skills in the areas of business, behavioral and leadership such as design thinking.

Infosys Cobalt is a set of services, solutions and platforms for enterprises to accelerate their cloud journey. It offers over 14,000 cloud assets, over 200 industry cloud solution blueprints and a thriving community of cloud business and technology practitioners to drive increased business value. With Infosys Cobalt, regulatory and security compliance, along with technical and financial governance comes baked into every solution delivered.

For more information, contact askus@infosys.com

Infosys®
Navigate your next

Infosys.com | NYSE: INFY

Stay Connected