AIMA
ALL INDIA MANAGEMENT ASSOCIATION

KPMG

INDUSTRY 4.0

INDIA INC. GEARING UP FOR CHANGE

March 2018

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Preface

In India, the adoption of Industry 4.0 is at a nascent stage. Widespread implementation still looks to be some years away due to challenges such as the need for high investment outlay, inadequate knowhow, lack of infrastructure and lack of adequate cybersecurity norms. However, with benefits such as cost reduction, higher efficiencies, safer factories and faster speed to market, Industry 4.0 can provide the country's manufacturing sector the much-needed platform to stay competitive in the global market. Furthermore, with the government's focus on manufacturing through programmes such as 'Make in India' and policies such as the 'National Policy for Advanced Manufacturing', Industry 4.0 could play a key role in boosting the manufacturing sector's share in the country's GDP to 25 per cent by 2022 from the current 17 per cent. That said, for the true value of Industry 4.0 to be unleashed, it has to transcend large manufacturing companies and become accessible to the 50 million plus enterprises that make up India's MSME sector, accounting for about 45 per cent of total manufacturing output and 40 per cent of total export.

This is where the Indian government assumes the role of a critical stakeholder. Putting the Indian MSME sector at the forefront of the fourth Industrial revolution will need significant push in terms of funds, infrastructure, technical knowhow and exposure — areas where the government's intervention can make a significant impact and make the benefits of Industry 4.0 accessible to the bottom of the pyramid. Furthermore, the government's role in India's Industry 4.0 story goes much beyond just enabling the MSME segment. With a large manufacturing base, a significant IT industry and a burgeoning consumer base, India is in a unique position to fully harness the potential of Industry 4.0, provided there is strong governing force orchestrating the ecosystem and bringing these individual components together.

Given the strong role of advanced technology in Industry 4.0, there is also a need to demystify the core skill requirements of Industry 4.0 through education and enablement. Best practices from nations that have succeeded with Industry 4.0, such as Germany, show that the government has a strong role to play here too by mandating relevant curriculum in educational institutes as well as in the vocational training infrastructure. Partnering with the industry, the government can use its vast research infrastructure to encourage innovation and learning around Industry 4.0.

This report looks into the state of Industry 4.0 adoption in India. Starting with understanding what Industry 4.0 entails, the report explores the various technology levers enabling the phenomenon, compares India's Industry 4.0 landscape with that of global peers, assesses benefits and challenges for India's manufacturers, and analyses the key enablers that are required to take the Industry 4.0 landscape in the country to the level of maturity it has the potential to attain. The report looks at building a supporting ecosystem combining forces from the government, enterprises and academia, highlighting the role that each of the stakeholders can play to make Indian manufacturing flourish on the back of advanced technology and next-generation leadership and talent.

The report is built on key themes identified and deliberated on jointly between the All India Management Association (AIMA) and KPMG in India. Along with data sourced through desk research, it also includes input and opinion from senior industry leaders and partners.

What is Industry 4.0?

After going through three industrial revolutions that brought about significant technological developments over a period of more than two centuries, the world is currently witnessing the fourth Industrial revolution, which is taking technology adoption by the world's factories to a whole new level.

This fourth industrial revolution, or Industry 4.0 (I4.0), is bringing together the different silos in a production system via a network, allowing real-time data sharing and facilitating machine-to-machine and human-to-machine interactions of unprecedented speed and scale. This is giving rise to seamlessly integrated value chains with inter-connected cyber and physical systems, enabling decentralised decision-making and unprecedented levels of automation. The digitalisation of the entire manufacturing value chain starting from the procurement of raw materials and extending right up to customer service using mobile devices, communication networks, sensors and actuators is completely transforming how the world's factories operate.

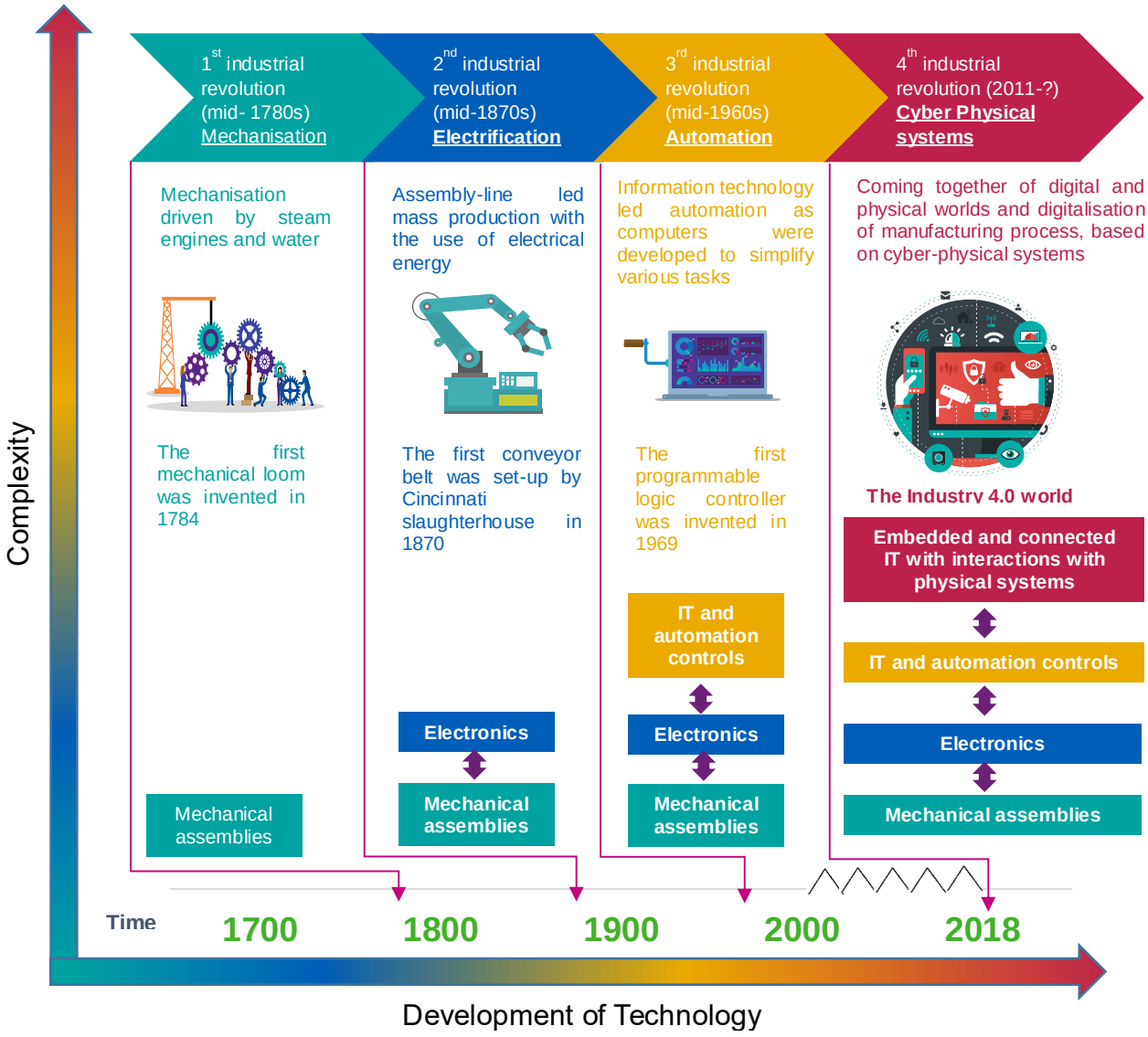
Widespread adoption of I4.0 is likely to benefit manufacturers in several ways:

— **Cost reduction and efficiency:** Cyber-physical systems can monitor the factory processes and make decentralised decisions, enabling faster processing. For instance, a connected factory is capable of taking automated self-correction measures in the instance of errors. Technologies such as 3D printing and laser technology allow better utilisation of resources such as the shop floor, thereby adding to the operational efficiencies. This leads to cost savings, better productivity and faster time to market.
— **Value add:** Digital manufacturing technologies, such as 3D printing, laser cutting, CNC-milling and robotic assembly, allow manufacturing of products in small batches, thereby allowing for better customisation, quality and value add.
— **Health and safety of factory workers:** By eliminating the need for human presence and intervention in certain high-risk tasks and environments, I4.0 can help manufacturers avoid exposing workers to health hazards and reduce fatalities on the factory floor.

From I1.0 to I4.0 — the rise of the connected ecosystem

After seeing constant progress on the back of mechanisation, electrification and the advent of the assembly line over two centuries, the global manufacturing industry adopted information technology in the 1960s, when computers came into the forefront of development, simplifying human effort. From then to now, both operational technology and information technology have come a long way, unleashing a vast plethora of possibilities on the factory floor through I4.0.

Figure 1: Evolution of Industry 4.0



The transformational nature of the fourth Industrial Revolution particularly lies in its ability to digitally integrate isolated systems using various synergistic technology levers, unleashing unprecedented levels of value.

Convergence of technology levers

I4.0 brings together technology forces such as Internet of Things (IoT), cloud computing, big data analytics, additive manufacturing, Augmented Reality (AR), robotics, cyber security and Machine-to-Machine (M2M) communication. While some of these digital technologies are already in use in industrial applications, some others are still not ready for application at scale. Manufacturers need to carefully pick the right mix of technologies that would maximize returns on investment.

Industry 4.0 key technology levers and their role

Internet of Things (IoT)

IoT enables real-time machine–machine interaction by connecting them over a network and help establish a connected value chain

Cloud computing

Cloud computing offers a platform equipped with vast computational, storage and networking capabilities, which would facilitate the interaction amongst various technologies

Big data analytics

Data analytic capabilities to support intelligent and real-time decision making

Additive manufacturing

Additive manufacturing helps production in small-batches in a cost-and-time-effective way, by reducing the lead time from product designing to product release and improves customisation

Augmented reality

AR could enhance business operations by leveraging mathematical modelling, AI and virtual reality

Robotics

Inter-connected robots to facilitate the automation of manufacturing processes, helping improve efficiency

Cyber security

Cyber security helps establish secured communication protocols to ensure data security

M2M

Machine-to-Machine involves the use of industrial instrumentation and sensors to record and communicate data directly with software.

Cost saving

- Reduction in production and maintenance costs
- Reduction in logistics and inventory costs
- Reduction in cycle time and time to market

KPIs to assess for business leaders while implementing I4.0 technologies

Value additions

- Increase in production output
- Increase in customer satisfaction
- Improvement in quality of products

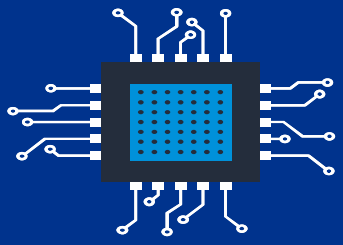
Breakthrough in these digital technologies, combined with dynamic business models, are fueling I4.0 globally, leading to the creation of ‘connected factories’.

The connected factory - powering digital manufacturing

With digitalisation, information flow within various factory systems can become seamless. This interplay of information technology with physical systems and operational technology — popularly known as IT / OT convergence — forms the key element of a ‘connected factory’. The “connected factory” phenomenon is backed by various I4.0 technology levers such as AR, IoT and big data.

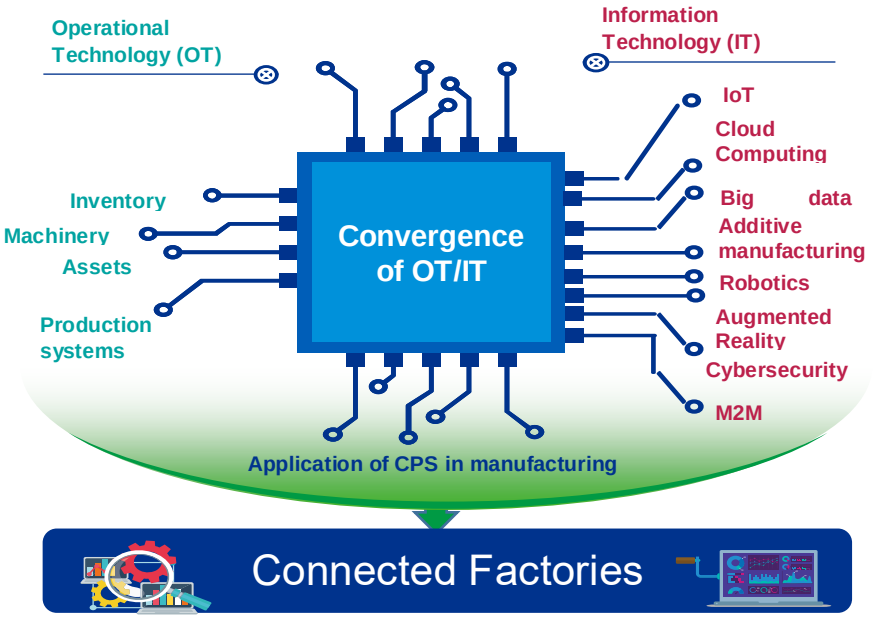
“Brilliant Factory”

In 2015, an American multinational conglomerate established a ‘Brilliant Factory’ in Pune with an investment of INR1,000 crore. The factory’s intelligent ecosystem comprises digitally inter-linked supply chains, distribution networks, and servicing units along with automation and 3D printing that enable the company to make real-time decisions to improve productivity and prevent downtime.



A traditional factory environment consists of sub-functions such as material procurement, manufacturing, product designing, production, and repair and maintenance — working in silos with minimal communication between them. With ‘connected factories’, this ecosystem is set to undergo transformation, as these silos become integrated into one large connected network. This makes it possible for the entire process to be seamlessly managed in real-time.

Figure 2: The application of CPS in manufacturing leads to ‘connected factories’



India getting ready for Industry 4.0

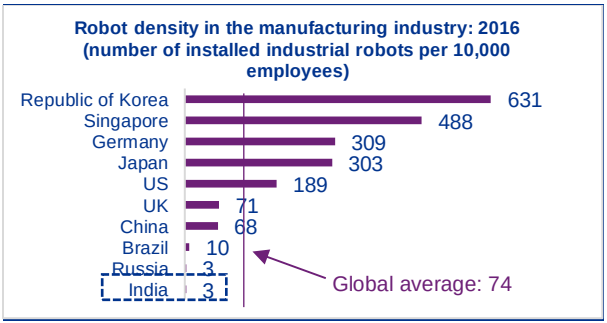
Current status of Industry 4.0 in India

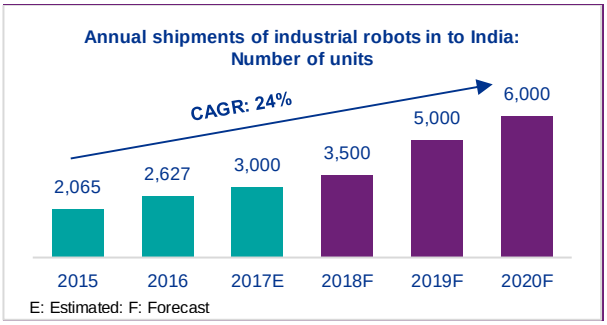
Globally, the I4.0 market is expected to reach INR 13,90,647 crore by 2023.[1] Countries such as the U.S., China, and Japan and European nations such as the U.K., Ireland, Sweden and Austria have all started adopting I4.0.

In India, the sixth-largest manufacturing country, the manufacturing sector forms an integral part of the country's long-term vision as seen by the government's strong focus on the 'Make in India' campaign. The government aims to augment the share of manufacturing in GDP to 25 per cent from the current 17 per cent, by 2022. A number of initiatives and policy reforms, such as implementation of the GST (Goods and Services Tax) and easing FDI policy, has been taken by the government.

Germany, the country that started looking at I4.0 adoption as early as 2010, launched 'Industrie 4.0', as a national strategic initiative to establish itself as a leading provider of advanced manufacturing solutions. It also identified a three-dimensional approach (Reference Architectural Model Industrie 4.0 or RAMI 4.0), to progress I4.0 in an organised manner. As part of this, the government provided education and resources to small and medium companies, and also signed MoUs to collaborate with countries such as China and Japan.

Figure 3: Current automation rate: Robots are still a rarity on Indian manufacturing shop floors[2]



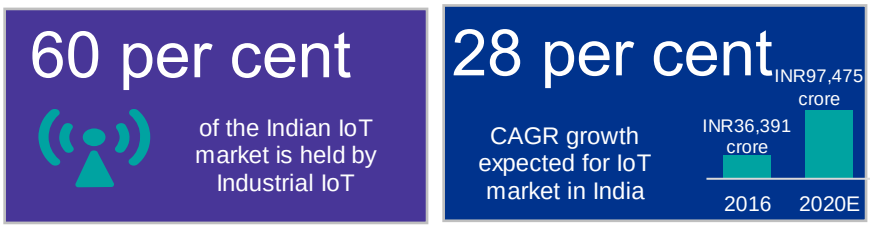


Given the task in hand, I4.0 presents a great opportunity for India to realise its manufacturing ambitions. At present, India lags its global peers in I4.0 adoption. A significant portion of the Indian manufacturing sector is still in the post-electrification phase with use of technology limited to systems that function independently of each other. The integration of physical systems on cyber platforms, the basic premise of I4.0, is still at its infancy. Furthermore, the Micro, Small & Medium Enterprises (MSME) segment has very little access to technology due to the high cost barrier.

That said, going by the progress that India is seeing in the two very critical enabling I4.0 technologies, IoT and big data, the country seems to be developing the right platform to base its 'smart factories'. India is expected to command nearly 20 per cent of the global IoT market, which is estimated to reach INR19,49,505 crore by 2020[3]. Furthermore, Industrial IoT, or the segment of the IoT market that particularly caters to the manufacturing sector, currently accounts for 60 per cent of the Indian IoT market.

[1] The global Industry 4.0 market will reach $214B by 2023, Businessinsider, 7 March 2018; converted at USD1=INR 64.9835
[2] Robot density rises globally, International Federation of Robotics, 7 February 2018; Executive Summary World Robotics 2017 Industrial Robots, International Federation of Robotics, accessed on 14 February 2018
[3] Top 5 Internet of Things (IoT) initiatives by Government of India, IOT India Magazine, 15 December 2016; converted at USD1= INR64.9835

The big data analytics market in India is currently valued at INR12,997 crore and is expected to grow at a CAGR of 26 percent reaching approximately INR1,03,974 crore by 2025, making India's share approximately 32 percent in the overall global market[4]



Sector impact

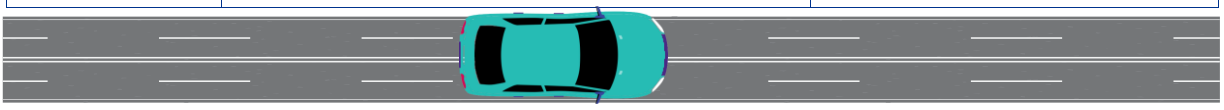
In India, digitalisation of physical objects in various industries is taking place at a slow pace, while the penetration level varies as per the sector needs. Sectors have started experimenting with the idea of connected factory at shop floors and assembly lines. To leverage technologies, some of these enterprises are testing / creating small scale solutions for I4.0. Nonetheless, capital-intensive industries that require high-skilled labourers, such as the automotive industry, are the ones who are pioneering the adoption.

Automotive: In the vanguard of Industry 4.0 adoption

The Indian automotive industry is at the forefront of adoption of key elements of Industry 4.0. Evolving technology, increase in the number of parts, growing competition and rise in labour issues have forced the Indian automotive players to adapt key components of Industry 4.0 such as robotics. The robot density of the Indian automotive industry is 58 robots per 10,000 employees, which is much higher as compared to the average of Indian manufacturing sector i.e., 3 robots per 10,000 employees[5]. Additionally, some of the automotive OEMs and auto component manufacturers are also using additive manufacturing / 3D printing, in their R&D centres to develop prototypes.

Figure 4: Some of the notable steps taken by the automotive manufacturers towards Industry 4.0 [6] [7] [8]

Technology	Examples	Benefit
Co-bots (collaborative robots)	One of the largest manufacturers of two-wheelers in India has installed co-bots at its plant to automate the assembly lines. Several processes such as material handling, welding, deburring, bolt tightening, sealant application and machine tending were collaboratively handled by co-bots and the plant employees.	This led to enhancement in productivity for the company i.e., production rose from 507 vehicles per person per year to 804 units per person per year, while maintaining the existing standards.
3D Printing	The largest two-wheeler manufacturer of India is using additive manufacturing for product designing of all two-wheeler parts for fitment and functional testing.	This has helped the company reduce its time to market.



[4] Big Data Analytics Market- Future Scope in India
[5] Study on emerging markets, with special focus on Asia, RockEU, 16 August 2016
[6] Bajaj Auto uses collaborative robots to enhance productivity, Autocar Professional, 19 August 2016
[7] Hero MotoCorp powers ahead with 3D printing, Economic Times, 18 February 2015
[8] Bajaj plants have 50% women workforce, Co-bots help increase production, Rushlane, 26 August 2016

Other sectors speeding up to adapt Industry 4.0[9] [10]

Textile

'Intelligent plant framework'

A Mumbai-based multinational company uses intelligent plant framework to connect all machines and examine the rate of work and efficiency. The framework allows to reduce the wastage and organise production flows.

Packaging

'Connected machines'

A Bengaluru-based packaging company has connected machines over a network that provides a monthly dashboard about the machines. It helps the company put predictive maintenance in place.

[9] GE bets big on India. Again., Live Mint, 17 June 2015
[10] Making connected factories a reality in India, Forbes India, 5 May 2017

Collaborative transformation

Going forward, I4.0 can transform the Indian manufacturing sector. However, this change would require collaborative effort from various key stakeholders, including the government and India Inc., in putting a viable ecosystem in place.

Role of the government — as facilitator

The role of the government as a facilitator is not only to extend support to the manufacturing sector, but also take reformative steps to encourage wider adoption of technologies. Taking cues from countries such as Germany, the government could propose a proper regulatory framework, develop competitiveness and form conducive policy environment for an enabling I4.0 ecosystem in the country. The government can also play a crucial role to encourage employment and bridge the skill gaps for successful implementation of I4.0. There is a heightened for the government in making sure that I4.0 is accessible to the MSME segment – the segment of India Inc. that comprises some 60 million enterprises and contributes to 45 per cent of the country's total manufacturing output[11].

Figure 5: Steps taken by the government of India to promote the adoption of Industry 4.0[12] [13] [14]

In 2015, the Indian government launched an IoT Policy that aimed at skill development, technological upgrades, and building IoT products specific to Indian demands, thereby occupying a considerable share in the global IoT market[15]. In addition, the government is formulating a National Policy for Advanced Manufacturing to enhance India's global manufacturing competitiveness[16]. The government has recently announced the launch of a mission on Cyber–Physical Systems (CPS) and allotted an initial corpus of INR100 crore for commencement.[17] Once fully implemented, these plans would be key tools to enhance the contribution of manufacturing output.

[11] Why budget SOPs will bring MSME sector some relief but not for long, Indi Today, 15 February, 2018
[12] Shaping the future of manufacturing in India, Live Mint, 11 July 2017
[13] Industry hails government's push on AI, Robotics, Business Standard, 1 February 2018
[14] Centre of Excellence (CoE) on IT for Industry 4.0, Press Information Bureau, Government of India, 5 May 2017
[15] Internet of Things, Ministry of Electronics and Information Technology, accessed on 16 February 2018
[16] Government formulating National Policy for Advanced Manufacturing, Economic Times, 22 December 2016
[17] Jaitley heralds cyber physical systems mission to create new jobs, The Hindu, 01 February 2018

Role of the India Inc. — as architect

One of the key strengths in favour of India's foray into the I4.0 era is the country's INR10,85,224 crore IT services industry.[18] India is one of the most sought-after IT outsourcing destinations in the world and houses some of the world's largest IT companies. India's IT expertise along with infrastructure can now be leveraged locally to catalyse I4.0 adoption in India.

The IT sector is expected to play a defining role in the I4.0 era. As a result of this, Indian IT companies are already on the look out to bolster their I4.0 capabilities through R&D in order to seize the latent opportunity. For instance, an IT major recently announced the setting up of a 'Factory of Future' lab in Bengaluru. The lab is reported to be working on new-age technology solutions to create a deep convergence of cyber and physical systems.[19]

Apart from this, Indian IT majors have also started exploring organisational tie-ups and collaborations to develop their I4.0 capabilities and offerings. Companies have started increasing their focus in partnering with companies from other sectors and countries to develop new IoT and M2M solutions relevant for I4.0. For instance, a Bengaluru-based IT major has announced collaboration with a Germany-based global leader in automation for an I4.0 cloud platform. In another development, another Indian IT major is looking to work with a major Japanese IT company in the area of smart factories.

[18] Indian IT to clock 7-9% growth in FY19, job creation to remain flat: Nasscom, The Economic Times, 20 February 2018; converted USD1=INR64.9835

[19] Smart manufacturing: With Factory of the Future Lab, Tech Mahindra places a futuristic bet, Financial express, 3 April 2017

Opportunities and Risks to consider in I4.0 adoption

Key challenges

Cost and technical issues

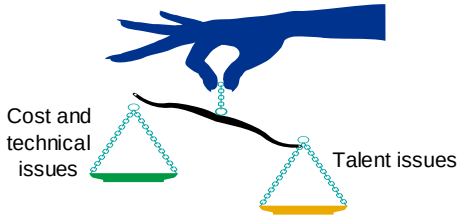
- **Lack of adequate infrastructure – physical and digital:** Despite continuous effort of the government, India still lacks basic infrastructure such as roads and electricity. Additionally, India's telecommunication network still suffers from low data speeds and unstable connection.
- **Cyber security:** According to KPMG in India's Cybercrime Survey Report 2017, 79 per cent of corporations in India have acknowledged cyber security as one of the top-five business risks. Apart from cyber security, the regulatory environment pertaining to data privacy would also need to be strengthened.
- **High cost of digital technologies:** Building the factory of the future having an entirely connected system could require significant capital outlay. Getting access to digital technologies for MSMEs, that forms the base of Indian manufacturing sector, remains a challenge due to the high cost of these technologies.

Skill and Talent issues

- **Leadership skill gap - Tradition Leadership versus Leadership 4.0:** India faces a lack of business leaders ready for the Industry 4.0 era, which could hinder the country's attempts for widespread adoption. Although, India Inc. has a strong traditional leadership, there are deficiencies of digital CXOs with a strong vision for Industry 4.0 adoption. The need of the hour is agile leadership and mitigating this challenge should be India's foremost priority. Although, most CXOs acknowledge the need for Industry 4.0, their execution capabilities are still untested.
- **Workforce skill gap:** India's current workforce lacks skill and expertise in new-age technologies such as data analytics, additive manufacturing and IoT. The government, industry and academia needs to collaborate to enable an Industry 4.0-ready workforce.

The right set of talent will be the key to success

The availability of adequate talent – both at a strategic leadership level as well as on the factory floor – can prove to be a significant challenge for India Inc. on its way to I4.0 maturity. Building leaders who can successfully navigate their organisations in the digital age and up-skilling the workforce will require significant planning, investment and collaboration from all stakeholders.

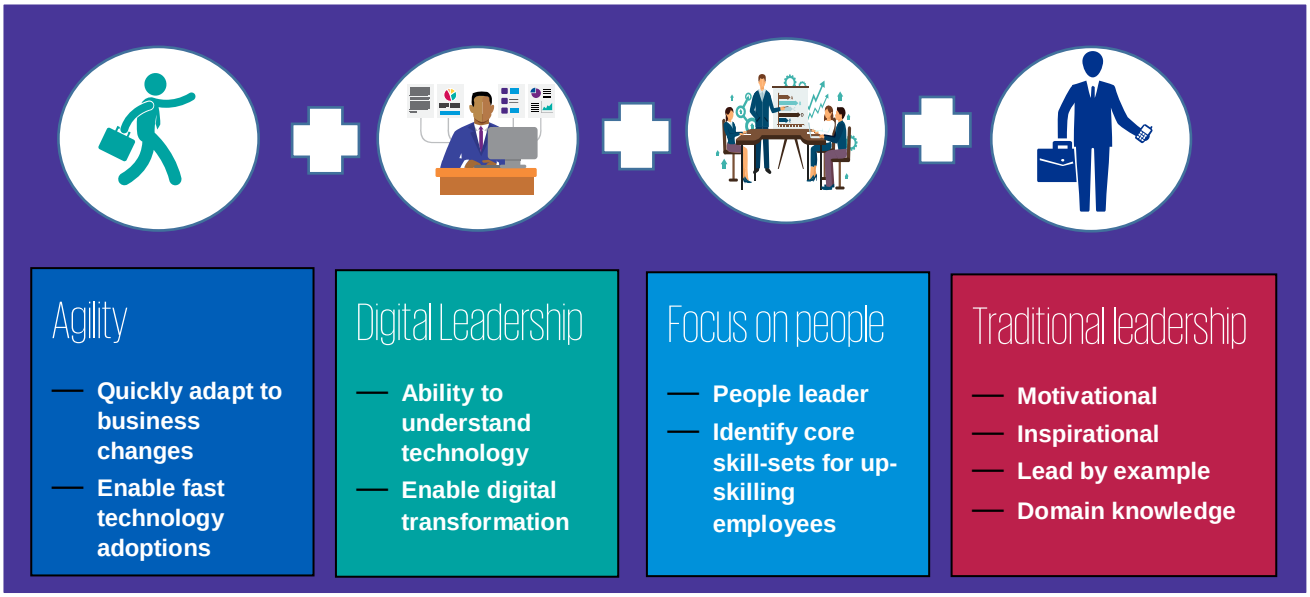


Re-engineering the talent pool for Industry 4.0

Leadership 4.0 — India needs 'digital' leaders

With the advent of I4.0, the traditional organisation structure incorporating human–human hierarchy is likely to be gradually replaced by functions where human and machines would interact at strategic and operational levels. The digitalised I4.0-ready India Inc., would therefore need to redefine leadership and build a new breed of leaders — Leadership 4.0. Such leaders will have to work with highly networked teams, operate at a fast-paced technology environment and work with cross hierarchical ecosystems. Most importantly, they will need to change traditional mindsets and manage that change skillfully across the organisation.

Figure 6: Essential skill sets required by Leadership 4.0



Although digital expertise and industrial domain knowledge would continue to be key ingredients for good leadership, leaders could also focus on acquiring relevant soft skills. With I4.0 automating most of the technical tasks, the focus could turn to soft skills for employees to be successful. Leadership roles also need to understand the new reality of human–machine interactions, and skills — like critical thinking, creativity, emotional intelligence, judgement and decision-making and cognitive flexibility — would be of paramount importance.

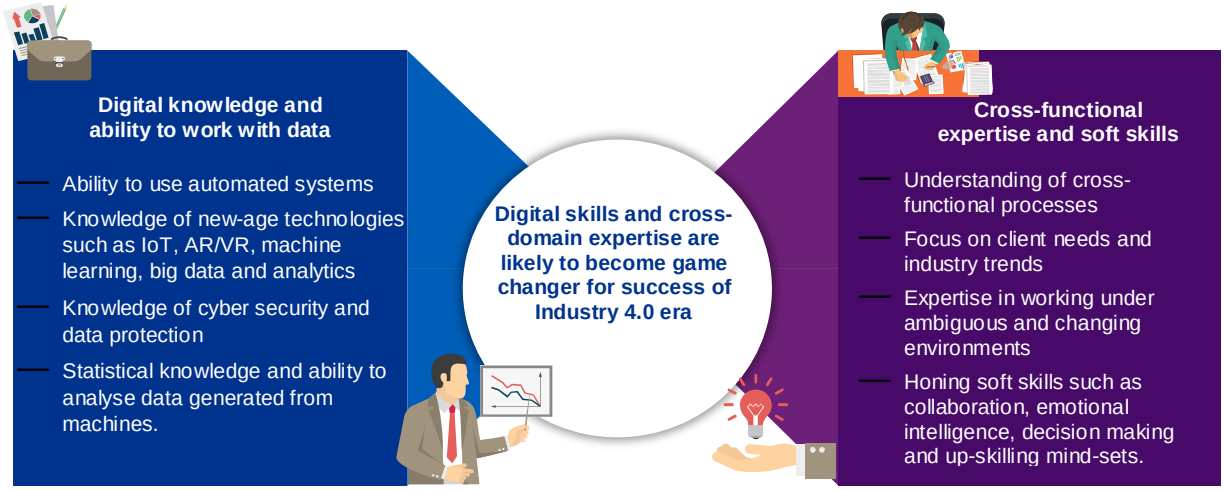
Building the next-gen workforce

In addition to competent leaders, a skilled workforce would form the key element for I4.0 adoption. The present-day workforce would need to be re-engineered to fill new roles arising due to I4.0. A next-gen worker needs to be digitally strong with a clear understanding of the domain.

Defining 'digital talent'

Apart from disruptive changes in production, I4.0 transformation reforms day-to-day tasks for employees. The main pillars of the talent shift are based on up-skilling ability, better leadership, L&D platforms and cross-function collaborations. Thus, a well-thought L&D strategy is as imperative as technological upgrades. In addition, the amount of repetitive manual work is going to reduce as employees focus on supervision of processes and other activities.

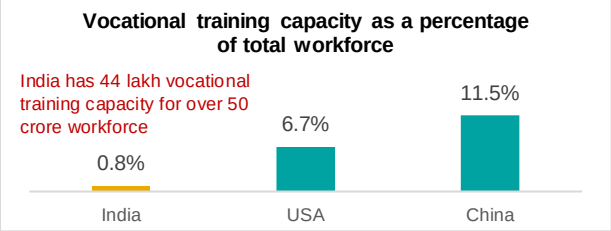
Figure 7: Skills required for the Industry 4.0 era

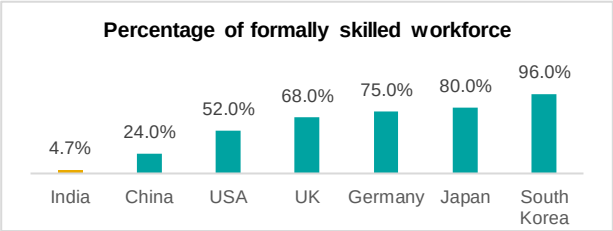


Up-skilling workforce

At present, India is struggling with low vocational training capacity and low percentage of formally skilled workforce. The quality and employability of engineers have also been questioned. With the onset of I4.0, the country would need to develop a robust training infrastructure to ensure up-skilling of its existing workforce.

Figure 8: Lack of skills to pose significant challenges for Industry 4.0 adoption in India [20, 21, 22]





[20] Skilling for the Future, Business Today, 8 November 2016
[21] High targets and wasted funds: The problems with the Skill India programme, Scroll.in, 26 July 2017
[22] Labor force, total, World Bank data, accessed on 14 February 2018

10

crore manufacturing jobs have been targeted to be created by 2022. India's labour force needs to be up-skilled to meet the demand–supply skill gap.

Repetitive jobs could go away and the workforce would need to up-skill to be ready for higher valuing adding tasks: Radical modifications in business models caused by the adoption of I4.0 is likely to leave a deep impression on the employment landscape over the next few years. Automation could replace 'low-skilled' and repetitive jobs, leading to redundancies in the workforce unless suitably upskilled to handle tasks in the I4.0 era. Furthermore, I4.0 is also likely to demand new skills to do the same tasks more efficiently in a connected factory environment.

I4.0 could create new jobs with demand for new skills: India Inc., is likely to create a number of new roles, but lack of I4.0-ready skilled labour force could make companies less competitive. These new roles are likely to be supervisory, managerial and cross-functional in nature, demanding diverse skill-sets. Hence, up-skilling in the I4.0 era is essential for a country like India which has a workforce of 50 crore. It needs to address the concerns of demand–skill gap and nullify the impact of automation on the employment scenario. Several domains, such as cognitive, robotics, advanced automation, Industrial IoT etc. will need to be developed and this will require collaborative efforts from the government, industry, academia and individuals alike.

Joint action needed to up-skill India[23]

I4.0 is likely to create widespread disruptions in the labour market. The key stakeholders — the government, industry and academy institutions — have to come together to re-think the way education system functions and encourage re-skilling in order to make employees competitive. The stakeholders need to change the skill map and take remedial actions to accommodate fast-paced technology trends. While I4.0 promises significant potential to maximise output, it does pose operational challenges which would call for pre-emptive actions by businesses, governments and employees.

[23] NSDC to review target of skilling 150 mn Indians by 2022, make it more 'realistic', LiveMint, 15 May 2017

Role of government, industry and academia in up-skilling the country

Government

- Take job creation initiatives like 'Make in India' which is expected to create 10 crore jobs by 2022
- Involve the private sector in PPP models to conduct I4.0 relevant training
- Launch mass skilling initiatives like 'Skill India', which aims to skill about 40 crore Indians by 2022
- Create proper infrastructure and develop innovation centres and test labs
- Provide supportive policies and adequate financing for skill development
- Promote practical and industry-oriented training
- Improve the quality of academic institutions and vocational training

Industry

- Create and define new roles for I4.0, which would be mostly managerial in nature
- Provide re-skilling opportunities by identifying a core set of industry-relevant skills and delivering them to employees
- Provide cross-function exposure to employees for them to learn outside their own disciplines
- Establish Leadership 4.0, which fosters a culture of up-skilling through various forums
- Participate actively in PPP initiatives and take up vocational training with the government
- Undertake and invest in R&D for I4.0 technologies

Academia

- Enhance quality of teachers and modernise learning infrastructure
- Align course curricula in tandem with I4.0 requirements, with well-regulated and industry-relevant updated content
- Focus more on practical, result-oriented knowledge, over theoretical content
- Promote a culture of research in upcoming areas like I4.0 and act as the testbeds for innovation and new learning
- Participate actively in the development of MOOCs (Massive Open Online Courses)
- Collaborate with industry players, e.g., a Bengaluru-based reputed academic institution is setting up a 'smart factory' in collaboration with a global aerospace major

Supported by industry bodies, state governments and other innovation platforms

Case study of a skill development platform by an MNC

Company: A German manufacturing conglomerate

L&D initiative: The company signed an MoU to set up four I4.0 CoEs across Karnataka in India, looking at diverse sectors like automotive, industrial automation, renewable energy and A&D. It aims to create an integrated skill development platform with benchmarked technical education curriculum, focussing on I4.0, automation, mechatronics and Internet of Things (IOT) infrastructure. The association targets to skill students on appropriate industry processes.

Way forward[24]

Road map for Industry 4.0 in India

Demand and volume growth, driven by consumerism trend in India, would create jobs, which is expected to offset some of the job losses due to I4.0

India is on the cusp of digital transformation in the medical device industry as it can help in adopting the evolving regulatory needs and designing patient specific devices.

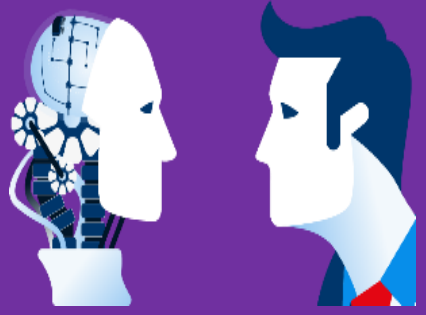
Taking a first step, the country has announced the establishment of a 3D printing facility for medical devices in Vizag

Government can focus on improving the ease of doing business and attracting FDI investments in the space through policy reforms

Collaboration between countries, corporations as well as academia would catalyse I4.0 adoption

Points to consider for CXOs

- Have a long-term strategic vision to lead an organisational transformation in the I4.0 era
- Focus on talent retention and re-skilling; enable timely up-skilling of workforce, relevant to I4.0 trends
- Foster a culture of innovation and trust in the organisation; provide a conducive environment for humans and bots to work together
- Focus on strengthening organisational data privacy and cybersecurity protocols, as threats may arise due to connected ecosystem.



[24] AMTZ, think3D announce $6M medical devices 3D printing facility in India

Recommendations

Government

01 As Enabler

- Encourage, promote and support original research aimed at developing technologies in emerging areas
- Mandate an industry-oriented curriculum in state-driven education boards at a graduation level
- Bolster the vocational training infrastructure in partnership with the private sector and include elements of I4.0 in vocational training

02 As Facilitator

- Set up a dedicated wing in the Industry Ministry to oversee and promote Industry 4.0 adoption
- Establish a network of 'testlabs' that will work with enterprises, industry bodies, government, academia, labour organisations, and the wider community to advance I4.0. Also connect with similar labs and I4.0 initiatives worldwide

03 As Policy-maker

- Provide financial incentives and aid for MSMEs – e.g. tax breaks, subsidies – to make I4.0 affordable to them
- Continue push with initiatives such as Smart cites, Digital India and Make in India
- Improve telecommunications infrastructure to ensure seamless IoT implementation
- Formulate adequate cybersecurity policies
- Encourage FDI and improve ease of doing business

Industry

The industry, particularly the large and multinational manufacturing companies, will adopt 4.0 if they see returns on investment.

01 As Adopter (Manufacturing sector)

- Include MSMEs in their supply chain
- Embrace disruption in business model
- Invest in Leadership 4.0

02 As Supplier (Technology sector)

- Invest in research on I4.0 technologies and innovation to improve output quality
- Continue developing verticalised technology solutions for industry 4.0

Industry associations

Industry associations could take a lead in I4.0 adoption in India.

Overall, widespread adoption of I4.0 would require collaborative efforts of industry associations. These associations can take initiatives to identify technological developments, find infrastructure and political needs, assess impact on sectors and plan a workforce up-skilling road map. The associations could also work closely with the government to facilitate faster adoption of I4.0 in India.

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AIMA makes a salutary contribution to management learning and practice in the country by offering various services in the areas of testing, distance education, research, training & consultancy, publications and management development programmes.

AIMA brings to the Indian managers, the best management practices and techniques through numerous foreign collaborations with professional bodies and institutions. AIMA is a member of the Asian Association of Management Organisations (AAMO) and works closely with several international management institutions like Robert H Smith School of Business at the University of Maryland, St Gallen Foundation etc. in organising international conferences and management development programmes.

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