The Rise of Robotics and Its Collision with the Workforce

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Will your company survive the workforce disruption triggered by the rise of the robot, powered by a new wave of artificial intelligence? The so-called Fourth Industrial Revolution (4IR) is upon us, and it’s the advent of robotics that promises to reshape global manufacturing as we know it. For corporate leaders, however, deploying robots may prove both a boon and a burden.

The advent of artificial intelligence, computer vision, navigation, MEMS sensor, and semiconductor technologies will drive innovation in the design and deployment of industrial robots in ways never before seen. It’s an exciting moment for manufacturers that are under constant pressure to optimize production to remain competitive. But it also carries some risk.

For the past 30 years, companies shifted manufacturing to low-cost labor markets like China, Vietnam, Bangladesh, and Indonesia, in order to better manage the bottom line. More recently, however, wage inflation, a shortage of skilled workers, labor disputes, and an aging population are giving companies cause to contemplate a wholesale shift from human to robot labor.

Job loss anywhere is a politically charged topic, and nowhere more than in the U.S., where lawmakers point the finger at low-cost labor markets, blaming them for the erosion of U.S. manufacturing. There’s no doubt that jobs have moved off-shore in recent decades, but robots, so it appears, are somewhat to blame. A recent M.I.T. and Boston University joint research report indicates that more than 670,000 US jobs have been lost, not overseas, but due to robots displacing human labor.¹ The trend is now set to accelerate, with advances across the board in robotics, computer processing, and artificial intelligence.

From large countries at the forefront of robot economic integration – such as China, Japan, Korea, the U.S., and Germany – to smaller markets such as Italy and Thailand, the effects of the robot revolution are already quite visible.

Today, Asia-Pacific is the fastest growing robotics market globally, led in large part by the intensity of manufacturing in China, Korea, and Japan. According to the latest IDC Worldwide Commercial Robotics Spending Guide, the region makes up over two-thirds of worldwide spend on robotics technologies and related services, and this is forecast to swell to more than 70% by 2020.
China’s World Robot Domination

Further evidence of the strength of the region is found in IDC’s 2016 Manufacturing Insights Survey. Over 44% of the Asia-Pacific manufacturing companies interviewed plan to adopt robotics by 2018, an amazing increase of 70% in a period of just two years.²

At a country level, China emerged as the global leader in industrial robot use beginning in 2013, and has maintained its lead ever since. The government’s "Made in China 2025" strategic initiative identified automation as a key national priority and placed robotics research, production, and adoption as a top industrial priority.³ China’s annual spend on robotics and related services is projected to hit a staggering US$59.4 billion by 2020, more than double 2016’s approximate spend of US$24.6 billion. As a result, China is on track to represent nearly half of Asia-Pacific’s estimated US$133 billion spend on robotics and related services by 2020.⁴

While China’s economic prowess can be largely attributed to its manufacturing strength in the last quarter century, its competitive edge is now at risk, due in large part to escalating labor costs. In the last 10 years, average annual wages have increased at a compound annual growth of 12%, significantly outstripping GDP and productivity growth over the same period.

² IDC, Asia/Pacific Manufacturing Insights Survey, 2016

³ The government’s "Made in China 2025" strategic initiative

⁴ "Asia-Pacific robotics adoption in manufacturing", IDC, 2016

⁵ "Projected worldwide spending on robotics in 2020", IDC, 2016

At the heart of wage inflation is a shortage of skilled labor. In a country of nearly 1.4 billion people, it’s hard to imagine, but it’s true. In some ways, the government’s one-child policy proved more effective than anticipated. As a result, the labor force is in a state of imbalance, with older workers retiring, and younger workers fleeing manufacturing for more preferable and higher paying white-collar jobs. In the key manufacturing centers of Guangdong and Shanghai, the situation is dire. As a result, for some manufacturers, the only choice is a shift to greater automation, robotics, and early stage artificial intelligence.

While estimations vary, if we assume that one robot is capable of replacing five to six human workers and that China will lose one million workers every year going forward, the country will need to add 160,000 to 200,000 multipurpose industrial robots each year just to maintain its current labor participation rate. Factor in automation upgrades, new-generation robotics, and standard depreciation, and the number per annum will likely run closer to 250,000 to 275,000 new robots per year.

The automotive industry has been a forerunner in robotics. In the early 1960s, General Motors installed its first so-called “Unimate” robots in its New Jersey manufacturing facility. The rest is history. The automotive industry remains the largest single industrial segment with a reliance on robots.

Robot “density” is a commonly used indicator in the industrial sector. And accordingly, China’s automotive industry leads the pack with a density of 392 robots per 10,000 employees in 2015, compared to a density of just 24 robots for the country’s composite manufacturing sector. This is about to change with scores of other manufacturing sub-sectors now snapping up industrial robotics solutions to augment and automate material management, core warehousing, logistics and assembly.
So, with this proliferation of ubiquitous automation, robotics, and artificial intelligence, how should the organization respond? There are strategic, technical, operational and people issues that will require careful consideration and planning. Perhaps it is just for this reason that we are beginning to see the emergence of the Chief Robotics Officer (CRO). While the scope and responsibilities of the CRO will necessarily vary from industry-to-industry, one thing is clear, integration of the role of robotics in an organization from manufacturing front-end to data management and delivery back-end, will be key.

Some lead areas of responsibility are likely to include:

- Synthesizing elements of key competencies now held by the Chief Information Officer (CIO), the Chief Operations Officer (COO), and the Chief Human Resources Officer (CHRO).

- Leadership and coordination in establishing and planning the organization’s robotics workforce, making key decisions regarding the acquisition of technology, aligned with internal research and development, and the spearheading of integration of the robotics workforce with human workers.

- Establishment of a strategy for the recruitment and retention of talent, focusing on the right mix of robotics design, development, implementation, and maintenance.

- Implementation of enterprise-wide robotics initiatives; including (but not limited to) the exploration of how combined robotics and artificial intelligence initiatives might be deployed to reduce cost, improve efficiency, accelerate development, and reduce errors.

### IDC Worldwide Robotics Top 10 Predictions

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<td>Robot as a Service</td>
<td>By 2019, 30% of Commercial Robotic Applications Will Be in the Form of a “Robot as a Service” Business Model, Reducing Costs for Robot Deployment</td>
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<td>Chief Robotics Officer</td>
<td>By 2019, 30% of Leading Organizations Will Implement a Chief Robotics Officer Role and/or Define a Robotics-Specific Function Within the Business</td>
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<td>3</td>
<td>Evolving Competitive Landscape</td>
<td>By 2020, Companies Will Have a Greater Choice of Vendors as New Players Enter the US$80-Billion ICT Market to Support Robotics Deployment</td>
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<td>4</td>
<td>Robotics Talent Crunch</td>
<td>By 2020, Robotics Growth Will Accelerate the Talent Race, Leaving 35% of Robotics-Related Jobs Vacant While the Average Salary Increases by at Least 50%</td>
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<td>5</td>
<td>Robotics Will Face Regulation</td>
<td>By 2010, the Government Will Begin Implementing Robotics-specific Regulations to Preserve Jobs and to Address Concerns of Security, Safety, and Privacy</td>
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<td>6</td>
<td>Software Defined Robot</td>
<td>By 2020, 60% of Robots Will Depend on Cloud-Based Software to Define New Skills, AI Capabilities, and Application Programs, Leading to the Formation of a Robotics Cloud Marketplace</td>
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<td>7</td>
<td>Collaborative Robot</td>
<td>By 2018, 30% of All New Robotic Deployments Will Be Smart Collaborative Robots That Operate These Times Faster Than Today’s Robots and Are Safe for Work Around Humans</td>
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<td>8</td>
<td>Intelligent RoboNet</td>
<td>By 2020, 40% of Commercial Robots Will Become Connected to a Mesh of Shared Intelligence, Resulting in 200% Improvement in Overall Robotic Operational Efficiency</td>
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<td>9</td>
<td>Growth Outside Factory</td>
<td>By 2018, 35% of Leading Organizations in Logistics, Health, Utilities, and Resources Will Explore the Use of Robots to Automate Operations</td>
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<td>10</td>
<td>Robotics for Ecommerce</td>
<td>By 2016, 45% of the 200 Leading Global eCommerce and Omni-Channel Commerce Companies Will Deploy Robotics Systems in Their Order Fulfillment Warehousing and Delivery Operations</td>
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Astonishing technological developments in artificial intelligence, computer vision, navigation, MEMS sensor, and semiconductor technologies will continue to drive robotic innovation, elevating the capability, performance, autonomy, ease of use, and cost-effectiveness of industrial and service robots. Indeed, robotics is—and will remain—a central force in transforming our global industrial complex.

As is true in so many businesses today, disruption is inevitable. And while much of the focus is on the highly-charged issues of job security, the benefits of robotics in the design, development, and output of new products and services holds promise of delivering to our manufacturing base improvements in operational agility, responsiveness, and improved customer experience.

Successful adoption of robotics as part of an organization’s strategic charter will require some careful consideration and hard questions. Among them:

- Does your organization’s workforce have the right skillset and operational knowledge to deploy robotics systems, transform organizational thinking, and define a long-term robotics strategy?

- Can you identify the talent gaps that likely exist in multiple layers across the organization, from the ground-level engineers who manage and maintain the daily operations of robots, through technology, research and development, and ultimately to senior leaders such as the CIO, COO, CHRO, or eventually the CRO?

- Is your organization ready to evaluate the relevancy and need for a CRO? Will you be ready to introduce a CRO into your organization? And in doing so, will the existing C-Suite adapt accordingly in order to effectively empower the CRO?

- As use of robotics evolves from core manufacturing to other service-based industries, will executives be ready to contend with many of the people-related issues that are bound to emerge as a result?

- How will organizations new to robotics, inform and equip themselves to effectively recruit talent to bridge the gap between traditional and automated produce or service delivery?

- And how will traditionally heavy-use robotics manufacturing organizations, such as the automotive industry, respond to the inevitability of losing top talent to other sectors as they follow suit and deploy their own robotics solutions?
While the rate of robotics adoption will vary across markets and sectors, one point is certain: The tension inherent in the supply and demand of robotics talent will pose a challenge to both pioneers and laggards in the robotics evolution.

For early adopters, investment in recruiting, training and developing new talent capable of guiding and incorporating robotics into an organization will prove critical. Once recruited, holding onto key talent could prove even more difficult. As has been the case with data scientists and their role in the emergence of big data and analytics, so will the retention of robotics design and engineering talent be of central importance to the changes set to take place in manufacturing. Balancing these investments with efforts to retrain, reskill, and redeploy employees who’ve been displaced, will require leaders to assume a level of finesse and diplomacy, sufficient to navigate the politics and lawsuits oftentimes associated with this level of structural change.

While it is the manufacturing sector that will be the first to grapple with these key innovations, in addition to people transformation issues, the service sector should not rest on its laurels. Just as vending machines displaced soda stands some 50 years ago, don’t be surprised if, in the not-too-distant future, you find your latte handed to you by a robot in an apron.

2. IDC Manufacturing Insights Survey 2016
3. Ministry of Industry and Information Technology on “Made in China 2025”
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