

Fourth Industrial Revolution

(focus on IT and Manufacturing industry etc)

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1. World Economic Forum 2016 Annual Meeting in Davos focused on the Fourth Industrial Revolution. It includes the new generation of technological advances – sensors, robotics, artificial intelligence, 3D printing, and precision medicine.

2. Industrial Revolutions history and future:

1784: Steam, Water, And Mechanical Production Equipment

1870: Division of Labor, Electricity, and Mass Production

1969: Electronics, IT, Automated production

2020: Possibilities in Cyber Physical systems

3. The skills you need to thrive in the Fourth Industrial Revolution:

Five years from now, i.e. by 2020, over one-third of skills (35%) that are considered important in today's workforce will have changed. Emotional intelligence will become one of the top skills needed by all. Advanced robotics and autonomous transport, artificial intelligence and machine learning, advanced materials, biotechnology and genomics will become important. Creativity will become one of the top three skills workers will need.

Leaders at the World Economic Forum, thus spoke

@ A New Climate For Doing Business:

"Diversity is the engine of invention. It generates creativity that enriches the world"

- Justin Trudeau, Prime Minister of Canada

@ The Transformation of Tomorrow:

"The fourth Industrial revolution should be a revolution of values"

- Amira Yahyaoui, Founder , AI Bawsala

@ The Digital Transformation of Industries:

"You can always go faster than you think you can..."

- Meg Whitman, President, Hewlett Packard Enterprise

@ Time for a new way of assessing global progress?

"GDP is not a good measure of economic performance, it is not a good measure of well-being"

- Joseph Stiglitz, Economist

"Economic growth does not mean anything unless it is inclusive growth..."

- John Green, Author and Blogger

"The opportunity to raise the quality of life is the biggest business opportunity..."

- Paul Kagame, president of the republic of Rwanda

"Speed is the new currency of business..."

- Marc R Benioff, Chairman, Salesforce

"Our current economic model is inequality by design..."
- Sharan Burrow, General Secretary, ITUC

@ The Transformation of Finance:

"The biggest impediment to a company's future success is its past success..."
- Dan Schulman, CEO, PayPal Inc

"Digital is the main reason just over half of the companies on fortune 500 have disappeared since 2000..."
- Pierre Nanterme, CEO Accenture

4. Five ways to prepare for the Fourth Industrial Revolution:

- a. First, we need universal access to affordable education and job training. There's going to be a constant requirement for workers to retool and retrain for the very jobs they possess, The jobs they possess, particularly in areas of IT, advanced manufacturing, healthcare and energy, are going to need lifelong education. And this education and training is not only the obligation of our governments, it's also the responsibility and opportunity for our businesses
- b. Secondly, we need to continue to ensure basic protection for workers as these changes take place. I mean a living wage, payment of overtime, childcare, sick leave, and the right to unionize, to collectively bargain. Another change in the corporate culture is the way companies invest their profit.
- c. Third, we have to modernize our infrastructure. Governments have fundamental responsibilities to build roads, bridges, railways, ports, broadband. And all of this can have profound impact on economic growth, generating well-paying jobs and bringing opportunity to areas where it does not exist.
- d. Fourth: we need a more progressive tax code. Not confiscatory policy, not socialism, but everybody should pay proportionately a fair share. The Oxfam report made a lot of headlines. It pointed out that 62 of the wealthiest people in the world have as much wealth as the poorest 3.6 billion people in the world. You may not like hearing it, but keeping billions of dollars in offshore tax havens might be good for your shareholders, but it robs your home country. So bring it back.
- e. Lastly, we need to expand access to capital.

5. Challenges, which have been identified:

- a. IT security issues, which are greatly, aggravated by the inherent need to open up those previously, closed production shops.
- b. Reliability and stability needed for critical machine-to-machine communication (M2M), including very short and stable latency times.
- c. Need to maintain the integrity of production processes. Need to avoid any IT snags; those would cause expensive production outages.
- d. Need to protect industrial knowhow (contained also in the control files for the industrial automation gear).
- e. Lack of adequate skill-sets to expedite the march towards fourth industrial revolution.

- f. Threat of redundancy of the corporate IT department.
- g. General reluctance to change by stakeholders.

6. Big Data Analytics consists of 6Cs in the integrated Industry and Cyber Physical Systems environment. 6C system that is consists of:

- 1. Connection (sensor and networks)
- 2. Cloud (computing and data on demand)
- 3. Cyber (model & memory)
- 4. Content/context (meaning and correlation)
- 5. Community (sharing & collaboration)
- 6. Customization (personalization and value)

7. VINT research report includes following:

- a. Information Technology and Operational Technology, with the Internet providing the core structure.
“Operational Technology (OT) is hardware and software that detects or causes a change through the direct monitoring and/or control of physical devices, processes and events in the enterprise. A new production paradigm is arising with the advent of cyber-physical Internet-based systems to offer innovative capacities that can benefit industry and other economic sectors. The leading paradigm is m2m: machine-to-machine communication, not only between machines in factories but also between all conceivable devices and systems.
- b. IT-ready machines: machines equipped with sensors that measure their functioning then communicate this in normal human language to ERP systems and to technical and administrative personnel. This kind of m2m communication and the corresponding HMIS (Human-Machine Interfaces) form the basis of how the so-called “Smart Factory” can work in heavy industry.
- c. An m2m system makes use of sensors and meters to communicate “events” – ranging from temperature, via a communications network (fixed, wireless or hybrid), to application software that converts the raw data into meaningful information. Maintenance and upgrades, preferably in the ultimate form of Predictive Maintenance, bring extra reliability and speed to numerous appliances. . With engagement, or customer interaction, we can share, via all kinds of domestic appliances – refrigerators, toothbrushes, televisions, and vacuum cleaners – user data in order to create new value and to shape service provisioning. The most optimistic view of the value that the industrial Internet of Things (IoT) can deliver to the manufacturing industry comes from Cisco.

8. Summary and conclusion:

- a. The Internet of Things plays a crucial role in this development. As a matchmaker between information technology (IT) and operational technology (OT). The marriage between IT and OT must be more than just a marriage of convenience. To enable the IT-OT fusion to succeed, a change of mindset is the first requirement. The IT staff, too, will have to exit their comfort zone. They will have to move away from their business dashboards with the quarterly figures and out onto the factory floor, into the outdoor workplace or the living room of the consumer: to the places where the action takes place and a difference can be made in perception, registration and speed, and the quality of the decision-making. The greatest common

denominator for these digital transformations is the connection of hardware, software and services to data and digital content. Meaningful smart solutions can then be built with the use of advanced analytics.

- b. Look at the operation through telecom eyes: The telecom sector actively promotes bridging time and distance by means of machine protocols (m2m). For which activities in your organization do you have no operational data (as yet), and how could sensors that deliver data be integrated into it systems? How could modern it devices such as iPad's, smartphones and wearable add value for the consumer and/or the professional when coupled to these operational systems?
- c. Configure a new IT-OT sector: It is essential to add IT-OT knowledge to the curriculum in order to realize acceleration in the new area of application. a combination of motion studies from wearable computers and analytics. Of course, we already know masters in human-machine communication, telematics, mechatronics and embedded systems engineering, among other things. A digital machine and human behavioral science in which themes such as design thinking, cyber security, privacy, consumer psychology and labor all converge, taking in the energy efficiency of embedded systems and, of course, lean production and processes.

To continue knowledge sharing please write to dileep.bhatnagar@gmail.com