VIEW POINT

RESILIENCE FOR TOMORROW'S WORLD – A PERSPECTIVE

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COVID-19 has brought forth the importance of digital readiness, which is vital for business continuity during pandemics. Building the necessary infrastructure to support a digitized world and stay current in the latest technology will be essential for any business or country to remain competitive in a post-COVID-19 world.

COVID19 pandemic is the ultimate bellwether for digital transformation and will be an impetus to several major trends that were already well underway before the pandemic.

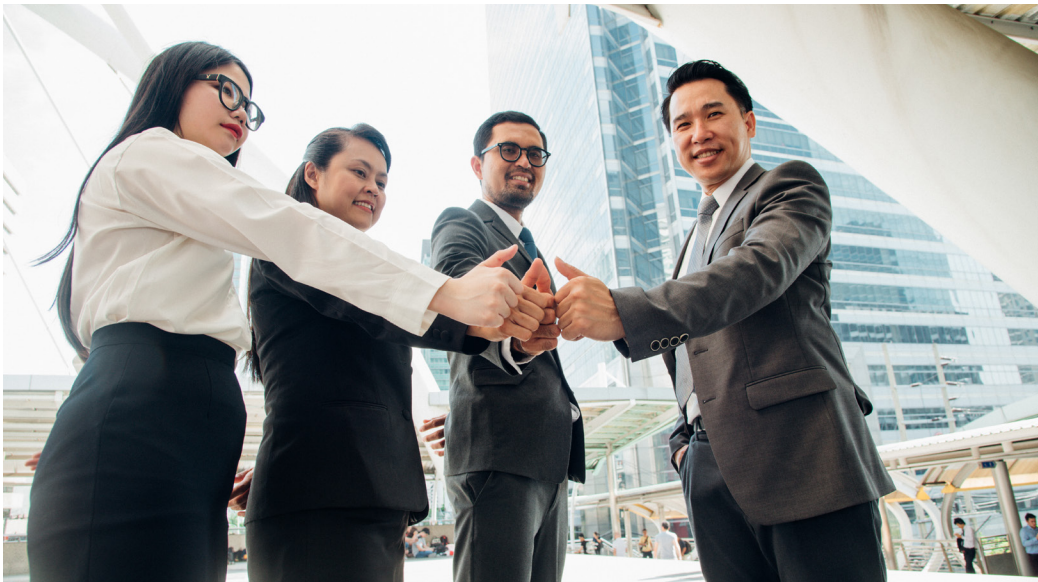
The following technologies stand to bloom in a post COVID19 world

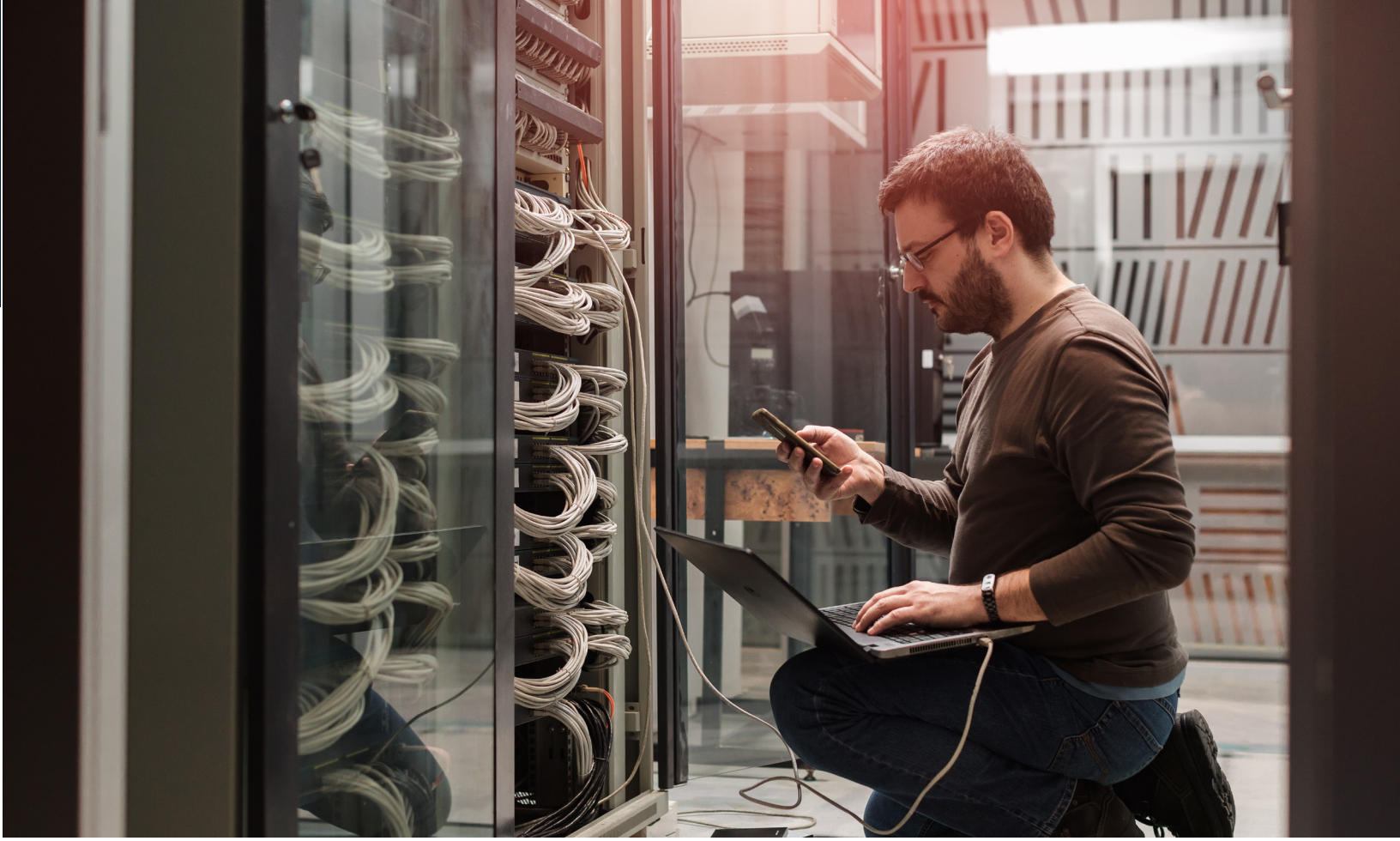
IoT: Smartification of cities, homes and business establishments are demanding newer solutions, applications/appliances and infrastructure. Smart homes are transforming into smart communities and clusters, where buildings and systems can exchange information intelligently and seamlessly. This is likely to see a resurgence of localized hybrid networks. It's even possible that the public Internet and the Web may be supplanted by community Internet and Web. Communities across the world are fatigued by information overdose. They would prefer to focus on issues and solutions important and relevant to their own locales and neighbourhood. At first sight, there seem to be no infrastructure resilience consequences. But the need for managing hypercomplex civil and urban infrastructure, will significantly increase the demand for instant breakdown impact management and recovery. From a security standpoint, this is even more critical, as failure of smart buildings and complexes can open up attack gateways hitherto unanticipated and unplanned for. It's very likely continuity and recovery frameworks of the future will have 'smart' as a prefix for all scoped items and probably for the very concept of continuity planning in itself.

5G & Edge Computing: The impending explosion of 5G and 'intelligence at the edge' will soon demand analytics and actioning capabilities at end points as opposed to reaching the hub. Mobile and IoT devices are producing humongous volumes of transient data – data that needs instant scanning, analysis and actioning thereof. Thus, the traditional paradigm of data as in store, access, move, use, purge is also being redefined in a fundamental way. Ephemeral/transient data will be an equal reality alongside more permanent forms of data and information. From an availability standpoint, manufacturers of edge devices are grappling with the complexities of managing enormous transient data loads as much as the need for assuring data integrity before analytics-driven actions can be auto-triggered. This leads to yet another dimension of security as in device functional integrity for, a functionally compromised device can have much more serious consequences than those from data integrity alone. In the Hi-tech and Manufacturing sectors, IoT/IoE is moving beyond traditional monitoring and probing functions. Active action and intervention by IoT devices, in real time, is already becoming pervasive. Intelligent, purpose-built drones offer new functional capabilities in large industries such as Oil and Mining. Again, the escalated security stakes cannot be overemphasized. Attacks on industrial technology infrastructure, including IoT/IoE are a painful reality even today.

I 5.0: Industry 4.0 is well under way and already paving the way for Industry 5.0. The line of control between humans and machine may blur. Future Man-Machine interactions will be increasingly closer. But herein lies the possibility of hybrid intelligent automation. Industry 4.0 is seeing the rapid integration of cyber, physical and IoT/IoE enabled devices. Industry 5.0 will bring back closer human-machine interactions in unprecedented ways. The counter-intuitive benefit from Industry 5.0 would be the ability of an experienced production floor executive or machinist catching potential manufacturing glitches by way of instant insights provided to him/her through an array of sensor-driven insight engines.

Nano Technologies: The rise of Nanotechnology has greatly contributed to major advances in computing and electronics, leading to faster, smaller, and more portable systems that can manage and store larger and larger amounts of information. These continuously evolving applications like transistors which reduced in size from 150nm in 2014 to 3nm today. Magnetic random-access memory (MRAM), computers will be able to "boot" almost instantly. MRAM is enabled by nanometer-scale magnetic tunnel junctions. Flexible, bendable, foldable, rollable, and stretchable electronics are reaching into various sectors and are being integrated into a variety of products, including wearables, medical applications, aerospace applications, and the Internet of Things. Flexible electronics have been developed using semiconductor nanomembranes for applications in smartphone and e-reader displays. Making flat, flexible, lightweight, non-brittle, highly efficient electronics opens the door to countless smart products.





This technological advancement is shaping the future by harmonizing human and intelligent machine capabilities and behaviour leading to these important trends.

1. **Authenticity/Visibility/De-Risking and Resiliency in Supply Chain:**
   A pivotal moment for supply/value chain and logistics. The recent pandemic has exposed the vulnerability of dependence on air cargo even as the shipping industry needs rapid overhauling of ships themselves. Rapid and dynamic rerouting of freight enroute has been done traditionally, however the hyperconnected world will open up ever more possibilities by way of intelligent, self-governed supply chains and shipping mechanisms. In a way Supply Chain 4.0 and Logistics 4.0 may see a quick and silent upgrade to Industry 5.0 where operations can be managed best with the right levels of human-machine interfacing and collaborative decision making in real time. COVID-19 crisis has shown a general lack of connectivity and data exchange built into our global supply chains. Future resiliency will depend on building transparent, inter-operable and connective networks. If there were any lingering doubts over the value of blockchain platforms to improve the transparency of businesses that depend on the seamless integration of disparate networks, COVID-19 has all but wiped them away. We need to approach this healthcare crisis as an important learning curve and focus on building transparent, inter-operable and connective networks.

2. **Future of Manufacturing:**
   Manufacturing facilities of the future may look completely different from those that have existed since the beginning of the Industrial Revolution. Traditional approaches to building solutions and IT infrastructure may no longer work. Again, asset relocation and write-offs may also see significant financial and legal remodelling. In a revealing study of the emerging fundamental shift in manufacturing facility design, Nina Rappaport highlights the rise of vertical urban factory and the imminent advent of collocated and multi-tenant manufacturing hubs and communities, where core hi-tech automation, robotics and AI platforms and services are available and leveraged securely by multiple manufacturers. The new colocation and shared manufacturing services approach is paving the way for newer synergies between manufacturers with complementary products, and possibly give rise to new, collaboratively engineered and designed products of the future. Co-located and multi-tenant manufacturing facilities are as yet a new, emerging paradigm, nevertheless, the need for impact and breakdown isolation of shared infrastructure cannot be overemphasized. Modularized approaches to containing failure impact must be baked into the core engineering and build phases of multi-tenant hubs, aside from the ever-present imperative of life and safety.

3. **Customer Centricity:** There is an aggressive push by the market toward hyper localized products and service offerings. In that sense, glocal approaches are having to scale up for hyper localization and hyper customization. When seen in the context of the manufacturing sector, agility and speed of production to consumption will have to scale up by orders of magnitude. This would evidently up the stake for accelerating smart manufacturing practices. The 'build for purpose' paradigm is rapidly getting supplanted by the new 'build for a specific customer/ community' paradigm and Industry 4.0 aims to herald this shift in a big way. The shift will transform the way factories manufacture as much as the products themselves, as in the production of 'smart' products and appliances. Retail goods, FMCG and CPG segments are leading the way and it is a matter of time before core manufacturing embraces the game changing approaches. Furthermore, the end consumer/ user and the community will be one of the primary drivers of inputs into engineering and design. Heightened eco-sensitivity may turn the clock back away from a consumption market to a market driven by prudence, longevity of use and the need for products that are enduring. Hyper localization, at the same time, multiplies the demands on enterprise solutions, logistics, transport and infrastructure.

COVID-19 has not only changed the way we work but also changed the way we live - the way we communicate and spend time with our family and friends, the way we communicate to the devices/machines, the way we experience the entertainment. COVID has not only accelerated the technology adoption at work but also by the common people in their day to day life. It has made the work-life balance into work-life integration. This article, "Resilience for tomorrow's world - A perspective" by Anoop Girotra has captured this digital acceleration and it's impact on our work and life very nicely covering the broad technology spectrum and it's possibilities from silicon to the seamless, secured, customer-centric economy. It's very informative and a quick read which will make your eyebrows raise.

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Anoop Girotra is an accomplished, customer-focused Global Business Leader managing large portfolio in Infosys Hi-Tech vertical. He is a trusted partner to C-level leadership of many business organizations. He is a sales leader with 20 years' of experience in business development, P&L management and client satisfaction. Possesses solid business and communication acumen with proven success in managing customer engagement. You can reach out to Anoop at Anoop_girotra@infosys.com

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