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Trickle down technology

> *2020s could be
> the India decade*

While the farmers' agitation in New Delhi has caught the headlines of the global press, that is just the political angle. One thing that is not political and pervasive is technology. Tech has the power to transform the life of each and every citizen—from the top of the pyramid to the very bottom. The Liberalization of 1991 transformed industry, the stock market and many areas like telecom. The Y2K transformed IT services and the 2000s also saw the rise of Big Pharma in India.

Post-2014 we have seen many advances in power augmentation and electrification, LPG connections, road making and the like. But despite India being a predominantly farming community, little progress has been made in the field of agriculture. Among all the countries of the world, AgriTech has the biggest unrealized potential in India. It could be argued that little happened after the Green Revolution of the 1960s. The 2020s should now be the decade of a tech powered Green Revolution.

It's time to focus on the farmer, the small trader and the owner of the small enterprise or manufacturing unit. The mobile and the IoT device has already put technology in the hands of everyone. Everyone has access to the cloud no matter what device they own. There was a time when you needed the most expensive of IT equipment to go truly digital. Now the playing field has been leveled thanks to the human race wielding billions of devices connected to millions of data centers. Democratization of technology is the new mantra.

The Covid year is behind us and we have entered the post-Covid era. Technological acceleration or techceleration has already taken place. It's not that Covid has brought us to a Brave New World which we didn't think was coming. Rather we knew it was coming and Covid merely accelerated that.

The West is in decline. China has seen a slowing of domestic demand, an ageing population and a world suspicious of its intentions thanks to the Covid crisis. It is India's decade if it so chooses. But for that to happen, technology will play a huge role. That technology will have to percolate right down to the masses and not stay in elite hands.

The government. The industry. The citizens. App developers. Product developers. R&D professionals. Startup founders. Everyone will have to step up for us to achieve our $5 trillion dollar economy goal on our way to becoming a fully developed country maybe by the end of this decade itself. Let's begin by fully empowering our farmers with the use of technology so that they can streamline their efforts and maximize their output to get integrated fully into this Brave New World.

Sunil Rajguru

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AGRITECH INNOVATIONS WILL BE KEY TO FARMER UPLIFT

The agritech space in India is seeing healthy tailwinds due to government impetus on affordable innovations improving farmers' incomes, and on widespread digitalization drives across the agricultural value chain

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Agriculture is the primary source of livelihood for about half of India's population, but the majority of the farmers still live on the edge of extreme uncertainty. The average agricultural land holding size also continues to shrink, making it difficult to generate sufficient household income. Farmers in India are still heavily dependent on rainfed agriculture, which makes them highly exposed to climate variabilities. Besides adverse weather conditions, stiff competition from larger landowners,

a limited access to markets, agritech services, and financing solutions, price fluctuations, debt pressure and crop failure, post-harvest losses due to inefficient supply chain, etc. make these smallholder farmers a vulnerable section of the population- so much so that farmer suicides account for more than 10% of all suicides in India.

Factors hurting Indian agriculture

Although India is among the top producers of several crops globally and the production of food grains has been increasing every year. Agriculture contributes around 20% of the country's GDP.

However, the agricultural yield (quantity of a crop produced per unit of land) is still lower in the case of most crops, as compared to other top producing countries such as China, Brazil, and the US. There is a clear lack of infrastructure in place across the agricultural value chain.

Among the issues that hurt the India's agricultural productivity are shrinking agricultural land holdings, heavy dependence on the monsoon, insufficient access to irrigation, soil sickness due to imbalanced application of soil nutrients, uneven access to modern technology across the agricultural value chain, rising post-harvest losses, lack of access to formal agricultural credit, limited procurement of food grains by government agencies, and failure to provide remunerative prices to farmers, etc.

Considering the condition of these small and marginal farmers in mind, the government has realigned its interventions from production-centric approach to farmers' income-centric initiatives, with focus on better and new technological solutions.

Tech transforming agriculture and uplifting farmers

By plugging in the existing inefficiencies in the agricultural value chain, digitalization and smart technologies like AI/ML, IoT, Remote Sensing, Farm and Data Analytics, Aerial Image-based Analytics, Robotics, Automation, Blockchain, etc. can prove to be an enabler, and can create a win-win scenario for all the stakeholders in the agricultural value chain.

Sangeeta Bavi, Director, Startup Ecosystem, Microsoft India said, "Data-driven agriculture is the need of the hour to scale sustainable food production. Data is key in removing the information asymmetry and guesswork out of farming. Especially with climate change playing havoc with predictable weather patterns, smallholder farmers need data-backed insights that are relevant to them. Advance information on weather patterns can help farmers take

necessary precautions in mitigating adverse impact on crop yield." The need for data is not just limited to precision farming techniques. There are strong use cases of enhancing supply chain efficiency and simplifying market linkages too.

In a country where dryland agriculture occupies 68% of the cultivated area supporting 40% of the population, Genomics can play an important role in growing crops in arid lands and reduce the import burden significantly. Delhi University's Centre for Genetic Manipulation of Crop Plants has been using 'Omics' approach to understand factors affecting high yield of the crops across various species. It is using Lenovo DCG's HPC-based Genomics Optimization and Scalability Tool, GOAST which can process 1 whole genome in 5.5 hours, compared to 48 hours earlier and 1 exome in 4 minutes. Paritosh Kumar, Scientist, CGMCP said, "The latest genome sequencing techniques produce very large amounts of data, which requires enormous compute and memory capacity to handle large-scale processing and analysis. It will help us to breed more nutritious, more drought and disease-tolerant, high-yield plants to feed the world."

Extending the cellular Narrowband Internet of Things (NB-IoT) protocol for satellite communications for maximum affordability, Skylo brings real-time, affordable, and ubiquitous IoT connectivity to millions of machines, sensors, and devices, even in the most remote places on Earth. By enabling equipment owners to connect and share their heavy-duty machinery, Skylo helps to make the access to farming equipment affordable, and helps farmers to increase their productivity in turn.

To help the marginal farmers facing water scarcity, a mobile phone-based irrigation advisory called Provision of Advisory for Necessary Irrigation or 'PANI' was piloted in Uttar Pradesh in collaboration with the World Bank, the University of Washington, IIT Kanpur, Kritsnam Technologies and GeoKno. The field-specific ground information captured by the sensors helped improve farmers' crop productivity and water usage.

Considering the rising labor costs and a shortage of labor in mind, students of Lovely Professional University (LPU) School of Agriculture have conceptualized and designed 'Flying Farmer', an affordable drone designed to solve two major agricultural issues faced by farmers – pesticide treatment and weed detection and can be exclusively deployed in farming and field survey. It estimates the nutrient content of the soil to aid production growth and reduce crop damage. The University will not file for a patent but instead, will open source the technology so that it can be inexpensively

available to any farmer, anywhere.

Lack of transparency, credit histories, and hassles relating to contract enforcement are limiting financial inclusion among smallholder farmers. Ashish Anand, CEO, Whrrl said, "Agriculture is the one little-explored sector that blockchain has the potential to revolutionize. With transparency and shared control accessibility blockchain could bring fairness to agriculture finance. It enhances farm to fork traceability by facilitating information about the crop origin as well as the details of the producers. Blockchain also provides updated demand and supplier information to farmers allowing them to define their prices and sell accordingly in overseas markets."

Skymet, supported by Caspian Debt is scaling its digital platform to provide solutions for filling the gap between financial institutions and farmers. The platform can compute Farm Credit Score using farmers financial health, repayment capacity and cropping history making it easy for the financial institutions to underwrite loans for the farmers and can simultaneously inform the farmer regarding the credit limit. Skymet is already working with SBI/HDFC/ICICI banks in Madhya Pradesh and with District Credit Co-operative Bank of Sangli in Maharashtra disbursement of Kisan Credit Card loans/other

farmers loans within a short period of time.

"Modern farming is full of opportunities, and it addresses multiple alarming issues like saving the environment, providing employment, helping marginal farmers, cultivation of nutritional food and so on," said Rajshri Mishra, Co-Founder, NIRJA which aims to redefine agriculture via Hydroponic Farming- a method of growing plants in a soilless farming solution without the limitations of space and with complete control over the growing climate, making it more efficient and ecological than traditional methods of growing crops and plants. NIRJA introduced Hydroponic farming among the marginalised farmers in some drought-prone areas of Bundelkhand.

"India has a very ambitious target of doubling farmer's income by 2022. With 85% of farmers being small landowners owning less than 2 acres of land, farm diversification is a very effective way of increasing revenue for farmers. The Ready to Implement Micro farms can be started with very little space and investment and is not very labour intensive to implement. As the investment and space requirement is low, more smallholder farmers take this up in addition to the existing activities." said Prasanna Manogaran, Co-Founder, Aqgromalin, which aims to help farmers diversify their portfolios into

the animal husbandry and aquaculture segment with Ready to Implement Micro farms.

👆 *(Read more such Agritech innovations on page 16-22)*

Agritech adoption and investments: India vs. Global

One of the effective indicators in understanding the adoption of any new technology in any sector, is the 'Quantum of Investments / Deals' that flow into these technologies and sectors, said Prabhakar Puranik, Head of Engineering- Advance Technology Solutions, Robert Bosch Engineering & Business Solutions. "While adoption rate may not be directly proportional to the investments that flow in, we can get a sense of proportionality for Smart Technologies adoption in Agriculture by comparing such investment inflows in 2020 in India vis-à-vis other geographies. Research reports reveal that India Ranks third in adopting Smart Technologies in Agriculture (investments of about $1.5Bn+) next only to USA and China (which, combined attract an investment of about $18Bn). While across the globe, there was an uptick of 30%-50% in adoption rate in 2020; India in fact saw an adoption rate upwards of 70% in 2020," explained he.

"Another way of looking at the technology adoption is by differentiating the Agriculture Value Chain broadly into two buckets, 'Farm Related (Farm to Market)' and 'Market Related (Market to Fork)'. We can see that in advanced countries the adoption of smart technologies in both these areas Agriculture is almost equal (50:50). However, in India, it is in the 30:70 ratio," said Puranik.

Agritech startups: A great enabler across Agriculture value chain

Startups have remained at the forefront of India's Agritech revolution, with over 650+ Agritech firms in the ecosystem including various think tanks, research labs, government, incubators and accelerators. Startups engaged in helping farmers, enabling financing for them and enhancing farm mechanization have been attracting significant interest and funding from top investors. A report by Maple Capital Advisors forecasts that the investments from venture capital firms in agritech startups are expected to exceed $500 million (around Rs 3,730 crore) in the next two years. India's agritech sector attracted about $245 million in investments from venture capital firms in 2019. The 'Supply chain tech and output market linkage' segment has emerged as the top funded segment, followed by the 'Precision agriculture and farm management' segment, says an analysis of the top deals by EY, which is, however, in sharp contrast to the global Agritech investment scenario. Globally the latter one leads the charge in terms of funding as well as the number of startups.

The next frontier of growth for Agritech:

Agritech market opportunity is spread across multiple segments- while the supply chain tech and output market linkage remains the top funded segment, financial services, precision agriculture and farm management, and quality management and traceability could script the next leg of growth in India's agritech story. As the agritech scene matures, we will see further consolidation of the startups across the segments and a rise of the diversified solution providers.

Favorable policies and a strong R&D support for the affordable technology innovations and adoption is also essential to drive the adoption of technologies across the agricultural value chain. Easy and simplified access to finance, farming advisory, robust internet connectivity, affordable technology solutions and mechanization options are also essential for the upliftment of the farmers. The agritech growth can be accelerated by building a robust ecosystem of multiple stakeholders of the agricultural value chain including technology providers, R&D institutions and the government.

"The lack of awareness and knowledge is also a major concern. The youth should be made aware of and armed with agricultural technology because the young generation is already using technology and is interested in it. They're interested in the traditional business of agriculture and grow in a tech-enabled way. So, the youth should be empowered to use technology as they are our future," suggested Sanjay Borkar and Santosh Shinde, Co-Founders, FarmERP.

Nikhil Das, Founder, Agdhi

The traditional method of detecting seed defects typically relies on manual inspection, grow-out tests (GOT) which is subjective, time consuming, labour intensive and involves higher costs. With SeedVision we have brought an AI-based seed phenotyping method which is a game changer in agriculture. Agdhi through ML, Computer Vision, Photometry and Radiometry offers efficient methods for seed classification and seed quality analysis in seconds. Additionally, Agdhi has also built one stop solution 'FarmerConnect' for all the farming needs. This farmer's community aims to strengthen the network and build new connections. FarmerConnect allows anyone to start with farming with state of the art technology and provides direction that has experience and knowledge. The company is also planning to launch a platform 'Planto' to identify the plant diseases with images of leaves and stem along with the suggestions and remedial actions.

Angira Agrawal, COO, Skylo

Skylo brings real-time, affordable, and ubiquitous IoT connectivity to millions of machines, sensors, and devices, even in the most remote places on Earth. This allows farmers to optimize operations by sending and receiving real-time data about growing conditions such as air temperature, moisture level or soil pH. The data can inform watering schedules, fertilizer needs, and growth cycles, resulting in lower energy costs, less water usage, and healthier crops. We also support emerging business models for equipment sharing- "tractor sharing," for instance. By enabling equipment owners to connect and share their heavy-duty machinery, Skylo helps to make the access to farming equipment affordable, and helps farmers to increase their productivity in turn. Extending the cellular Narrowband Internet of Things (NB-IoT) protocol for satellite communications for maximum affordability, Skylo's solution has become disruptively affordable- costing 95% less than traditional satellite connectivity.

Harsh Agrawal & Nikita Tiwari, Co-Founders, NEERx

NEERx has worked with ISRO and designed smart sensor for hydrology and land application named "SHOOL". It collects crucial soil and crop health parameters such as water and nutrient movement at multi depth, salinity, rain, heat stresses, local weather and crop progress. SHOOL Cloud data is modeled with crop phenological statistical models and AI-ML based algorithms to generate curated reports from sowing to harvest. The actionable insights help manage soil-water balance calendar, nutrient application schedule and crop growth metrics at micro as well as governance level. SHOOL has provided alternative to costly foreign based solutions whereby the cost to consumer is considerably less than most of its foreign and Indian counterparts. Determined by crop type, land topology and region, the sensors are planted in the field and the data gathered is displayed on a mobile app.

Mallikarjun Kukunuri, CEO, Niruthi

Niruthi provides farm-level insights needed by farmers, input and commodity markets, financial institutions, insurance companies and government agencies. By bringing together data from different sources such as satellites, weather

stations, drones, and Internet of Things (IoT) as well as farm-level data collection through CropSnap mobile apps—to one single data technology platform, it can provide a model of climate-risks and forecast crop yields. Niruthi monitors and manages risk at the farm level using an array of tools and technologies for integrating data to turn mobile images into geolocated information about cropping patterns, crop condition, and crop yields. Our technology reduces the cost of field surveys because we use a smart sampling technique utilizing wall-to-wall satellite data which reduces the number of samples required for accurate estimation of area and yield and hence reduce the cost of conducting the sampling itself.

Sandeep Karnati, Co-Founder & CTO, KIOT Innovations

IoT solutions can be of a great help to the farmers, as it can add various sensors and communication modules within the farming process. Companies these days are trying to develop affordable sensors that help understand the soil's behavior, alerting the farmer only when a particular 'nutrient' is required at a specific time. The image processing technology is another IoT technology that can be used for analyzing acres on land within minutes. Understanding the fact the internet is the most common issue faced in rural areas, IoT devices these days can be operated without the internet. Communication mediums such as LoRa (Long Range wireless radio-frequency), sensors deployed with mesh protocol with a central gateway and other communication mediums help act as a substitute for the internet. Especially with mesh protocol, you can connect various farms or crops within one gateway.

K. Sri Harsha, Founder, Kritsnam

Kritsnam Technologies is a company in the field of IoT with focus on cost-effective and data-driven water resource management solutions and empower farmers with precision irrigation. Indian agriculture dominated by marginal farmers is suffering a significant productivity loss due to changing and unpredictable weather conditions, and irregularity in water supply. We develop IoT-based instruments that can monitor water quantity and quality in real time. Using these technologies, we started building applications in the field of irrigation management both on the farmers' side and also on the irrigation departments' side. Using the satellite data from NASA and weather forecasts, we also built a Provision of Advisory for Necessary Irrigation or 'PANI' in collaboration with the World Bank, the university of Washington, IIT Kanpur, Kritsnam technologies and GeoKno. the field-specific ground information captured by the sensors helped improve farmers' crop productivity and water usage.

Sanjay Borkar & Santosh Shinde, Co-Founders, FarmERP

Data-driven agriculture and agribusiness is a future for almost all stakeholders in Agriculture. Smart agriculture helps in mapping and tracing the entire process, from pre-sowing to harvesting, procurement, and sales, to traceability. Using the latest technology like AI, ML, IoT will improve productivity and make agriculture cost-efficient too. It could also help mitigate climate risks making agriculture more predictable and sustainable. When the number of people using smart technologies in agriculture will increase, the cost will go down and the adoption rate will increase. We have been promoting digital, smart and data-driven farming through our smart and innovative technology offerings - FarmERP and FarmGYAN. The smart and comprehensive multi-lingual agriculture

management platform has been widely used globally for farm, farmer, procurement, processing, supply chain and financial data management and analysis.

■ ■ ■ ■

Om Routray, VP- Marketing, SourceTrace

SourceTrace is a global leader in providing digital solutions to agriculture and food businesses. We enable full visibility into the agricultural and food value chain, with touch points across every stage – from farm to retail. Our SaaS solution and agri value chain management software make farming sustainable, supply chains efficient and bring transparency and traceability into food trade across 32 countries. We work with agri-importers or a cooperative which is working with a large base of farmers and help them monitor the farm and make an estimate of the crop yield by digitizing all the data in a farmer profile, by geo tagging his farm, putting his historical record, soil test report, etc. We also help them in carrying out farmer training programs. All of these solutions are high demand in international markets but we are also seeing a gradual rise in domestic markets too.

■ ■ ■ ■

Sandeep Raju, Co-Founder & Board Member, Samaaru India

Like with all adopters of technology, we see farmers who are enthusiastic early adopters as well as those who are conservative followers. This hinges on the business case for a farmer – adoption is high wherever we can establish a strong correlation with productivity and quality which in turn leads to higher incomes. We have a long track record in applying deep handholding models with our farmers and are ramping up the use of precision farming techniques as well as data-driven agriculture. From our experience, thanks

to smartphone penetration, a substantial number of farmers are indeed tech-savvy in the context of their professional and personal needs. We prefer a blended approach with a combination of hi-touch and hi-tech – our partner network has a key role to play in supporting our farmers via an assisted tech model.

■ ■ ■ ■

Taranjeet Singh Bhamra, Founder & CEO, AgNext

To solve the problem of quality, accelerate transactions, and build trust in every intersection between the buyer and the seller, AgNext has created Qualix for rapid commodity assessment solutions across the food and agri value chains. It's like an MRI for food with the ability to do instant on-field analysis for the Grains and Spices in less than 30 seconds. Qualix analyses every aspect of food i.e. physical, chemical, and ambient using computer vision, spectroscopy, and IoT-based technologies for food quality monitoring. With the right technology in place, farmers can obtain accurate prices for their produce and greater incentive to improve their farm practices for better quality crops. For businesses, this technology helps save money and increase profitability, because now they know what they're paying for. Finally, for consumers, we ensure quality by accurately ascertaining whether there are adulterants or not.

■ ■ ■ ■

Rajendra Lora & Chandrakanta Sahu, Co-Founders, FreshoKartz

FreshoKartz aims to integrate farms, farmers, vendors, traders, and customers on a common platform. Apart from subscription-based soil data-based crop and fertiliser recommendations, Freshokartz sells and delivers agri inputs, quality seeds through its distribution centers and even to farmers' doorsteps. It even provides services such as

agri-machineries, farmers' loans through its partner network. Once the crop is ready, we have a network of 100-plus buyers who are buying through our network comprising around 1,25,000 farmers in the state of Rajasthan. On the basis of the farm-level data and estimate on crop yields, we can connect buyers with the farmers before harvesting. Through the overall process FreshoKartz claims to help farmers to save at least 20-30% on the input cost, or by increasing the yield by proper usage of agri inputs and the advisory services.

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Anilkumar SG, Founder & CEO, Samunnati

Today, there is increasing awareness in the farming community regarding IoT-enabled sensors, modern soil and water management systems, digital tools, such as precision tools, apps, AI, digital platforms providing market linkage and information flow, etc. However, there is a clear need to bring together all the stakeholders in the agri ecosystem on a single, unified platform. To empower farmers to reap the benefits of digitalisation, we announced Agri Elevate, a first-of-its-kind ecosystem platform offering services across the value chain to FPOs and Agri-Enterprises. It can be considered a dedicated search engine for agricultural services which helps FPOs and Agri-Enterprises to identify and gainfully engage with each other, nationally as well as regionally. The platform also offers a content repository which helps the stakeholders stay up to date on the latest developments in the agri ecosystem, so they can improve their businesses.

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Sateesh Nakula, Co-Founder & CEO, BigHaat

Small and medium farmers need high quality inputs and advisory to reduce their cultivation cost, improve yield and earn better profitability. BigHaat offers a holistic experience to the farmers throughout the crop lifecycle by offering them with a highly personalized and data-led crop advisory in regional languages for better produce and higher profits. It has a built-in social media platform for

farmers to learn and share the knowledge, connect with fellow farmers and experts. By simply uploading a diseased plant picture, farmers can access our Crop Doctor feature for instant diagnosis and guidance. We are the first startup offering to provide plot level advisory to farmers by integrating with satellite remote sensing data, AI, ML and Cognitive Intelligence. We provide the advisory free of cost. We earn on each transaction on our platform from the vendors / suppliers.

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Sandeep Sabharwal, CEO, SLCM Group

An enormous amount of food grains gets wasted due to archaic procurement, storage, and inefficient warehousing methods every year. Scientific Warehousing is the need of the hour and is one solution that can address the problem of wastage during storage to a large extent. Sohan Lal Commodity Management (SLCM) is a leading Agri-warehousing company has developed a patent-pending algorithm named "AGRI REACH" that combines a series of processes, audits, and real-time tracking of the facilities to give error-free results and deplete the risk of crop damage. It uses techniques like geo-fencing to real-time tracking, bar-coded storage receipts to avoid thefts/ pilferage, internal audits along with "Maker and Checker" policy at each level. We have also taken a lead towards paperless QC by developing an AI-based mobile app to assess crop quality within a minute with up to 90 per cent accuracy.

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Yogesh Patil, CEO, Skymet

Skymet is scaling its existing digital platform to provide solutions for filling the gap between financial institutions and farmers. The idea behind this digital platform involves developing an application for

farmers that provides farmers services involving crop recommendation, agro-advisory services and informs the farmer regarding the credit limit. Our AI based platform provides a holistic solution that increases farmers' adaptive capacity to climate associated risks. The platform can compute Farm Credit Score using farmers financial health, repayment capacity and cropping history for the financial institutions for underwriting loans for the farmers. Use of remote sensing, Geo-tagging/fencing and overlaying cadastral maps over land records helps in land and crop identification, crop acreage and yield forecast. This will help detect false declarations of land ownership and crop type and unlock the potential of small and marginal farmers' across the agri-value chain.

Anuj Sharma, Director, Earth Analytics India

Earth Analytics India is making use of drone and satellite data for mitigating risks in agriculture and infrastructure and for better farm advisory services. In the monsoon season, cloud cover over major areas doesn't permit the use of optical satellite images. But unlike the Optical satellite imagery, Synthetic Aperture Radar (SAR) can overcome cloud coverage. Specialized in analyzing radar-based remote sensing data, Earth Analytics India is helping insurers and government stakeholders and farming aggregators to have a regular transparency about the crops grown. Our Crop Monitor product informs stakeholders about anomalies in the season such as floods or droughts, indicates the status of water and provides an overview of the main crop type pattern in the selected geographies. The technology can be used for crop identification, crop planting area statistics, soil analysis, crop yield estimations as well.

Prateep Basu, Co-Founder & CEO, SatSure

SatSure's platform enables combining satellite imagery with weather, social and economic datasets, and uses the power of IoT, ML, analytics to generate timely, location specific actionable insights. We are providing SaaS solutions to the financial sector and public sector, assessing the underlying risk of the agriculture assets they chose, and monitoring that risk remotely over the entire lifecycle of their assets. These insights are made available to them to help them take decisions on how much to lend to some person, the claim validation, or for providing farming advisory, and weather forecasts to the farmers, thus helping in establishing a better connection between the financial service providers and the farmers they are lending to. The lenders can connect to our platform and see the crops that have been grown, monitor the farming conditions, etc.

Ashish Anand, CEO, Whrrl

Lack of transparency, credit histories, and hassles relating to contract enforcement are limiting financial inclusion among smallholder farmers. With transparency and shared control accessibility blockchain could bring fairness to the agriculture finance. Combining the benefits of IoT with Blockchain and Smart Contracts, Whrrl is solving the recurring banking frauds issue in warehouse receipt finance vertical while simultaneously enabling digital lending in priority sector post-harvest financing to farmers/FPOs/traders. Farmers don't need to undergo paperwork also as they can apply for loans from our Anndhan mobile app, which helps to reduce the loan disbursal time from 10-12 days to a few minutes/hours. They can select the lender of their choice where they get more benefits from low interest rate, transparency, etc. Even warehouse service providers get benefited

by reduced paperwork and improved operation efficiency.

■■■■

Sunoor Kaul, Co-Founder & Director, Origo Commodities

Origo Commodities focusing on commodity supply chain and trade finance has comprehensive solutions for procurement, quality grading and certification, professional and scientific storage, preservation technology and structured financing to farmers, processors and traders through our warehousing network and banking partnerships. It has become the largest service provider to the government with its warehousing capability and network, and is also spearheading a technological transformation in agri supply chain financing through its flagship agri-trade finance platform, TradeFi. It has a unique product basket comprising both, customised end-to-end commodity management solutions as well as independent service offers. We have recently executed a Pass-Through Certificate (PTC) transaction that creates a new asset class of securitized commodities. For the first time in the country, institutional investors will have access to SEBI listed instruments financing agri commodities in WDRA (Warehousing Development and Regulatory Authority) accredited warehouses.

■■■■

Prasanna Manogaran, Co-Founder, Aqgromalin

India has a very ambitious target of doubling farmer's income by 2022. With 85% of farmers being small landowners owning less than 2 acres of land, farm diversification is a very effective way of increasing revenue for farmers. We aim to help farmers diversify their portfolios into the animal husbandry and aquaculture with our Ready to Implement Micro farms which can be started with very little space and investment. It is not very labour intensive and reduces farm idle-time also. Aqgromalin provides a multilingual app based platform called AQAI for farmers to procure live input materials. The platform, with a growing user base, provides rich data analytics to understand grower patterns and recommend micro-farm products to match with market demand. Aqgromalin also develops IoT solutions to improve efficiency in brooding, hatching, and nursing techniques across Animal husbandry and Aquaculture.

■■■■

Vivek Sharma, MD- India, Lenovo DCG

Genome sequencing through our Genomics Optimization And Scalability Tool (GOAST) has the potential to significantly accelerate research that could revolutionise food security and sustainable agriculture through successful plant breeding, including food protection and eliminating the rate of disease outbreaks by understanding the core issues of plant virology. We are now able to decode one whole plant genome in a mere 5.5 hours, compared to the previous industry average of 48 hours. This has enabled researchers to get faster insights and breed high-yielding crops that can withstand harsh weather conditions. Handling the scale and complexity of genomics analytics is only possible in HPC environments, which together with Machine Learning and AI are on their way to delivering on the promise of precision-based agriculture outcomes.

■■■■

Agendra Kumar, President, Esri India Technologies

Geospatial infrastructure plays an integral role across the entire value chain in the agriculture sector. geographic information system (GIS applications collectively improve the overall productivity and efficiency by helping effective management of the crop life cycle, irrigation, fertilizers, pests and diseases, agricultural produce and livestock. Advanced GIS capabilities like spatial modelling and predictive analysis using AI, ML, IoT and remote sensing provide enhanced situational awareness for

accurate forecast of likely scenarios to mitigate, plan and respond, including the impact of natural disasters. GIS maps and analysis helps companies to insure crops at the right value and in case of disasters with the post-damage analysis and quick claim pay-outs. With GIS, the supply chain from farm to table can be managed efficiently that minimises wastage. Geo-enabled digital transformation is the need of the hour to combat the multifaceted challenges faced by the agriculture sector.

Prabhakar Puranik, Head of Engineering- Advance Technology Solutions, Robert Bosch Engineering & Business Solutions

A way of looking at the technology adoption is by differentiating the agriculture value chain broadly into two buckets, "Farm Related (Farm to Market)" and "Market Related (Market to Fork)". We can see that in advanced countries the adoption of smart technologies in those two areas is almost equal (50:50). In India, the ratio stands at 30:70. However, the adoption of smart technologies in Indian agriculture sector looks to be on a steep upward trend. Some of the farm related challenges that can be solved by the application of smart tech are Farm Management, Farm Mechanization, Farm Digitization, Yield estimation, New Farming Practices, etc. Some of the market related challenges that can be solved are, Agribusiness Marketplaces, Logistics and Transport, Warehouse/Cold Storage Chain, Processing Technology, End to End Food Traceability.

Sangeeta Bavi, Director- Startup Ecosystem, Microsoft India

Through the Microsoft for Agritech Startups program, we are guiding startups through different growth stages and helping them become market-ready with best-in-class tech and business enablement resources. Startups get access to Azure FarmBeats, which can help simplify aggregation of agricultural datasets across providers and generate actionable insights from AI/ML models. We have seen strong use cases of enhancing supply chain efficiency and simplifying market linkages with the power of data in agritech startup solutions on the Microsoft cloud. Startups like CropData and SatSure are leveraging the power of Microsoft Azure and Azure FarmBeats in creating data-backed transparent agriculture models that generate more value to not just the farming community but for all stakeholders in the value chain. The program provides a shared platform for learning and innovation by bringing startups, corporates, governments, and VC firms together.

Vaibhav Gawde, Head- Solution Engineering, Oracle India

Indian Farmers Fertiliser Cooperative Limited (IFFCO), an Oracle customer chose to add a voice interface to its applications. To purchase fertilizers, farmers needed to travel to IFFCO outlets in the past (often without knowing if what they want to purchase is available in store or not), then wait in long queues at times, and look for a person who could help them complete necessary transactions in store. The farmers now can simply ask the digital assistant if there is enough inventory available before making a trip to the store and they can do it with minimal training. IFFCO has plans to add more language capabilities in due course and are now looking to extend this to farmers possibly integrating it with IFFCOBazar.in, to enable voice-activated order placement for quick and safe doorstep delivery, offering even more convenience to farmers.

INDIA ON THE VERGE OF AN AGRITECH REVOLUTION

The tech industry needs to work closely with the government bodies to bring the emerging tech to the small and marginal farmers

Kunal Kislay

For emerging new technologies, one has to understand that there are two key aspects. First being the technological offerings and the problems it's solving and the second being industry adoption challenges. Let's have a look at the interplay of both and how technological intervention will pave way for the Agritech revolution in India.

Technologies changing the Agritech sector

One may have chances upon the articles describing the adoption of AI, big data, IoT sensors, farm management softwares and computer vision technology.

Computer vision technology is a major game changer in the Agritech sector and is fast catching steam in the industry. One of the primary solution offerings of such technology is the use of drones to capture multispectral and hyperspectral images which are run through computer vision AI models to get insight into crop and soil health that can be further used by agriculturalists to improve existing models of farming. Computer vision assisted technology is also being used in robotics and automation technologies that are helping farmers in various processes of farming by identifying the rocks, the chemical composition in different areas of the soil

and providing detailed data on all the aspects that will help in better planning and efficiency resulting in cost savings in the long haul. It also helps in monitoring crop health throughout the crop cycle by measuring various parameters like the color, shape, and texture of crops.

Using different spectral imaging cameras, individuals and organisations will also be able to identify the water stress, moisture, and do irrigation control.

AI adoption in the agriculture sector is also helping identify plant diseases, pests, and nutrient deficiencies. The analysis also helps find appropriate solutions to crop destruction by animals.

With the rise of farm analytics on agricultural data, there are many app-based solutions emerging as well. The amalgamation of such solutions with computer vision tech has helped end users keep a check on the quality of their produce and provide a data base on which farmers can price their crops.

Tech-driven solutions are not just focused for the end users, but also provide critical data to the animal feed and agribusiness industry. The agribusiness industry develops new crop variety, agrochemicals, pesticides, and fertilizers over a period of 5-7 years. This requires a lot of research and data collection which is time consuming, expensive and a laborious task.

With a data-driven approach, the research and development cost in the agriculture industry will drastically reduce. Government schemes and private institutions can leverage the insights to build policies agnostic to the needs of the farmers and help them get access to better products as well.

Industry Adoption Challenge

India owns 9.6% of the global cropland with small and marginal farmers owning only 47% of it. The small and marginal farmers are 86.2% of all the farmers in India and 13.2% of medium land holding farmers own 43.6% of the farmlands. The biggest challenge in the agriculture industry is to bring the technology to the farmers, who depend on government institutions and traditional/practical knowledge for farming and tackling the problems they face.

These 126 Million+ small farmers majorly depend on government bodies for any and all technological help.

Due to the size of our nation, the tech industry will have to work closely with the government bodies to enable small and marginal farmers to get access to

KUNAL KISLAY, Co-founder and CEO of Integration Wizards Solutions

emerging technologies in this niche and empower them. Medium-sized farmers who can afford such technology should be incentivised to use the same more robustly and encouraged further.

With the increasing penetration of smartphones in the rural belts, app-based solutions can help the farmers connect with the buyer, retailers and manufacturers. This will help remove the middlemen from the supply chain and thus improve the farmers income by letting them get access to the marketplaces or consumers directly. Some of the app-based solutions have seen traction of millions of users per month.

Another emerging technology for the Agritech niche will be the use of drones. The Indian government has not yet laid out regulations and guidelines around drone use and operations for the same.

However, tech, aviation and agricultural industries are awaiting more clarity on the regulations and guidelines for early adoption around the same. Looming uncertainty can cause issues of investment into the Agritech sector which is a pressing concern.

The author is Co-founder & CEO,
Integration Wizards Solutions

EASING THE HOUSE HUNTING PROCESS WITH AR & VR

Physical site visits for buying property may soon become obsolete. Use of immersive technology can help buyers experience hundreds of properties from the comfort of their homes

Anand Thakur

The concept of virtual reality (VR) has been in existence for a long time but in recent years it has seen increased traction, especially in the areas of video gaming, simulations and 3D cinemas.

While gaming and cinema related VR has focused mostly on fantasy-based recreations, simulations like flight simulators, real estate simulators have

focused on reality-based recreations. Flight and military simulators are important so that an individual can experience a challenging scenario in a safe environment before they can actually handle it. On the other hand, it has increasingly been realised that VR has a very strong use case for real estate as well.

Buying a property is a long term decision. People often spend months visiting tens if not hundreds of properties before shortlisting a few. Most properties end up being rejections at first sight- too small, poor view, not enough sunlight. Sometimes one just doesn't like the layout. This is where virtual experiences come in.

Now, before we jump into how digital/virtual experiences have/can impact this market, it is important to understand these technologies a little and how they have evolved. We will also talk about the real estate connection and what lies ahead.

In the context of this article, 3D digital experiences can be of three types:

Interactive 3D models

Static 3D models allow the user to get a quick overview of the property. With advancements in technology, we today have interactive 3D models. One of the most popular implementations being Google Street views. In interactive models, the user can control and navigate through the view. This typically uses navigation widgets.

The four key technologies that have boosted interactive 3D models are:

1. Increased support for webGL (web graphics library) in modern browsers. Chrome browser started enabling webGL by default, that too only for high-end devices, since version 30.
2. Improved capabilities for Three.js which is a JavaScript library to display animated 3D graphics in a web browser using webGL.
3. Improved availability of high-speed internet as 3D content is often very heavy.
4. High-end devices with more memory and computational power becoming affordable.

Such models are a precursor to VR.

Immersive Virtual Reality (VR)

While VR can be of many types, immersive VR is where the user feels that they are a part of the environment being simulated and not just viewing it through a window. Video games and flight or military simulations are two of the biggest use cases. There are a few reasons why this is not ubiquitous despite having so many possibilities. To begin with, you would need a VR headgear to experience immersive virtual reality. Traditionally such headgear has been very expensive. For that exact reason VR for real estate has seen more adoption among property developers rather than the end buyers. This has enabled property developers to invite customers to their head office and using VR help them experience multiple projects. The buyer can then decide which property they would like to physically visit before making the purchase.

However, with the advent of VR capabilities in handheld devices, coupled with low-cost head gears
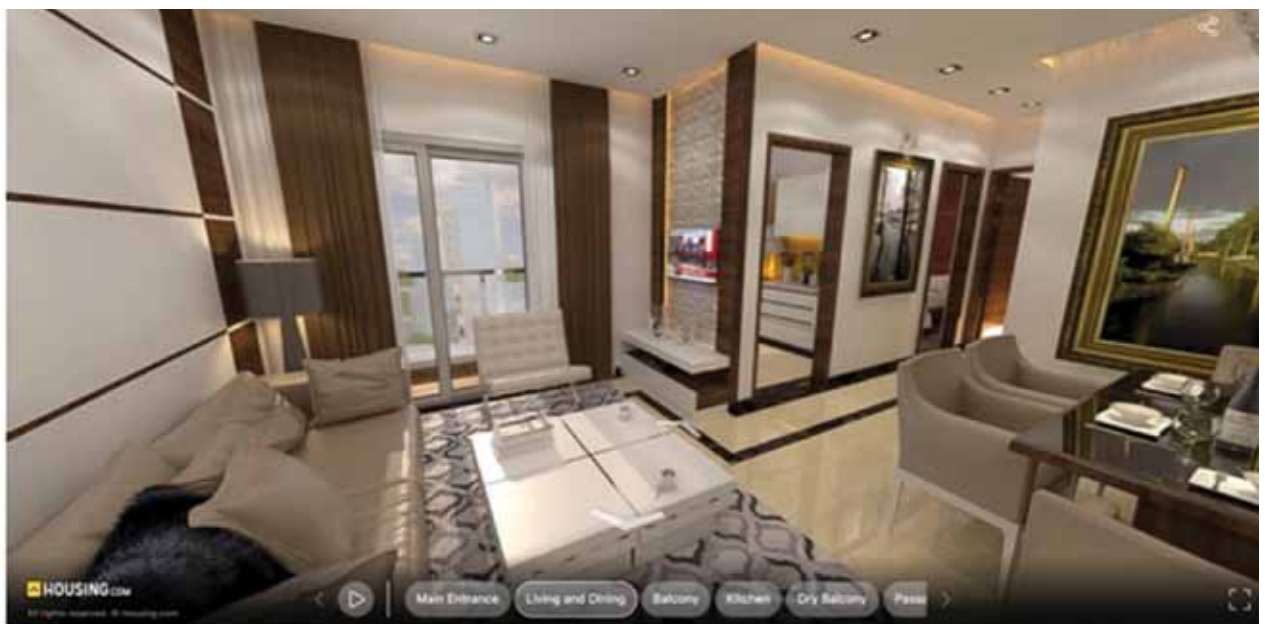
we will soon see potential buyers experiencing hundreds of properties from the comfort of their homes.

Extensive research is being done to use holographic projectors to provide immersive VR experiences. Soon the tech that Mysterio used to trick Spiderman may become reality, you never know!

Augmented Reality (AR) and/or Mixed Reality (XR)

Augmented Reality (AR) has definitely seen more mass adoption then VR. The success of Pokémon go is testimony to this fact. And unlike VR, AR has seen good adoption in the world of real estate as well. Since AR does not necessarily require immersive experiences, today's modern handheld devices are more than capable of rendering AR models.

ANAND THAKUR, Group CTO, Housing.com, Makaan.com, PropTiger.com

AR, as the name suggests, enhances the reality around you and does not create a new reality. Advancements in unity engines have further helped this cause. AR in real estate will help potential buyers to explore project sites and building exteriors from their homes. It can also be used to try out various home décor options overlaid on a model of the real room before making a purchase. Although it's not possible to show an AR experience on a 2D screen, but here it is:

Overall, 3D visualization technologies are making big waves in the field of real estate. With rapidly evolving technologies in this area, multiple physical site visits may soon become obsolete. This will not only expedite purchases, but also open up a whole new market.

The author is Group CTO, Housing.com, Makaan.com, PropTiger.com

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WHY SHOULD BUSINESSES CONSIDER A HYPERAUTOMATION STRATEGY?

Merging Hyperautomation technologies with redesigned operational processes can help organizations reduce operational costs considerably

Niraj Hutheesing

Hyperautomation is nothing but an amalgamation of different technologies to carry out end-to-end automation of an organization's processes under a unified and intelligent system.

According to the McKinsey report, there are five factors which impact the pace and extent of adoption of automation namely:

1. Technical feasibility: Technology has to be developed, integrated, and adapted into solutions for specific case use

2. Cost of developing and deploying solutions: Hardware and software costs are involved in developing any solution or technology.

3. Dynamics of the Labour Market: The supply, demand, and costs of human labour affect which activities will be automated.

4. Economic Benefits: Include higher throughput and an increased quality, alongside labour cost savings.

5. Regulatory and Social Acceptance: Even when automation makes business sense, adoption of it does take some time.

Many organisations are slowly but undeniably comprehending the importance of automating multiple business activities. Accordingly, we are also observing a never seen focus on digitizing processes and functions. Various technologies that are being used for automating include Robotic Process Automation (RPA), Artificial Intelligence (AI), Bots, etc.

Challenges faced by businesses

The entire world went blank when the Covid-19 locked people were stuck inside their homes. The lockdowns across the globe led to an interference of the digital transformation itself. The slow and organic growth that Intelligent Automation started witnessing, suddenly broke the ceiling. The C-suite was not expecting to switch to digital operations for a long time. Dependence on manual processing, inefficiencies in such processes forced senior management to re-consider the business process strategies. Even before Covid-19 struck, many businesses were facing real challenges namely:

Legacy systems and integration issues with newer technologies: Without an exception, the legacy systems in old businesses are still being used. This creates an issue whenever a new technology or API is introduced. Integration with newer technology becomes a challenge. A complex environment leads to confusion and chaos.

Expensive human errors: Errors in businesses can become expensive as sometimes correction costs are even higher than the cost of the error. Manual intervention can mostly never be error-free.

Manual reporting is time-consuming: In most businesses, data ingestion, transmission, management is still done by employees. Repetitive task of data punching leads to inefficiencies of human resources. Simple tasks can be replaced easily by automation and be done in much lesser time with almost zero inefficiencies.

Human resource turnover = frequent changes in business processes: The typical issue that every organization faces is the change in business processes when employees leave and new resources are inducted. This leads to an absence of standardization in processes as

every person has a different style and way of functioning. Hence, even if the organization would want to regulate the business processes, complete regularisation can never be attained.

Absence of structured automation: Even where automation has begun, an undeniable fact of the on-going situation is that structured End-to-End automation is still amiss across all organizations. A unified approach to automation is absent which has further complicated the business processes.

Increase in operational costs: The organizations with no or very little automation saw a spike in operational costs especially during the pandemic. This was because of the fact that people relied heavily on automation and digitization to get their tasks done which were otherwise done manually.

Smart Governance: The government is managing and making its operations digital at a rapid pace and businesses need to match with their systems to stay updated on any new update to stay compliant.

The role that Hyperautomation plays

In the last few years, Hyperautomation has gained much popularity. Hyperautomation is defined as automating with advanced technologies through AI, RPA, etc. to get improved processes. It comprises end-to-end automation processes through RPA, Machine Learning, etc.

The aim is to generate a digital twin of an organization, commonly called a DTO. For example, the actual organization could be functioning with approximately 1000 employees. Hyperautomation gives a pictorial of how the same organization would appear with superior automation technologies.

Though Hyperautomation is a relatively new concept, organizations across the globe have announced a plan to consolidate their automation tools and move in this track. It is predicted to be one of the top strategic technology trends in recent times. According to reports, by the year 2024, organizations will lower operational costs by 30% by merging Hyperautomation technologies with redesigned operational processes. Thus, Hyperautomation is the talk of the town which will help in reducing costs, saving time, and take automation one mark higher.

Hyperautomation Use Case

To understand the concept better, one can refer to a case study of the banking and financial services sector. Banks can exploit Hyperautomation at a heightened level and derive great benefits. Functions such as lending operations, back-office tasks, regulatory reporting, sales and marketing, credit rating, etc. can be hyperautomated. For eg., a KYC process can be hyperautomated. Presently,

NIRAJ HUTHEESING, Founder & MD, Cygnet Infotech

e-KYC is a common concept whereby an Intelligent Character Recognition Solution converts a handwritten KYC form to an electronic form, filling in appropriate fields of KYC. This information is further transmitted to other systems. This Intelligent Automation solution can read countless transactions and recognize any fraudulent activities carried out in bank accounts. The technology can also foresee the probability of fraudulent transactions in a specific account, thus reducing the risk considerably.

How can Hyperautomation help organisations?

Hyperautomation is a boon that will impact our lives on a large scale. Covid-19 taught a tough lesson in a few months – 'Technology is indispensable'. While automation has been around for a while, Hyperautomation is a notch higher which shall take automation to the next level. Hyperautomation can make difference in the following ways:

• Hyperautomation automates the business processes in a unified manner and delivers enhanced results when compared with automation. It helps in providing value.

• It is large scale automation that does not involve only IT but all business processes

• It is smart automation. Not only does it reduce mundane and routine tasks, but also takes simple decisions making the human resources free for strategic decision making.

• It also helps in delivering job satisfaction and hence employee retention.

There is no doubt in the fact that Hyperautomation is the future of digitization. Although the concept is still blooming, harnessing the benefits of the same may take some time.

The author is Founder & MD, Cygnet Infotech

HOW TO RECORD A VIDEO WITH NIMBUS CAPTURE

Recording your screen isn't tough, you just require the right tool and Nimbus does the job perfectly

Ashok Pandey
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Google Chrome is one of the most popular web browsers, and this can help you to record your screen as well. You need a perfect extension and Nimbus has everything that you would need. You can download the extension from the Chrome web store.

Once added just follow some simple steps to record your screen. Let's see how you can record the screen using the Nimbus extension

Once you have added the extension to your browser, click on the Nimbus icon and select record video.

You can see there are several options. If you want to record audio from a microphone, you need to enable the record mic option, it's active by default.

If you want to record audio from a website for example from a video player enable the record tab option. If you're recording a tutorial or webinar, they'll probably
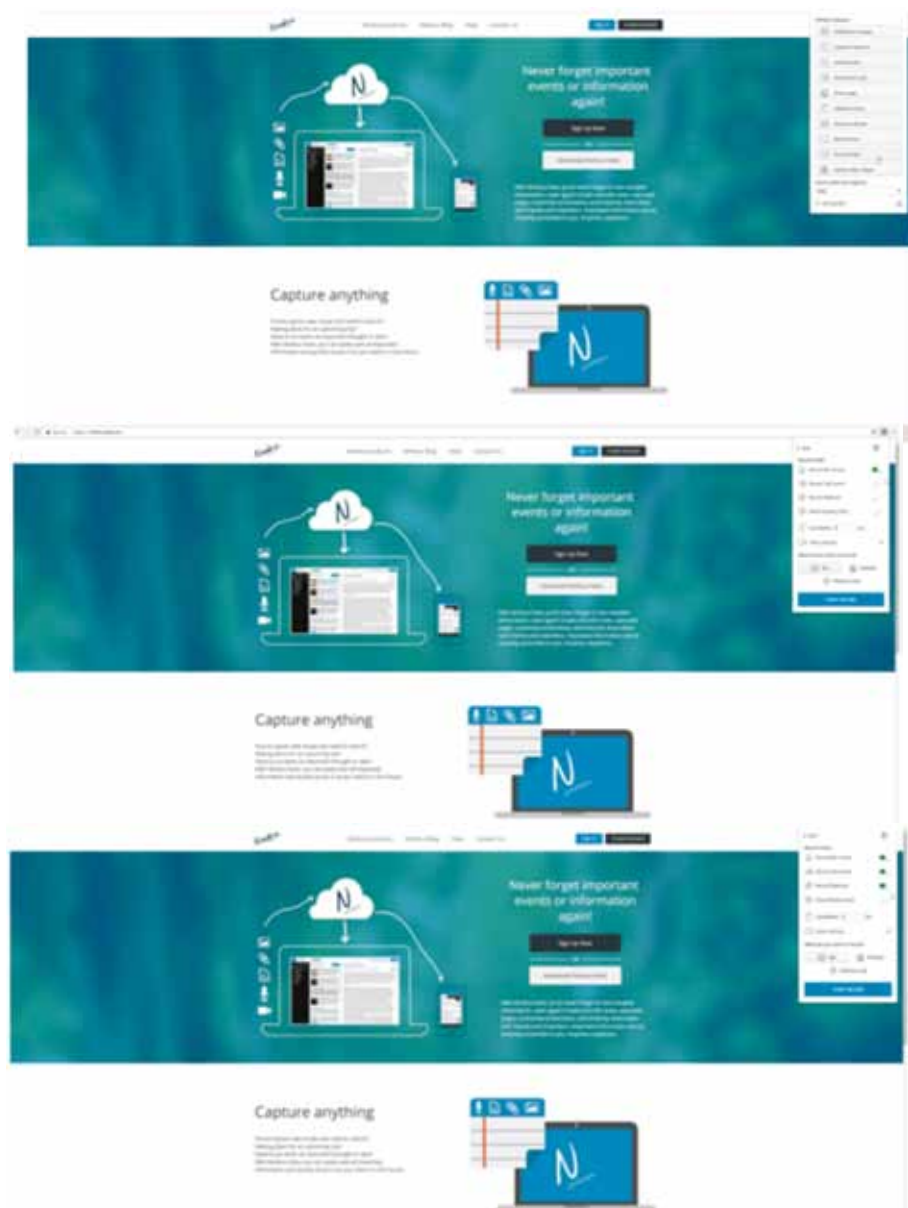
need to record from a webcam. That's also possible, you just need to enable the webcam option.

If you want to emphasize on certain elements of the video or draw the viewers attention to something for this there are drawing tools, which we're going to enable in the video settings. You can choose the video quality, as well as select a microphone or webcam if you have more than one.

Now you can choose what you want to record – Tab or Desktop

Using the "Tab" you can record the browser page. While the "Desktop" record any other programs window, webcam, etc. Let's record a video from a page.

When you click on the "Start Record" button the recording will begin.

As you can see, the recording has begun and the drawing panel has appeared at the left bottom of the page. Using the different tools available on the panel you can draw an arrow or add a question mark, etc. You can pause your recording and then resume, once done you can click on Stop.

This extension records the video in WebM format, but this format might not be supported by all players, so you can convert it to mp4, or even GIF for that press convert to mp4 GIF, select the resolution you want and start converting.

This is a paid feature, but quite affordable.

Next, you can save the video to your drive or send it to Nimbus note to share with friends and colleagues. You can also send the video to Google Drive or YouTube.
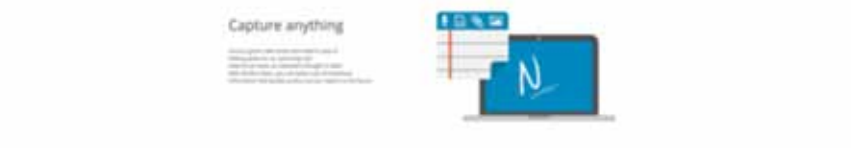
HOW TO RECORD YOUR SCREEN IN WINDOWS 10 WITH XBOX GAME BAR

No need to add additional software/extension, you can use inbuilt utility to record your screen easily in few simple steps

Ashok Pandey
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Windows 10 comes with an inbuilt recording utility, called Xbox Game Bar. This utility can record a video of your actions, whether you are playing a game or creating a tutorial. The Xbox Game Bar is easy to use utility. You can enable it in few simple steps and start recording your actions.

Steps to record screen in Windows 10

Step 1: Run the application or game you want to record, unfortunately, the Xbox game bar screen recording tool can't capture some programs for instance ¬ File Manager, or the entire desktop. However, you can record almost all the regular apps.
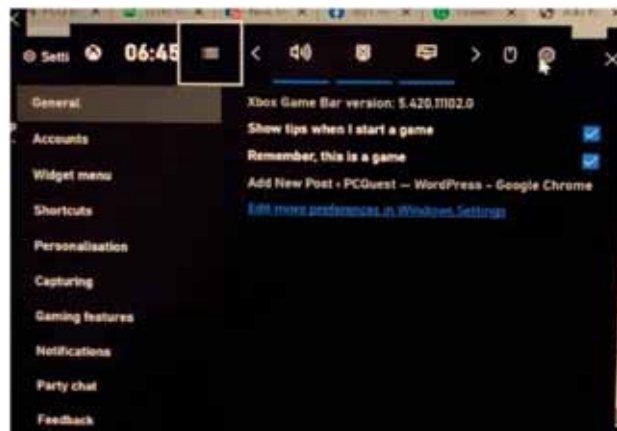
Step 2: Open the Xbox game bar by pressing the Windows key + G at the same time or go to the start button then look for Xbox Game Bar and click to open.

Step 3: Click on the setting and in the first option – Genera, check the box "Remember this is game". This will enable the recording feature for the application or game you want to record.

Step 4: Now you can start recording your actions with the app or game by clicking on the "Start recording" button or you can press Win + Alt + R to begin capturing video.

Step 5: Once done click on the red recording button to stop the recording. The game bar can disappear when you are using other apps, you can simply bring that back by pressing Win + G button.

You can find your recorded video under the 'Video' folder in a subfolder named 'Captures'. You can also find them in the Xbox app under the option 'Show all captures', which will open the gallery.
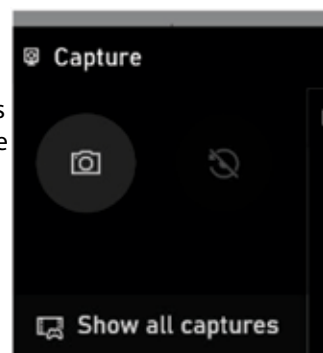
Try this inbuilt utility and lets us know your experience.

ESSENTIAL TERMS TO KNOW BEFORE BUYING A PRINTER

Efficiency, productivity cost, and longevity – one needs to keep these factors in mind before buying printers. However, selecting the best printer isn't going to be an easy task unless you do thorough research

Ashok Pandey
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It's difficult to find the right printer that does everything without you shelling out too much from your pocket. There are so many cryptic terms used to explain a printer's features. Although, all the printers may serve the same purpose, they operate differently. You should understand the differences first and then consider multiple other factors such as usage. We've put together a list of the essential terms that you keep in mind before buying a printer.

Single or Multi-function?

This question is not only relevant for individual users but for a business. There are multi-function network printers available that will allow users to not only print but also copy, scan, email and fax.

A few can argue about having a separate scanner, which can offer OCR and other scanning capabilities. Modern MFPs also comes with such features and functions with a similar or higher scan resolution of 1200 dpi. Choosing an MFP not only be a cost-effective choice as well as you can avoid trouble to manage different devices.

Laser or Inkjet?

For office use, lasers are the preferred choice over inkjets, especially if you need to do volume monochrome printing. Although the initial investment in buying a laser printer is high compared to an inkjet, the overall running cost throughout its life is much lesser. So, unless you are purchasing a printer for image or photograph printing, lasers are ideal for you.

There's a new class of inkjets available nowadays that come with ink-tank technology. Their cost-per-page is much lower than traditional inkjets. Plus, they allow wireless connectivity, meaning you can fire a

print from anywhere. And if you need colour in the office without the added high printing cost, then these devices are also worth exploring.

Technology – A laser printer uses a non-impact
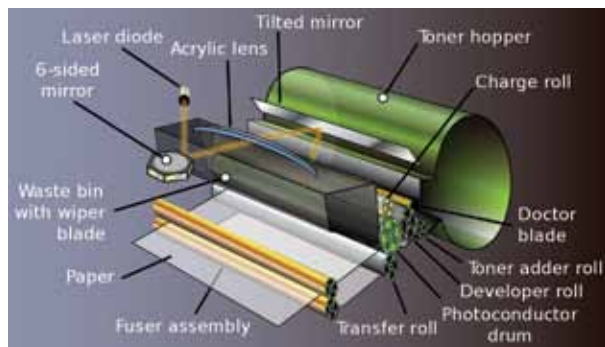
photocopier technology, in which keys don't strike the paper. A laser beam reproduces the image and prints it on the drum. This laser light runs side to side over the drum and the negatively charged toner (cylindrical component) that allows the laser to pick up ink in a powder form through static electricity. Then toner and paper meet to leave a permanent impression.

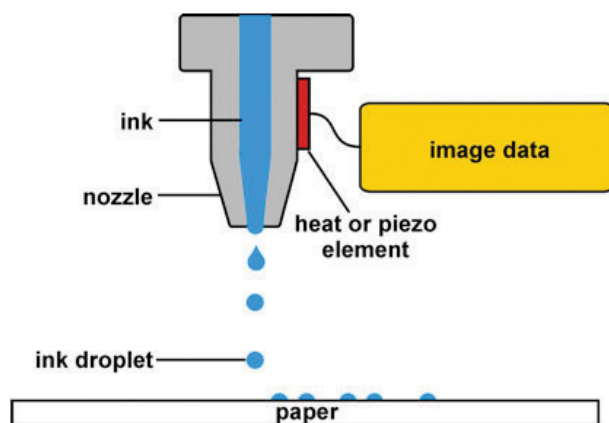While Inkjet printers spray tiny ink droplets onto the paper,in this, the printer employs a moving print head, filled with colour and black ink. This head goes side to side and spray the ink bubbles onto the documents being printed.

While most of the functions will be similar in both inkjet and laser printers, the two different print technologies achieve printing results in very different ways.

Cost Per Page – The upfront cost can be a major factor in choosing the printer. Inkjet printers are less expensive compared to laser ones, as inkjet technology is less complex thus the cost of manufacturing is also lower.

On the other hand, the printing cost of inkjet is higher than the laser. The refilling and replacing cost of the toner on a laser printer is lesser than that of a cartridge refill in an inkjet. Plus, as compared to inkjets, you can print more pages with a laser. You can calculate the cost per page using the formula – cartridge price /page yield = cost per page.

Depending on the nature of your business, you can print multiple documents on a daily basis. The cost per page of a laser printer will be less expensive compare to inkjet.

Print Quality and Speed – Laser printers produce fine quality text and graphics, making it an ideal choice for document printing.

Photograph output is of moderate quality with laser, while, inkjets produce sharp and vivid images. Inkjet printers outshine when you want to print on a wide variety of media like vinyl, plastic, cloth, etc.

Compared to a laser printer, inkjet is slow when it comes to printing black and white text pages. Laser printers can print up to 120 pages per minutes. Inkjets are slower with around 25 pages per minute. This is one of the main reasons to choose a laser printer over inkjets for business.

Image Quality

There are many terms that determine a printer's image quality. Knowing them can help you decide which printer would be right for your needs.

Resolution – Printers can print at different resolutions, which determines the level of detailing in your print-outs. Print resolution is measured in dpi or the number of dots a printer is able to print in a line across an inch. The more dots it can place, the higher the resolution, and therefore, the better the print quality.

For monochrome text-based print-outs, a resolution of 300-600 dpi is good enough, but for graphics printing, you obviously need higher resolutions. So don't go for anything less than 1200 dpi.

Ink Configuration – Professional colour printers come with more than the four basic cartridges (CMYK) found in traditional printers. These can range from 6, 8, and 12 colour cartridges; where more cartridges imply a wider gamut of colours in your prints. It will also more closely match the colours you see on the screen.

Though the printout will never be an exact replication of what you see on the screen, but the wider gamut of colours will ensure richer image quality. This, along with colour calibration using software will ensure a more accurate print output.

Ink Droplet Size – This is typically measured in picoliters (pl), where the lower number means a sharper image. When choosing a printer for great quality photo prints, look for the minimum droplet size. The typical range is from 4-12 pl.

Media Handling

Printers can print on a wide variety of media types. Paper alone has a lot of variety—glossy photo paper, matte photo paper, high-resolution paper, semi-gloss photo paper, greeting cards, envelopes, and the list goes on. Besides paper, there are so many other media types that a printer can print on—T-Shirts, photo stickers, Iron-on transfers for colour fabric, etc.

If your need is to take print-outs on more than plain A4-sized sheets, then it's important to check which media types are supported by your printer. Usually, printer manufacturers have a complete media compatibility chart for their various models.

Besides media type, it's also important to look for media capacity, or the number of sheets of paper a printer can support in its input as well as the output tray. A heavy-duty printer will be able to support a higher number of sheets of paper, which means that you won't have to keep rushing back to refill paper in your printer. A high-capacity output tray means even if you need to take volume prints, then they won't spill out of the tray and spread all over the floor.

Duplex Printing

This means having the ability to print on both sides of the paper. Duplex printing can be automatic or manual. As the name implies, in automatic duplex printing, you don't have to do anything. The printer will automatically print on both sides of the paper. In the manual, it will print on one side of the paper. You'll then have to re-feed the paper into the printer to print on the other side.

Ease of Use

While this is not a technical term, it's nevertheless an important aspect to consider while buying a printer. How easy is it to load and unload media from the printer? How intuitive is the printer's control panel? Is it easy to navigate and customize the print settings?

Ease of handling consumables is also important. How easily can you pull out and replace the toner cartridge in case of a laser printer, or re-fill/replace the ink cartridges in case of an inkjet printer? Can you, for instance, easily clear a paper jam should it occur?

Availability of universal drivers is also important.

If you lose your printer's drivers in thefuture, or your system becomes corrupt and requires re-installation, how easily will you be able to set up the printer on it?

Duty Cycle

There are many other terms you should consider before buying a printer besides the ones we've just explained. The duty cycle for instance is another important term to keep in mind and look out for it in a printer's specifications before buying. Duty cycle is the number of pages that can be printed by a printer per month at its rated print quality, without any kind of deterioration.

The duty cycle is usually arrived at by the printer manufacturer after a lot of stress testing. Printer drum is another term to be familiar with. It's found in laser printers and is an electrically charged cylinder that fuses the toner powder onto the paper to create the printouts. The drum is consumable, so it's important to know its life and replacement cost while buying a laser printer.

Wireless and Network Printer

For home use or low print volumes, a printer with USB and Wi-Fi connectivity would be better choice. It will be connected directly to a users' PC or mobile via a USB cable or Wi-Fi connection.

For a business with multiple users, a network printer is useful, implying high printing volumes. In such a case, networked printers are ideal choice, because they're sharable by multiple users. The advantage is that they're accessible to whoever you'd like no matter where they're sitting in the office.

Nowadays, along with LAN connectivity, business printers also come with Wi-Fi support and allow users to fire prints even from their smartphones and other mobile devices. Even in Wi-Fi, printers nowadays support Dual-Band Wi-Fi, which basically allows them to connect to two different frequencies—2.4 GHz and 5 GHz. This allows for a more stable connection and higher speed connectivity.

This can be a great feature to have if you need to keep your printer in a location where there's no LAN port.

Conclusion

For business, the laser printer is a clear choice and inkjets for home users or small business. There are many suitable printers for both home and business, so look for the features you need from what all we just covered and then look for the right one for your need.

10 BEST PRINTERS

Canon Pixma MG2577s All-in-One

Price: ₹2,849

This is an affordable all-in-one printer based on inkjet technology. You can print, scan and copy documents as well as images using this multi-function device. It supports USB connectivity, has a print speed of up to 8 pages per minute and supports different paper sizes, including A4, A5, B5, legal, envelope among others.

Canon Pixma G2012 All-in-One Ink Tank Colour Printer

Price: ₹10,799

The all-in-one printer comes with an ink tank, enabling you to easily refill the ink and enjoy the best quality but low-cost printing. It comes with USB connectivity and a 1.2 inch LCD on the printer that allows you to interact with the printer directly. With a speed of up to 8.8 PPM, the cost per page is 9 paise (Black & White) and 32 paise (Colour), as per ISO standards.

HP DeskJet 2723 All-in-One Colour Printer

Price: ₹4,999

The inkjet technology-based all-in-one printer is capable of printing Up to 7.5 ppm at an economical cost of Rs 6 (Black), Rs 8 (Color) per page, as per ISO standards. Print, scan and copy documents and papers with your voice as it comes with voice-activated printing through Alexa and Google Home.

Epson Eco Tank L3101 All-in-One Ink Tank Printer

Price: ₹10,899

The Ink Tank Printer lets you print, scan and copy. It offers a high page yield of 4,500 black and white pages and 7,500 colour pages. The compact machine can easily fit in a corner. This Epson printer comes with a micro piezo printhead that allows you to print up to 33 pages per minute. The per-page print cost of the printer is as low as 7 paise (Black & White) and 18 paise (Colour) as per ISO standards.

HP Smart Tank 500 All-in-One Ink Tank Color Printer

Price: ₹11,999

Ideal for home and small businesses, this multi-function printer offers up to 22 ppm back and up to 16 ppm colour prints. The printer is perfect to scan document at 1200 DPI and print on different page sizes including A4, B5, A6, DL envelope, legal, letter etc.

HP Neverstop Laser Tank

Price: ₹12,669
This single-function printer is an ideal choice for small business with a page yield requirement of up to 20,000 pages. The laser printer comes with USB and wireless connectivity, enabling users to print directly from their mobile device. It has print speed of up to 20 ppm and supports page sizes including A6, A5, A4, Letter, etc.

HP Laserjet Pro M126nw

Price: ₹16,999
The multi-function laser printer is a good choice for enterprise/business.
It offers wireless, USB, ethernet and HP ePrint App connectivity, plus has an LCD display to interact directly. With a speed of up to 20 PPM and 2 Rs cost per page print, this has a compact design. It supports A4, A5, B5, envelopes, postcards and manual duplex printing.

Brother DCP-L2531DW Multi-Function Laser Printer

Price: ₹15,499
If you have print requirements that are a bit high, then this printer offers you a duty cycle of 15,000 pages. The all-in-one laser printer offers all the connectivity options including USB and Wi-Fi. It has speed of 30 ppm and can print of page sizes like A4, Letter, A5, A6, Executive, Legal, Folio and more. The printer also supports auto duplex printing.

Canon MF244DW Digital Multifunction Laser Printer

Price: ₹21,727
The laser multi-function printer offers various connectivity features including USB 2.0, Wi-Fi, Canon PRINT Business, Canon Print Service, Google Cloud Print and Apple AirPrint. The printer comes with an LCD display, enabling users to interact directly and take prints or copy of documents. With the print speed of up to 27ppm, this suplex printer is a perfect choice for offices with up to 15000-page yields.

HP Laserjet Pro MFP M226dw Printer

Price: ₹29,999
The laserjet multi-function printer is perfect for various print, scan and copy requirements. It offers a print speed of up to 25/26 ppm A4/letter and has a duty cycle of up to 15000 pages per month. This comes with auto duplex printing capabilities. Additionally, you can connect the printer to your Wi-Fi.

WE'RE SEEING AN INCREASING DEMOCRATIZATION OF GAMING

Gamezop is a multi-game platform started by brothers Yashash Agarwal and Gaurav Agarwal in 2015 that aims to become an effective distribution channel for game developers and the preferred gaming destination for users. In a free-wheeling discussion with Prabhu Ram, Head-Industry Intelligence Group (IIG), CMR, Gaurav Agarwal, Co-Founder, Gamezop spills more details.

At CMR, our recent gaming research insights point to an increasing democratization of gaming. Thanks to powerful smartphones, we have seen the emergence of new gaming cohorts. While there are the serious gamers, there are casual and hyper-casual gaming fans. The hyper-casual ones are playing a key role in driving gaming forward.

Let us talk about who Gamezop's consumers are, and what is Gamezop's value proposition.

I completely agree with you that gaming is seeing increasing democratization. Even quality titles are no longer restricted to those with powerful gadgets. In fact, the biggest opportunity for gaming companies around the world today is to convert the non-gamers to casual and hyper-casual gamers. This massive opportunity is very close to our hearts at Gamezop.

If we look around, we will see that all smartphone-based gaming companies want to push their games through mobile apps that the users are expected to install. One app gives you one game. If you want to try another game, install another app. If space on the device is a constraint, delete something else to make room.

This whole process is too frictional and hinders new users from coming into the gaming ecosystem. The task of installing an app to play a game, we aren't realizing, is akin to downloading a video file, and then playing it on a media player. This is what all of us actually used to before YouTube happened. The question is when videos can be played instantly and on a single tap, why not games?

Gamezop eradicates the need to install a new app each time a user wants to play a game. Our approach is to add a gaming section within popular non-gaming apps and websites. This way, the users

of these apps and websites are able to play trending games, just as easily as they play a video on their Facebook feed.

Smartphone games are being distributed today largely within the two major app stores. Gamezop aims to become the third large channel for distribution of games, where games will be delivered as instantly playable and run smoothly within apps and websites people already use.

Let's talk about the game developers that Gamezop works with. Do you acquire content? Or license it? What's your strategy?

There are two sets of developers that we work with. First, the game developers. We acquire content from all around the world. We have looked at both acquiring games as well as, in some instances, non-exclusively licensing games. After acquiring content we catalogue them in a single multigame platform.

Secondly, we work with developers of apps and websites to distribute this multigame platform. As we discussed, adding a dedicated section for games boosts engagement time within non-gaming products as well as earns them additional revenue. Over 2,200 apps and websites – including Amazon, PhonePe, Indian Express, Samsung My Galaxy – have a gaming section powered by Gamezop. Through this wide network of partners, we have over 40 Mn users on our platform each month.

How do potential partner apps discover Gamezop?

App developers or website developers are always looking to add user engagement and additional revenue. Added to this is the fact that there is absolutely no cost to integrate Gamezop.

> **"Gamezop eradicates the need to install a new app each time a user wants to play a game. Our approach is to add a gaming section within popular non-gaming apps and websites."**

GAURAV AGARWAL, Co-Founder, Gamezop

Our hands are always full with new integration opportunities. On one hand, there are potential partners who have seen Gamezop integration on a product, liked the offering, and reach out to add a similar feature for their users. On the other hand, we strive to reach out to category leaders as well.

We enjoy this B2B2C approach because each time we add a new distribution partner we get a boost in user count without any spending. If we were another B2C gaming company, we would be solely responsible for growing our user base. It's tough to retain existing users, let alone adding users. Given that Gamezop is live inside 2,200 products, we benefit from the multiplier effect of each of these products adding to their user base.

Gamezop recently raised INR 32 Cr in Series A round led by BITKRAFT Ventures. What does your future roadmap look like?

We realized early on that our product has a global use case. 25% of Gamezop's end users already come from outside India. Most of the games that we actually acquired are from global game developers, so the content catalogue is already fit for consumption outside India. We have raised capital for our overseas expansion so that what we have achieved in India through partnering with publishers can be replicated overseas.

It's a really cost-effective model to be able to reach millions of users each month without spending a single rupee. Adding a few more geographies to our network will take us one step further towards our goal of becoming an effective distribution channel for game developers and the preferred gaming destination for users.

TOP 5 FREE MUST HAVE APPS EVERY PC GAMER SHOULD TRY

Whichever configuration and whatever device – laptop or PC, having these free apps on your machine will boost your gaming experience

Boudhaditya

PC gaming is demanding, and it is not always about the games that you play or the hardware that you use. Sometimes some applications and software can help you have a good experience while playing and even provide stability. The application and software in this list are free and should be on every gaming system, be it a laptop or a PC.

WISE GAME BOOSTER

It is one of the best game optimization software of all time. It's free and takes only about 10 MB of your hard disk space. You click on add game and browse the executable exe game launcher file of all of your games. This won't allow you to play the game unless you optimize the pc for it. All you have to do is hit optimize all. It's going to take a while, have some patience and only after the optimization you are allowed to play your games. This program always runs in the background constantly trying to provide the most optimized gaming experience.

MEMORY REDUCT

It's a RAM cleaning software free and simple to install. Once you launch it, it will show you how much RAM is in use. This software will be available in your system tray and whenever you feel like your computer is running slow, you can left-click on it and hit clean memory or manually open it and hit clean memory.

HIBERNATOR

Hibernate mode is very similar to sleep but instead of saving your open documents and running applications to your ram, it saves them to your hard disk. This allows your computer to turn off entirely. Which means once your computer is in hibernate mode it uses zero power and this app allows you to do that in seconds.

SOUND LOCKER

If you play games like PUBG or Counter-Strike, you always want to have your volume as high as possible to listen to the footsteps.

However, the gun sounds are too loud that it can ring your ears. If you lower your volume, the gun sounds will be lowered and along with the footsteps. This app solves the issue, it makes gun sounds lower without affecting the sound of footsteps. This will block all the high volume sounds without lowering low volume sounds helping you have an enhanced precision in the game.

KOVAAK'S FPS AIM TRAINER

This is one of the best aim training software of all time. This can help you improve your aim at tracking, flicking and click timing, how often you actually flick track etc. in your games. It allows you to train a set of skills for your games. This software is used by a lot of professional players of Counter-Strike, Fortnite, PUBG, Overwatch and mainly Apex Legends. By using the software, you will feel that your aim is much more consistent, and you can easily flick and track subconsciously without even concentrating. It becomes totally automatic.

BACK TO THE FUTURE: 5 FUTURISTIC GAMES FOR LOW END PCS

Even if you have a low-end PC you can enjoy these 5 really amazing games

Boudhaditya

Cyberpunk was a good game and looked really futuristic but everyone knows how that turned out. However, there are games that look futuristic and are not very demanding. These 5 futuristic games will take you to a place that can only be imagined and make you a part of it.

EVE ONLINE

Eve Online is a space-based persistent-world massively multiplayer online role-playing game. This game is 100% free to play. The game contains a total of 7,800-star systems that can be visited by players. Set more than 21,000 years in the future, the background story of Eve Online explains that humanity has used up most of the Earth's resources through centuries of explosive population growth and began colonizing the rest of the Milky Way. As on Earth this expansion also led to competition and fighting over available resources but everything changed with the discovery of a natural wormhole leading to an unexplored galaxy subsequently dubbed as New Eden. This game is really fun to play and players must try this out.

DEUS EX: HUMAN REVOLUTION

Dues Ex: Human Revolution is an action role-playing game with incorporated first-person shooter and stealth mechanics. Players take the role of Adam Jensen, a man equipped with mechanical cybernetic implants called augmentations. The game's environments ranging from open-world hubs to more scripted environments are explored in the first person. Although, actions such as hiding behind cover, conversing with non-playable characters, NPCs and some attack animations switch to a third-person view. In these environments, players can find NPCs who will advance both the main story quest and optional side quests. Completing quests along with other actions such as combat with enemies rewards Adam with experience points which raise his experience level in the game.

MASS EFFECT 3

Mass Effect 3 is an action role-playing game in which the player takes control of Commander Shepherd from a third-person perspective. Shepherd's gender appearance, military background, combat training and first name are determined by the player before the game begins. If the player has a completed saved game from Mass Effect 2, the character from that game can be imported by importing an old character. Decisions from prior Mass Effect titles are carried over which impacts the plot of Mass Effect 3. Similar to previous instalments in the series, the player is able to choose from six different character classes that each have their own unique set of skills. Mass Effect 3 begins in the year 2186. The Galactic Community lives in fear of an invasion by reapers. A highly advanced machine race of synthetic organic starships that are believed to eradicate all organic civilization every 50,000 years.

TOM CLANCY'S GHOST RECON: FUTURE SOLDIER

Tom Clancy's Ghost Recon Future Soldier is a third-person tactical shooter video game. The game is a third-person cover-based shooter pulling the left trigger causes the over-the-shoulder view to zoom in allowing for more precise aiming. Clicking on the right analogue stick causes the game to switch to a first-person camera which lets the player look down the iron sights. Some cover can be partially destroyed forcing players to seek other hiding spots while taking cover. Players can be suppressed by machine-gun fire which takes the effect of narrowing and shaking the player's field of vision making it harder to return fire. A new feature in the series is adaptive camouflage which allows the ghosts to become partially invisible.

In the game, it is explained that the processing power doesn't exist yet for the camouflage to keep up with quick movements, so it is only active when the player moves slowly. It's enabled automatically when the player crouches and disengages when running firing or taking damage. The game opens in the year 2024 with the four-man ghost recon team. Sometime later a nuclear missile fired from Russia impacts London but the nuclear warhead is eliminated at the last minute by the American missile shield during firefights.

DEAD SPACE 3

Dead Space 3 is a science fiction survival horror action-adventure video game. Dead Space 3 takes place in the 26th century. Mankind has colonized the stars but is in desperate search of new energy sources. One potential method was found in the Chicksyllab Crater on Earth, an extraterrestrial artefact dubbed the Black Marker which produces a constant electromagnetic field in defiance of the law of conservation of energy. The game opens in the year 2314 until Volantis, an ice-covered planet with an irregularly shaped moon, where sovereign colonies armed forces player characters can roll and take cover to avoid attacks.

THE INDUSTRY IS POISED FOR THE PERFORMERS & ACHIEVERS, ARE YOU???

Dataquest unveils the most credible, comprehensive industry ranking & analysis

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- Thought Leadership - CEO Interviews
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  - Data Management
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  - Analytics & Big Data
  - Collaboration
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BLUESTACKS 5: THE NEW AND UPDATED VERSION OF THE EMULATOR

The most popular emulator comes with its latest version - BlueStacks 5. Fixed some of the "issues" and has tried to work towards a more immersive gaming experience

Boudhaditya

BlueStacks Emulator is one of the famous emulators out there. Emulators let you run mobile games on a PC with the same account and player profile. Some players want to play mobile games without compromising on the PC gaming experience and emulators are just the tool. BlueStacks are coming out with their latest update in the form of BlueStacks 5. This is an updated version of the BlueStacks 4 Emulator and brings in multiple changes with it. The company has fixed some of the "issues" and has tried to work towards a more immersive gaming experience.

Lesser RAM Usage

One of the major underlying issues with emulators is their RAM consumption and BlueStacks 4 was no different. While running the emulator on an 8 GB RAM system, the gaming experience saw a major performance hit. Your system had to be clean and all the memory had to be dedicated to one application, BlueStacks. That has changed with this update. BlueStacks 5 now uses up to 40% lesser RAM making gaming a smoother and more immersive experience. Players can now run it without worrying about running out of memory and yes, you can play Spotify in the background now.

Faster Boot Speeds

The emulator now doesn't take an eternity to load. Earlier the emulator itself used to take a good amount of time to load and the loading time of the game was a completely different ball game. That has changed in the new update. The emulator loads much faster now taking you to the home screen in less than 10 seconds.

Enhanced Optimization and Multitasking

BlueStacks 5 consumes significantly less CPU while maintaining a stable FPS even during long hours of gaming. The power efficiency will now allow players to indulge in gaming for hours without worrying about lag and stutters during the crucial moments of the game. You can also run multiple instances in the Eco mode to reduce CPU usage by up to 87% and GPU usage by up to 97%.

Expansive Game Library

BlueStacks 5 is home to over 2 million games that can be played by over 500 million players worldwide. This offers a large option of games to choose from and play the one that appeals to you the most.

5 BEST GUNS FOR BEGINNERS IN CALL OF DUTY MOBILE

There are multiple guns available in CoDm but to win the game you need some better and more effective guns

Boudhaditya

Since its first appearance on the gaming scene, Call of Duty mobile has been a very popular game. Rightly so, it comes from one of the best game developers in the world. Activision is known for the Call of Duty franchise and their arrival to the mobile gaming scene has just taken it to another level.

This might look easy when started but the competition is extremely stiff and players need to make multiple choices in order to succeed in pushing rank and winning matches. Weapons play a major role in helping players do so. There are multiple guns available in CoDm but some guns are just better and more effective. These should always be in your loadout during multiplayer matches and should be on your list in battle royale matches.

HS2126 SHOTGUN

This gun is based on the M1216 shotgun that was seen by players in Black-Ops 2. This is a fully automatic shotgun that needs to be rechambered every 4 rounds. This gun has a very good magazine size that can hold 16 bullets, and you only need 4 bullets to take the player down and with this, you can easily take down a squad in a single magazine. Since this is a shotgun, you need to make sure that your aim is really precise. HS2126 comes with a perk where every single kill that you make with the gun, your speed will increase allowing you to swiftly move around the map and make a lot of sprint kills.

CHICOM

Chicom is another gun that was seen by players in Black-Ops 2. This is a 3-round burst sub-machine gun and has a very high fire rate. This can help you get consecutive kills in close-range combats but the damage rate dips when the distance increases and you are taking long-range fights as it is an SMG. Chicom comes with a perk that boosts your reload speed after every kill that you have made with the gun. So if you and your enemy both are stuck in reload, you will have an upper hand and might even secure the kill.

RPD

This gun can be seen in Modern Warfare 2. RPD is the first LMG that players unlock in CoDm. It is a decent gun considering the level on which it gets unlocked. This gun extremely effective if you are taking a long-range fight. It has a very high bullet range and damage. This means that while taking long-range fights, the bullet-drop will be less allowing you to connect more bullets on your enemy in order to secure the kill. If you want to get maximum kills in the Battle Royale, this is the gun for you. This is not a run and hunt type of gun. It is heavy and slows down the movement of your character by a great margin. As it is an LMG, the magazine size is big and reload time is also on the higher side. So if you have a habit of reloading after every kill or every few bullets, this gun is not for you.

XPR-50

This gun is also taken from Black-Ops 2 and can be unlocked by players after reaching Level 88. This is a semi-auto sniper rifle and is very deadly but the recoil is slightly on the high side. The gun is a little low on accuracy but it compensates for that with its higher fire rate. if you are unable to take the enemy down with first shot then you might have troubles with the second and the third shot. The perk that this gun brings is that every weapon kill will add a bullet to the magazine.

ASM-10

ASM-10 is unlocked at level 10 and tries really hard to be AK-47. The gun has low damage, low range and low mobility. However, the recoil on this gun is very low and this makes it a good option for mid and long-range fights. This is not a bad gun, unlocks very early in the game, and you will have fun spraying down enemies with this gun. You can take a spot and keep spraying the enemies down and securing kills for yourself and your team.

IS GAMING ON PROJECTOR A VIABLE OPTION?

When you think of having a projector for gaming, the first thing that comes in mind that there could be an issue with dull visuals. But nowadays, the gaming projector can achieve 4K visuals, HDR10 and can perform at much higher refresh rates than ever before

Muneer Ahmad

A few years ago, gaming was only treated as a hobby for kids and teenagers. With a constant evolution in the world of gaming and technology, people of every age, nationality and social background now enjoy playing video games. Gaining constant popularity, they are becoming the most watched videos on YouTube and nowadays, social media influencers/ bloggers are constantly leveraging on the gaming audience.

With projectors coming to light in the gaming industry, they have their specific requirements that the high-end gamers demand. Since E-Sports has transfigured gaming, it turned into a serious competition played by advanced gamers.

The first thing that comes to mind while talking of gaming projectors is that there could be an issue with dull visuals and blurry graphics. Since the gaming projectors have matured, it has provided a tremendous medium for communal and competitive gaming. Nowadays, any of the gaming projector can achieve 4K visuals, HDR10 and can perform at much higher refresh rates than ever before. But they can sometimes be more complex with new features and a steeper learning curve than ever before.

It is important to consider all the factors involved while gaming on a projector. With every product having its pros or cons, it is important to understand the features required in a gaming projector for

a larger-than-life gaming experience. With each feature, there is a list of additional elements included to make the experience a great one.

Size

In terms of size, projectors offer an immersive environment, creating a fantasy world of video games for the player to completely immerse himself or herself.

Nevertheless, affordable projection screens tend to start around 100-120 inches.One can get a decent projector with luminous brightness, vivid color reproduction, and even 4K resolution. In comparison to other elements of gaming, projectors are still the most cost-effective way to get a mondo-sized screen, by a very broad margin.

Brightness and Quality (Resolution)

If you have to give presentations at work or at school/ college, you have probably used projectors before, but your needs are pretty different in a gaming projector. To enhance the picture, you cannot always darken your surroundings, so good resolution is necessary for gaming.

Resolution and brightness is another factor to consider. Ensuring to offer a true-to-life color performance, in both bright and dark light, gaming projector is an applicable choice. Missing any details while gaming is certainly not something a gamer would consider. Although, projectors have a fixed resolution, this drawback, however, can drive the users to pick a projector that has the resolution they want beforehand.

Projector Refresh Rate

Nothing is worse than fuzzy pictures or sluggish lag time when you are either in the middle of the road, or in the middle of battling the top boss of a level only to lose at the end. Refresh rate is an important factor for advanced gamers. The refresh rate refers to how quickly the images from your gaming system is processed by the projector.

Crisp and transparent images at a quick refresh rate is imperative. A cleaner and seamless graphic, will help in enhancing the experience of gaming. While choosing, opting for a projector with 4.2ms Ultra-Fast Input and a RefreshRate of 240 hz or greater would be a better choice. If you have a slow lag time, for example, your character may have died in battle before the picture appears on the screen. Some projectors usually come with boost lag time characteristic, but these versions come with a higher price tag.

MUNEER AHMAD, Business Head, ViewSonic India

External Speaker Usage

On a general basis, projectors aren't known for their built-in speakers. The majority of speakers do not sound any different from the desktop ones, and might create concern about the face that the audio quality in the game might sound faint or grainy.

If audio is a significant figure that one is looking for, then the person will invest either in new speakers or in a soundbar. When the gaming console is wired directly to the projector, refresh speeds and input lag times are usually quicker. There will be a decrease in lag time and the picture refresh rate when you attach a soundbar or speakers to the projector and the gaming console to the home entertainment system.

Conclusion

There is nothing like gaming on a projector. The game is on a big-inch screen. You almost feel like you are in the center of the action, and there are sharp and simple details. Although this sounds great, it only lives up to your standards if you consider a few important factors.

You want to select a projector with a fast refresh rate and minimal lag time. It is also necessary to pay attention to the size of your room. If you have a limited field, you will need a projector that can handle shorter distances without distorting the images. With a little testing, comparing different product specifications, you can feel the thrill of gaming on the 'big screen.'

The author is Business Head, ViewSonic India

ACHIEVING MORE WITH LESS: TECHNOLOGY SPEND PRIORITIES OF A POST-PANDEMIC CIO

To enable faster and more dynamic IT spend, the CIO must rely on a set of tools and data that creates an accurate and transparent view of the firm's IT landscape and project portfolio, including the cost, value and complexity of each element

lien Kokocinski & Oliver De Decker

Today, CIOs at many traditional banks are confronted with a complex situation. On the one hand, the pandemic is placing pressure on banks to rapidly cut costs. On the other, CIOs are expected to deliver important digital transformations and mandatory initiatives as banks adapt to the current conditions, including cybersecurity reinforcements or establishing the right

infrastructure to allow people to work and collaborate remotely.

At the same time, as the uncertainty surrounding COVID-19 and its consequences continue, CIOs need to be in a position to adjust the levels of IT spend in response to evolving situations. This may mean reducing expenses in the event of a prolonged crisis or a slower-than-expected economic recovery; or alternatively, increasing spend to allow the organization, its infrastructure and project portfolio to be mobilized quickly to benefit from any recovery.

A Comprehensive and Transparent View of Costs Versus Value

To enable faster and more dynamic IT spend, the CIO must rely on a set of tools and data that creates an accurate and transparent view of the firm's IT landscape and project portfolio, including the cost, value and complexity of each element. Today, most banks do not have that view. In fact, it would be fair to say that within many established financial institutions, the business and IT teams do not sufficiently understand each other. While IT managers are concerned with the cost of their network and servers, business line owners are not focused on these specific elements, but rather want to understand the headline cost of technology as it relates to their products and customers.

The CIO accordingly needs to articulate the IT budget in a way that speaks to the business in a transparent fashion. This would allow the CIO to provide clear guidance to the business on questions relating to the cost of launching a new functionality or increasing the scope of a product, or what cost reduction will result from a certain action.

ROI on the Line

Cost-cutting is another example of where the CIO – and the business – need to have full transparency and understanding regarding immediate gains versus intrinsic value and longer-term impact. When banks need to cut costs, it is the 'change bucket' that usually suffers first, being deemed the softest target. Typically, change projects that heavily impact IT will be stopped, postponed or slowed down to reduce expenditure, and this also impacts the balance between the bank's internal and external workforce. These adjustments need to be made in an intelligent fashion that avoids reducing resilience and hence putting the bank at risk. If CIOs do not have a clear view of return on investment (ROI) across their IT expenditure, this becomes difficult to achieve.

However, postponing or slowing down transformational initiatives means that important process improvements or customer experience innovations will not be achieved as planned, which may result in a loss of revenue in the future. Again, the CIO needs an effective solution to analyse the ROI of each investment or project and clearly assess value and impact. The CIO can then make data-backed recommendations on whether to reduce or stop projects that are not vital or sufficiently revenue positive or, conversely, to increase investment in projects that will deliver a sufficient ROI.

Data is Key

An effective solution should be built around a multi-dimensional analysis of data for each IT application and project as well as business lines and products (considering elements such as scope, costs, income generated and resource consumption).

That analysis can then inform decisions such as whether to discontinue a poorly performing product or business line or, alternatively, to transform it through additional investment.

Overall, this focus on data will enable the CIO to strengthen IT management and address the dual challenge of optimizing and prioritizing IT spend.

Here's how CIOs can implement a more flexible approach to technology spend management and demonstrate the value of the IT function

Ensure Technology Cost Transparency - Technology cost transparency (TCT) provides visibility into cost drivers, technology resource consumption and cost information in respect of the balance between business and IT functions. This ensures that any adjustments reflect the most appropriate level of expenditure and offers the ability to forecast demand for technology services and to simulate the impact of change.

TCT seeks to establish a mentality that orients technology by service, with defined service levels and clear pricing. It translates IT services, process expenses and resource consumption into business functions and generates understandable metrics to enable key strategic decisions, as well as providing solid governance and a continuous improvement framework.

Measure Performance and Business Value of The IT Function

The CIO needs to move from being a cost centre to become a strategic partner within the bank. Strong CIO performance requires IT to be managed as a

business, through the application of best practice and benchmarking against the market to clearly demonstrate the value of the IT function.

Create the right conditions for optimizing costs efficiently and sustainably

This involves identifying cost reduction opportunities and assessing their potential and feasibility in the context of both BAU and projects, as well as prioritizing projects that offer a quick ROI and establishing a continuous optimization culture among IT managers.

Increase elasticity of technology costs

CIOs can help direct their banks to make better choices through technologies and contractual models that enable a transition from fixed to variable costs, such as cloud or as-a-service solutions. Reducing the ratio of fixed costs helps adjusting the cost base quickly in case of downturns.

Increase elasticity of human costs

Firms need to deploy the right IT skills, at the right time and in the right quantity, to meet market and customer demands. This requires building a flexible technology talent ecosystem and tapping into larger skill pools through partner networks, remote working arrangements, upskilling existing workforce, as well as continuously reviewing strategic sourcing and partnership strategies to reflect the skills and IT capabilities required to meet business needs.

Adopt agile approaches for managing budget and project portfolio

Agile portfolio operations and Lean governance can maximize value for the business by enhancing operational excellence, ensuring compliance and increasing adaptability to change.

The need for transformation has been a constant theme for banks since the financial crisis of 2008, and the pressures arising from continuous regulatory change, increased competition and rapid technology evolution are nothing new. However, the 2020 global pandemic has radically increased these pressures and banks have no choice but to adapt to new working models and changing customer expectations.

CIOs have played an important role through the pandemic, ensuring continuity of services. Now, as they are facing significant cost constraints while at the same time looking to accelerate strategic technology projects, CIOs need to evolve from being a cost centre to becoming a valuable business partner to help banks transform their activities and the way they serve their customers.

CIOs must position themselves at the centre of the dialogue between the business and IT to ensure that they speak the same language about IT costs and partner effectively to make smart investments, maximize benefits to the bank and increase ROI.

Both authors are Partners at CAPCO

IT'S TIME TO INTEGRATE TECHNOLOGY INTO THE APPRAISAL PROCESSES

The absence of continuous feedback, inability to provide valuable insight, and the subjective nature have pushed companies to look for technology-aided performance appraisal processes

Sujatha Kumaraswamy

With appraisal season right around the corner and companies gearing up for annual performance reviews, it's time to reflect on what can make this performance management process seamless and far more efficient than what it is. Often, and usually due to rudimentary issues in the current review process, employees feel undervalued and blame the process to be subjective and biased. Mapping out employees' performance, for instance, has transformed over the past few years, given that many long-established performance processes were unsuccessful to meet expectations of employees and employers both.

Previously, performance grading was done using the bell curve methodology, which categorised employees into three categories – top performers, average performers, and low performers, which maintained a ratio of 70:20:10 in the respective categories in terms of ranking style of this nature. This methodology showered the top performers with N number of rewards and benefits, penalised the underperformers and overlooked the average performers. Factors such as the absence of continuous feedback, inability to provide valuable insight, and the subjective nature have pushed companies to look for technology-enabled scientific methodologies.

People's personalities do affect his or her performance across various roles, and the process of understanding how this phenomenon works is very critical. An organisation can define the breadth and depth of competencies essential to determine success in each role. Continuous behaviours shown by employees on such competencies can be measured using psychometric tools. Behavioural assessments are capable of presenting analytics on how an employee performs consistently on such behaviours, and inputs from these scientific assessments can be helpful in continuous mentoring sessions.

The percentiles obtained from these overall assessment scores can be helpful in comparisons and benchmarking. Trainability factor score gives scientific inputs for successful Learning and Development (L&D) intervention. Constantly observed workplace behaviour of high-performing employees help managers to set expectations and milestones. Behavioural traits such as adaptability, good culture

SUJATHA KUMARASWAMY, CEO, MeritTrac Services

fit, and the ability to remove all emotions from issues are something to look for while deciding promotions during appraisals.

Integrating technology into the appraisal process has, to an extent, simplified the process. Doing so makes it efficient, error-free, and scalable. Technical evaluations help one to review employee performance regularly and give feedback and make it more impactful and goal-oriented. Involvement of technology in the appraisal process makes it more participative too. It also provides HR and various other teams with analytics that helps them invest their time and resources in people development.
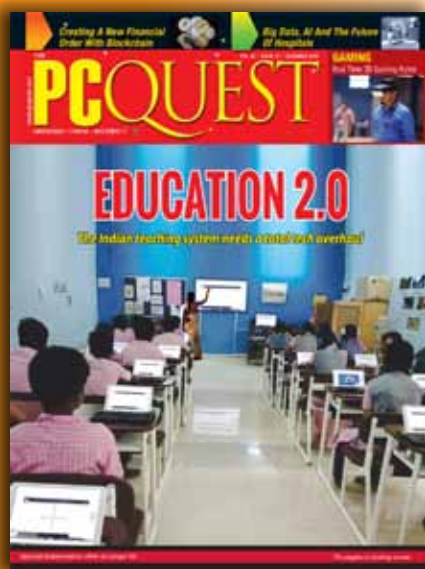
Technology has the potential to amplify the performance assessment process. It eradicates elements like bias and saves time which can be invested in other crucial activities such as employee development and succession planning. A performance management program's advantages serve everyone involved in the organisation and support its progress in reaching organisational goals. Organisations using a digital system will be better equipped to handle today's (and tomorrow's) challenges in the most effective manner.

The author is CEO, MeritTrac Services

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LEVERAGING TECH EXTENSIVELY TO SOLVE THE URBAN MOBILITY PUZZLE

Technologies such as Cloud, Automation, and Machine Learning have became the force multiplier for Rapido, as they have been able to manage business efficiently, transform at scale and pivot business whenever needed

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Homegrown bike-taxi platform, Rapido has embraced an extensive array of technologies to build a robust and scalable business. Besides cost optimization, adoption and innovative application of cutting-edge technology was particularly helpful for the company during the COVID lockdown period. It gave them an opportunity to pivot business whenever needed.

Srivatsa Katta, Head of Engineering, Rapido tells the story behind. The mobility solution provider has a compact team of 35 engineers. But technology became a force multiplier for the team- they have been able to kickstart new business verticals in a matter of 3-5 weeks which helped them serve end users in turn as well as the businesses. Within a short time span the urban mobility solutions provider has managed to scale up its operations significantly offering bike-taxis, autos, and hyper-local delivery services across 100-odd cities in India.

"Digital Native companies have the edge in

a social distancing world. The key for them is to recalibrate services and offerings with the changing consumer behavior. Our key priority a few months back was making Rapido an affordable and safe ride for every person who has to travel in the new reality. We wanted to ensure that we leverage our tech capabilities to the maximum capacity and churn out more solutions to address challenges that people face in the new normal. We feel the new normal should be considered as an enabler and not a crippler. It should enable businesses to think beyond and provide solutions that can sustain long term challenges and uncertainties, with the support of a dependable technology infrastructure," explained Srivatsa.

Rapido's priority was to enable more people to commute within the city in an affordable, accessible and safer way, and now the focus is to help people move things. In the long term, focus is more on helping moving people and moving goods as per their needs and requirements, he added.

Here's how Rapido has evolved themselves in the past few months leveraging technology.

Making the app experience a breeze

Rapido wanted its riders and customers to be able to locate each other more easily to improve the customer experience and reduce costs. Another desired feature was optimised routing between destinations for improved travel times at all stages of the process. These processes had to be lightweight to service the 15L+ bike owners/riders (called captain) using its platform. Hence Rapido sought to optimize its mobile application across multiple metrics through the deployment of a powerful mapping tool, i.e. a Google Maps Platform solution that incorporated a variety of the available APIs to meet the needs of the taxi service and their customers. The Google Analytics for Firebase helps the bike-taxi service operator to measure customer engagement with its app, enabling the business to make informed decisions about where to direct its resources.

Leveraging the power of data

Rapido also started investing a lot in the data platform and machine learning algorithms to convert the business data to actionable insights. "We could innovate a lot in terms of business such as sizing and meeting the demands, doing the surge pricing, analyzing business performance which includes seeing how the cities fared against each other at any given point of time, etc. and how we scale our systems based on those metrics," explained Srivatsa.
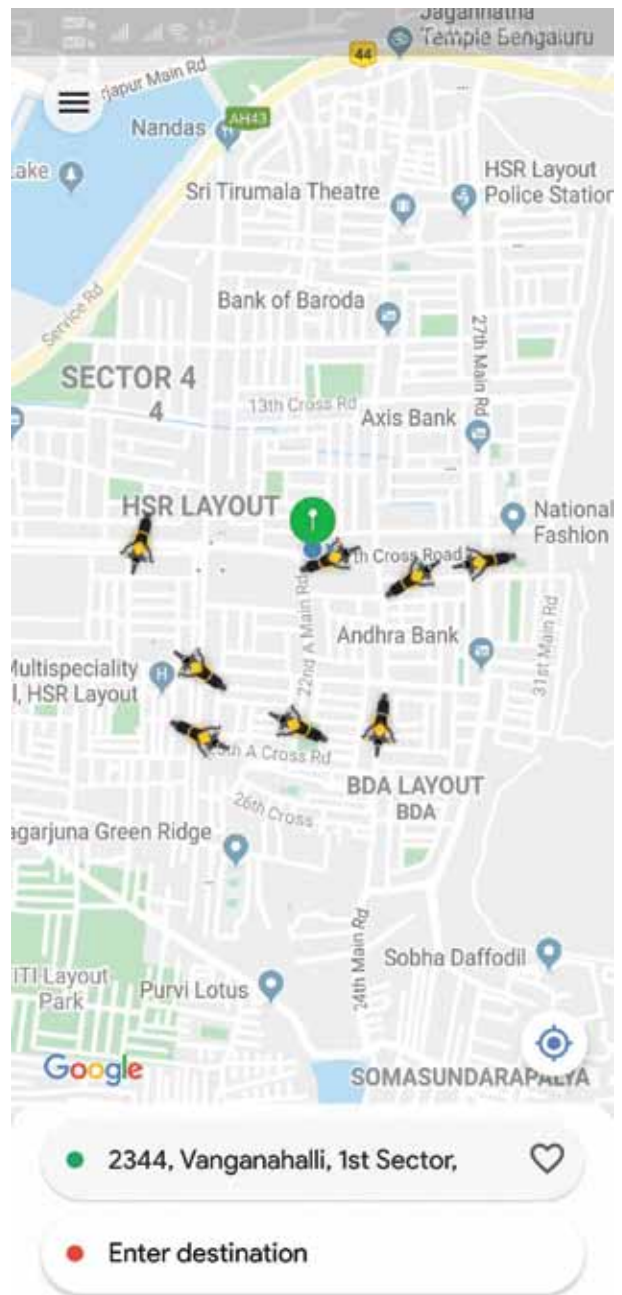

Image source: Rapido

Embracing Cloud and Automation to transform at scale

Within a span of 4-6 months, Rapido moved 95% of its applications onto Google Cloud, primarily using internal resources, and is now running 98% of its apps and workloads in Google Cloud. "Google Cloud's native integration with Kubernetes and the speed with which the open source community updates the container orchestration system played a key role in our decision to consolidate onto Google Cloud," said Srivatsa.

Rapido now uses Google Kubernetes Engine to run its applications in a secure, managed and scalable containerized infrastructure. Cloud SQL runs the organization's relational databases, while Cloud KMS manages cryptographic keys stored in third-party vault software.

Vision API enables Rapido to automate and accelerate the onboarding of new captains. When a new captain uploads licenses and vehicle registration details to the application, the platform verifies the documents using the Google Cloud service–meaning the entire process can be completed in just a few minutes without any human intervention in 80 to 90% of the cases.

Rapido's embedded penalty mechanisms also does not require any manual intervention as it gets triggered on the basis of certain signals such as the speed being a signal, taking alternative routes without the customer consent being a signal as well as customer feedback. The system pushes the captains to strictly adhere to certain guidelines.

Rapido also uses a range of Google Cloud Firebase services for the app development, testing, and modification. In addition, it is using the Firebase Test Lab app-testing infrastructure to test its Android and iOS apps across a range of device configurations, view the outcomes, and make changes as needed. It uses the Firebase Remote Config to change the app's behavior and appearance on the fly in response to the results of A/B testing across sections of its user base. Cloud Firestore provides a NoSQL cloud database to store and sync data for the Rapido app.

Protecting the users' privacy

Rapido is handling over millions of transactions and dealing with multiple stakeholders in between its bike-taxi and logistics business. However, for such a B2B2C expansion, Rapido needed to ensure the communication privacy for all stakeholders – customer, rider and partner company. The company needed a solution to optimize the delivery cycle through timely and contextual communication between all stakeholders without compromising on privacy at any touchpoint.

Using Airtel IQ, Rapido has been able to facilitate seamless and timely communication between the stakeholders while ensuring zero privacy incidents. While the biggest advantage of on-boarding Airtel IQ for Rapido has been the expansion of its partner network without any privacy or integration incidents, leveraging Airtel IQ, which is natively supported by Airtel telecom network, Rapido has also been able to:

- Provide better experience to all stakeholders due to wider network reach and stronger connectivity
- Improve delivery process efficiency due to 99.9% network uptime
- Gain confidence of both customers and partners on service reliability
- Ensure 100% privacy on every transaction

Moving forward

As a platform, Rapido is well equipped to be able to pivot to new businesses quickly as long as it involves managing supply and demand within the mobility and the logistics space. It has a long-term vision as well. "Just the way UPI has become the popular standard for transferring money, our north star vision is to standardize the logistics application programming interfaces (APIs) so that Rapido becomes the platform of choice for anyone who wants to leverage the platform as a service for mobilizing either things or people," said Srivatsa.

BITCOIN BOOMS GLOBALLY, BUT GOES BUST IN INDIA?

It is curious that just when cryptocurrencies are seeing their greatest run on the global stage and blockchain looks set to deliver in the post-Covid world, the Indian government is looking to ban Bitcoin and other digital currencies like it

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These have been heady days for Bitcoin. Created in 2008 and launched in 2009, a developer paid 10,000 Bitcoins for two Papa John's pizzas in 2010. (Today those Bitcoins would be worth cool half a billion dollars, talk about inflation!) Non-profit organization Electronic Frontier Foundation started accepting Bitcoin payments in 2011. In 2012, TV serial The Good Wife saw an episode titled:Bitcoin for Dummies.

In 2013, a US government agency first seized

Bitcoin in a drug case. In 2014, casinos and online games started accepting Bitcoins and in 2015, Coinbase raised $75 million. The Japanese government recognized cryptocurrency in 2016 and in 2017 it got the ₿ symbol. 2018 saw the cryptocurrency bubble while the number of Bitcoin ATMs crossed 5000 in 2019.

2020 was the Covid Year and saw a Great Reset. Stalwarts stumbled and newbies thrived. Rapid digitization and collaboration became running themes. So what would happen to Bitcoin? Would it go boom or bust? Surely it wouldn't stay the same! In 2020 from February to March it crashed from a near 10K to an almost sub-5K. Many thought it was finished, but since then its rise has simply been stunning.

Bitcoin regained the 10K mark in May and smashed through the 25K ceiling by the end of 2020. 2021 would be even more momentous with it crossing the 50K mark and it breached the trillion dollar mark in terms of total worth. First we had trillion dollar economies. Then we had trillion dollar companies and now we had a trillion dollar cryptocurrency.

Of course there have been many factors for its spectacular rise. For one, the post-Covid world seems to be going totally in the digital direction and people seem ready for cryptocurrencies, not just a select few aficionados. Hedge funds have shown interest in it and banks are considering them as assets. Investors have made great returns on this investment in the last year or so.

Paypal said it would allow its platform to use Bitcoin. Of course the biggest news came when Tesla bought $1.5 billion worth of Bitcoin and it may be possible to buy one of their cars in the future with that cryptocurrency. Elon Musk has a Midas touch and he seems to have blessed a Bitcoin which was already on the rise. Musk even called Dogecoin "the people's crypto" and even that got a boost. While Twitter CEO Jack Dorsey jumped on board, there's now talk that Apple may buy Bitcoin.

Curiously amidst this high, the Indian government is heading toward a complete ban on cryptocurrencies and may give a transition for Indians to get out of their holdings. The talk is that forget investing and trading, even mining would be banned. All this comes at a time when thousands of cryptocurrencies are being traded all over the world. The Manmohan Singh Ministry had cautioned against its usage and in its first term, the Narendra Modi government had said that it would not be legal

The India Story

2012-13: Interest and investment in cryptocurrency starts taking off.

2016: Demonetisation leads to a greater interest in Bitcoin.

2018: Government says Bitcoin is not legal tender and wants cryptocurrency out of official transactions as a crackdown begins.

2020: The Supreme Court gives some relief to cryptocurrency use.

2021: The government indicates a total ban with a grace period to phase out those who have crypto assets. The Reserve Bank of India to come out with its own digital currency.

tender. After that the Supreme Court of India did give it some respite.

But now we are looking at an outright ban. This is all part of the Cryptocurrency and Regulation of Official Digital Currency Bill, 2021. The Reserve Bank of India is thinking of coming out with a digital currency, which is great. However the very purpose of blockchain, cryptocurrency and Bitcoin is to decentralize and empower the people. The RBI should come out with a digital currency but it should compete with Bitcoin and the latter being banned is retrograde. In fact after this news came to light, people tried to trend #IndiaWantsCrypto on Twitter.

All financial systems depend on the interdependence of countries, companies and currencies. Bitcoin has been accepted by almost all the world and India's efforts to step out of it may prove counterproductive. If it goes ahead then it will join a very small club of countries like Nigeria which think along those lines.

Digital currencies. Virtual currencies. Cryptocurrencies. A great shift by the financial systems to the online world was underway, further accelerated by the Covid crisis. It would be a wiser strategy to experiment with and then embrace all the digital tools available at our disposal.

WHEN MAKE IN TECH INDIA REALLY TOOK OFF

The Y2K crisis led to the Indian IT services revolution and after that we have made great strides in tech R&D with centres mushrooming all over India. But after the Covid crisis, it seems that Make in Tech India has come of age

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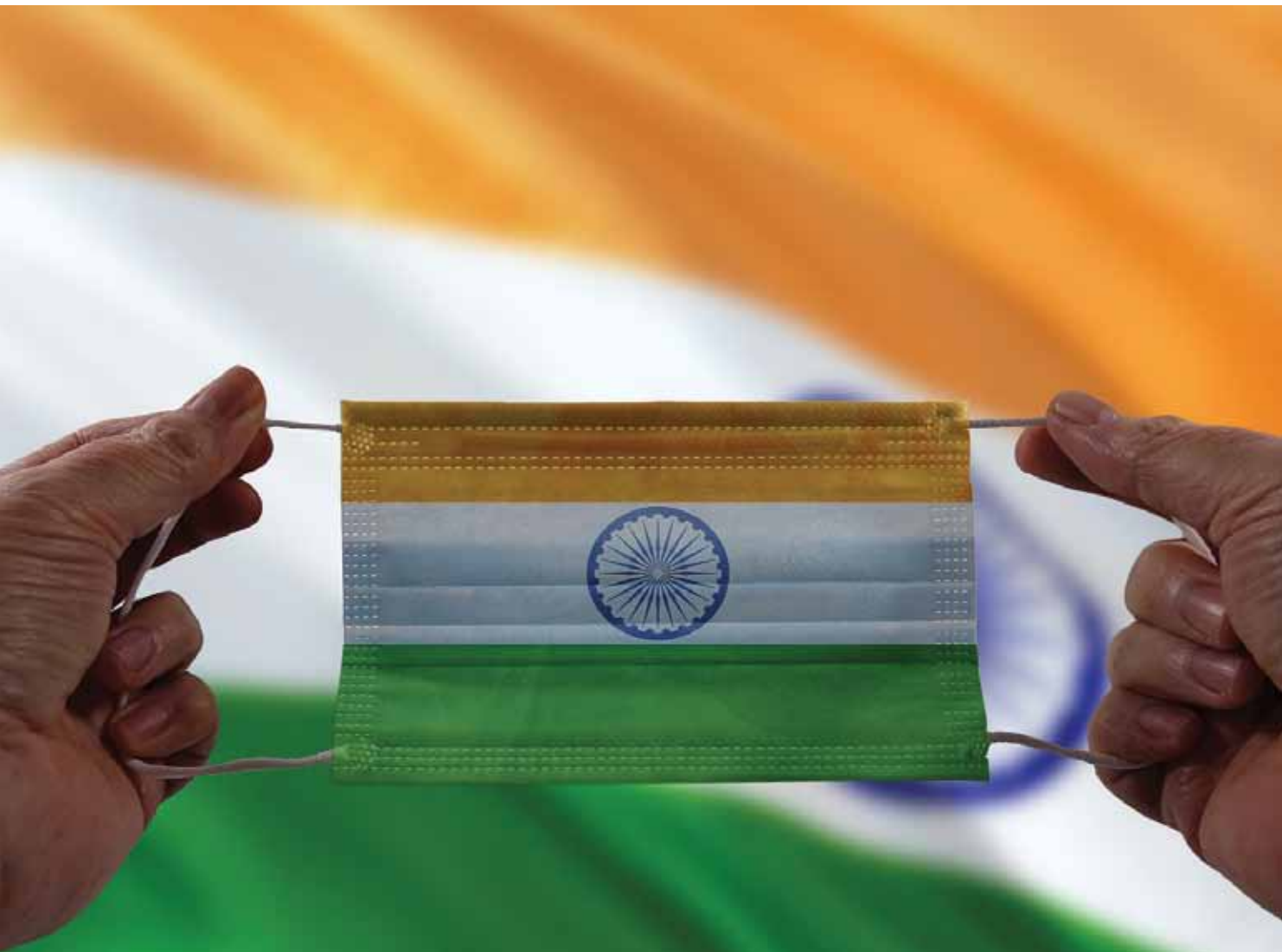
While the Make in India scheme was launched way back in 2014, off late it's really taken off when it comes to Tech India. 2020 was a landmark year when India replaced Vietnam as the second largest producer of mobiles in the world and is now in competition directly with China. Samsung, Vivo, Micromax, Xiaomi and Spice Group stepped up on the count and we also got HMD Global (Nokia) and Wistron (HTC, Motorola, Blackberry).

Qualcomm's Design in India and the MSME-Samsung Technical Schools are some of the other initiatives. The crowning news came when it was announced that even the iPhone would be made in India. The Covid crisis led to the world being less dependent on the China supply chain network and that's where India has the maximum opportunity. We are way behind in terms of mobile exports and we have to catch up on that front though.

Another win was Tesla, which has emerged as the most valuable auto company in the world. If the future is electric vehicles, then Elon Musk's vision is very important for India. While they had shunned this country for years, Tesla has finally come good. Tesla has registered in India, will come out with an R&D centre in Bengaluru along with a car manufacturing unit in Karnataka. Close on its heels, Amazon announced that Fire TV stick devices would be made in India and more consumer products would follow. Foxconn will play an integral role in many such manufacturing plans. Amazon is also going ahead with its $2.8 billion cloud plan for India as we get our second AWS cloud computing region, and we are heading to be the most important outside the US.

Previously the government cleared ₹12,195 crore Production Linked Incentive norms over 5 years for the telecom and network equipment manufacturing. We are looking to push both 4G and 5G equipment with a focus on the Internet of Things or IoT devices. Both Jio and Airtel said they can come out with 5G services by the end of this year or the beginning of the next one. The ball is in the government's court when it comes to 5G auctions.

After that the government also came out with a 4-year ₹7,350 crore PLI for IT hardware and this will cover things like servers, PCs, laptops and tablets. As per the official statement: It will lead to production valued at ₹3.26 lakh crore with exports valued at ₹2.45 lakh crore. The combined direct and indirect revenue is expected to be in the range of ₹15,760 crore and the time period will also generate 1.8 lakh jobs.

Betting big on the 2020s

In the 1960s, we made great advances in agriculture as the Green and White Revolutions showed. After Liberalization, the 1990s saw the rise of IT & Telecom. In the 2000s, it was IT Services and Big Indian Pharma. In the 2010s, India greatly focused on its infrastructure because without roads and electricity, you can't even dream of Industry 2.0 let alone 4.0

The Covid crisis reduced the world's dependence on the China supply chain. Meanwhile local manufacturers are stepping up and the Government is pushing all sorts of schemes really hard and cracked down on Make in China. 2020s could well be the decade of Digital India.

Something to also look at is social networking newbie Koo, which won the Atmanirbhar Bharat App Challenge. It has crossed 4 million users. That's still small compared to the billions that Facebook has. But then again Twitter India is 17-18 million. If Koo can get even half of that, it will be a serious challenger now that many Central ministers are pushing it. We could go the China way and have many local apps which are huge even though they do not have a presence in any other country.

There are other small things like allowing local players to get into the mapping business. Flipkart backed MapMyIndia and ISRO are getting together for one such venture. Couple this with the Indian GPS satellite plan and we may no longer need Google Maps in the distant future.

Finance Minister Nirmala Sitharaman presented a paperless digital budget from a "Made in India" tablet device this year. The budget also looked to enhance digital payments and framing policies for building data parks. The government has presented the The Cryptocurrency and Regulation of Official Digital Currency Bill, 2021 to "Create a facilitative framework for creation of the official digital currency to be issued by the Reserve Bank of India." That should be interesting.

While 2020 was a great year for Make in Tech India, 2021 could prove to be even better.

PRESENTING THE BIG 4 OF INDIAN RETAIL

Consolidation is the name of the game and the Indian retail scene is no different. It doesn't matter if its offline or online, every top retail giant has ambitious plans for dominance

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There are two things to note in Indian retail. One is that the mom and pop stores will survive. That much is clear. But there is not much space in the middle. Consolidation is happening in a big way at the top and soon we will be left with only the large players. Secondly, going ahead in the future, it's quite easy for an offline giant to get into ecommerce or an online giant to open retail stores if it wants to. In fact that's why many mergers in the world happen to be an online-offline marriage.

Flipkart was founded way back in 2007 and was one of the first success stories of the Indian startup and ecommerce worlds. In 2018, Fortune 500 giant Walmart acquired a controlling stake in Flipkart. Sachin Bansal's exit made him a multi-billionaire. Flipkart's acquisitions of Myntra and PhonePe made it a force to reckon with.

Amazon is a lone wolf, a FAANG company and in the year that Walmart acquired Flipkart, it crossed a market capitalization of one trillion dollars. It entered the India market in 2013. Amazon India is growing at a great pace in India, opening up fulfilment centres all over India and also has the world's largest Amazon office outside of America in Hyderabad.

While Flipkart and Amazon were the stories of the 2010s, there appears to be much more consolidation in the 2020s. Big Bazar is one of the oldest players in the block founded way back in 2001 and it has hundreds of stores all across India. On the other hand, Reliance has developed really big global ambitions in the last few years. It is positioning itself as a tech company and has gone for many IT acquisitions. Jio has been a huge success story and with 5G will go on to power smart cities. While there's already Jio Mart, Reliance acquisition of Big Bazar is creating a retail giant. While Amazon has taken them to court over a technicality, Reliance will probably prevail in the long run.

Bigbasket was formed in 2011, but it really took off after the Covid crisis broke out. The lockdown led to a huge spike in people ordering groceries at home. Overall ecommerce really got a boost in India. Meanwhile another giant, Tata, has been big in offline retail (Westside, Croma, Landmark) and pushing its ecommerce brand Tata Cliq. They also announced that they were working on a super app. Now the Tatas are taking over Bigbasket and probably the consolidation at the top is complete.

Reliance & Tatas as the desis.

Amazon & Walmart as the videshis.

These are the Big 4 of Indian Retail.

CLOUD FOR SMALL BUSINESSES: SMBS CAN TAKE ADVANTAGE OF COMPETITION BETWEEN BIG GIANTS

In 2021, majority SMBs are expected to move to the cloud. They want to know how cloud services can help them improve their business in an era where software as a service (SaaS) has become predominant and successful

RS Maan

Forming the backbone of every country's economy, small and medium businesses (SMBs) have their own unique thought process and decision-making ways. They use different data points to drive digital transformation and bringing new changes in business. This is primarily because SMBs undertake new endeavours when they feel the need for it. Since cloud plays an important role in digital transformation, SMBs are transitioning to the cloud.

Cloud computing holds promise not just for the large enterprises. On the contrary, it has proven to be one of the breakthrough technologies that is equally, if not more, accessible to the small and medium sized enterprises. This effectively removes entry barriers for small business owners and provides a levelled-playing field to the maximum extent possible.

Cloud computing enables easy access to business applications and data from any part of the world, at any hour and on any device. These services are cost-effective as compared to hosting servers in-house. According to survey conducted by Gartner, over 60% of SMB owners will take to cloud services for hosting data by the year 2022. Therefore,there is a huge opportunity lying untapped for cloud providers in SMBs, beyond large enterprises. SMBs are unique in nature and more dynamic than the consumer and big enterprise markets. And many of them are already taking to cloud for the fulfilment of their requirements and business success.

Cloud Servicesfor SMBs: Outlook for 2021

In 2021, it is expected that majority SMBs will be moving to the cloud. They want to know how cloud services can help them improve their business in an era where software as a service (SaaS) has become predominant and successful.

Some major benefits that cloud can offer to small businesses are:

1. Reduction in Costs

For an SMB, SaaS offers cost-effective rates. The nature of cost-reduction will vary depending on whether the solution offered is on-premises or outsourced, but it is sure to bring in a lot of savings.

2. Flexible Access

Cloud computing provides flexible access to all employees of an organisation. Upon creating a unique user on cloud solutions, the employee can then access it on the cloud through multiple devices. This way employees can access work from office,

home or even when on the move, be it through their smartphone, laptop or tablet. This also helps enhance the productivity of employees.

3. Improved Security

Cloud stores and maintains all data in a central location, whether in a CSP or within house. This makes it administratively much more convenient to protect database that is centralized from cyber thefts, as compared to storing data across multiple devices.

4. Efficiency & Scalability

Cloud servers centrally store the data and are superior in performance. Additionally, productivity applications and software are operated over the cloud. So, the overall efficiency of the company doesn't get affected even if the devices become obsolete. Similarly, when a small-sized business plans to expand its operations, it becomes easier to do over cloud network. It is also faster and cost-effective. For the purpose of scaling up, all that needs to be done is create new users over the cloud network.

5. Remote Work

Cost-related efficiencies are one of the primary competitive advantages that SMBs offer. As they have a paucity of resources, most small sized businesses are constantly looking for ways to cut down on extra expenses. Cloud computing solutions are reliable for serving as a seamless platform for remote work for the employees of a company. And SMBs can save huge costs by taking to cloud platforms.

The big giants are competing for a greater market share in the cloud computing space. In this scenario, SMBs can gain big advantages from this competition. They can benefit from the experience of these large enterprises and also leverage offers such as free credits, GTM programs and discounts, that come as a package from cloud providers. As OEMs are competing for market shares, the ball is in the SMBs' court to benefit from this ongoing battle.

Summing Up

In the times to come, SMBs will continue to grow alongside the big giants owing to the benefits that cloud services offer. Digital automation is improving human productivity and so we are witnessing SMBs moving to the cloud every day devoid of any increase in their expenses and without any in-built teams to help them manage the cloud.

The author is Managing Director and Global Chief Revenue Officer, Codleo

HOW MANAGED SERVICES ENHANCE BEST PRACTICES FOR IT

Managed Services were essentially a response to complex problems that emerged unforeseen in various stages over the lifecycle of evolving systems. Born alongside expanding IT networks and infrastructures, Managed Services bring hard-learnt lessons and global best practices to adopters

Avishek Chakraborty

Managed services is the term for when a company partners with a third-party service provider to handle the complete operations of an aspect or department within the company, in most cases these are IT related services. In the age of exponential growth, the quality of IT infrastructure and IT proficiencies can make or break a business. Managed Services were essentially a response to complex problems that emerged unforeseen in various stages over the lifecycle of evolving systems. Born alongside expanding IT networks and infrastructures, Managed Services bring hard-learnt lessons and global best practices to adopters.

Here we explore some broad aspects of the efficiencies that Managed Services bring to IT:

A complete Product Team in your reach without the management strings to pull:

Managed Services are backed by a team which adopts the Product Team Model – comprising of professionals who are adept at everything that goes into building, deploying and running a product. Members cover the gamut of expertise from Business Analytics (BA), Development, Quality Analysis (QA), DevOps as well as Support & Maintenance.

The client company would usually require considerable resource allocation and possibly face existing workflow disruption in taking up a given endeavor. In these cases, Managed Services comes to the rescue, taking on the project from solution ideation (BA), implementation (Development), testing (QA) and deployment (DevOps) to ongoing support & maintenance.

Proactive Approach to identify and solve potential issues before they arise:

The managed service teams know the product in and out and monitor functions, changes and updates on a day-to-day basis, scouting for any bugs or roadblocks beforehand rather than being resigned to react to issues once they arise.

This saves organization large amounts of downtime and potential revenue and productivity loss, while ensuring optimal experience for the end-customer. Several periodic custom reports ensure that everyone concerned is aware in time of anything that may require their attention, or merits innovation.

With power (ownership) comes responsibility, that is shouldered mightily:

Nurturing a project from initiation to operation and iteration, conveys a sense of ownership to managed service teams, which is answered with empowered innovation. There are no piecemeal fixes, nor 'it's not going to be my problem tomorrow' attitude. The solution doesn't end at a ticked checklist item, it is about ensuring that desired business, operations and customer goals are met, thresholds raised and continually optimized.

The highly-demanding nature of such asks results in building and deploying of several innovative custom utilities, tools and automation processes to overclock efficiency and simplify tasks. Said utilities then become part and parcel of the IP & working culture of the client, helping in consistently doing more with less.

Flexible, Always-Available, On-Demand Service:

With so much invested in each account, clients are evermore precious for Managed Service providers. Client retention requires catering to ad-hoc requirements with full-fledged zeal and top-notch quality.

For instance, a client may need analysis of Supplies vs. Orders/ Inventory vs. Demand/ Logistics & Distribution route optimization etc. to meet sales targets, reduce costs, extend serviceable geographies or prepare for peak season; at very short notice. Managed Service providers rise up to the challenge of ensuring and demonstrating the ultimate usefulness of their work in such decisive moments, as well as remain flexible to adapting towards evolving business needs.

Automating all that can be automated:

Managed Services in many respects revolve around automating IT and even operational or administrative tasks wherever feasible. Remote Monitoring & Management (RMM) keeps a tab on critical tasks like diagnosis, alerts and performance analysis, controlling and effective reducing future occurrences of bugs and issues. Tools like Auto Fluence help optimize effort expenditure through various intuitive dashboard interfaces like Snapshot, Exceptions & Time Series – revealing various data streams in a single place, bypassing multiple application log-ins. Jmeter is employed for Regression Testing and Performance Testing, to test applications under a given load, besides testing the functionality and workflow. Each time a new functionality or feature is released, Automation Scripts can be run to ensure a seamless release.

Professional Services Automation (PSA) takes the bulk off administrative tasks such as transaction logging, billing, numerous protocols of customer account management and so on. RMM & PSA are often integrated for smooth coupling and further enhancing mutual efficiencies.

These practices help reduce repetitive tasks, reduce costs, eliminate the scope of manual errors and ensure quality, while freeing up your workforce for more challenging and enriching tasks.

In the wake of COVID-19 induced disruptions across all walks of life and work, Managed Services can help you chart a safe course to recovery, by digitizing and automating many aspects of IT, controlling cost & time expenditures and directly or indirectly ensuring better customer experience and retention.

The author is Director of Managed Services, Acuver Consulting

2020 SAW THE "CLOUDIFICATION" OF WORK

Sushant Rabra, Partner KPMG, talks about the cloud, digital transformation and the changes taking place in the technology space as a result of the Covid crisis and subsequent lockdown

PCQ Bureau

2020 saw the "Cloudification" of work

1:31 / 22:52

Said Sushant: "Organizations realized that the work delivery is happening beyond their premises, sometimes beyond organizational boundaries, in a virtualized setup. The work could get delivered in a satellite office or at somebody's home or from the client's office and get stitched together through digital platforms. The nature of work delivery itself moved to what we call as "cloudified" work delivery."

He added: "Cloud-enabling layer saw significant impetus and adoption in the last one year. A lot of clients who were still sitting on the side, looking at whether to adopt it or not, actually took that decision. Whatever cloud journeys they had planned for say 18-24 months got accelerated."

Click to check out the complete interview…
🖐 https://www.youtube.com/
watch?v=UGFEcTVu8EM&t

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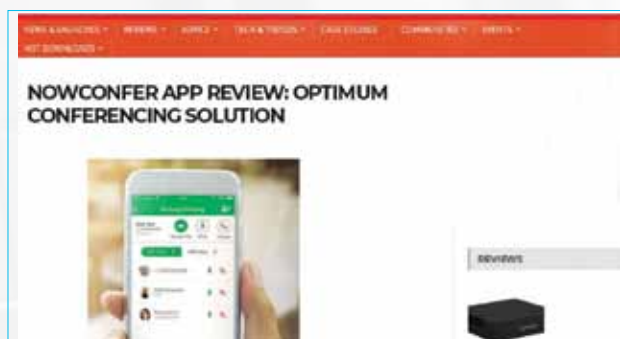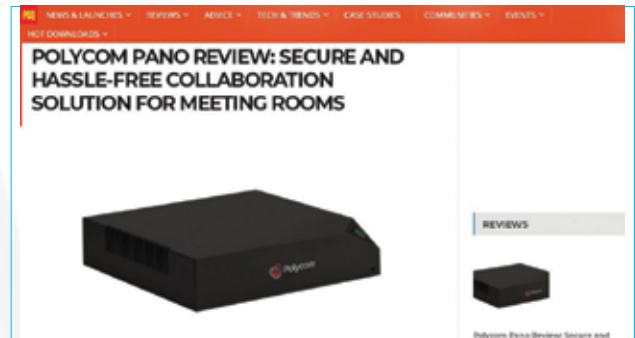
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NOTEBOOK

ASUS EXPERTBOOK P2451

— Ashok Pandey
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The pandemic has changed the world, now most of the professionals are working from home and their best companion is a powerful business machine. Asus brings ExpertBook P2451, a slim and light business laptop, upgrade over the previous-gen (P2440).

I have been using the ExpertBook for the past few weeks, so, herein we'll see how it performs in the real world.

Build Quality

The notebook is built with aluminium alloy, which makes it light as well as strong. Graded with MILSPEC 810-G certification, it is durable enough to handle accidental drop and spills. It has a thin profile of only 19.9mm and weight around 1.5 kg. It can be easily carried around in a bag or hand.

It got a matte finish on the top which gives a premium look and protects from fingerprints and smudges. Asus uses ErgoLift hinge that can lie back in 180 degrees.

14-inch FHD display

The slim and light laptop has a 14-inch FHD screen, but that's not meant for content creators. The screen is fine but not what a professional would like to work upon. It comes with colour accuracy (only 46% sRGB), average brightness level (~190 nits) and a contrast ratio of 70:1.

The black images go faint on it, from any angle you can try for that. Being a business laptop, it should have an FHD with wide viewing angles but again disappointing. Even if you slightly turn the screen left or right, the image goes dull.

Performance

Packed with powerful specs, the ExpertBook is a fast laptop with more than enough performance for the average professional tasks. While using the PC for more than a month, I run various applications which we typically use to perform our day-to-day tasks. No doubt, it manages all the applications perfectly without any performance lag while surfing the Internet, watching videos and playing games.

It is built to deal with even more heavy applications, thus I loaded it with various high graphics-intensive apps, including Adobe Suite. We opened two chrome browser with 10 tabs in each with applications like MS Word, Excel and Adobe Photoshop and Premiere. While operating the machine with all these applications running on the background, we didn't notice any performance lag. We were able to switch between applications.

I used the PC to edit various images as well as videos. Also, I run some games that consume a whole lot of power, such as and games like Shadow of Mordor and Thief. Though it's not a gaming machine, yet these games can help us to understand the real-world performance when a professional will use it with high graphics-intensive applications. The laptop did well, in terms of gaming performance as well. I didn't see any visible lag while playing games.

Further, I opened 10 Tabs in Chrome and Mozilla, MS Word, Excel, PPT, etc, plus run Adobe Photoshop, Premiere and CS. Even then

Price: Starts at ₹58,697

Overall: 8/10

SCORE

PRICE: **9**/10
PERFORMANCE: **8**/10
FEATURES: **8**/10

KEY SPECS:

Intel Core i7
NV-GeForce MX110
14-inch FHD display
Windows 10

PROS: Build quality, performance, battery life, slim and light
CONS: Display

there was no noticeable performance. We edited a sample video and rendered that then switched between apps, still no performance lag. But going beyond that with two browsers with 10 tabs in each and other productivity apps, we notice a little performance lag.

The laptop has a giant 3 Cell 48W Lithium battery that provides more than 8 hours of battery backup when on moderate usage. With some heavy usage, you can get over 4 hours of battery life while with heavy graphics usage it can last for over 3 hours. While using the Imtec Battery Mark it resulted with 2 hours 30 min, which I can expect when using 100 per cent CPU.

The ExpertBook holds a webcam with physical privacy shutter as most of the new business books. It also comes with SensePoint nub that works great. The keyboard is a joy to type on, and it's backlit. The speakers are fine, but not very loud. There's also a fingerprint sensor.

Bottomline: ASUS ExpertBook P2451 is priced well and offers enough power juice to run various applications simultaneously. It could have been a perfect machine for professionals but the screen disappointed with its bad colour reproduction and viewing angles.

NOTEBOOK

LG GRAM 17 (17Z90N-V)

— Ashok Pandey
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The LG Gram 17 mobile office laptop comes with a huge 17-inch screen. Despite having large screen LG kept it light and thin, only 1.350 KG weight and 17.4mm thick. At the first look, it gives me impression of being a heavyweight laptop, but it feels featherlight when I pick it up. But what about durability and performance? Let's check out —

Build quality

LG Gram 17 has an elegant design and slim case built out of magnesium alloy which keep is lightweight and enhances the durability. The dark silver-grey case has a smooth matte surface that is not at all susceptible to fingerprints. Despite having 17.4 mm thickness, it looks sleek. There are no noticeable sharp edges. The hinges allow to open the screen up to 140 degrees and it holds the display tightly in position.

17-inch Display

The 17-inch screen IPS display with 16:10 format and offering a native resolution of WQXGA (2560x1600p). It has a contrast of 1077:1 and brightness of 354 cd/m². The screen delivers vivid colours and clear imagery without any distortion at any angle.

Working on the screen is pleasure, with its superb colour reproduction. Text appears sharp and viewing any video or image remain steady even from any angle. But the reflective display surface, make it difficult usually in outdoor conditions.

One thing which I missed with the LG Gram is touch capability which we can find with most of the Windows laptops at this price.

Keyboard, touchpad, speakers and fingerprint sensor

The notebook has an illuminated chiclet keyboard. It has 16 mm keys that offer a short stroke and a clear pressure point. Keys have a smooth surface and when you type on it, keys bounce slightly. Overall, it is a comfortable keyboard suitable for daily typing tasks. The power button comes with a fingerprint sensor which enables secure and smooth logins.

The touchpad is about 12 x 7.8 cm offering ample space for using gesture controls. The touchpad has smooth surface enabling you sliding over it easily. It offers a short stroke and a clear pressure point.

The Gram comes with 1.5-watt stereo speakers which are loud enough to watch movies and play games, but with almost no bass. The HD webcam is adequate for video calls and virtual meetings.

Performance

The Gram laptop comes with the latest-gen Intel Core i7 CPU with integrated graphics Intel Iris Plus, 8 GB RAM, and 512 GB SSD. The combination gives you enough juice to handle most of the day-to-tasks. But when it comes to graphics performance, it might struggle with some high-graphics intensive applications.

While browsing the internet and working on daily productivity apps, I didn't notice any performance lag. It was super smooth to switch between the apps and work on the PC even for longer hours while using the PC for more than a month. Though it's not built to deal with heavy applications, yet I loaded it with various high graphics-intensive apps, including Adobe Suite. We opened two chrome browser with 10 tabs in each with applications like MS

Price: ₹105999

Overall: **8/10**

SCORE
PRICE: **7**/10
PERFORMANCE: **8**/10
FEATURES: **9**/10

KEY SPECS: Intel Core i7 CPU, 8 GB RAM, Intel Iris Plus Graphics, 512 GB SSD, 17-inch WQXGA (2560 x 1600), Intel Wi-Fi 6 AX201, Bluetooth 5.0, HD Webcam, Lithium-Ion (80W) battery

PROS: Lightweight, sturdy, long battery life, decent performance

CONS: Expensive, lacks at heavy graphics performance

Word, Excel and Adobe Photoshop and Premiere. While operating the machine with all these applications running in the background, we didn't notice any performance lag. We were able to switch between applications. When I used the Adobe Premiere for video editing, it was able to handle the application however the rendering time was a bit higher compare to Asus ExpertBook P2451.

Also, I run some games that consume a whole lot of power, such as and games like Shadow of Mordor and Thief. Though it's not a gaming machine, yet these games can help us to understand the real-world performance. The laptop did well, but yes I missed a discrete graphics in it.

Further, I opened 10 Tabs in Chrome and Mozilla, MS Word, Excel, PPT, etc, plus run Adobe Photoshop, Premiere and CS. There was no noticeable performance, just a little delay when switching between apps.

LG Gram comes with a giant 80Wh battery that gives you juice to run for more than 12 hours with daily productivity. With some heavy usage, you can get over 7 hours of battery life while with heavy graphics usage it can last for over 4 hours. While using the Imtec Battery Mark it resulted in 3 hours 37 min, which I can expect when using 100 per cent CPU.

Bottomline: Having a large 17-inch screen, the laptop has good design ethics and perfect for mobility. With a good combination of hardware and giant 80-Wh battery, LG Gram is a good choice for frequent travellers but comes at a higher price point.

SSD

SEAGATE FIRECUDA 120 SSD

— Ashok Pandey
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Seagate's FireCuda series of SSDs are built for gaming, speed and endurance. Whether you want to upgrade your existing PC or building a beast for gaming, the FireCuda 120 SSD is built with SATA 6 GB/s interface to enhance your PC performance.

Features

The 2.5-inch FireCuda 120 SSD claimed to deliver sequential speeds up to 560MB/s read and 540MB/s write, while random speeds are slated to deliver 100,000 IOPS read and 90,000 IOPS write. The SSD comes with 1.8M hours MTBF, with 1400 of Total Bytes Written. You also get Seagate's SeaTools to monitor drive health, performance, and firmware updates.

Additionally, FireCuda offers three years of Rescue Data Recovery Services with 95% success rate against unexpected data loss.

Performance

To test what Seagate claims, we added the SSD on our test bed (Intel Core i7 CPU, 8 GB RAM, Windows 10 OS and Cooler Master 350 Plus).

Running the synthetic benchmarks, to identifying the key strengths and weaknesses of a drive. It performed really well on Crystal Disk Mark (sequential) and resulted in 182.03 MB/s read and 156.87 MB/s write speed.

Using the HD Tune Pro, it delivered maximum and minimum read speeds of 162.3 MB/s and 153.5 MB/s respectively.

The AS SSD benchmarking (sequential) was also splendid, 174.93 MB/s read, 146.02 MB/s write.

Using the copy benchmark, it delivered –

ISO 126.71 MB/s speed
Program 102.11 MB/s speed
Game 137.44 MB/s speed

In our random test in which we transferred the assorted 5GB data (Video, PDF, Word and other files) from our HDD drive to the Seagate SSD, it took only 1 min 02 sec. While transferring the same data from drive to PC drive it took about 1 min 11 sec. On the other hand, when I transferred the 1.2 GB movie to the drive, it took only 10 sec which is similar to the last drive.

To test its real-life performance, I installed Windows 10 on this

drive and added all the essential software including Adobe Photoshop, MS-Office, etc. The boot time of the machine was boosted from 20 secs to 09 sec. While working on the PC, we experienced faster processing and app loading as well.

The SSD is built for professional and gaming enthusiasts, so we installed some of the high graphics-intensive games on the machine such as Thief and Need for Speed games. The gaming operation was quite smooth with great rendering and amazing performance. Playing games like 'The Hobbit' was an amazing experience on the machine using the drive. It boosted the rendering speed as well as the enhanced overall gaming performance.

Bottomline: Seagate FireCuda 120 SSD is a perfect fit for gamers with good overall performance, but available at a higher price.

Price: Starts at ₹27,999

Overall: 8/10

SCORE

PRICE: **7**/10
PERFORMANCE: **9**/10
FEATURES: **8**/10

KEY SPECS: Capacity - 1TB, Interface - SATA 6 Gb/s; Form Factor – 2.5-inch SATA; Sequential Read/Write - Up to 560 MB/s Read, Up to 540 MB/s Write

PROS: Overall performance, perfect for gaming, bundled tools

CONS: Pricey

AMD

**INDIA'S
MOST TRUSTED BRAND**
TRA's Brand Trust Report – India Study 2020

Power of Trust

Dell EMC VxRail™now powered by AMD EPYC™ processors

Built for VMware®, with VMware, to enhance VMware, VxRail is the easiest way to deploy vSAN.

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