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Spot On

How one mid-sized logistic company's
technology-leveraged model helped it
quickly get back to normalcy—
post COVID disruption?

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The not-so-discreet New Normal



The COVID-initiated changes are as much about changes in the way we do business as they are about changes in the way we think about it

Shyamanuja Das

We have done a cover story on a company's technology journey after a long time. Though the cover text has explicit reference to the extraordinary situation created by the pandemic, the story is mostly about the technology journey of SpotOn Logistics, a mid-sized B2B express logistics company, which helped the company sail through the situation.

Yes, it is not much about the 'responses' to the pandemic. All of us have discussed enough of that. And they all sound similar – connectivity, secure access, collaboration, contactless...some of that you would find in this story too. But that is very little.

There is one reason why we picked up this company. Here is a company, which was not a greenfield, but which was beginning a new journey and was willing to challenge the biggies leveraging what we love the most – technology. Every aspect of its business leverages tech fully. But what we really loved most was the way it had integrated data-based decision making into every aspect of business and using AI/ML to get the best out of data. If you have to read only one part of the story, please read the section on how it uses data and analytics.

Once you build that ability to get and analyze data at granular level, taking any decision is easier—be it on next business opportunity or how to respond operationally to a new change. The COVID-initiated changes are as much about changes in the way we do business as they are about changes in the way we think about it.

I think, that is the elusive New Normal. Initially, all of us had thought this phase would pass away and we would see a new stability, which will be very different from the pre-pandemic stability, which we called New Normal and behaved in a manner that the current phase is somehow a transit phase. But that post-pandemic stability, is nowhere in sight.

But we are carrying out all our regular activities—there is IPL, there are festive sales, there are celebrations. We are doing everything without too many people gathering at one place. I think we are already in that New Normal.

It started for many with the COVID and for many others like SpotOn, well before that. It is continuing. And it will continue well after the virus goes—or becomes ineffective. ■

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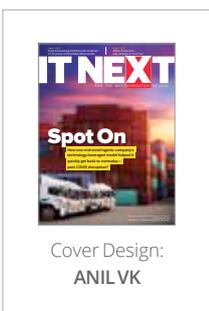
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MANAGEMENT

Managing Director: Dr Pramath Raj Sinha
Printer & Publisher: Vikas Gupta

EDITORIAL

Editorial Director: Shyamanuja Das
Assistant Manager - Content: Dipanjan Mitra

DESIGN

Sr. Art Directors: Anil VK, Shokeen Saifi
Associate Art Director: Shri Hari Tiwari
Sr. Visualiser: Baiju NV

SALES & MARKETING

Executive Director - B2B Tech:
Sachin Nandkishor Mhashilkar (+91 99203 48755)
Associate Publisher & Director - Community:
Mahantesh Godi (+91 98804 36623)
Associate Director - Enterprise Technology:
Vandana Chauhan (+91 99589 84581)
Head - Community Engagement:
Vivek Pandey (+91 9871498703)
Head - Community - NEXT100 & CIOs:
Megha Bhardwaj
Community Manager - B2B Tech: Renuka Deopa
Senior Manager - Community Development:
Neelam Adhangale

Regional Sales Managers

South: BN Raghavendra (+91 98453 81683)
West: Shankar Adaviyar (+91 9323998881)

Ad Co-ordination/Scheduling: Kishan Singh

PRODUCTION & LOGISTICS

Manager - Operations: Rakesh Upadhyay
Asst. Manager - Logistics: Vijay Menon
Executive - Logistics: Nilesh Shiravadekar
Logistics: MP Singh & Mohd. Ansari
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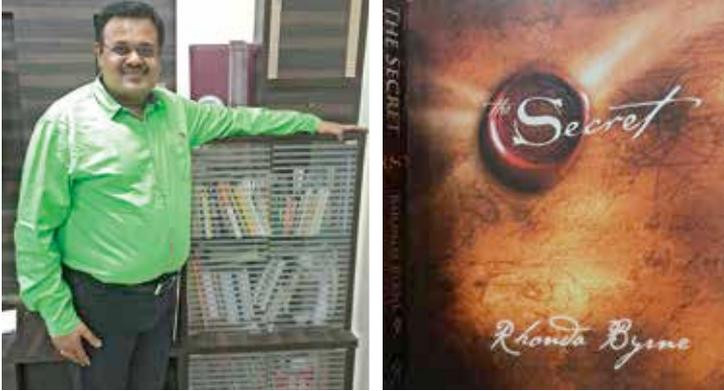
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Books maketh the man: Reading books can help you achieve your goals

Book - A Man's Best Friend

NEXT100 Winner 2017 **Dharmesh Sanghavi**, General Manager - IT, Bajaj Consumer Care shares his immense passion for reading books and how it has impacted his Life...

I developed reading habit at a very early stage in my life. I used to like books about the real world rather than fiction. I love reading books which either give a positive direction to life or a biography of some great personality. When I was in the 4th or 5th Standard, I used to request my father to buy books for me. Those days, we could buy old books (second hand) by weight. My father would buy the books and my mother gave them to me to read during school vacations. I spent hours reading books during school break. My sister

used to wonder how I could spend hours devouring those books. Reading helped me in my studies and in the development of faster reading habit at a young age.

I continued this habit of reading through college, but now it included newspapers too. After I graduated from engineering college, I travelled by the local trains of Mumbai and would buy the books sold in trains or at stations. These books were copies of original books and were quite affordable. I believe 'a room without books is like a body without a soul'. My interest in reading and collecting books led me to create a small bookshelf for myself at home.

One of my gurus recommended 'The Secret', the book is also available as a short movie. This book changed my life forever. I used the book to create a broad vision for myself in 2008. I noted 25 goals for my life, and you will be amazed to know that I have started fulfilling my goals at a much faster pace after using the 'law of attraction' mentioned in the book.

Whenever I travel within India or abroad, I have kept up the habit of picking up good books and adding it to my small library at home. Thus, I keep reading books of choice even today. Nowadays, in the digital world, people are comfortable reading either on Kindle or Tab, but for me physical books remain the medium of choice when it comes to reading.

Last but not least, 'books are a portable magic' and I suggest you too read books on the topics of your interest. You will become what you read as a book is a man's best friend. ■

As told to Dipanjan Mitra, Team ITNEXT



Dharmesh Sanghavi

Dharmesh Sanghavi is General Manager - IT at Bajaj Consumer Care. He has been a NEXT100 winner in 2017. He served in companies like Yash Birla Group, The Loot India, Planet M Retail,

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Subhiksha Trading Services, Harmony Distributors and Savex Computers. Sanghavi completed his BE in Computer Engineering from Mumbai University and holds a certification in PMP from PMI.



Playing badminton re-energises and calms after a long hectic day. It gives happiness.

The Joy Of Shuttling

NEXT100 Winner 2016 **Sandesh Rane**, Senior Manager - IT Systems, Mahindra & Mahindra shares his immense passion for badminton and how the sport has helped him in life

I can still remember those days when together with my school friends, I was genuinely happy hitting a piece of crumpled paper back and forth using our slippers and notebooks. Dirt on the rough street and sweat on our bodies have been our true companion.

Playing badminton has always been my stress reliever. It is the thing I do whenever I am happy, sad, in good or bad mood. Some ask me why I keep playing this sport despite a busy schedule. To be honest, I don't really know what it offers me specifically. The only thing I am very sure of is that my heart feels so excited and contented

when I am playing badminton. It is the perfect form of exercise which also provides me a huge amount of energy and helps me overcome anxiety and stress.

It has been 12 years since I started playing badminton again after school days. The restart was not so easy. The club where I go to play already had enough good players (I would say veterans). Getting a slot there was a challenge for me. At the club, I met numerous skillful badminton players. I watched them play and it gave me the boost to play better myself. I gathered a few neighbors from my society and formed an open court in our premises. Since I did not have proper training in badminton, I started YouTubing to understand some skills. I used to practice with friends late in the night after coming home from work.

Today, even though I do not have fundamental skills as yet, I have a permanent place in the club team and have started playing for the club at the district level.

Every time I play, I learn new techniques and trivia on how to improve my game. I have played with different players, approaches and games, which really is challenging.

Right now I don't consider myself as the best badminton player that I can be. I know that I still have to improve my game and gain more experience in the sport.

For me, it is important first, to know what you really love to do and second, things that you do not tire of doing every now and then. This could help us find people who are on the same wavelength as ours. They are the people in our life that we have a connection with. I have learnt that when you find your comfortable slot, you can feel the warmth of genuine happiness. Playing badminton will forever have a huge place in my heart.

And, playing is not just fun but also keeps us mentally and physically fit. ■

As told to Dipanjan Mitra, Team ITNEXT



Sandesh Rane

Sandesh Rane is Senior Manager - IT Systems at Mahindra & Mahindra. He is a NEXT100 winner of 2016. He has worked at Bridgestone India. He is a PGDBA in Customer Relationship Management from SIBM and Diploma

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in Mechanical Engineering from State Board of Technical Education and Training. He has a Harvard Manage Mentor Certification, and certifications in ITIL and Prince2 from Axelos Global Best Practice.

Spot On

A mid-sized logistics company that invested in digitization and AI to compete sees the investment paying off hugely in the post-pandemic scenario

By CIO&Leader

The advent of COVID-19 resulted in an unprecedented lockdown that kept getting extended and created an extraordinary situation. Businesses were impacted like never before. The level of impact could be gauged from the fact the Indian economy contracted by a quarter—its first negative growth since quarterly GDP data started getting published in 1996.

But despite the huge disruption, people and businesses had to carry on and life kept moving. Digital technologies have rightly been credited for making this happen. But not everything can be moved as bits. Food, essentials, medicines...they needed to be moved to sustain lives. With bits, atoms needed to be moved too.

While sectors like healthcare and pharma have been celebrated by common people for living up to the challenge, one industry that worked relentlessly in the background carrying the materials (the atoms) is logistics. Despite significant challenges, such as lockdown in many states, lack of manpower and manufacturing and retail getting impacted, the logistics industry had to operate for our lives to move on.

Interestingly, digitization itself came to the rescue. And those who had invested in it proactively worked more effectively and efficiently—by managing the lack of resources and extraordinary conditions really well.

One such story is that of mid-sized logistics company, SpotOn, which had not just automated significant parts of its operations, it had used advanced data analytics and Artificial Intelligence (AI) to optimize its operations, which came handy.

We explore the story in depth.

SpotOn Logistics is a mid-sized private equity backed B2B logistics company formed in 2012 after a buyout of Dutch logistics company, TNT's India domestic road express business. Abhik Mitra, the CEO of SpotOn was part of the acquiring firm, India Equity Partners, and was the erstwhile India MD for the unit within TNT. The company's estimated revenue is around INR 675 crores in FY 2019-20.

After acquisition, the new entity was called Startrek Logistics—it was renamed SpotOn Logistics four years later—with Mitra as its MD. Mitra was clear about one thing. To turn around the loss-making unit, he could not compete by being just another company, much smaller than the market leaders at that time.

SpotOn Network	
	Current
PIN Codes Served	22,000+
Locations Served	300+
Depots	13
Hubs	38
Routes Operated	337
Fleet Size	1,000+
Total Schedule Capacity	3,052 tonnes



“The way I see supporting business is in three buckets. There is engineering, there is classical IT piece and there is data. These are three pillars on which we run our business”

Abhik Mitra
CEO, SpotOn Logistics

Mitra was clear that the new company had to break some of the long-standing beliefs in the express logistics industry. And there was no doubt in his mind that the only way to achieve this was by leveraging data and using technology.

Even today, it is difficult to miss Mitra’s consistent reference to data and IT, while talking about any aspect of his business. One thing, however, is noteworthy for our readers: the clear distinction, not demarcation, between data and IT, in his mind.

“The way I see supporting business is in three buckets. There is engineering, there is classical



IT piece and there is data. These are three pillars on which we run our business,” says Mitra, adding quickly that “no one out of these could be or should be separated from the other.”

After investment by Samara Capital, the company only accelerated its digitization journey.

The Digital Foundation

Logistics companies globally have taken to technology for improving efficiency of their operations. Many Indian companies too have taken to digitization significantly.

Acknowledges Mitra, “There is some essential technology that companies like ours need for running the business. Not all of our competitors have that in place, but many have.”

“We want to deliver our goods on time and in perfect condition (no damage, no theft). This is the sole reason of our existence. Customers expect on-time consignment delivery. Consistency, predictability, reliability and information are all customers look for. From Day One, we have used technology to have control over all these parameters,” he says.

“From the time we pick up a consignment to we deliver a consignment, it is all done digitally,” says Mitra.

Pickups are either done through a web shipping tool, where the data is entered in the system auto-



matically or through a tab with a Bluetooth printer. Each box has a label, which is scanned at every touch point in the network. Many logistics companies still use manual routing labels, though that is changing. SpotOn claims 100% digitalized pickup and delivery including booking.

But pickup and delivery are only the visible aspects of the entire chain. There is a big world in between. Every consignment passes through four more touch points – Origin Service Center, Origin Hub, Destination Hub and Destination Service Center. At every touch point, there is a scanning system in place to keep track of goods—when they arrive and leave. The scanning system at each touch point helps in keeping a track of them. Data at every touch point is essential as it gives information of vehicle arrival, departure, unloading and loading timings, etc. There are 38 hubs and 13 depots. SpotOn serves more than 22,000 PIN codes in more than 300 locations. That is a huge network itself. When at rest, any box is at any of these locations.

But for most of the time, a box is actually moving and somewhere on the road in a vehicle. SpotOn has 350 routes and a fleet size of more than 1,000. Collectively, the SpotOn boxes travel more than 200,000 kilometers a day.

Tracking every vehicle, every shipment from origin to destination is needed to have complete vis-



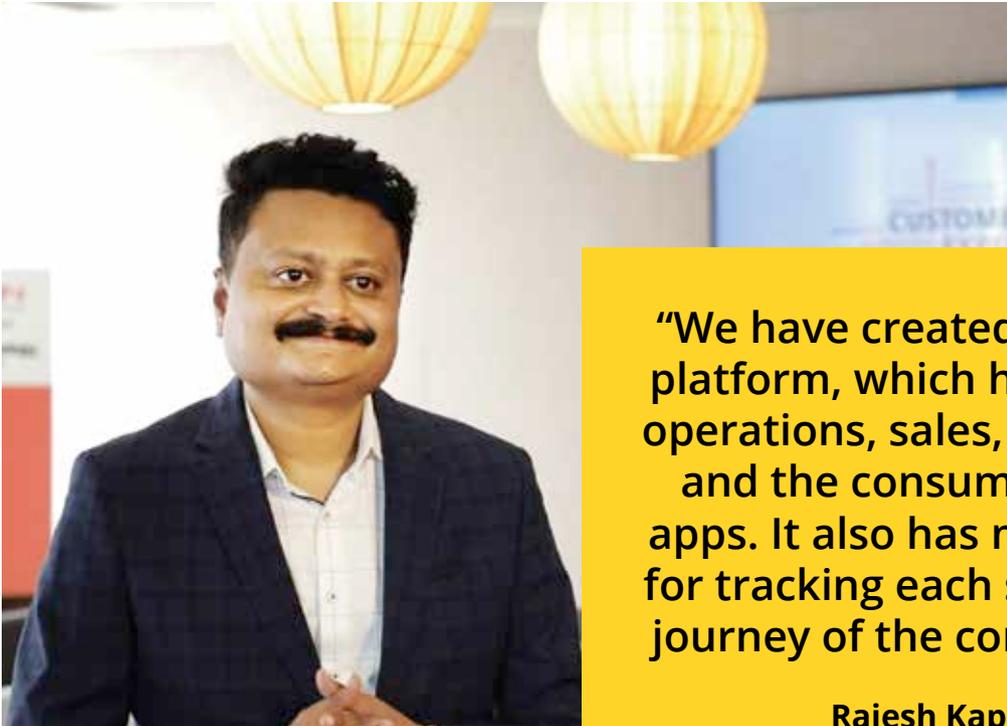
“We have leveraged technology in all aspects – keep improving customer experience, enhance sales teams’ productivity, boost visibility, tracking and tracing of our consignments”

Uday Sharma
COO, SpotOn Logistics

ibility. “Else, how will we manage to know if a truck is stuck or a consignment is lying somewhere?” asks Mitra.

So, the vehicles are on GPS and continuously tracked. A central management team monitors the data through GPS, thereby keeping track of any break-down of vehicles between two hubs. The data is available to the company in real-time which helps it inform the customer about the current status of delivery.

All these operational technologies, based on which SpotOn is built, are referred to as ‘basic’



“We have created a mobility platform, which has apps for operations, sales, employees, and the consumer mobile apps. It also has mobile apps for tracking each stage of the journey of the consignment”

Rajesh Kapase
Director - IT, SpotOn Logistics

technology’ by Mitra—though they may not be so basic for all his competitors.

What sets apart SpotOn is that when it started, it “consciously decided to compete with the biggies, leveraging technology,” to build differentiation.

Does that sound clichéd? Only if you forget the fact that SpotOn was not a greenfield startup funded by starry-eyed techies with backing from Silicon Valley venture capitalist.

It was an existing unit, of a large multinational with long legacy, which was making losses. It was easy to get distracted by the immediate metrics. But not only did SpotOn decide to use technology, the company ‘internalized’ it as a culture.

“We have leveraged technology in all aspects - keep improving customer experience, enhance sales teams’ productivity, boost visibility, tracking and tracing of our consignments,” says Uday Sharma, in a matter-of-fact voice.

Unless you start talking to the heads of technology and engineering, you cannot be blamed for dismissing it as another regular claim by business executives these days.

SpotOn has built this technology brick by brick. While it uses SAP for financial accounting system and materials management, it has its own ERP, which is called e-SpotOn. Sales & Distribution functions from lead creation to prospect manage-

ment to contract management and Operations functions from the customer logging in to the system to book till the final confirmation of delivery to the consignee, the entire chain is handled by e-SpotOn.

The company has also created a mobility platform, which has apps for operations, sales, employees, and the consumer mobile apps. It also has mobile apps for tracking each stage of the journey of the consignment. The company is largely on own infrastructure with in-house development team, informs Rajesh Kapase, Director - IT at SpotOn.

He says because of technology—and he claims its fairly unique in the industry—the company has information on not just the location but also the status of each vehicle, each box at any point of time. He should know as he has spent years in this industry.

All these help make the processes more efficient and pass on the advantages to the customer. But, in a highly competitive industry, that is not enough. The company should have much better understanding about its customers’ businesses. Every vertical has different requirements.

Says Sharma, “We manage various business verticals ranging from pharma, industrial and manufacturing, automobile, etc. So we have a holistic

platform in place which helps us deliver differentiated service to different industry verticals.”

All this ‘customer delight’ and efficiency is achieved by what Mitra refers to as ‘classical IT’, what in Gartner’s definition of Bimodal IT, is the Mode 1 technology, the part that is focused on predictability, “exploiting what is known, while renovating the legacy environment into a state that is fit for a digital world.”

Much of the proactive differentiation happens in Mode 2 technology that is exploratory and proactive—something Gartner calls exploratory, experimenting to solve new problems and optimized for areas of uncertainty.

It is in this Mode 2 technology that SpotOn stands out.

SpotOn’s Mode 2 tech:

It’s spelt d-a-t-a

Beyond the business-as-usual technologies, there is a constant endeavor at SpotOn to improve leveraging technology through experimentations. Artificial Intelligence (AI) and Machine Learning (ML) are the go-to technologies for this part.

“Our agenda is defined in two ways, says Satya Pal, AVP - Engineering at SpotOn, who heads the business reengineering team, a small but highly focused team of about a dozen people consisting of data scientists, industrial engineers and business

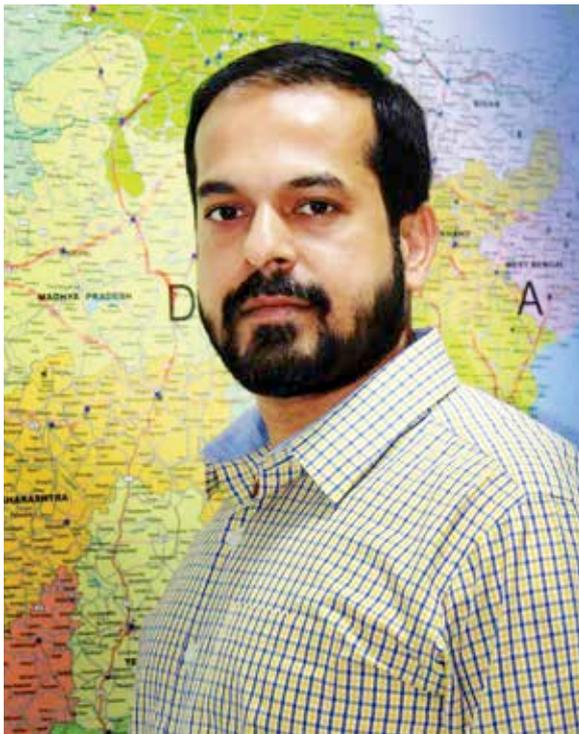
analysts works on both the inputs to create the solutions, that primarily works at achieving this.

“One, it comes from business operations—which are specific challenges or opportunities. Two, it also comes from the board as a strategic direction—a broad problem statement—which we break down to multiple smaller specifics for solving,” Pal explains.

As an example of the first one, take, for example, linehaul optimization. Linehaul is the lifeline of every logistics company. With 38 hubs, close to 350 routes, more than 750 vehicles, and a total schedule capacity of more than 3,000 tonnes per day, the operation is not just huge, it is complex too.

“How do I optimize my reach percentage at the lowest cost, for example,” says Mitra. “The number of variables is just too large for linear programming,” he adds. That is where AI came in handy.

The difference between traditional automation and these tasks is not in what they set out to achieve—but how and how accurately they do that. Typically, analytics value chain consists of four steps: descriptive (what happened, which most IT systems can easily tell), diagnostic (why something happened, which smarter IT systems these days can identify), predictive (how it is likely to happen, this is where AI comes in) and finally prescriptive (how to make the new things happen). For most operations, the last part is still done by humans.



“Our agenda is defined in two ways. One, it comes from business operations—which are specific challenges or opportunities. Two, it also comes from the board as a strategic direction—a broad problem statement—which we break down to multiple smaller problems for solving”

Satya Pal

AVP - Engineering, SpotOn Logistics

SpotOn today does not just do diagnostic analytics but a lot of predictive analytics as well. Take service quality analysis. The data engineering team provides the visual analytics to the service team; identifies pain areas and the causes of pain and provides not just corrective but predictive inputs. The same applies in Sales' Churn Analysis.

Most of these problem statements are inside-out. They originate from operations and after analytics goes back to operations. On the other hand, there are inputs that come from top. They are broader strategic directions, based on an outside change or a vision.



“Now, customers have started buying which was difficult for us to sell them pre-COVID. The speed of adoption with regard to digital pick up has been very good”

Abhik Mitra
CEO, SpotOn Logistics

Says Pal, “Take the example of COVID. After COVID, how the scenario will change? Which industries are likely to see less demand, which are likely to see more demand, which locations are more impacted by the pandemic? All these have direct bearing on our operations—volumes and networks.” These inputs do not originate from the operations itself but has huge importance for operations.

However, some data scientists crunching numbers is not all that the reengineering team does. The industrial engineers actually hit the ground, talking to the vendors, getting the pilots designed, implementing the PoCs. The business analysts work on studying the process and the changes required. All those inputs go into engineering.

“Conventional logistics companies are still working on the law of averages,” says Pal. “The problem with that is that there is no granular analysis of data. So, when I talk to some of them, I know they struggle to understand, how, on an average day, we are achieving more than 76% of linehaul utilization with more than 83% of reach. It is very confusing to them. They assume it has to be a trade-off,” he adds.

SpotOn uses open source tools and Python to cut the data much more flexibly and faster, informs Pal. But it is what they achieve; not what they do. He is quick to point out that they do not do tech for the heck of it.

“There are the hyper-funded startups, which after round three funding, go on a hiring spree. They would hire a huge data science team; a huge team of developers; another huge team of industrial engineers. They do not just incur huge costs but they create complex structures, with lack of clarity. They start so many projects but drop many of them. As many as nine out of ten projects get dropped,” Pal says.

SpotOn is conscious of that spiral and carefully selects the projects that actually matter the most, evaluating each project very carefully before taking up. For example, initially, the team had identified 34 use cases for AI and ML alone. Then, based on various parameters, such as how crucial it is to the business, the impact that it could create and the ease of doing it, they selected four or five of them. While others may be taken up later, the focus is on these selected use cases now.

“We have already closed one of the biggest items, the linehaul optimization, which we have solved with the use of reinforced learning. None of the companies globally that I know of have solved the linehaul problem using the reinforcement learning of AI,” says Pal. Reinforced learning is an

advanced AI technique through which an algorithm is trained to give an output to improve.

“So, we are very lean, very objective. We quickly decide if it is a build or buy. And we close that,” he adds.

Core of this group is data engineering. There are multiple KPIs there—right from automation of reports to data analytics of company data, and image classification. It also builds models and forecasting.

Then, there are the functional optimization efforts, leveraging data and ML. It can happen in all parts of the business: network optimization, pickup and delivery optimization, optimization of infrastructure productivity, and even service quality optimization.

Visual analytics is being used to monitor what is good behavior and what is bad behavior by training algorithms to take the visual feed and analyzing them to arrive at the result. This helps in monitoring the operations.

While SpotOn does all these to create differentiations from its competitors—it is the fastest growing company in the segment—this tech-readiness came in handy when the huge disruption happened due to the pandemic, making logistics extremely challenging.

COVID and after

With COVID hitting, some of the technology-enabled facilities that were in place but were not being used fully by many clients started getting used. Some changes became a little less painful, unlike in many other companies. And of course, certain new solutions had to be put in place quickly.

SpotOn implemented a contactless PUD solution to minimize, if not eliminate, roughly 11,000 human touch points daily using technology, making it safer for all those involved.

Bills have a physical invoice and a physical hard copy that gets attached to it. For years, apart from the physical invoice and physical hard copy, SpotOn has been supplying e-invoice and e-Proof of Delivery (e-POD). Not all customers were open to that. During the pandemic, however, customers didn't want hard copy invoice and hard copy POD. So, the company started giving mobile or e-call notes to avoid contact between the receiver and shipper. SpotOn has accelerated that in the post-COVID world.

“Now, customers have started buying which was difficult for us to sell them pre-COVID. The speed of adoption with regards to digital pick up was very good as during our pilot study, many customers responded positively in Bengaluru,” says Mitra.



All that safe operations apart, the reality is market was severely hit. The business had to be optimized to cater to that.

Many locations went under lockdown but there were shipments to those locations that had to be delivered. The idea was to see where to pick up, when and how much, so that you do not waste unproductive time by getting held up. When synchronizing pick-ups in different locations is done through proper data management, especially in terms of volume and time, route optimization or route modification can be done optimally. That is because lockdowns were being imposed in different states in different times, which the consignments had to move through.

“This could not have been done without proper data. If you want to do it manually, it is almost impossible to get it remotely correct,” says Mitra.

Except for a few small initiatives, it is not that the company did many things afresh. It just looked at the data through different lenses to get the operations right. In a way, the pandemic was one more huge variable that tested SpotOn's system for resilience.

The company plans to keep its focus on technology going forward in all that it does. Last year, SpotOn acquired a third-party logistics company, RTS. Mitra is already looking what technologies could be helpful in optimizing and differentiating in that business. And blockchain is a serious idea in his mind.

But it is too early to get into those details. Wait and watch this space. ■



Balancing Security, Privacy And Convenience In The Enterprise Space

Every enterprise is keen and relentlessly working towards striking a right balance between security, privacy and convenience. The employees and customers seek convenience, the CISO vouches for security, and compliance pushes for privacy

By Akhil Verma

Privacy paradox is an interesting term. It attempts to describe the contradictory behavior displayed by online users when it comes to data privacy. On one side, users are much concerned about their privacy; namely, how their personal data that is captured, stored or transmitted. On the other hand, their actions don't reflect those concerns, as they seem to prefer convenience over privacy. The best instance of this paradox can be illustrated by how users opt for passwords for different website logins. Now, we all know that to dissuade hackers, an alphanumeric password of at least 10-12 characters is the optimum one.

Additionally, one should have different passwords for different logins, to ensure that exposure of one login id will not result in the revelation of the rest. More importantly, saving passwords in your browser is a definite no-no. Yet, not many people seem to follow these best-practices. If they are coerced to formulate a secure alphanumeric password, they will tend to use the same for all the logins, and also have no issues in saving these passwords in the web browsers. This happens because people tend to overlook long-term risks in favor of short-term convenience.

The curious thing about the privacy paradox is that it not only afflicts individuals but even enterprises. The essential difference is that the contours of the dilemma faced by the corporate is far more complex and has many dimensions. An enterprise has to continually evaluate the benefits of conveniences with the threat of attacks and formulate a strategy. For instance, to boost employee productivity, they need to seamlessly collaborate over the cloud, using different applications or tools. But then, using third-party solutions can increase the vulnerability of corporate data; hence these applications need to be adequately whetted before being allowed. Thus, restrictions and firewalls are necessary to ensure better security and collaboration.

Hence, every enterprise is keen and relentlessly working towards striking a right balance between security, privacy and convenience. The employees and customer seek convenience, the CISO vouches for security, and compliance pushes for privacy. Harmonizing all these concerns and aligning them to business needs is the only way that enterprises can move forth. Let's take a look at these issues in a bit more detail.

Understanding the security aspect

Security as a topic and a concern area has undergone much change over the past two decades. Back in the early days, when I started in this sphere, security was treated like an externality. Firewall and anti-virus were the be-all and end-all of enterprise security. Companies that had them in place felt secure and safe. To be fair, the threats to security were not that sophisticated either. In fact, hacking was not always a hated term; there lived a breed of hackers who seemed to live by an ethical code – a sort of omerta. But then, all seemed to change quite dramatically in a short time.

Hacking was no more about sophistication but exhortation. Starting in 2010, a new wave of attack emanated, called ransomware, wherein, a user would need to pay the hacker a certain sum to save files on their compromised system. The most famous instance of this ransomware was the WannaCry, which spread across the world in 2017. The attack infected more than 2 lakh computers in over 150 countries, making it the biggest ever. But that was just the beginning. In the same year, came the NotPetya attack targeting some of the biggest businesses. The total damages related to NotPetya are believed to be around USD 10 Billion. Enterprises were jolted out of their trance by these attacks. Suddenly, security was not an externality; it became the core.

Companies across the board started to invest in technologies and systems that safeguarded the corpo-

rate crown jewels, namely the data center. The board got involved, the management was keen, experts were brought in, and the regulatory framework was strengthened. All of this contributed to making companies resilient to cyber threats.

This is the very reason why most organizations have been able to do transition in the new scenario created by Coronavirus pandemic. The security systems and protocols have been in place for quite a few years. For the BFSI sector, compliance has been another important factor for putting in the control mechanisms. In my opinion, the Gopalakrishna Committee Report on IT by the Reserve Bank of India (RBI) was a landmark shift. This report in 2011, gave recommendations on information security, electronic banking, technology risk management and cyber frauds. The next big event occurred in 2016; when the RBI came out with the Cyber Security Framework. As per the guidelines, banks would need to put a cyber security policy, separate from their IT policy, and get it approved by the board. Banks were also required to appraise the RBI, of the measures undertaken. There were in total, 24 baseline controls, which were listed as critical aspects for enterprise security. I had the good fortune to work indirectly in the formulation of these baseline controls.

Thus, compliance in many ways can be an excellent catalyst for the implementation of security controls and has been so in the banking sector.

Think like an airport

One of the questions that get often asked is how secure is secure enough? The simple answer to that one is that one can never be secure enough. Security is an evolving landscape. The threat vectors are continually evolving, and the attacks are getting sophisticated. This means that as an enterprise, it should not only look to forestall any attacks but also create capabilities wherein any attack could be confined or isolated. One

needs to have levels of security, quite like the seven layers of the OSI model.

And this is where I would like to draw the reference to a traditional airport. Let me illustrate the analogy; imagine an airport as an enterprise. There are multiple entry points and multiple exit points at the airport. The outer perimeter is guarded strongly, with barricades, bollards and armed guards. Then you have the entry gate that only allows you inside based on identity authentication. Even when you are inside, there are still more levels of security; the security gate, the boarding area, and even the aerobridge. Thus, even if one level is compromised, the management can isolate and deal with it. Similarly, enterprise security also must be designed on different levels to ensure that there are multiple check-points.

Just like the airport, which has a no-trust policy, similarly, enterprises should also adopt a zero-trust approach.

Another aspect that needs to be kept in mind is that rather than going in for a single solution from a single vendor, it is better to have multiple partners collaborate to create a robust mesh. Each security provider has one or two specialties; companies should tap these specialties. Remember, security cannot be a one fit all exercise; it needs to be crafted as an intricate circuit, that is at the very heart.

The person is the key

Recently, the SANS Institute, world's premier provider of cyber security training and certification services, was hacked and lost approximately 28,000 items of personally identifiable information (PII) in the data breach. Can

you guess how the breach happened? Due to a single staff member of the Institute falling victim to a phishing attack. And forget SANS Institute, even Twitter hack was because of vulnerability on the employee side. Digital security is great, the tools might all be in place, but usually, the critical vulnerability is the human-error. I remember reading an analyst report, which suggested that almost 70% of attacks on enterprise systems take place due to laxity on the employee side. It could be an unpatched machine, or a phishing click-bait, or even a social-engineering attack; there are plethora of ways in which attackers can enter into the systems.

Hence, it is essential to educate and sensitize the employee. They must be apprised of the latest trends that taking shape around the world. Frequent mystery audits must be carried out as part of sensitization exercises. This is all the more relevant in our current times when Work From Home is the norm, not the exception. With people accessing corporate systems from their home laptops or over shared Wi-Fi, the vulnerabilities have increased manifold. In such a scenario, the onus is on the security department to not only ensure a safe environment for seamless WFH but also to appraise the remote-worker against threats that might harm his/her systems.

In the end, balancing security, privacy and employee/customer convenience is not all that difficult, if approached in the right manner. Yes, there are challenges like the privacy paradox, but then we also have high-end technologies to deal with such scenarios like Artificial Intelligence, Machine Learning or even Blockchains. These all solutions are helping companies face the challenges upfront. My advice to all CISOs and enterprises is pretty simple; stick to the basics, and ensure no slip-ups. All the rest will fall in place. ■

The author is CISO at Airtel Payments Bank



Digital security is great, the tools might all be in place, but usually, the critical vulnerability is the human error



Mapping Cybersecurity To Business Risks

Businesses need to categorize, prioritize and standardize their business requirements in terms of cybersecurity

By Pawan Chawla

Recently, one of the most prolific social media networks in the world, Twitter was hacked. Hackers who used what is called as a “coordinated social engineering attack” on some of the most high-

profile accounts like Barack Obama, Jeff Bezos, Elon Musk, Bill Gates, Mike Bloomberg, Kanye West and so on. The message was cryptic and short, “I am giving back to the community. All bitcoins sent to the address below will be sent back doubled. If you send

USD1000, you will get USD2000. Only for 30 minutes.”

Generally, this message should have alarmed the Twitterati, but some twits (pun intended) really fell for it and actually sent money on the link. In a quick jiffy, the scammers made up

more than USD120,000 in untraceable bitcoin payments before the hack was revealed. The Twitter hack was an eye-opener of sorts. While, the hack was spectacular in the eye-balls it generated, but technically it was not very sophisticated. According to Twitter, the hackers were able to convince some of the company's employees to use internal systems and tools to access the accounts and help the hackers defraud users into sending them bitcoin. In short, it was nothing but an indiscretion of a few employees or more.

Cybercrime is a whole industry in itself, with many dedicated firms working in the shadows to inflict financial damages. Most of the attacks that are conducted today are ransomware...

Companies like Twitter invest billions of dollars in security measures and technology, and yet, they are not invulnerable to cyber-attacks. This is the harsh reality of life, something that I have experienced first-hand in the security space. Generally, when categorizing risks that an organization faces, business ones are considered differently than the IT risks. The increasingly digital nature of businesses, the overlap between the two has been on the rise for the past many years. While cybersecurity is considered as a subset of IT risks, it now has a direct impact on the business. A compromised server or a hacked database is not merely an IT issue; it has a direct impact on the business.

Not only businesses but the hacks can also be costly to the economy. Back in 2013, a false tweet from a hacked account owned by the Associated Press (AP) stating that President Barack Obama was injured in a bomb-attack, sent financial markets

into a tailspin. According to experts, the Dow Jones Industrial Average dropped 143.5 points, and the Standard & Poor's 500 Index lost more than USD136 billion of its value in the seconds that immediately followed the post. One Tweet and USD136 billion were lost.

The COVID-crisis has only increased the vulnerabilities of the enterprises. With a majority of employees working from home, this is the most opportune time for hackers to exploit enterprise vulnerabilities. I recently chanced upon a piece of news infor-

mation that since January-end to now, some 1200 new domains have been registered daily, that more than 5,00,000 domains. What could be the purpose of such a high number of domain registrations, if not for malicious attacks?

Evidently, hackers are taking an active interest in the current crisis and trying to benefit from it.

Mapping Cybersecurity to Business

The topic of cybersecurity must seem very pertinent in our current crisis. But, the fact remains; the issue has found much resonance in the corporate space in the past few years. The top management is keenly aware of the threats that are posed to the organizations and are pretty clued on it. There's hardly any board meeting that does not end with a discussion on the mitigations of cyber-threats. The increased awareness has coincided with the increasing threats that

are posed by hackers. In the past, the attacks on corporates would be made by an individual or a group of them, and it would primarily be random. But not anymore, cybercrime is a whole industry in itself, with many dedicated firms working in the shadows to inflict financial damages. Most of the attacks that are conducted today are ransomware, derived from coercing the company into paying up. The most famous attack in that regards was the NotPetya in 2017, in which companies like Merck lost as much as USD1.3 Billion in damages resulting from the hack.

Little wonder then corporates are very conscious of any laxity that can result in an attack. Yet, many times companies miss the wood for the trees. In their pursuit of security, they are more focused on the technological aspect, investing in solutions and systems and not mapping them back to the business. Cybersecurity is a holistic issue that needs to be viewed on a broader level. A piece-meal approach to security, wherein, you safeguard different enterprise infrastructure at different times can be counterproductive. Companies need to understand that technology is not the end of cyber threats. Businesses need to categorize, prioritize and standardize their business requirements in terms of cybersecurity. The mantra to a good cybersecurity infrastructure is simple, "if you don't implement it in the right, it won't help you in any way."

There are times when businesses realize that adopting a new cybersecurity technology, either it is too early or not really the right fit for the organizational needs. The approach needs to shift from a tech-centric view to a more business-oriented one. And this is where the CISO comes into play.

Evolving Role of the CISO

Over the past decade or so, the role of the Chief Information Security Officer or CISO has undergone much change. The contours of the engagement for the CISO have dramatically changed. Earlier, the CISO was a technology-oriented profile that looked at the secu-

urity aspect from a limited view. But not anymore, CISO is no more a tech guy; he or she is the one that maps technology and security together based on business requirement. The CISO is the second line of defense within an organization, the first being IT. Evaluating any new technology or solution is the purview of the IT function, CISO considers the fallout of each action, whether it will increase the cyber threats or not.

In many ways, the CISO is the bridge between two functions in the company: IT and risk. The CISO is the person who is capable of taking business risks with the CRO and also able to discuss technology with the CIO. Thus, the onus in no small extent falls on the CISO to map cybersecurity risks to those of business.

So what are the steps to map business risks and cyber threats? Here is a simple guide on how companies can go about doing that:

- 1. Understand the business requirement to close the gap between the business and cyber risks:** The first step is to understand the business functions and their needs and create a heatmap of the cyber risks that are faced by the business.
- 2. Stop assuming and start measuring:** Many times, within the company, certain things are assumed and hence taken for granted. For instance, if there is a patch that needs to be updated, the CISO will expect that the IT function would do it, and vice-a-versa. To avoid such type of confusion, it is vital to have a clear delineation of duties between the different stakeholders.
- 3. Calibrate and automate:** Companies need to realign their cybersecurity strategies to meet business requirements frequently. Ideally, one of the best ways to a secure scenario is to automate. Today there are many exciting solutions in AI and ML that can streamline the processes.
- 4. Evaluate and implement the right security:** Once the heatmap



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is ready, and all the calibrations are done, it is now time to evaluate and implement the right security solution.

- 5. Create an actionable:** Once all these processes are done, it is crucial to get everyone in the company on-board with the security infrastructure. Departments should not be working in silos. All the functions should come together in a cohesive mix.

This, in short, outlines how business and cybersecurity risks can be mapped. The threats that are facing enterprises are maturing and evolving every day, and so should our

response. In the latest "2019 Internet Crime Report," the Federal Bureau of Investigation (FBI) has stated that the number of cybercrime complaints from both individuals and business organizations reached a staggering 467,361. The total cost of those reported crimes was even more mind-boggling: over USD3.5 billion.

With the way things are in 2020, the numbers will go up. My humble advice to all corporates and my colleagues is, simple; stay vigilant, stay safe. ■

The author is a renowned technologist and currently, the CISO at Future Generali India Life Insurance Co



Living The New Normal, Separating Hype From Reality

Making endpoint devices available to users at home, sanitizing and securing devices remotely, updating security patches and Anti Virus signatures at endpoints, installing VPN for remote access and configuring additional monitoring use cases/rules around remote access workforce, were crucial for the success of operations continuity during the COVID pandemic

By Milind Mungale

Julius Caesar is a play by William Shakespeare; in it, there is a famous phrase that is often quoted, "Beware of the Ides of March." Apparently, Caesar was warned about the Ides, which falls on March 15th, and he chose to dismiss it and lost his life.

The COVID crisis in our country surfaced visibly around the beginning of March and peaked during the mid of March which reminded me of Ides of March. This was the time again when initial signals of this pandemic lead to this new era Ides of March because immediately after COVID-19 outbreak

came, the nation-wide lockdown. It was around the same time that we started preparing for the possible impact of the Coronavirus epidemic on business functions. Not everything was clear, but it was evident that we have to begin with crafting policies and tweaking processes to deal with the crisis.

Towards the end of January, we started following the news about the outbreak in Wuhan, China. In the month of February, we were clearly aware of what this can lead to because of the virus spread in China and a few other countries who witnessed the early impact of this pandemic. The realization was scary that every country on the planet was vulnerable, and this is not just another outbreak like SARS or MERS. The potential impact could not be predicted but sensing the threat of the spread, considering that no clinical remedy to arrest it was available, our preparations started at the beginning of March. The need for social/physical distancing for prevention of unafflicted and isolation for those who were affected, gained the momentum for our preparations. Unlike Caesar, we did not dismiss the Shakespearean Ides of March and were fairly ready with our strategy by March 15th to face the big uncertainty that was going to unravel.

The Lockdown becomes a Reality

Yet, the scale and the impact were unimaginable. It was only on March 20th that we got the feelers about an impending lockdown. Prime Minister Narendra Modi had announced country-wide Janta Curfew on March 22nd, and it rang the bell in our mind that it could be a trial-run for a much bigger step that may have to be taken on a nation-wide scale.

Subsequent announcement led to the commencement of a nation-wide lockdown from March 24th. Initially, it was meant to be a 21-day complete shutdown across the country. Even 21 days appeared to be the biggest ever peace-time shutdown that had been witnessed. We are now completing lockdown, close to six times that period. Barring certain services such as law enforcement and medical / health care, millions were confined to their homes with initial uncertainty of access to essential supplies. While, individuals faced the challenge, the

companies too were not immune. While we were making preparations for the future considering certain timeframe in our hand, suddenly, the announcement of lockdown took away all the time we had budgeted for a smooth transition in lockdown. We had envisaged at least one week time after Janta Curfew, whereas the announcement came in just one day. We knew there would be implications, like remote working, social distancing. A percentage of the workforce, a significant one, would work from home. But, 100% of all staff will need to function from home for three weeks was never envisaged. That is the time when I first realized what would be the experience when the feeling of amusement and annoyance erupts at the same time.

The next two weeks were spent in a mad scramble. Our first big challenge was to deal with infrastructure issues. Thankfully, NSDL eGovernance has been at the forefront of IT adoption due to the business model of digital delivery for various G2C services facilitated by our company; thus, the challenge was appearing manageable in terms of process evolution and adoption. However, practical difficulties were very different. We had to figure out all the employees who did not have laptops with them and make arrangements for them. In reality, this was easier said than done. The companies that were providing laptops on a rental basis were suddenly inundated with requests. The demand far outstripped the supply, and the prices shot up manifold overnight. Even if one was willing to pay, the suppliers were dry on laptop stock. We had to hunt for vendors who had laptops available and make logistic arrangements for the delivery of the devices. The shortfall was covered by allowing people to use their own devices and internally the term got coined as UYOD as against the popular term BYOD. That was not the end of it as many were facing network challenges as well which in some places got addressed by allow-

ing them to use their personal Wi-Fi or Mobile Hotspot, but only after ensuring robust access security. Certain situations, even that did not work as the service provider bandwidth/network signal was either weak or too much burdened as all were working from home and probably such huge surge of traffic was not envisaged in a residential area.

Besides, there was the infra support and services challenge which required focused attention on the success of the strategy and scheme of Work From Home. Usually, whenever there is an issue with hardware or software on endpoint devices, the IT Infrastructure support team is always available within the office premises. End-users never did, therefore, few things like configuring certain system set-up of connecting to a different network etc. and suddenly they were burdened to do all that just with the help of some telephonic support. People were used to physical proximity for discussions and meetings, and now, everything was virtual. While we do not have official tickets opened, I am sure; few may have struggled with acclimatizing themselves with the Virtual platforms and efficiently juggling in the Concall / Bridge Call / Video call mode of operations. I can proudly say that my team members worked from early morning to late night, that too not for hours or a couple of days, but a couple of weeks (which were not five days but seven days weeks), for remotely configuring and enabling people to work from home and later they continued their long hours' support to ensure continuity of such working.

Getting Accustomed to the New Normal

The first two weeks after the lockdown was taxing and crazy both for the employees and the IT teams. People working from home were learning new things, and so were we. Despite all the efforts, close to 20% of the staff were unable to connect to the office ecosystem due to numerous reasons.

This was also the time when there was a lot of misleading and exaggerated news floating around. There were various projections about the WFH culture being vulnerable and posing the threat of cyber attack on the organization's critical infrastructure. Not many said "how" but, they said, "it will happen". This was in public media; the management was also concerned about all these reports, especially as almost all the employees were working remotely using whatever devices and network they had access to. The security threats might not be hype, but the psychological impact of the concerns around these security threats, caused to the people, was definitely hype till the time that management was explained of how we had identified and implemented appropriate controls to reasonably counter such security threats.

The New Normal is not some novelty that will go away. The way things seem at the moment, we will have to adapt to the reality for a long time to come

Personally, I was not much affected by this hype. Cybersecurity and data integrity are not some ad hoc subjects. Even before the wave of the pandemic, organizations across the board had to create a secure perimeter around the corporate assets. It wasn't necessitated by the outbreak but had always been the need of doing business securely in the digital world. Thanks to DRM (Disaster Recovery & Management) and BCP (Business Continuity Planning) as they offered a base level blueprint to address this situation and I am sure most of my fellow CIOs and CISOs were able to make the transition with less hassle. Indeed, there were some teething trouble, as now the onus of security had shifted to the discipline adhered by end-user, especially when they were allowed to use their own

device. We had to sanitize (not literally) and securitize the devices, install firewalls, update security patches, install Anti-virus, disable unnecessary functions (ensuring that it does not impact the e-school of their kids or office work of their spouses because each household would have one family computer to be used by all), configure VPN access etc.. Fortunately, our employees were eager and enthusiastic, and we were successfully able to migrate the work-load on the home network. Also, critical enterprise applications and data are anyways ported on data centers that are professionally managed and operated. In short, the security infrastructure is already in place; only it needs to be bolstered in certain spaces.

Little wonder then by mid-April, all our employees were functioning from their homes without a hitch. All the

doom and gloom scenarios did not really materialize, and that shows the network and security resilience. However, we remained alert 24 X 7 and not depend on the confidence, luck or the blessing of God.

Lessons from the Pandemic

So, what are the lessons that we have learnt? There are quite a few. One of the basic ones was that all the planning and strategizing that we do is not enough as something hidden will surface to challenge our preparation. Secondly never to underestimate the potential impact of any disaster, however small it appears to the eyes and the mind. For years, we had built scenario planning into our DRM & BCP, but never did we imagine a scenario like this where every IT set-up was working but no human resource

could reach any of our offices across the country. The COVID pandemic has been tragic for the world, and pretty humbling for the enterprise IT & Security folks like myself. We had to learn and adapt many things quickly; even today, I am doing that. For instance, at NSDL eGovernance, I have already proposed to do away with desktops for good, all employees will get a laptop which has been welcome not as an idea but as a strategy going forward. Here are some of the revelations as a result of the pandemic:

- WFH is not only possible but also preferable in some instances due to productivity gains, opening up the possibility of better performance while enjoying flexibility and comfort or avoiding hectic travels
- Employees can work from anywhere; they don't need to be in the same location, opening up the possibility of hiring good and talented hands from across the country
- From Bring Your Own Device (BYOD) the world can shift, with some caution and care, to Use Your Own Device (UYOD)
- Office architecture needs to be reimagined. When people can work from any of the geographical locations, why would there be a need for fixed desks within the office?

In the end, the new normal is not some novelty that will go away. The way things seem at the moment, we will have to adapt to the reality for a long time to come. The way of working we were used to has already become history during our lifetime. We don't have to wait for the next generation to come, make changes and call our earlier way of working as primitive and history. Rather we will handover stabilized future way of working to them. Let us remember that the adaptation should not be from a negative/restricted mindset; we should embrace the opportunity and build our systems that are aimed at growth with positive/open mindset. ■

The author is EVP & CISO, NSDL e-Governance Infrastructure Limited



Analytics In Manufacturing: The Potentials Companies Should Try To Tap In Uncertain Times

Data and Analytics can be used to easily identify and resolve problems related to product manufacturing, faulty suppliers, unused inventory in warehouses and several other bottlenecks

By Souveek Ray

With the high level of uncertainty in manufacturing, supply chains and demand prevailing across the world in recent months, and economic growth coming to a standstill,

it is pertinent that companies look at every potential opportunity of reducing costs and increasing margins. Most well-established corporations have likely already invested in efforts to optimize and streamline their plants, supply chain or procurement

to an extent. So where is the opportunity to reduce costs even further? The one asset that manufacturing companies have not yet fully leveraged is data. In today's world, manufacturing organizations generate enormous amount of data

and most have yet to recognize its vast potential.

Advanced analytics have enabled industries to have visibility to problems that they did not know existed in their processes. Problems related to product manufacturing, faulty suppliers, unused inventory in warehouses and several other bottlenecks can be easily identified and resolved with data and analytics. When added up, some of the seemingly small issues can result in considerable savings for companies.

Here are a few ways data and analytics can impact the manufacturing industry and lead to considerable improvements in organizations.

1. Increasing Supplier Accountability and Improving Quality of Parts Supplied

When trying to improve processes and reduce costs, companies often forget about the supplier aspect of their manufacturing chain. Faulty parts supplied by external vendors can lead to quality issues in the final product and thus cause unnecessary warranty

claims from the end customers. In many of these cases the fault cannot be attributed to the supplier part and hence the warranty cannot be retrieved from the supplier. With the help of analytics tools, organizations can gain visibility to these processes and identify and eliminate faulty suppliers from the system. While a Production Part Approval Process (PPAP) is a valuable tool for establishing competence of component suppliers, a lot of companies lose visibility to track defects after a PPAP is approved. Analytics can play a major role here, by providing visibility to the data that can help to track supplier performance and take necessary remedial actions.

2. Improving Methods of Demand Forecasting and Finding Ways to Reduce Unsold Inventory

In the manufacturing industry, strong demand forecasting can be a differentiator between a successful company and one that has too much unsold inventory at hand. Most companies tend to do forecasting based on his-

toric sales only and do not consider a lot of external factors that can impact demand. Organizations can leverage predictive analytics to build projections of purchasing trends based on many more variables than simply using past sale numbers. This can greatly help in minimizing production waste.

In large-scale manufacturing units, Analytics can also be leveraged to reduce Zero Demand Inventory. By comparing Zero Demand components with active in-demand components, similarities can be drawn between them and their bill of materials and help organizations identify material that can potentially be repurposed to active parts.

3. Optimizing the Pricing Process

In most cases, large manufacturing companies use a method to price their products that considers the costs incurred, historical prices and the profit margins they intend to derive. This has proved profitable for most organizations. So, where is the role of analytics in this? Analytics can be used in a big way to create pricing models that consider several external factors and come up with a price that helps drive volume as well as increase revenues. Companies that consider Frozen Standard costs at the beginning of the year and price their products based on that alone are losing revenue by not considering the fluctuation of raw material costs. Analytics can help bridge that gap by creating dynamic pricing models. Modern pricing algorithms take into account several external factors that include pricing fluctuation of commodities, competitor pricing, demand, whether or not the product is an IP to the company and many other factors.

4. Preventive Maintenance

Who wouldn't want to solve a problem before it gets big? For companies that deal with equipment with high failure rates and downtime, it is an absolute necessity to carry out preventive maintenance. Preventive



Organizations can leverage predictive analytics to build projections of purchasing trends based on many more variables than simply using past sale numbers



maintenance is often carried out when cued from visual inspections and documented parameter thresholds. A lot of times, this process is not enough to prevent failures. In the world of analytics, it is possible to have automated triggers and warnings issued before a part fails, based on data accumulated through sensors. Real-time sensor data is captured and analyzed for deviations, enabling the prediction of maintenance events and component life.

Computer Vision and Deep Learning can also be used to identify anomalies without removing the parts. Technologies like Virtual Reality (VR) and Augmented Reality (AR) help visualizing the inside of parts and point to problem areas without having to remove a screw. This can save a lot in labor costs by avoiding the full tear-down of large components.

5. Enabling Changes in Processes by Providing Visibility to Data

There are many ways data and analytics can help in optimizing processes and reducing costs, but one of the most basic things that data and analytics provides is visibility to data that can help in better decision making.

In the world of analytics, it is possible to have automated triggers and warnings issued before a part fails, based on data accumulated through sensors

Without building complex data science models and advanced analytics techniques, sometimes the simple visibility to data can have far reaching financial and operational impacts on an organization's decision making. It can help to uncover critical information through various methods of data delivery like reports, interactive dashboards, chatbots, alerts, etc. and provides insights that can make big impacts in operations. These are inexpensive ways of leveraging data to make informed decisions.

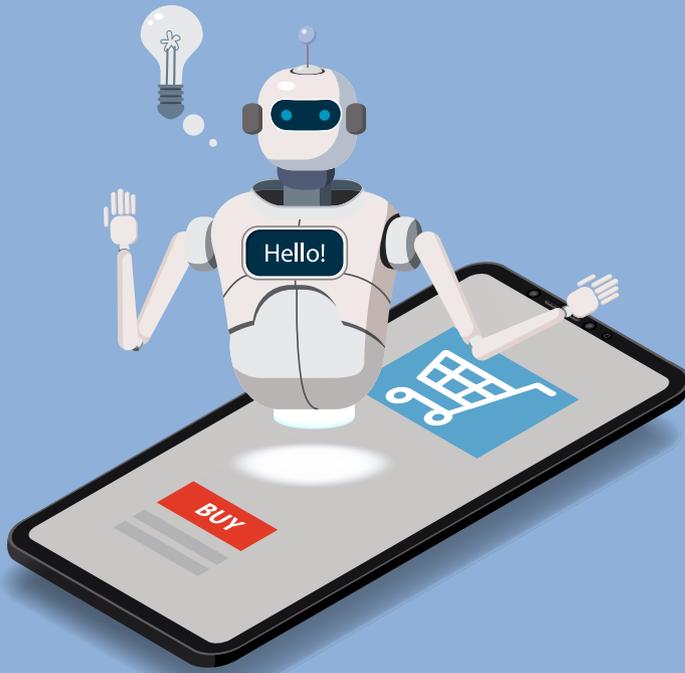
So, what needs to be done to be able to start leveraging data?

To achieve these, companies need to have an analytics strategy. This is the most important part. Companies are often happy with the status quo and thus don't have a proper data strategy and roadmap defining where they want to go. An endorsement is

needed from the leadership and a top down approach must be taken to have a successful digital transformation.

The other aspect of becoming a successful data-driven organization is to have a gradual, step-by-step process. Small investments with tangible results will help in developing more interests among the leadership and eventually lead to an increase in investments. Agile methodologies help in a big way to achieve this by means of rapid prototyping and experimentation and then putting these experiments to use. Successfully operationalizing the small experiments and theories developed builds appetite for more. This is how relatively traditional companies forge their futures as data-driven organizations. ■

The author is Senior Product Manager, Data and Analytics at GE Transportation, a Wabtec company and NEX100 Winner 2019



Operationalizing AI/Advanced Analytics To Improve Online Retail Businesses

The implementation of data analytics and AI has enabled online retailers to recommend a product by understanding the what, how, and why of customer requirements rather than just product compatibility and sales history

By Savitha Chinnappareddy

A recent report, titled 'COVID-19 Impact on Global E-Commerce & Online Payments - 2020' revealed that a double-digit share of online shoppers was buying more digitally due to COVID-19, and some of them adopted the practice for the first time during the outbreak. The share of global retail sales generated via e-commerce was rising and projected to reach one-third by 2024. There has been a sudden change in how people are approaching this period of isolation, and it has changed their shopping behavior. From bulk-buying to online shopping, people are changing what they're buying, when, and how. This has also pushed a lot of rather traditional brick and mortar operations, finding ways to sell online. New data from e-commerce platform provider, Shopify, suggests the number of new online stores across the globe on its platform increased 20% week-over-week for each of the last two weeks of March 2020. As we move into a new normal in the coming days, it is safe to say that people would be looking forward to shopping online rather than visit crowded markets which will act as a catalyst to the growth of online retail.

The Changing Technological Landscape in Retail

In an ever-changing retail landscape, retailers who have successfully embraced digital transformation are gaining a significant competitive advantage in an atmosphere where customer experience rules. While traditional retailers are adopting digital technologies, such as the Internet of Things (IoT), mobile, Augmented Reality (AR) and Virtual Reality (VR), Artificial Intelligence (AI) and Machine Learning (ML) to connect with customers, digital players have recognized the advantages of establishing brick-and-mortar locations to round out the experience they can offer their customers. Here are a few of the most disruptive developments in retail today:

- **VR and AR** - Simulation technology allow customers to arrange furniture in a virtual rendition of their home, check the fit of clothes without trying anything on, and even test drive a car.
- **Customer adoption of emerging platforms** - Shoppers increasingly use technology to research products and services, making it essential for retailers to address customer concerns in real-time.
- **New class of retailers** - Retailers are inventing new business models such as brick-and-click that integrate online and offline sales portals.
- **New metrics to measure success** - Customer experience per square foot is supplanting sales per square foot as the primary measure of retail performance.
- **Rising digital adoption** - Retailers are engaging in AI technology to supplement human customer support. Chat-based shopping and voice commerce increasingly being adopted.

Data Analytics and AI Changing Online Retail Operations

We live in a world where consumers expect and demand instant gratification when shopping online. It is becoming increasingly difficult to satisfy consumers at the pace they expect without compromising on the quality they demand. To add to that, competition across markets are at an all-time high. Even during these times, two solutions stand out and show long-term promise – Data Analytics & Artificial Intelligence (AI). Let's delve deeper into a few sectors which are being disrupted with the introduction of data analytics and AI.

Customer Segmentation and Interaction

While traditionally, segmentation is generally done based on mass and demography-based data sets, with AI capabilities in place, online retailers can now adopt micro-segmentation by

building a strong opinion-based individual customer persona. This leads to more personalized offers being generated for prospective customers. On the other hand, customer interaction has moved from being one-sided to interactive, where responding to customer questions is done through voice and chatbox-based AI bots. Through AI, online retailers can also predict customer attrition based on the customer's persona, buying behavior, and other external factors.

Another area where AI is revolutionizing the retail sector is through wait time prediction. Rather than merely providing a pre-determined estimate to a customer for any tech support or servicing stores, looking at previous data and using ML, online retailers can set better wait time expectations leading to better customer satisfaction.

Intelligent Product Recommendation and Pricing

The implementation of data analytics and AI has enabled online retailers to recommend a product by understanding the what, how, and why of customer requirements rather than just product compatibility and sales history. Pricing strategies have also changed with the introduction of AI. While traditionally pricing would be based on pre-defined factors like sales history, promotion and holiday calendar, etc., AI can now monitor competitor price changes and market fluctuations in real-time and recommend pricing at product and store level. In case the system requires providing estimated pricing, with data analytics and ML, it can offer such approximate estimations more accurately. Additionally, based on feedback regarding the performance of the products and upgradation journey, online retailers can predict or decide the warranty of the products in a much better way.

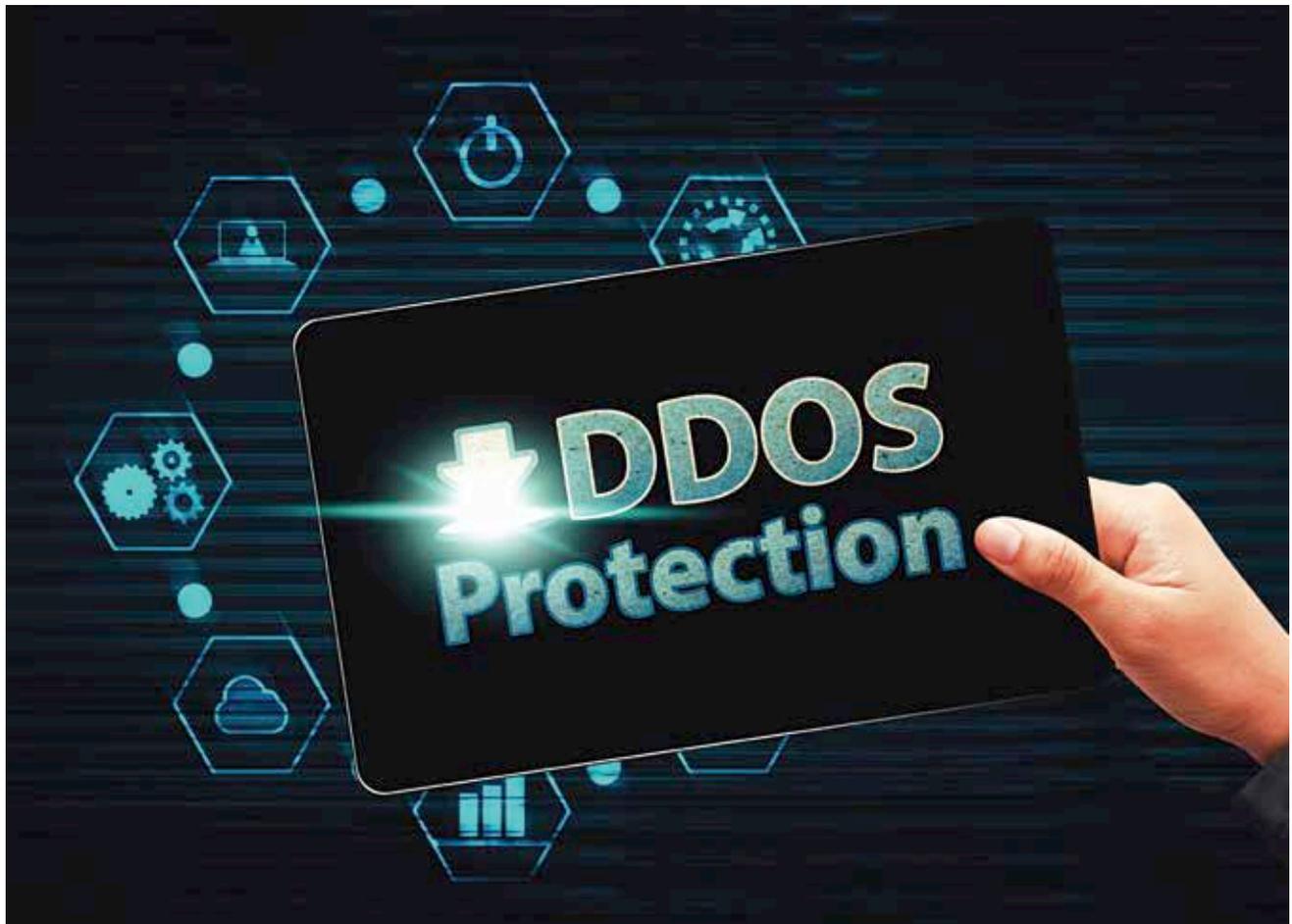
Forecasting, Inventory Management and Logistics

With traditional tools, it was difficult to predict demand and manage inven-

tory based on internal and external events. At the same time, tracking orders and predicting delays was also a cumbersome task leading to dissatisfied customers. However, with newer AI tools being introduced, online retailers are now able to predict demand better by monitoring events, manage inventory by monitoring real-time stock situations and predict out of stock or stock at-risk situations by analyzing customer behavior, fashion trends, and weather patterns. Based on the analysis of delay in delivery or delay in response in case of the online segment, decisions can be taken for locating the new inventory or stores accordingly. The logistics team can enable real-time data sharing, order tracking, and delay prediction through the supply chain critical path with AI tools. With AI, it is also possible to predict the areas where demand will come from and assign delivery resources accordingly.

To achieve a successful digital transformation, retailers need to do more than merely acquiring huge data sets. AI capabilities can equip retailers with the ability to ingest large volumes of data in various formats across locations, learn from patterns, and respond in real-time. Creating a 360° customer profile also helps generate relevant, and personalized offers to customers. In addition to helping retailers customize their offers, AI and ML enable predictive analytics, allowing retailers to project the details of a customer's history into the future, and calculate outcomes for events such as product sales or store renovations. Understanding these outcomes vastly increases retailers' ability to prepare for events and respond to customers proactively. Thus, AI and ML offer enormous potential for retailers to deliver compelling customer experience, drive cost efficiencies, and even improve employee motivation. ■

The author is Technical Lead, Emerging Technologies & Solutions at QuEST Global



DDoS Protection - Like Airbags In Your Car

Like car accidents, DDoS attacks may occur infrequently, but once they happen – the damages are severe

By Nikhil Taneja

In India, over 415 deaths occur every day due to road accidents either due to drivers' negligence or due to not taking enough safety measures like use of helmets or airbags. If we have never been involved in a car accident, that doesn't mean we will never need airbags.

In our business environment, customers who haven't been attacked in a long time start to wonder whether they still needed DDoS protection at all.

But just as we would never take out the airbags out of a car because we have never been involved in a serious

accident, so we shouldn't cut back on cyber defense just because we hadn't had a major attack in a while.

The Probability is Low but the Risks are Severe

According to Radware's 2019-2020 Global Application and Network

Security Report, 33% of organizations reported being attacked by DDoS in the prior year.

While this is certainly a threatening figure, looked at the other way around, it means that two-thirds of organizations did not experience a DDoS attack in the last 12 months.

Stretch the statistic back, and it means that in the past two years, about 45% of organizations did not experience an attack, 30% did not experience an attack in the past three years, and 20% have not seen an attack in the past four years. And stretch it back even further – it means that about one in eight organizations have not been attacked in the past five years.

This has led many organizations – quite sensibly – to wonder why they still need to go through the hassle and expense of deploying dedicated DDoS protections.

The problem, however, is that like car accidents, DDoS attacks may occur infrequently, but once they happen – the damages are severe.

Revenue Depends on Availability

Ultimately, most organizations' revenue depends on customers being able to reach their services.

According to a study by Gartner, the average cost of IT network downtime is USD 5,600 per minute, or almost USD 300,000 on average. Although these figures may vary by the size of the organization, number of affected assets and the severity of the outage, it demonstrates the very real damages that can occur as a result of outages.

As customers increasingly consume services online, this means that an organization's website and network are mission-critical assets, and any downtime will lead to significant losses.

Damages as a result of a DDoS attack can be direct or indirect:

- **Direct Loss of Revenue** – If your website or application is generating revenue directly on a regular basis, then any loss of availability

When such an attack occurs, the risks and costs of being unprotected – or having inadequate protections in place – far outweigh the costs of maintaining DDoS protection

will cause direct, immediate losses in revenue. For example, if your website generates USD 1m a day, then every hour of downtime, on average, will cause over USD 40,000 in damages.

- **Loss in Productivity** – For organizations that rely on online services, such as email, scheduling, storage, CRM or databases, any loss of availability to any of these services will directly result in loss of productivity and lost workdays.
- **SLA Obligations** – For applications and services that are bound by service commitments, any downtime can lead to breach of SLA, resulting in refunding customers for lost services, granting service credits, and even potentially facing lawsuits.
- **Damage to Brand** – In a world that is becoming ever-more connected, being available is increasingly tied to a company's brand and identity. Any loss of availability as a result of a cyber-attack, therefore, can directly impact a company's brand and reputation. In fact, Radware's 2018 Application Security Report showed that 43% of companies had experienced reputation loss as a result of a cyber-attack.
- **Loss of Customers** – One of the biggest potential damages of a successful DDoS attack is loss of customers. This can be either

direct loss (i.e., of customer who choose to abandon you as a result of a cyber-attack) or indirect (i.e., of potential customers who are unable to reach you and lost business opportunities). Either way, this is a key source of damage.

Would You Take the Airbags Out of Your Car?

Like many hazards in life, protection against DDoS involves balancing risk vs. probability. Most of us have never been involved in a serious car accident, or have our house burnt down. Yet we still install airbags in our cars and purchase insurance for our homes.

This is because while such events occur infrequently, the damages from them are so catastrophic and far-reaching that we are willing to bear the 'peacetime' costs of purchasing them, so that we have them available in times of need.

The same logic applies to DDoS protection. While some organizations face constant attack, others are targeted infrequently. This does not mean, however, that the threat does not exist. And when such an attack occurs, the risks and costs of being unprotected – or having inadequate protections in place – far outweigh the costs of maintaining DDoS protection even at times we might think we don't need it.

Going back to the example we started with, even though most adults have never been involved in a serious car accident, studies have shown that car safety is the #1 consideration in purchasing a new car. This is because in the unlikely event of a serious crash, the driver's life will depend on it.

Likewise, service availability is the lifeline on which many organizations depend to serve customers and generate revenue.

What's your #1 consideration in making a security purchasing decision? ■

The author is Managing Director - India, SAARC & Middle East, Radware



Beating The Odds With Virtualization

How 63 Moons overcame the lockdown due to COVID with technology

By Balaka Baruah Aggarwal

63 Moons Technologies, formerly known as Financial Technologies—a provider of technology platforms and solutions for the financial industry, including digital marketplaces and exchanges—has successfully leveraged virtualization technologies to tide over the disruption caused by the COVID-19 pandemic.

With more than 1,000 employees on its rolls, 63 Moons had just a couple of days to gear up for the lockdown. The company, which had already implemented server virtualization and was running SAP workloads on it, embarked on an enterprise-wide initiative to roll out desktop virtualization to enable employees to work remotely in a secure manner.

Says Neehar Pathare, Vice President - ICT & CISO, “With just 48 hours before the lockdown, we were racing against time to roll out the VDI solution across the company. We stayed in office during the time and successfully made the deployment live within the stipulated time, with full support from VMware.”

The imperative for 63 Moons to keep the lights on was because the



Neehar Pathare, Vice President - ICT & CISO

stock exchanges were operational during the lockdown and many brokers are using its trading platform. With the VMware Horizon VDI implementation, it was business as usual as employees were able to connect to the corporate network quickly and easily. What weighed in the company's favor were the high network connectivity premises which supported speedy access—1 GB connectivity to desktops, 10 GB at the switch level and application-centric infrastructure (ACI) running its data center.

While one of the main objectives was to extend the enterprise to employees, another imperative for Pathare, as the company's CISO, was to securely deliver applications. Operating in the financial domain, even senior company executives worked on desktops to meet compliance requirements. Therefore, data

With the VMware Horizon VDI implementation, it was business as usual as employees were able to connect to the corporate network quickly and easily

protection and prevention of data leakage was a key performance indicator while implementing VDI, but the company was able to achieve it as the technology entailed storing data at a central location and employees could

not download or store data locally in a VDI environment.

More importantly, VDI implementation facilitated easy administration of end-point devices. As employees were logging remotely with personal devices, maintaining desktops in a VDI environment is easier than a traditional environment as rolling out patches, deploying new software or adding RAM or hard disk capacity is done at the central server. Also, central maintenance ensures timely updates as it eliminates concerns about endpoints being switched off at the time of patching or software deployment.

Pathare was also able to achieve regulatory compliance as the centralized VDI system made it easier for regulatory controls to be implemented and enforced at virtualized endpoints in a repeatable and streamlined fashion.

Says Prajit Nair, Director Sales, End user Computing at VMware and who has been closely associated with the implementation, "The COVID-19 pandemic and the subsequent lockdown brought to the fore the benefits of virtualization as never before. Businesses that had earlier viewed virtualization as technology for enabling business continuity are now seriously considering it to usher in the New Normal and facilitate employees to continue to work remotely."

A large VDI deployment, which allows 700 concurrent users, the 63 Moons juggernaut was kept rolling with technology adoption and in-house innovation. More than 30 new employees were onboarded remotely from different locations during this period via VMware Workspace which is a digital workspace platform that provides secure access to employees via any end-point. The 63 Moons in-house team of developers also developed an application to enable its contact center to function normally by routing calls to executives working remotely while enabling access into the corporate network to resolve customer queries. ■



TRANSFORMATION A Sectoral View

How industry value chains can be positively impacted by digital transformation initiatives, especially leveraging big data, IoT and AI

By Saumya Chaki

PART IV: ► PUBLIC SECTOR ► MEDIA AND ENTERTAINMENT

The author is Data Platform Solutions Lead at the Services Integration Hub in IBM and has written three books



PUBLIC SECTOR

Transforming The Public Sector With Digital Technologies

Digital transformation in public sector is a growing trend worldwide as governments realize the benefits of the disruption it brings to citizens

Like the private sector, the government or public sector worldwide is looking at greater speed in delivering citizen services with greater transparency and scalability. Governments are rapidly adopting the paradigm of Digital Transformation and this is evident in some of the recent initiatives, be it Digital India in India or Digital Government in the UK. At the crux of this wave of digital transformation is customer centricity.

At the epicenter of this disruption are a set of digital technologies

including Big Data Analytics, Mobile Apps, IoT and Artificial Intelligence which are helping public sector enterprises reinvent themselves and provide a wide range of services to citizens and residents.

Transforming the Public Sector with Digital Technologies

In today's digital world, governments are under the power of digital technologies in engaging with citizens in a more open and transparent way. This has led to numerous initiatives across

the world, which could be summarized as follows:

- **Digital Identity** – Have a single digital identity for all citizens and residents and link them to different government schemes as well as utilities to understand the services used by citizens as well as measure customer feedback. Digital identity has significant value in 3rd world countries where public distribution system tracking of benefits becomes transparent and gives unique insights into progress of social benefit schemes. Digital

■ TRANSFORMATION: A SECTORAL VIEW

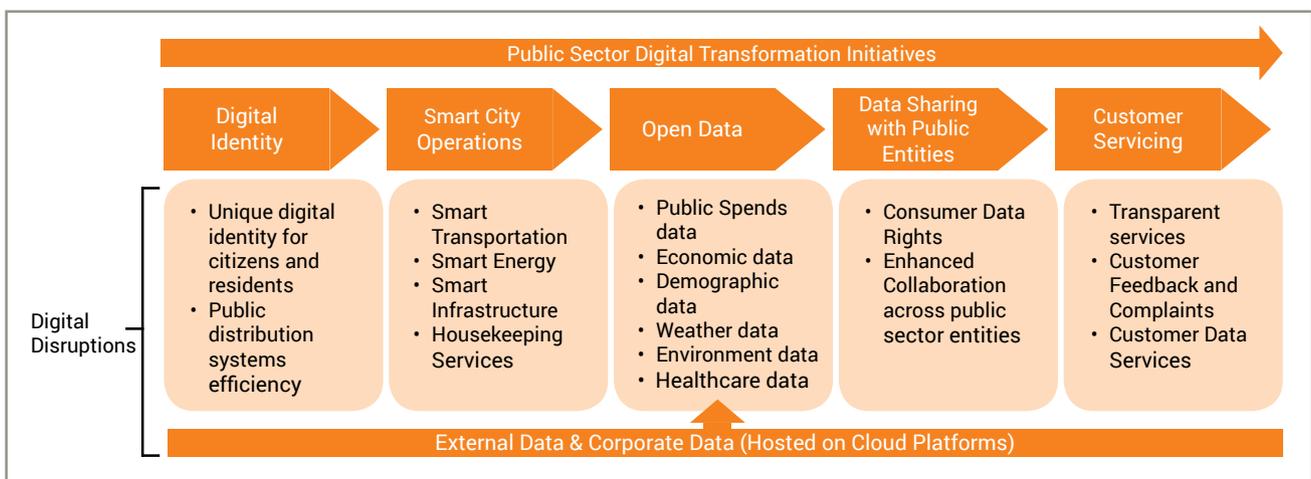
identity is also used to vote in many countries.

- **Smart Cities** – With the advent of digital technologies in an interconnected, instrumented world, smart cities are being built globally. Smart cities are projected to be a USD 400 billion market soon covering over 600 cities. These are based on data collected in real-time from IoT sensors across different utilities in the city which are then analyzed using Big Data Analytics and Visualization technologies to inform citizens about traffic, weather, power, waste management, etc. The services around smart cities include smart transportation, smart energy, smart infrastructure and operations data.
- **Open Data** – Public bodies produce and commission huge quantities of data and information. By making their datasets available, public institutions become more transparent and accountable to citizens. Open Data sets are used by the governments and opened to use by citizens and private sector enterprises in creating value for end users. Open data sets could include tourism maps, places of attraction, details of government spending on utility projects etc. For example, during the Covid19 pandemic, governments worldwide have provided open data sets for citizens to consume to under the

growth of cases, potential hotspot areas, etc. Extensive use of Big Data Analytics and GIS is being used to leverage the power of open data.

- **Data Sharing by Public Entities** – Data sharing guidelines were drafted by the Government of Australia as part of Consumer Data Rights as well as ensuring better collaboration between government entities. For instance, the telecom department planning to lay new optical fiber lines would share data with the department of transportation to ensure better co-operation and lower disruption of services. In the UK, the Transport for London (TFL) often shares insights with customers about planned engineering works in the weekend and its impact on travel services helping citizens plan their journeys better.
- **Citizen Services** – The digital technologies enable public sector enterprises to provide services around customer data (consumption patterns, amount billed), transparency of customer information around utilities provided as well as customer portals and chat-bots for providing information and log feedback and complaints. The key disrupting technologies that are reshaping the way public sector providers are making a difference to citizens are as follows:

- **IoT** – At the core of the smart cities' initiative is the use of IoT sensors in equipment and assets that provide real-time data about the usage of the assets and help citizens make informed choices about how they plan their day.
- **Artificial Intelligence (AI) and Big Data** – AI and Big Data are crucial differentiators for smart cities as well as open data sets by ingesting data from across the varied public sector data sources and providing unique insights to citizens and residents. Use of AI chat bots in citizen services is helping make the customer experience better and providing these services 24*7. Big Data Analytics is used in the procurement and supply chain functions of public sector enterprises for insights into supplier performance and supply chain efficiency.
- **Mobile Apps** – Mobile apps are the key to access to information for citizens and navigate the wide range of public sector utilities from power and transportations to education.
- **Geographical Information Systems (GIS)** – GIS systems provide citizens with diverse data sets from road maps, land use patterns, weather maps that empower citizens with knowledge of cities and towns and help them make informed decisions about land purchases, travel, etc.





As is evident from the transformational impact of digital technologies in the digital transformation of public sector, there are key benefits that can be derived as well including:

- **Cost Optimization** – Digital technologies have helped optimize the cost of operations by analyzing data integrated across the various public sector utilities which can be analyzed to generate insights across Procurements, Operations and Customer Servicing.
- **Transparency and Customer experience** – Armed with digital technologies and enhanced customer service capabilities, public sector providers are better placed to understand customer complaints as well as acquire new customers by understanding customer preferences better. Access to open data sets brings in lot of transparency of government objectives and helps enhance the customer experience.
- **Revenue Models** – With customer centricity at its focus, public sector enterprises will look to create cus-

Armed with digital technologies and enhanced customer service capabilities, public sector providers are better placed to understand customer complaints as well as acquire new customers by understanding customer preferences

tomized offers to meet customer buying behavior. The sharing of open data sets creates an ability to generate new revenue streams as well as look at cross sell opportunities-based on customer segmentation and competitive intelligence. The ability to merge multiple data sets and generate insights creates new revenue generating models and opportunities.

Digital transformation in public sector is a growing trend worldwide as governments realize the benefits of the disruption it brings to citizens. There are challenges to digital trans-

formation adoption in terms of 1) public-private sector participation in funding projects and providing services 2) skill gaps in public sector to take the transformation initiatives to completion as well as 3) differences in opinion among government departments. McKinsey predicts that government digitization could free up to USD 1 trillion annually in economic value worldwide, through improved cost optimization and operational performance. The increase of e-governance projects at both center and state level reveal the transformation sweeping across India ■



MEDIA AND ENTERTAINMENT

Transforming The Media And Entertainment Industry With Digital Technologies

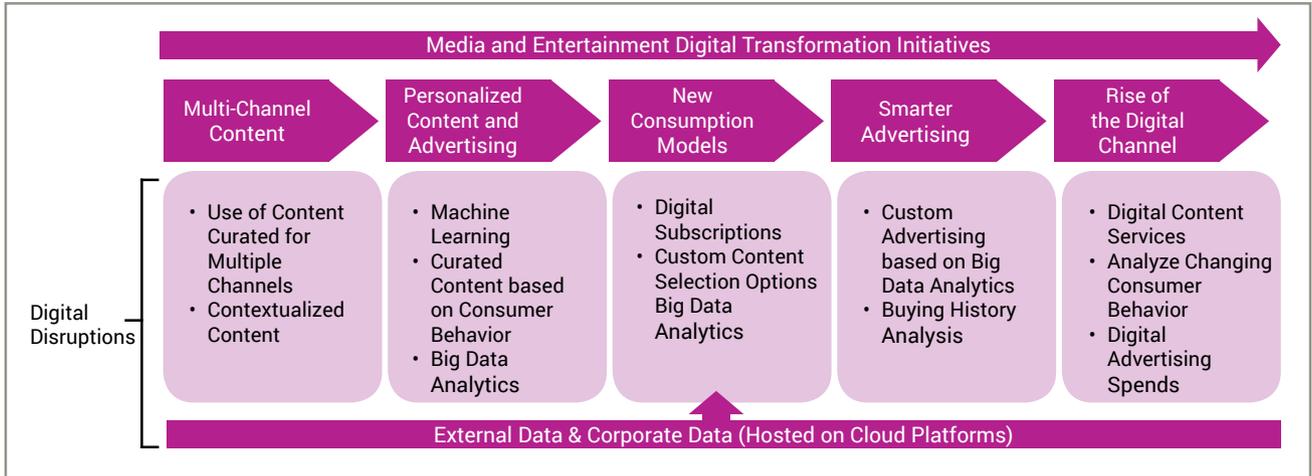
In today's digital world, media and entertainment companies leverage the power of digital technologies in engaging with customers and provide them numerous channels of consuming information and entertainment

Media and entertainment industry are continuously transforming with new types of content being created, new subscription models in vogue as well as new ways to fund entertainment projects. For consum-

ers as well, what is changing is the way we consume entertainment, the way we share it and the modes in which we pay for it.

At the epicenter of this disruption are a set of digital technologies including Big Data Analytics, Mobile Apps, Artificial Intelligence (AI) and User

Experience which are helping media and entertainment enterprises reinvent themselves and provide a wide range of media products for consumers to examine and consume. According to the PwC Global Entertainment & Media Outlook for 2019-23, the revenues for the industry is expected



to grow from USD 2.2 trillion to 2.6 trillion in this period.

Transforming the Media and Entertainment with Digital Technologies

In today's digital world, media and entertainment companies leverage the power of digital technologies in engaging with customers and provide them numerous channels of consuming information and entertainment. This has led to numerous initiatives across the world, which could be summarized as follows:

1) Multi-channel Content

Content creators are increasingly engaging with consumers across multiple channels. A clip from a TED talk could be posted on a Facebook page to generate interest, while the complete talk could be hosted on YouTube or TED website. Users could be encouraged to share and comment on the content with relevant hashtags generating more interest (trending views) on social media. A Netflix promo on Twitter could lead a user to watch a web series on Netflix where in the content is curated based on the purpose it serves on a given channel.

2) Personalized Content and Advertising

Netflix and Amazon have been using algorithms to understand content

preferences of consumers and then tailoring suggested content based on prior consumption behavior. This creates opportunities for curated advertisements and not have advertisements rolled out to the entire audience.

3) New Consumption Business Models

Traditionally, media houses sold newspapers and magazines. Now, they are moving to digital subscriptions of online newspapers. When cable television started, the consumer had to purchase the entire range of channels even though they may not be watching them. Now, the advent of digital providers like Amazon Prime or Netflix provide more curated content and advertise based on consumer behavior.

4) Smarter Advertising

Media and entertainment companies are leveraging Big Data Analytics and AI to make advertising smarter and not just make traditional product placements. Previous buying history and changing demographic trends are used to make advertising savvy by placing products and services that a consumer is most likely to be interested in and buy. LinkedIn tailors training offering placements based on a person's professional profile, interests also tie up with other training providers to provide curated content

that is relevant and provides professional value.

5) Rise of Digital Channel

With the proliferation of smart phones, and other devices like tabs, the opportunities for digital content has been rising continuously. Marketers are observing this trend, and this reflects in the advertising spend; by 2023, it is expected that marketers will spend more than 50% of budgets on digital advertising. This is also reflected in the use of mobile devices in engaging with media and entertainment which has risen from 1.6 hours a day in 2012 to 3.3 hours in 2018.

The key disrupting technologies that are reshaping the way media and entertainment providers are making a difference to citizens are as follows:

- **Machine Learning** – Machine learning algorithms are used to understand consumer consumption trends as well as assess impact of changing trends in consumption patterns across demographic groups. Curated content can be pushed on digital platforms based on this analysis. Movie plots are now based on insights from Machine Learning algorithms that help studios predict customer likes and a higher probability to generate revenues and deliver hits.
- **AI and Big Data Analytics** – AI and Big Data Analytics are crucial differentiators for media and enter-



tainment companies to assess the impact of new business models, analyze effectiveness of advertising spends across multiple channels as well as provide curated content across multiple channels.

- **Mobile Apps** – Mobile apps are increasingly used to provide content on mobile devices. With the proliferation of smartphones and increasing device usage by consumers, all content providers irrespective of business (LinkedIn) or entertainment (Netflix) or social media (Instagram, Facebook), all have mobile apps. A lot of content is consumed on Mobile Apps and results in revenues from subscriptions.

As is evident from the transformational impact of digital technologies in the digital transformation of media and entertainment, there are key benefits that can be derived as well, including:

- **Cost Optimization** – Digital channels have helped optimize the cost of advertising. The rising trends of more digital content consumption has led to more advertising spend

Personalization and curation are key to success and survival for the media and entertainment industry. And personalization is about providing unique experiences

on digital channels which have reduced the cost of advertising as compared to traditional channels. Big Data Analytics and Machine Learning enable media companies to provide curated advertisements to target consumers that results in more efficient spend of advertising budgets.

- **Transparency and Customer Experience** – Armed with digital technologies and enhanced customer service capabilities, media and entertainment providers can provide a more transparent and customized experience to customers. Emphasis of user experience design and curated content makes the customer experience richer and increases customer appetite for more content.
- **Revenue Models** – With customer centricity at its focus, media and entertainment enterprises look to create curated content and provide custom products and services for customers to consume. The rise of digital subscriptions and multiple product bundles has resulted in new revenue streams. The ability to merge multiple data sets and generate insights creates new revenue generating models and opportunities.

Digital transformation in media and entertainment industry is a growing trend worldwide as it is not just a differentiator but a provider of competitive advantage. Yet challenges remain in parts of the industry, for instance the news industry is in decline as there is only a small increase in the number of readers paying for online news. Personalization and curation are key to success and survival for the media and entertainment industry. And personalization is about providing unique experiences to millions of customers which can only happen when 1) you have deep insights of your customer's interests and changing tastes 2) being nimble and flexible – keep enhancing the content and end-user experience on websites and mobile apps 3) provide compelling content that can be shared by customers using hashtags and links to social media platforms. The rise of crowdfunding option is another disruptor that cannot be ignored anymore—around 16% of crowdfunding is for music, film and other entertainment initiatives ■

Double Scoop

Two times
the revelation



Piyush Gupta

Manager - IT, WebHelp India

A BOOK I LOVE READING

Ramayana

MY MOST FAVORITE ACTIVITY
IN THE COVID ERA

Yoga



MY FAVORITE
SPORTSPERSON

Roger Federer



MY TECH IDOL

Bill Gates

MY PEER IN THE IT
COMMUNITY

Harpreet Singh,
Manager - IT, Crisil

A CUISINE I LIKE THE MOST

Aloo Puri



Harpreet Singh

Manager - IT, Crisil



MY FAVORITE AUTHOR

Khushwant Singh

MY FAVORITE SINGER

Abhijeet Bhattacharya



A PLACE I'D LIKE TO VISIT IN
THE NEAR FUTURE

Singapore



A VIDEO CONFERENCING
PLATFORM I USE THE MOST

Zoom

MY FAVORITE COLOR

Royal Blue

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डिजिट अब हिंदी में

देश का सबसे लोकप्रिय और विश्वसनीय टेक्नोलॉजी वेबसाइट डिजिट अब हिंदी में उपलब्ध है। नयी हिंदी वेबसाइट आपको टेक्नोलॉजी से जुड़े हर छोटी बड़ी घटनाओ से अवगत रखेगी। साथ में नए हिंदी वेबसाइट पर आपको डिजिट टेस्ट लैब से विस्तृत गैजेट रिव्यू से लेकर टेक सुझाव मिलेंगे। डिजिट जल्द ही और भी अन्य भारतीय भाषाओ में उपलब्ध होगा।

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