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Sunil Rajguru

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Join the 35-year journey

It's great to be the Editor of the oldest technology magazine in India that boasts of a rich heritage of editors, writers, authors, contributors and reviewers. A brand that has a rich bank of magazines, articles, events, innovations and milestones. The India of 1987 would probably be unrecognizable to the youngsters of today. It's been one long journey and we managed to document it all.

In this Special Edition we are looking at the history of technology in India, take stock of the present and look into the future. For that we have roped in dozens of industry experts to tell the tale. Some sent in an article and that will be denoted by a simple byline. But wherever you see "in conversation with", be sure to check out the detailed and exhaustive video interview that has been posted on our YouTube channel. If you are reading the PDF version, then you can simply click the hyperlink to do so.

*It all
began in
1987*

This will give you a ringside view of the early days of the computers upto the 1970s. The nascent 1980s which saw the coming of the New Computer Policy (NCP). The roaring 1990s with Liberalization, the National Telecom Policy, the coming of the mobile and the Internet. The 2000s have seen the proliferation of laptops, smartphones, tablets and all manner of smart devices. Wi-Fi and broadband became the very part of the DNA of this country while the 2010s have seen great digital leaps followed by the technological acceleration (Techceleration) of the 2020s. This edition is forward looking too.

We look at the PCQ Story, our very own personal account of this magazine with a timeline and old covers. It was great interacting with all those associated with PCQuest from the 1980s and taking many trips down memory lane. But that has only scratched the surface and we would look to interacting with more contributors, readers and industry people for their rich stories.

CyberMedia launched India's first software industry magazine Dataquest in 1982 and after that it has been a pioneer all the way. The telecom industry magazine Voice & Data. CIOL.com, India's first tech news site in 1996. DQ Channels India, for channel partners. The DQ Week. BioSpectrum magazine. Living Digital, the tech lifestyle magazine. Global Services magazine. DARE for entrepreneurs.

We look forward to your views, comments and suggestions via email or any of the social media channels.

We hope you enjoy reading this Special Edition. A lot of effort has been put into it.

Sunil Rajguru



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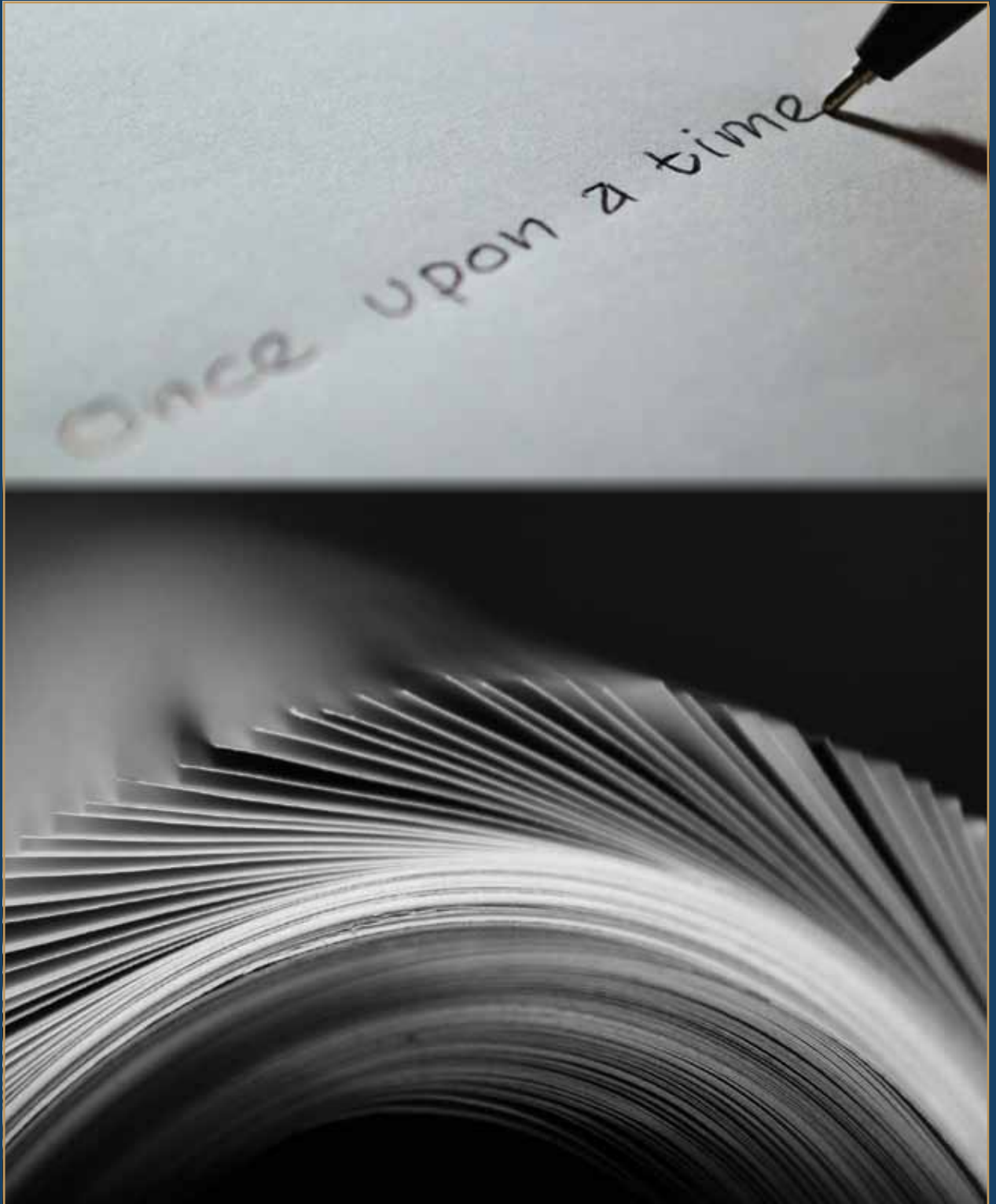


35 Years of PCQuest

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The PCQ Story



How PCQuest led to the Personal Computer Revolution in India

by
**PRADEEP
GUPTA**

If you talk to the youngsters of the 1980s & 1990s, most of them would say that it was PCQuest which was the tool that they used in terms of learning about the entire PC market.

Let me give you a very brief history of how this product came about. In 1982, we had started Dataquest. The question I was asked at that time was: A magazine for Information Technology? Because Information Technology was a fledgling industry, worth less than Rs 100 crores.

The same question got asked to me when we announced in 1986 that we were coming out with a personal computer magazine. Two products for Information Technology from the same media house? It doesn't make sense! At that time terms like B2B and B2C had not been invented. Otherwise, it would have been very easy for me to convey to everybody that one was a B2B product, and the other one was B2C.

That was the time when PCs had just come about in the world 1981-82. They started becoming big in 1982-83. In India the first PC came I think in early 1985. The total installed base of PCs was just 20,000 when we decided to start a PC magazine. We felt that this was something which was going to become very big, and we have been proved right. Today more than 20,000 PCs get sold every day. A huge transformation has taken place in the PC ecosystem marketplace.

When it all began, we made sure that we talked to the end users. We looked at what were the tips, tricks and traps of the entire PC market. We had content like "How do you assemble a PC?" PCQuest was a product that led to the PC revolution in this country.

If you talk to the youngsters of the 1980s and 1990s, most of them would say that it was PCQuest which was the tool that they used in terms of learning about the entire PC market; in terms of exposure to the PC; in terms of using the PC for their benefit. It also had a great impact on the SME and enterprise market in terms of bringing office productivity via the desktop. Therefore 35 years becomes a very special occasion for all of us.

We have been doing continuous innovation. After the PC we realized that there many Indian products were coming out and they needed to be analyzed and compared. Therefore, we set up PCQuest Labs, which was an instant success. That's because PCQuest tested products in dusty Indian conditions where the telephone lines were bad, and connectivity was poor, and so on. That's why our reviews were of great value to the Indian users.

We were the first in India to come out with a CD on the jacket of a magazine (first in Asia I think). We became the market maker for CDs in

PRADEEP GUPTA

Chairman & MD, CyberMedia Group



India. We came out with many changes and many innovations to ensure that the Indian users were getting their dose of technology in an easy, readable and friendly manner.

I am very happy that we are celebrating our 35 years. Now, we are at another critical moment. In the next 15 years, Deep Tech is going to change each and every aspect of human life. It will change each and every business. It will change each and every social fabric. It will change the way we work. The world that would be 15 years hence is something we cannot even imagine. This will be brought about by technologies such as AI, ML, AR, MR, blockchain, IoT, 5G. The role that PCQuest will play in the next 15 years is indeed going to be a defining one for the

usage of technology.

I look forward to interacting with you when we celebrate our 50th anniversary in a different form altogether because I am sure at that time, we will have a different kind of a technology.

When we launched this product, it was through the pages of a magazine. Today I am communicating with you through a video (*Catch this complete video address at the PCQuest YouTube channel*). 15 years later it will be in a different format.

Enjoy all these pieces that we have put together of the last 35 years along with different videos of people who have been stalwarts of the entire IT industry and get a real flavor of the past. ■

The advent of the PC in India in the 1980s

in conversation with

**SHYAM
MALHOTRA**

Edited excerpts from an exhaustive video interview...

Like any other change, there were a few evangelists for the Personal Computer. A few people who believed that this would be important. In the government think tanks there were people who thought that way too, otherwise the government policies would not have come out. They promoted manufacturing and so there were some companies making computer hardware like DCM, Data Products, ORG Systems, the HCL of old, Wipro, Usha etc.

There was also scepticism, cynicism and opposition. Like one of the earlier users were public sector banks. The unions protested a lot, so they were not called computers, but ALPMs: Automatic Ledger Posting Machines. This was the way of bringing in a "computer device" with the purpose of ledger postings, which was acceptable to the unions.

Computers were also called word processors. In some ways even for using the words computer, there was a little bit of resistance.

But then again there were people who believed in it, and they kept pushing the PC and talking about it. As and when the machines started coming in, gradually people got used to the idea and saw the benefits. There was resistance, but I think ultimately the benefits that the machines gave in terms of work convinced people that they were not going to threaten jobs and lead to displacement. It took time.

The need for a PC magazine

Dataquest was a magazine which was for the IT industry, but it was a business magazine. Somewhere along the line it became obvious that the people who were using computers needed different kinds of content, therefore there was a need for a publication or a place where they could go to where they could learn how to use them. If the whole business of promoting computerization really had to happen, the industry would not grow unless there were more takers. The basic idea came from there. There should be a magazine for the users. But yes, again there was a whole lot of scepticism and question marks. A second IT magazine? Are you guys mad? Those were the expressions on the faces of people. We first had PC World and then PCQuest. Initial usage of PCs was essentially word processing, spreadsheets, powerpoint and games. In our office we used to have Pacman contests.

When it really took off in the 1990s

But I think the major catching on happened in the 1990s. The telecom policy pushed for connectivity. The usage went up dramatically when



SHYAM MALHOTRA

Executive, Business, & Life Coach
Former Executive Director, CyberMedia



computers got connected. In the latter part of that decade, early software companies had started establishing themselves. The big rush came because of the Y2K scare where a lot of stuff had to be rewritten and a lot of it came to Indian organizations because they could

churn out people. The next wave was the call centers. These two really spread the use of computers." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

Creating the world of Personal Computers in India

by
DAVE GHOSH

“Your publisher is a pioneer too in India – having the guts to launch a magazine just focused on the world of Personal Computers when there was not a captive subscriber market.”

It is the summer of 1992, and I am in Berkeley, California, sitting in the patio of a coffee shop and enjoying the strong flavor of Columbian beans while the cool breeze flowing in from the Bay is giving some relief from the heat. But the heat is turned up even more, since I am in the presence of two great personalities in the world of Personal Computers.

“So, you worked for PC World India?”, one of them asked with his ever-smiling face. I am just overwhelmed to be in the presence of greatness and somehow elicited a yes.

I could never have imagined in my dreams of befriending these two gentlemen, who were instrumental in innovating and proliferating the use of Personal Computers in the 1980s – in the US.

I left India in 1990 with my parents and settled in the Silicon Valley.

Having worked at Dataquest and PCQuest from 1985 to 1990, I quite naturally wanted to further my journalistic career in the US. But the economy was just recovering from the recession and obviously with not too many jobs in the computer magazines, I decided to become a freelance writer and started making my rounds to various expos and conferences, trying to sniff out a story. It was at one of these conferences that I met Adam Osborne – founder of Paperback Software – the publisher of Lotus1-2-3; founder of McGraw Hill/Osborne and Osborne Computers – the very first portable computer launched in 1981 and the predecessor to the laptop computer of today. Adam, just recently divorced was looking for a place to stay

temporarily and decided to move in with me! A house we shared for over two years in Fremont, California. It was Adam who introduced me to David Bunnell, a pioneer in the personal computing industry who founded some of the most successful computer magazines including PC Magazine, Macworld and yes, PC World!

At the coffee shop, David Bunnell decided to nickname me David – feeling that Debasish is way too complicated. “Your publisher is a pioneer too in India – having the guts to launch a magazine just focused on the world of Personal Computers when there was not a captive subscriber market!”, he added. This coming from someone who himself boldly launched Personal Computing one of the first slick magazines on this topic. At one point, four of the top 10 computer magazines were ones that he’d started.

At this 35th year celebration of PC World India, now known as PCQuest, I cannot help but think how true that is. An average desktop

sold for 5 lacs INR in the 1980s and the extremely high cost reflected the low 2600 number of units sold. Besides the cost there was a strong sentiment and resistance to the adoption of Personal Computers creating unemployment and massive layoffs. It was a mission that no one even comprehended to take on at that time.

Minicomp, HCL, Wipro, Zenith, and many more companies took the lead in introducing PCs to the Indian market despite the extremely high duties on computers and computer parts. But what really spurred the market was how personal computing can benefit productivity for an organization and positively impact individuals – it was an evangelism at its best and no doubt with risks investing in it. The stories on how lawyers, accountants, desktop publishers, travel agencies, banks, advertising agencies, and even a discotheque called Xanadu! The stories we churned out month after month on successful use and outcomes across every walk of life and then the famous disk we would insert into every issue with tools and apps for free!

We were all comfortably cruising on Dataquest but were excited and thrilled to be a part of the creation we know today as PCQuest. Today we are all enjoying the fruits of this labor. Laptops and PCs are everywhere and India itself has become a giant in not only exporting IT services but building world class applications for personal computing, used by millions across the world. Without doubt, PC World India/PCQuest contributed to the explosive growth of the personal computing industry in India. The power and influence has largely been forgotten in the internet era, but at the time, in the and 1980s and 1990s, were as authoritative and read as eagerly as journals were in the Bollywood world.

Adam left for India to live in his ancestral home in Kodaikanal and passed away in 2003. David Bunnell

DAVE GHOSH

SVP- Global Alliances &
Channel Sales, LiveHire
Former Editor,
CyberMedia



and I became good friends and I met him and his lovely wife Jackie regularly at his home until he passed away in 2016. I still remember him flipping through the pages of PC World India and beam with pride, as one of his own creations that changed the world of personal computing in India. ■

PCQ as a tech influencer and the BBS culture

Edited excerpts from an exhaustive video interview...

in conversation with

**KISHORE
BHARGAVA**

"My earliest memory of PCQuest was around 1987 itself. We were trying to cover technology which was very new to everybody. We provided the readers with a lot of meaningful content. My first article was on something as trivial as a network card. It had a full-page review. The one big advantage we had was supportive editors. If we wrote a bad review, because it was a bad product, the editors supported it hundred percent. Even at the cost of losing advertising.

We did some fabulous ground-breaking stories in the beginning. In terms of virality, reviews and graphics became popular. The graphics were not of the level they are today. When people would even see a good GIF, people would be very impressed. It was exciting for the users. If someone did something in photoshop, that was really appreciated. So much feedback came by the way of written letters.

To put things in perspective, imagine a time when there was no Internet and no additional resources. It was a daily ritual for me to go to the American Library and British Council Library and sit down and pore over whatever technical material one could get. We would go to various engineering college libraries and labs. It was the true hacker mentality of: You find something, you read as much about it, you play with it, you break it, you fix it, and you do things beyond what the box says as some of the manuals were pathetic.

Bulletin Board System, precursor to today's chats

The Internet officially was launched to the public in India in 1995. A lot of people are not aware that the Internet came to India much before that, in 1988 but was restricted to educational and research institutes. It was called ERNET (The Education and Research Network). I do have the fortune of being one of the hackers who got into that system.

In India there are two people who set up BBS first, almost at the same time in 1989 within hours of each other: Atul Chitnis in Bangalore and me in New Delhi. It was a very simple two window chat. If you found another user on that system, you could check by saying: Who is online? If you knew the person you could give your user ID. The screen would split into two parts. Your message would be on other side and the other person below that. It was a real time chat. That became really popular as you were able to connect with people across time zones and across geographies.

Two types of BBSes got set up. One was where a lot of people would put files and other resources for downloads, the "file leechers". The other was where discussions started happening. My BBS was always a



KISHORE BHARGAVA

CEO, Linkaxis Technologies



place for discussion. You will be surprised at the number of people who even today tell me that they used to be on these BBSes. One such name is Paytm's Vijay Shekhar Sharma. Mine was the only BBS that had an exclusive "women only forum". That included my wife along with Mala Bhargava.

Seeding the Indian Linux community

PCQuest set up a BBS I think in the early 1990s. Once we had access to online communities, one was able to start getting freeware or shareware. Things like useful utilities, anti-virus, compression software etc. What PCQuest started doing early on was making a collection of the most useful of these utilities and publishing it on a CD. The magazine was being grabbed in the market due to this. Every time PCQuest came out,

people would look forward to: What's going to be on the CD and what am I going to gain from it? When it comes to Linux CDs in the early times, some of those magazines were the maximum reprinted ever. Every March we would come out with a Linux CD. The Indian Linux community got really strongly built because of that. The community was seeded by PCQuest.

Every little step in the beginning with PCQuest has been in some ways a blockbuster. Setting up a lab (PCQ Labs) with enough capabilities and equipping the people to allow them to take a product and dissect it was very forward looking. Doing this in the early 1990s was ground-breaking." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

Setting up India's first tech test lab

by
**GIRIDHAR
RAJAGOPALAN**

When we started doing reviews of products like PCs, printers & other office equipment, government readers started incorporating the product specifications into tender documents.

The early 1990s was an era of plentiful products—from printers, PCs and UPSs, to spreadsheets, word processors and PC databases. The market offerings included products from international brands and Indian companies. It was also a time when money was tight, and investment in technology solutions was a decision that was not easily made. Users agonized over every purchase—and wanted value for money for every rupee spent. PCQ used to get regular letters and telephone calls from readers seeking advice on hardware, software and peripherals. Editors and staff were hard pressed to provide unbiased advice. So, we decided to verify product features and performance claims. That was the genesis of PCQ Labs.

World-class reviews, despite limitations

Without doubt, the idea of an in-house lab for a technology was not new. US and UK-based publications like PC Magazine, PC World, PC Week, et al were regularly reviewing products. However, few Indian readers had access to these international publications—and to the full range of products that they covered.

However, we had limited resources and expertise at our disposal, and the challenge was to create a review methodology and process that was comprehensive, robust, reliable, efficient and well documented. We wanted our reviews to be world-class, despite the limitations. So, we started off with modest goals—and a few product categories. First, we analysed how other publications did their reviews—this was in the days before Internet—by reading through hundreds of reviews.

We also sought help from some vendors on how benchmarking tests were done by large customers. For specialized products like UPSs and accounting software, we contacted IIT-Delhi labs, and a few knowledgeable technical consultants. Some of our regular technical contributors pitched in as well, to define and identify test processes. It was a unique collaborative effort, often steered by PCQ staff. Discussions often stretched late into the night, and over weekends over what should be included or excluded from a review.

Admittedly, the learning curve for all PCQ staff members was steep—whether reviewers or copy editors. Everyone has had to learn enough about technical jargon and specifications to identify what was relevant—and whether it mattered enough to the user. All the time we were cognizant of the fact that our reader implicitly trusted our judgement and conclusions—and that we could not afford to be wrong.

Few vendors had the courage to send a product for review, without knowing the results until it was published in print. So, a lot of time was spent by editors in interacting with the vendor community, and convincing them of our abilities, credential and review ethics—and we are still grateful to many of them for the trust they reposed in us.

GIRIDHAR RAJAGOPALAN

Group Editor, 9.9 Group
Former Assistant Editor, PCQuest & Labs



Starting with a lean team

In the initial days, the PCQ review team was very small—three internal people doubling up as reviews and feature writers, and some specialist consultants. We started off with office productivity tools like word processors, spreadsheets, PC databases, printers and PCs—and then slowly took on more advanced products like modems, UPSs and financial accounting software. For every product category we had to develop the testing and review methodology—and a 500-word review often represented 20 to 100 hours of work.

As PCQ reviews became popular, vendors began send us products to review. Products would arrive on floppies, or sometimes in a formal packaging. Some of them were simple utilities developed by enthusiasts and small companies. They had limited features and functionality. A quick look, and we would send them back with brief comments. Naturally, the developers would be upset and would remonstrate with us. But generally,

we would publish the review, warts and all. We were confident that our review process, documentation and procedures were robust. CyberMedia's management was fully behind us—and many threats of legal cases never materialized!

PCQ reviews and government tenders

PCQ always had a very loyal reader base—and we were pleasantly surprised to learn how many people in government departments were regular readers of the publication. When we started doing reviews of products like PCs, printers and other office equipment, these government readers started incorporating the product specifications into tender documents. Some vendors tried to get us to incorporate proprietary features into the review specifications, in the hope of blocking out their competitors from tenders. It was all very hilarious—and sobering for us. To place 20-year olds at the center of lobbying for tens of crores of commercial contracts was scary prospect. ■

How PCQ became a Market Maker

by
**PRASANTO
K ROY**

From driving modem sales to CD drives to UPSs and Linux, this monthly magazine, its CD-ROMs, and its test lab changed India's tech market.

It was a hot and sunny day in the summer of '95. A colleague and I had stopped by for a quick chicken-rice lunch at a busy spot in 'Asia's largest IT marketplace', Nehru Place. The cheap-and-cheerful place also served rajma-chawal and boasted three tiny but tall round plastic 'dining' tables to share with strangers – standing only, no chairs.

Our table companion had several cardboard boxes with him, and, I was happy to see, two copies of PC Quest. It was our first issue that carried a CD-ROM on the cover, the first magazine in Asia to do so. I was curious: why two, and what would he do with the CD, which had the entire IBM OS/2 operating system? We got talking. He was delighted to know I was the editor of PC Quest. He was an IT dealer, with a shop in the next building—and he was suddenly flooded with orders for CD-ROM drives, five of them just that day. He insisted we visit his shop. We had had some very sweet and milky tea there.

When we introduced CD-ROMs on the cover of our 45,000 PC Quest copies, that was more than the total number of drives in India that could read those disks. Our cover CD-ROMs, quarterly at first, then monthly, sharply drove up sales for CD-ROMs. It was early days for the Internet in India, and downloading a full CD worth of software—over 500 MB of it—took several days over dial-up modems. This was also a reason the CD-ROM issues sold like hot cakes: hoarded, stored, exchanged and “sold in black” at twice the cover price. Readers quickly got access to shareware, freeware, and sometimes commercial software that companies decided to give away, as IBM had. Later, we moved on to 4.7 GB DVD-ROM disks, and the quantum of software exploded.

Then we started shipping a curated 'PCQuest distribution' of Linux every year on the cover-mounted CD. That began and drove Linux use in India in the late 1990s. Linux was light, robust, and free, and made a terrific server, rejuvenating an old 386-based PC that would struggle to run Windows. For the next two decades, every Linux user in India would remember PCQ Linux and the team of regular contributors and columnists that would put it together each year, led by Atul Chitnis and Kishore Bhargava. Those half-dozen odd folks were already well known on the BBS circuit: the electronic 'bulletin boards' that pre-dated the Internet. Atul had created a program called CyberNet, and set up on it the PCQ online BBS. All this got thousands of readers to buy modems – to dial up into maybe three BBSs out there.

And it was on us to test dozens of modems: Zyxel, US Robotics, Motorola... our makeshift lab in our South Delhi basement office echoed those distinctive modem dial-up squeaks. When we moved into CyberMedia's own building in Gurgaon as the first occupant of a now-crowded Sector 32 institutional area in 1999, the largest area in it was kept for a new PCQ Labs that gradually got stocked with test equipment,

PRASANTO K ROY

MD, FTI Consulting
Former Editor, PCQuest & Former President &
Chief Editor, CyberMedia



including my favorite, an HP digital storage oscilloscope.

And so we crossed the millennium bug without the world ending, into a new era. A couple of other magazines had started giving cover CD-ROMs, but our disks, and especially the annual PC Quest Linux distributions, had made a major mark – finding their way into the IITs, government departments, and defence labs. Our frequent ‘shootouts’ reviewed popular equipment – ‘20 Modems Tested’, ‘The Annual Mega-UPS Shootout’ – were sine qua non for buyers. And not just individuals: organizations would read them, and then we began to find government tenders, and even a defence tender for UPSs that said applicants must have had their product

tested by PCQ Labs!

That was remarkable, for a magazine and a test lab that did not do commissioned product tests for payment, despite many requests.

Two decades down, former and present readers still tell us they have saved every PC Quest issue and CD-ROM from those years. Unicorn startup founders tell us how they read those issues in school and college, and wrote letters to the editor. Unlike most tech publications of the 1990s, PC Quest lives on, with other CyberMedia publications like Dataquest, all adapting to a changing world. And it feels special, having been part of and steered a magazine that helped change the market, driving tech usage in the world’s largest democracy. ■

How PCQuest started the Linux Revolution in the country

by
ANIL CHOPRA

PCQ Linux CDs were being sold in the black market for double the price. It was even selling on eBay for 400 bucks! The distro even reached countries like Mauritius!

Though it has been more than 25 years since PCQuest released its first ever Linux distro with the magazine, it seems like only yesterday that it happened. The memories of how it all took place are still fresh in my mind. I feel really proud to have been a part of the team that spent countless sleepless nights to start the Linux revolution in the country.

Let's first set the context of how it all started. Back in the 90's, the cost of owning and running a PC was exorbitantly high. In order to do anything useful with a PC, you had to buy not only the hardware, but also the OS, applications, a modem and an Internet connection pack with it. All this made the PC of the 90's accessible to corporates, educational institutes, or a select few rich individuals who could afford it. So, if you really wanted a PC, you could either save money for months to buy one, or go to the computer lab of your school or college, remove your shoes outside, step into the air-conditioned room and start using it. Yes, that's how computer rooms were in those days!

What does that have to do with Linux you may ask? As Linux and all the software for it was free, users only had to worry about buying the hardware. Moreover, it was very stable and could extend the usable life of a PC for a much longer period of time. The global open-source software movement ensured that there were more than enough free software tools available on Linux on the Internet. While this sounds very exciting, the initial difficulty was in getting a usable copy of Linux itself. It was just not possible to download it because Internet connectivity was very slow and expensive back then (unlike today where you can download GBs of data in just a few minutes!).

Keeping this in mind, PCQuest managed to get a copy and released its first version of Linux back in March 1996. The first edition was a Slackware Linux distro and not PCQ Linux. The issue was a success, which could be gauged by the sheer number of requests that came in to repeat it. And so we did--In September 1997, PCQ released another issue with Linux. While this was also successful, it still wasn't a big enough hit to create waves in the market.

The real waves were created in May 1998, when the PCQ Team decided to swap Slackware with RedHat Linux. Not only did they swap, but they also customized it by removing all unwanted packages and applications, added essential ones, and then rebranded it as PC Quest Linux. The team that put it together also created a comprehensive users guide in the magazine to go along with it, so that people could learn how to use it. This issue was so successful that there were long queues at the news stands to buy a copy. The issue was sold out from the stands and

ANIL CHOPRA

VP- Research and Consulting, CyberMedia Research
Former Editor, PCQuest



PCQ had to reprint more copies of it to meet the demand!

In fact, the issue was so successful that PCQ Linux CDs were being sold in the black market for double the price. At one time, it was even selling on eBay for four hundred bucks! The distro even reached neighbouring countries like Mauritius who referred to the CD and the magazine to learn how to use the latest software tools!

So what started as an experiment turned out to become a revolution in the country. Developers, students, technology enthusiasts, consultants, IT heads—everyone who till now didn't have easy and affordable access to software and tools to learn and experiment were able to get everything they needed for the mere cost of a magazine!

It wasn't just the main Linux issue that promoted Linux in the country. The PCQ team kept releasing newer versions of PC Quest Linux year after year for more than a decade. PC Quest Linux was re-branded to PCQ Linux, the RedHat distro was changed to Fedora Linux, the distro became bigger and was released in two CDs at first, and later on DVDs. Every subsequent issue of PCQuest that followed also carried a lot of hands-on tutorials on how to use different kinds of tools in PC Quest Linux.

It was a combination of all this that made PCQ the most important source of Linux and a huge promoter of open-source software in the country. It was innovations like this that kept PCQuest ahead of all competition. So much so that while most magazines have shut shop, PCQuest continues to celebrate its 35th year. ■

Influencing & guiding a generation's tech choices

by
**KRISHNA
KUMAR**

Be it the individual buying her first PC or the corporate deciding on which software to implement and how, PCQuest was invariably their guide.

I still remember that day clearly. It was getting late; but that was nothing new at the Labs. We were used to working into the night. Divya Mahajan, then a student at IIT Delhi was working with us. As it was getting late, his father dropped in, and we got chatting. Divya's father was CIO at NIIT and I was curious on what all new things he was doing. Oh! I am setting up an intranet. The pride and excitement in his voice was unmistakable. Those were early days of the internet. Corporate networks mostly ran on Novell Netware and Sun's Solaris was the predominant Unix flavor. Digital's Vaxes were still popular. VSNL (remember giasdl01 anyone?), Sify and the like were the ISPs. Networking those days did not mean TCP/IP!

Intranets were new, so his excitement was natural. But soon, the excitement and euphoria in his voice gave way to the frustrations of the implementation. An intranet runs on this new thing called TCP/IP. How do you get it running on diverse operating systems and hardware? How do you decide what IP addresses to assign? Where do you store files in the network? What software do you run, once you get the machines talking to each other? Issues that are no brainers today were showstoppers then!

That discussion got us seriously thinking. If someone who had access to the best of experts was struggling, what about the others who don't? A few days of tossing the idea back and forth with the team, and we decided to setup an experiment.

We assembled an esoteric mix of hardware. There was a desktop running Windows. Another ran IBM's OS/2. We had an oldish Mac that was used for reviewing Mac software. A machine running Solaris was also organized. We had a tallboy chassis on which we used to mix and match hardware for various tests. Amitabh, we used to call it. Amitabh got configured as a server running Netware. It took three months, but we finally had an intranet up, stable and running. The network was connecting over TCP/IP. We had documents being accessed on a browser over HTTP and we had working email! That issue, titled 7 steps to intranet, had more pages devoted to this one implementation than to all product reviews! It later got published as a book also.

That issue set the future direction for PCQuest. Even the new tagline for the magazine evolved from that. The Tagline now read: Technology – products – implementation. The magazine would cover technologies, products that were built using those technologies and solutions implemented around them. It is not as if we were new to technology implementation. The wildly popular PCQ Linux CDs were accompanied by

many implementation stories. These were mostly focused on the desktop or on an individual server. It was the PCQLinux CDs and accompanying articles that popularized Linux in India. With the seven steps to intranet, we moved beyond the desktop into a truly networked world! Issues like these and the many that followed became hand-on guides for enterprises of all shapes and sizes to implement their tech.

Soon, we segmented our coverage into hands on implementation and technology strategy. This split was carried over to our hugely popular conference series with parallel tracks for CIOs, IT managers and sysadmins; the IT manager and sysadmin tracks being fully hands on. While these conferences were hugely popular and house full most of the time, the conference that I will remember forever is the “How to buy a PC” series.

Those were early days for home computing. These conferences used to run along with PCQ expos. We would take a PC apart in front of the audience and reassemble it while explaining each part, available options and price points. Once, in Trivandrum, the session was so full that people were crowding outside. Someone from the crowd asked some questions and two of us started answering. Soon, there were three full sessions running in parallel – one inside the hall and two outside in the corridor! In Pune, a family had come together. The son had just got admission for engineering and they were scouting a PC for him. The boy wanted the best available spec while the father was requesting moderation. He was taking a loan to buy the PC. At the same time, he did not want his son’s studies to be deficient!

But the best came in Chandigarh. I was talking. The talk finished and I noticed that a tall Sardarji was standing there watching me intently. I can still picture him clearly – tall

KRISHNA KUMAR

Former Editor, PCQuest.
The first one to head
PCQ Labs



and well built, maroon turban and matching maroon trousers, pink shirt and well-kept beard. After some time, he walked up and in a booming voice that everyone in the room could hear, he said – “Mujhe computer ke bare mein kuch nahin aata. Main thumein dekh raha tha. You are honest. I am a farmer, aur iss saal fasal achha tha. Tell me what computer I should buy?”

I have had my fair share of compliments and brickbats since then. But that ringing “You are honest” from that farmer in Chandigarh. I have never had a better compliment than that. ■

Personal tech spins off

by
**MALA
BHARGAVA**

Many tech enthusiasts who know me today would be surprised to learn that I started my writing career with PCQuest, not Computers@Home (Living Digital), the magazine I created and headed for a decade. I had abandoned my attempts at a career in psychology in 1995 and was floundering when I met the then editor, Prasanto Roy. It was he who taught me how to explore products and write about them and I took to it like a duck to water. It was just then that the Internet arrived in India via VSNL and the excitement began.

My very first look at the Internet left me none the wiser as I tried to make sense of commands that sounded like pure gibberish. But then came the World Wide Web and this was where we began to practically live—specially if we could break into someone else's account. The possibilities were endless with the 'Information Superhighway' all set to change life. Which is exactly what it did.

I remember marvelling at the first digital cameras, playing with pagers, watching as modems & printers & UPS machines were reviewed in mammoth shootouts by the newly created Labs

I wrote on how to navigate the Web as a freelancer for PCQuest and soon also had 'multimedia' products to explore and introduce to readers. All this was so readily lapped up by readers that CyberMedia decided to start a separate magazine dedicated to 'non-techies' or as we know refer to it, personal tech. Products poured in and there was so much to write about in my new magazine, Computers@Home. I had a small but entirely exited and involved team and all of us had to be pushed to go home at the end of the day. I remember marvelling at the first digital cameras, playing with pagers, watching as modems and printers and UPS machines were reviewed in mammoth shootouts by the

newly created Labs at PCQuest. We learnt about rigour, objectivity, and a sense of responsibility to both readers and companies who looked for a thorough and fair evaluation of products. Computers@Home was born out of PCQuest and then became its client, so to speak, for reviews and tech know-how.

Looking back to those first heady days of the connected lifestyle we now take for granted, I often play a game of then-and-now with myself. Did we really use pagers and feature phones and did we not always have the pocket computers we call smartphones today? Did we really have no Google? No Social Media? No Likes and followers, no push notifications and messages pinging in? Somehow it seems impossible to envisage the world being any different from the way it is now. There was no AI everywhere, no Machine Learning, no oceans of content streaming out through YouTube, no choice of music services and certainly no beautiful iPhones to show off. ■

MALA BHARGAVA

Editorial Consultant, Hindu Business Line
Former Executive Editor, Living Digital



The relevance of PCQ for today's generation

by
**SUNIL
RAJGURU**

Greek philosopher Heraclitus, who lived from 536 BC to 476 BC, stated: Change is the only constant of life. That cliché remains as fresh about 2500 years later. As we celebrate 35 years of PCQuest, boy has technology really changed in India during that period! But then so has PCQ!

The IBM PC was unveiled in 1981. India's New Computer Policy came in 1984. But it took many years for the PC to capture the imagination of India. When CyberMedia launched a Personal Computer magazine in 1987, it was way ahead of the times.

PCQ made sense of the Personal Computer and popularized it when no-one in India was quite sure of what it was. Understanding even the accessories was a challenge and PCQ helped out there too. Personal software. Enterprise software. Multimedia. PCQ demystified it all and helped an entire generation ease into technology in both their personal and professional lives. The effect of this was felt for decades to come and influenced both the tech industry and the personal habits the readers.

The non-commercial Internet came in 1988 in the form of ERNET (The Education and Research Network). PCQ was ready with the BBS (Bulletin Board System), the precursor to the Internet chat. Imagine chatting with people all over the world years before the public Internet came. India was Liberalized in 1991. So, when the products started proliferating soon after, nobody could keep track of it all. PCQ set up India's first tech labs, analyzed and tested in a way unseen in India by enthusiastic pioneers who dug deep.

When the commercial Internet finally did come in 1995, the dial-up (the peculiar sounds it made is still recalled by everyone from that era) meant that you had to wait ages and ages and spend tonnes of money for something modest to be downloaded. PCQ started distributing CDs

with software, tools, games and even an operating system (Linux). The average techie of the day would look forward to the monthly CD and explore what all it had. It was a bonanza for the average user. It was like opening a packed virtual gift hamper.

We pushed Wi-Fi in the early days and realized what a big thing it would be. After that there was a special focus on enterprise implementation for SMBs so they wouldn't be left out. Buying Guides. Best IT Implementation Awards. SMB Handbook. SMB Forum. User Choice Awards. It's been a series of innovations and specials.

The main point is that PCQ kept evolving. From being a PC magazine to a PC ecosystem magazine to a developer magazine to an IT implementation magazine to finally becoming a pure play technology magazine. Today PCQ takes a look at the cutting-edge technologies and makes sense of them all. There are enough of emerging technologies to understand, and they don't stop changing.

PCQ kept evolving. From being a PC magazine to a PC ecosystem magazine to a developer magazine to an IT implementation magazine to finally becoming a pure play tech magazine.

SUNIL RAJGURU

Editor, PCQuest, Dataquest & CiOL



The technological acceleration unleashed by the Covid Era means that now tech is entering every facet of your professional and personal life. There will be no let up. The genie is out of the bottle.

Cloud. 5G. IoT (The Internet of Things). Industry 4.0. Artificial Intelligence (AI). Machine Learning (ML). Deep Learning (DL). Natural Language Processing (NLP). Virtual Reality (VR). Augmented Reality (AR). Mixed Reality (MR). XR (Extended Reality). Robotics. Robotic Process Automation (RPA). Blockchain. Cryptocurrency. Bitcoin. Quantum computing. NFTs (Non fungible tokens). Web3. Metaverse. The list is endless and will have things falling in and out of it at the drop of a hat. There's also a lot of jargon and Alphabet Soup for the Soul in there.

Let's have a look at the things that have

shut down, become redundant, fallen out of use or terms simply still relevant but unfamiliar to today's generation. Floppy disk. Multimedia. DOS. LAN. DTP. BBS. PSP. CD. Dial-up. Dot matrix printer. Pentium. Apple Newton. Netscape. Hotmail. MSN Messenger. AltaVista. Napster. iPod. MP3 Player. Compaq. Palm. Blackberry. Orkut. Google Plus. Internet Explorer. Every year there will be additions to this list.

You can check out our magazine (both the print and PDF version), website, social media channels, YouTube channel, panel discussions, webinars, virtual events and even offline events, which are bound to resume soon. Whatever works for you.

PCQ has remained relevant for all generations in the 1980s, 1990s, 2000s and 2010s. It has become even more relevant in the 2020s. ■

35 Years of PCQuest

A glimpse into the journey of India's first technology magazine

1987

Cybermedia launched India's first technology magazine, PCQuest. It was initially called PC World India, with the name being licensed from the international PC World magazine, which got rechristened as 'PC Quest' two years later



Reviewed the popular word processor, WordStar 2000

Featured database management systems, DBASE II to DBASE III conversion in **'How to'**

Started **User Opinion Polls** to know about the brand preference, buying habits while considering PC, software, etc. and the user perception too

Did the first ever **benchmarking**— A comprehensive comparison of PCs

1988

Came out with a comprehensive **PC Buying Guide** for the readers

1989

Started '**Best Indian Product**' Award. Reviewed and evaluated different IT products; came out with buying guide of personal computing products

1994

PCQuest Online BBS: Before the Internet came to the country, PCQuest launched an online chat facility, India's first Bulletin Board System (BBS). Readers and tech enthusiasts would use their machines to dial into the BBS to interact, share information, answer technical queries, etc.



PCQ Labs: The first Indian magazine to set up its own independent IT products test lab facility. The lab grew over time to become a credible authority for product purchase decision-making. It tested a whole range of consumer/enterprise products and even set up its own data center to test enterprise class products like servers, NAS devices, switches, etc. The entity is known as **CyberMedia Labs** today

1995

PCQuest CDs: The first Indian magazine to distribute free CDs with the magazines. From August, 1995 onwards, commemorating its 100th issue, PCQuest started distributing free CDs along with its magazine. The CDs used to contain OS, software, and lots of demos from the leading software giants such as OS/2 Warp OS, Lotus Notes, PC DOS 7, etc.





1996

PCQuest Online BBS moved to the web with the launch of www.pcquest.com

PCQuest provided a free **Linux distro on CDs**, distributed along with the PCQuest magazine. This distro was based on Slackware Linux

1998

PCQuest introduced its own Linux distro based on RedHat, called **PCQuest Linux**. It became so popular that the magazines sold out fast on the stands and PCQuest had to print more copies to meet the demand. It was even found being sold on the black market, for 3-4 times higher than the price of the magazine



2002

PCQuest started putting tutorial videos in the CDs. QTV (later rebranded as TechLive) contained all the excitement from the PCQ labs

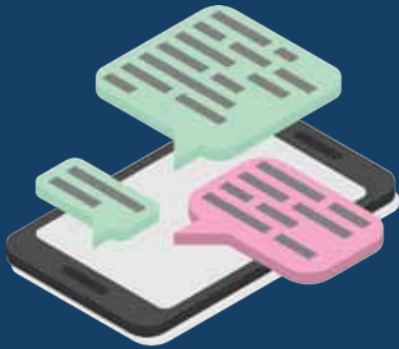
2003

PCQuest DVDs: PCQuest started to give out free DVDs with the magazine to accommodate more software and distros. Later on, as the demand for software increased, PCQuest started giving out dual layer DVDs containing over 8GB of software

2004

PCQuest introduced '**Best IT Implementation Awards**' to recognize all the good IT projects in the country. Starting with just 11 project nominations in the first year of inception, the awards started receiving over 200 project nominations every year eventually from across all the major industry verticals





PCQuest RQS and IMS: Another first in India, this allowed readers to send back a **Readers' Query Service (RQS)** card, asking for more information about a particular product carried in the magazine. Each reviewed product used to have a unique RQS Code. This was later converted into an SMS service, also called PCQuest Instant Messaging Service (PIMS)

2005

PCQuest TechLive: PCQuest started producing its own videos for distribution along with the software on its DVDs. The 20-25 minutes program contained hands-on technology advice as well as the latest technology trends

First Indian magazine to give out Multi-Boot DVDs containing 5 Linux distros

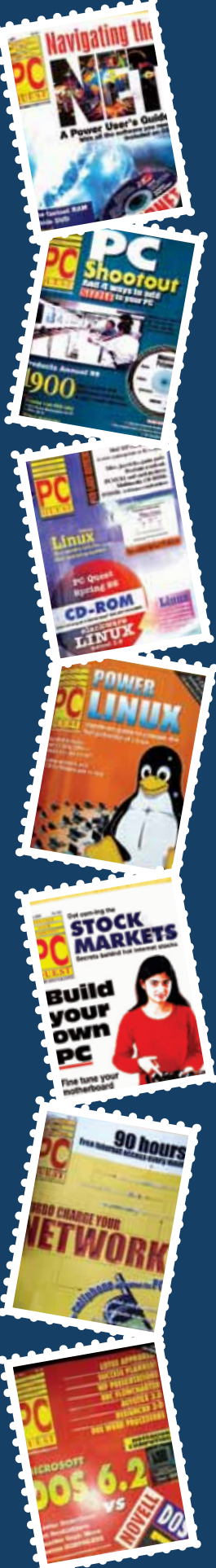
2006

First IT magazine in India to set up its own HPC Cluster out of 20 ordinary Intel Pentium 4-based desktop machines connected over a Gigabit Ethernet network



Started a supplementary **'SMB Handbook'** and sent it out to 40,000+ SMBs on a quarterly basis, absolutely free of cost and later took it online on www.pcquest.com





Started the **'Enterprise Solutions Showcase'**, the first mega event ever in India to showcase the crucial IT solutions in action to the enterprise CIO community. The event attracted over 1,500 IT decision makers across Delhi and Bengaluru

Started the **'PCQuest Users' Choice' & 'Most Wanted IT Brands'**, the only annual survey of its kind in the country that captured brand preferences of the top IT decision-makers. The survey checked CIO preferences across more than 40+ IT product categories spanning hardware, software, and services. It became the de-facto buying guide for the enterprises, govt. and PSUs later on

PCQuest QR Codes: Initiated QR Code with magazine content. QR codes provided rich multimedia experience to the print content



PCQuest Online Forums: The first Indian publication to set up an interactive Online Forum, which became a real hit with the readers, attracting 3L+ users, unheard of at that time. The forum was set up well before the social media sites such as Facebook, LinkedIn became popular in India

2008

'PCQuest SMB Forum' was launched with a series of roadshows. Within 5 years it covered more than 32 Indian cities, advising Indian SMBs about how to use IT

2010

PCQuest launched **'Spark IT'**, the first mega developers conference along with CIOL, that helped developers and project managers stay ahead of the curve. The first edition attracted more than 1,500 developers



2015

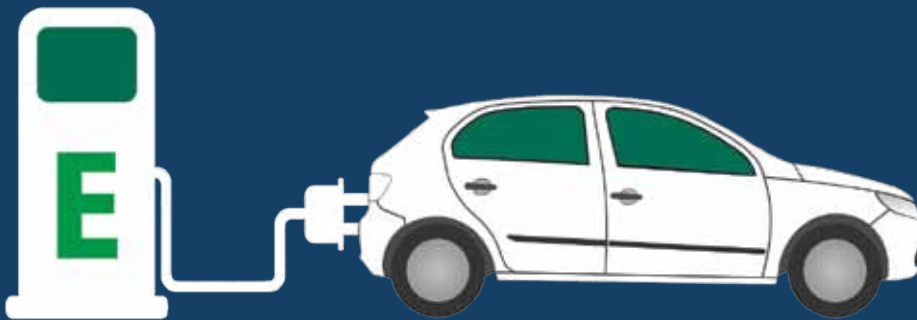
PCQuest in collaboration with HP initiates '**Business Now Express**', a unique outreach program for Indian SMEs. A bus carrying the latest HP products travelled around six cities in Maharashtra and took them to the doorstep of SMEs

2016

Started recognizing '**India's Top Tech-led Startups**' and engaged them through a unique 360-degree startup grooming and IT training program

2019

EV tech: PCQuest focuses on Electric Vehicles technology and innovation



2020

PCQ continues with its Media 4.0 strategy to usher in the New Normal with regular video interviews, webinars and panel discussions on the enterprise and emerging technologies. Special issues on Collaboration and WFH



PCQ Users' Choice Awards: Users' Choice and Most Wanted IT Brands relaunched with a brand new identity



2021

Launched **HealthTech Virtual Forum**. Focus continues on Enterprise tech, and emerging tech like AgriTech, EdTech, Connected Vehicles, and Gaming



2022

Started capturing the History of Technology. Commemorating 35 years of the magazine, PCQuest launched a video series special with the Who's Who of the tech industry

■ *Compiled by PCQuest Team*

Technology Yesterday, Today & Tomorrow



Indian computing in the pre-PC world

in conversation with
VEER SAGAR

Edited excerpts from an exhaustive video interview...

“In those days there was no IT Ministry. The Department of Electronics for a long time reported to the Department of Atomic Energy. The first time computers came in, it was an IBM 1401 that was refurbished in their Bombay factory and given on a heavy lease of Rs 8.5 lakh a year. (Note: This was a “variable-wordlength decimal computer” that was introduced in 1959). I was there in the middle of all these happenings and very very lucky, first as a supplier of IT in Dunlop with the 1401 in 1965–66. The IBM engineer would come in a three-piece suit stitched in Hong Kong and offered a lot of support in system design.

All that it had was 4 tapes and two removable disk drives. It was quite

a challenge to program on it with cards. Sales disks and purchase disks were two separate things. Modifying it was a major pain. There used to be a huge printer with 132 characters one way with four carbon copies. It was a strange beast. The room in it was also huge with air conditioning and ducts coming under and on top. Only authorised people could enter with their shoes off after dusting themselves. It was like a temple. The only place where you could learn all this was the Indian Statistical Institute (ISI) in Calcutta.

Political problems in 1977 and a 360 upgrade

After the Janata Party government came to power in 1977, thanks to FERA (Foreign Exchange Regulation Act), foreign companies could not own majority shares and they had to dilute. Coca Cola and IBM said sorry we are not diluting and left. The problem was there were a lot of 1401s and maintaining them was a big thing.

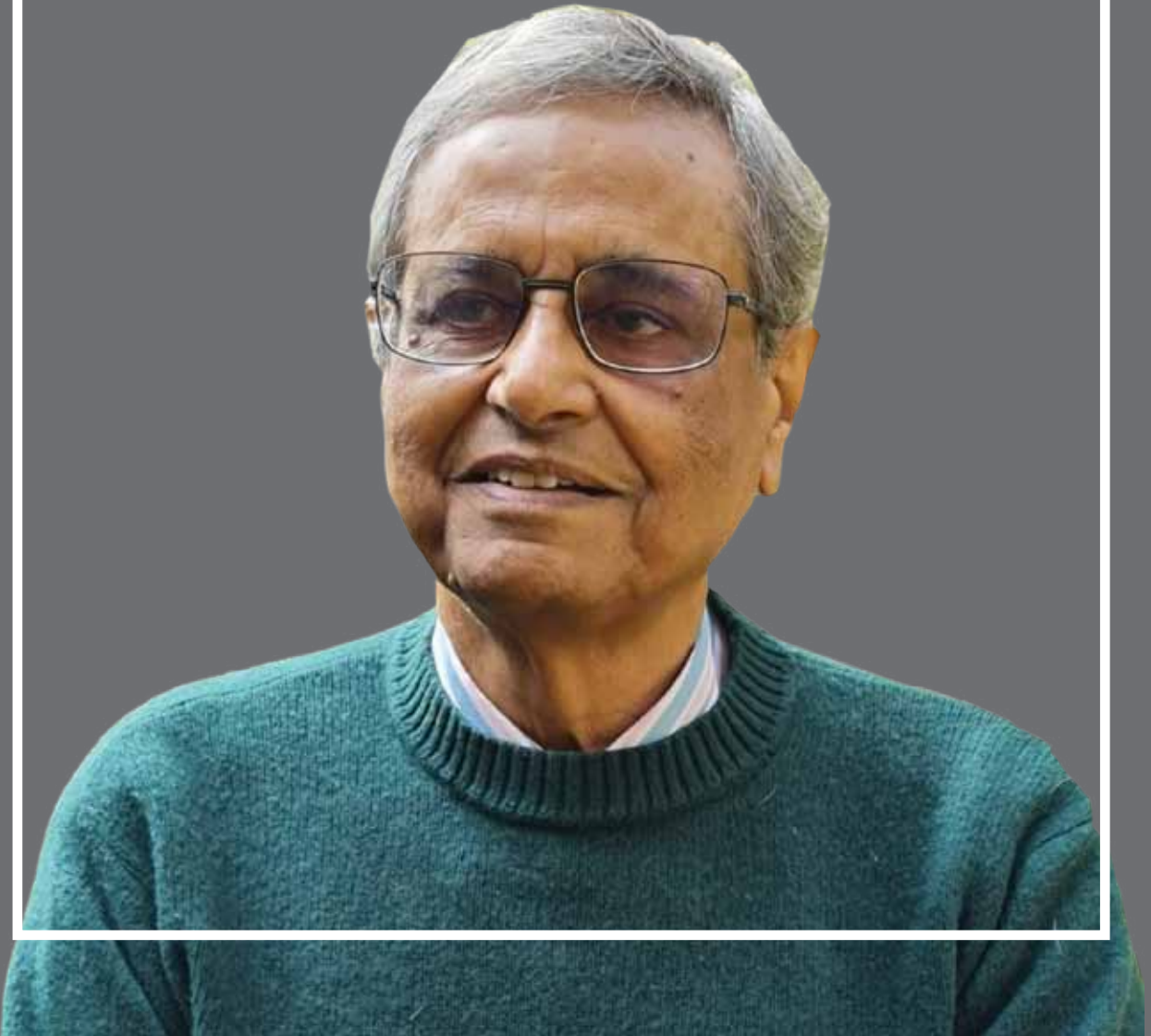
We wanted to upgrade it to a 360 (IBM System/360) and in those days had to provide a 100-page justification on why you wanted to import the computer, how it would affect the country, and hold your breath, how it would affect the agricultural sector along with disk mapping and memory mapping. An expert committee would decide whether you deserved to get a computer or not and if so, what size. Then a financial committee would decide who would supply the computer and at what price.

Later I was a member of many of these expert committees. Since we were aligned with the Soviets, there was also a lot of pressure to buy Russian computers, but there were too many issues with that. We ultimately went in for a Burroughs’ system. But there were compatibility issues. At that time a computer room cost as much as the computer



VEER SAGAR

Chairman, Selectronic India
Former President & CEO, DCM Data Systems



itself: One crore for each of them.

The 1984 New Computer Policy

The government allowed PCs and chips to be imported. So, a lot of Indian companies were set up making PCs and minis. There were three types of companies. One was the companies that had their own internal R&D like Wipro, DCM, HCL and ECIL. Then there were those who assembled like PCL, Zenith and ORG. Then we had the grey market. In those days a PC went for a lakh of Rupees and a mini for 3-4 lakh because the duties

were high, to the tune of 150%.

Then Sivasankaran (of Sterling Computers), I don't know how he managed what, he brought down the prices to forty thousand Rupees. It was cash and carry and had no service and support though. Then Zenith followed suit and all our prices crashed. That's when PCs became more widely used and the mystery started disappearing." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

Disruption in the PC Industry

Edited excerpts from an exhaustive video interview...

in conversation with

**BIKRAM
DASGUPTA**

"The year when IBM left (1977) we all said that we can do something now. But at that time, we had to define what is PC manufacturing? What is PC trading? How we differentiated it was that there were certain products where you could see the subassemblies separately; and as a whole. The PC then belonged to that category. There was a huge debate going on whether you could call it assembly or integration. Entire policy was getting framed on that basis. From the industry point of view, it was all energy, enthusiasm of wanting to change India rather than actual knowledge of PCs. We were trying to do something that was not done before. HCL was one of the earliest companies and Dataquest one of the earliest magazines of influence.

Selling hardware versus selling software



But there were many problems. The government was trying to stop fly by night operators but in the process aided them. Both over invoicing and under invoicing was happening. We were talking to the government to do something about it while the sales were going on. Everybody was facing the music. That continued for a while. There was software which had 160% duty. With distribution charges the price went to such a huge level that nobody was able to buy the PC. This was a huge problem because initially it was all about hardware, and we had to sell software free to the customer.

Much later we realized in terms of crashing duties, it was better to go after software rather than the hardware. Hardware then could be sold with the added value of software. Finally generic software duties crashed to zero per cent. How things have changed. Today hardware is selling only because of software. The selling jargon was first "IT" and then "solutions".

But 1987 was a very good year for us at PCL when the transition happened when we went from trading the PCs to assembling them. Then there was a huge turning point in the early 1990s too. PCL was the first company in the industry which bought a surface-mount technology (SMT) plant for manufacturing of motherboards when I got the huge Dell order of \$50 million.

The PC companies: The early entrepreneurs

You wouldn't have seen this level of entrepreneurship, I will be aggressive enough to say, in any other industry. These entrepreneurs came from the middle class. The millionaires and billionaires came much later, but at that time the aspiration was created in the mind of an average student, who thought he could do something on his

BIKRAM DASGUPTA

Founder & Executive Chairman, Globsyn Group
Former Director, Pertech Computers Limited (PCL)



own. Today nobody talks about that contribution. That is the major revolution which happened. There was a total change in the way we started looking at things. I feel very proud we were among those

groups of people who brought about that revolution." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

Taking computer education to the masses

in conversation with

**RAJENDRA
S PAWAR**

Edited excerpts from an exhaustive video interview...

The state of IT education in 1981

"At that time, it was non-existent. But the manufacturing industry was already anticipating a problem of talent shortage. This was the number one concern: How will the industry grow? NIIT was born out of that threat. It was a problem and we saw that as an opportunity.

At that time there were a handful of people coming out of the IITs, but they were not the ones writing programs. There was nothing significant to build talent for the sector.

Basic courseware for a brand new era

The first two courses that NIIT announced in 1981 were one, an entry level BASIC. It was a 4-week programme, 5 days a week and 2 hours a day. We had a long-term programme: Entry level COBOL, for 12 weeks. The early thrust was on languages. COBOL was at that time state of the art. We also taught FORTRAN to engineers and scientists.

The continuous evolution of training

Very soon we realized that programming is one part of it. We need to do analysis. You need to define a problem. Companies wanted to build a strategy. We spent a lot of time doing user education for corporates and ran a programme for them called: How to buy a computer. As people came to study, they articulated what more they wanted. We were extremely responsive. We covered the whole gamut of information system management at one level down to entry-level programming. It

was languages, structured system analysis and design, structured methodology, database, database design... all of the "nuts and bolts" issues in the 1980s that were important.

We were trying to track developments in all the places where there was a thought leadership. There were a few campuses which were doing path breaking work and we interacted with them. Edward Yourdon was the father of software engineering. We made an arrangement with his company to teach structured methodology and TCS was a very big participant. We tried to expand to cover all constituencies, but quite clearly the largest need was for people who could write programs.

NIIT: First of its kind franchise in education

We created the idea of a franchise for education which had never been done before. We found like-minded entrepreneurs in cities and motivated them to go back to their towns and set up an NIIT centre. If you walked into



any NIIT centre at its peak (there were thousands) it would give you the same look and feel. *Far Eastern Economic Review* talked of it as the McDonald's of education.

1990s: Y2K & the perfect storm

1990s was a golden decade. For the IT sector there were a couple of things happening at the same time. India's Liberalization had happened. We got the STP policy. India needed foreign exchange. We got a lot of push. At the world stage, the Y2K opportunity was becoming large and the West knew that if they didn't fix their problem by the Year 2000 they would have a catastrophe. They were willing to spend a tonne of money. The Internet had arrived. It was a perfect storm. 1990s was an era where Y2K added fuel to what was already a high growth area.

After the bubble burst, post-Y2K, a few years later we started growing again and went into new technologies. Governments were beginning to invest. The PC was in the home. Everyone was getting on to the Internet. There was growth and a huge amount of tailwind that took us into the future.

The evolution still continues...

By this time, we were in the face of every consumer in India. We were 90% B2C and had some amount of leadership training. But over a period of time as our international business grew, we found a solid demand coming from corporations. Today that is 80% of our business. That's for the Fortune 100 companies, in all sectors: healthcare, airlines, engineering, oil etc. For these companies we do something called Managed Training Services. It's like a learning process being outsourced.

Future of online education: Who'll get the blend right?

Education is a very engaged and involved process. Every learner learns in

RAJENDRA S PAWAR

Chairman & Co-founder, NIIT
Founder, NIIT University



a unique way. Trying to put everything into a process has its downsides. Human intervention is a must. What happened during Covid, everybody did online learning but now you are seeing the underbelly. Online learning has a very important role to play, but a very specific role. A proper hybrid blended model is the solution. So, the one thing is who gets the blend right? That will make the difference between making an impact on people's lives or just giving them a piece of paper." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

The era of the PC assemblers

in conversation with
RAJ SARAF

Edited excerpts from an exhaustive video interview...

"Somewhere in 1980, we started making computers. At the time apart from Zenith we had HCL, Wipro, Nelco, IDM etc. They all started 1978 onward. But the IBM PC was born in 1982. Prior to that everyone had their own operating system. The most common OS was CP/M (first Control Program/Monitor, then Control Program for Microcomputers). Most of that was based on a Zilog Z80 or Intel 8080 processor.

We were possibly the first company to take a standardized OS CP/M. When the IBM PC came with MS DOS in 1982, everyone started shifting to that computer market with the Intel 8080. This was the scene till 1984. After that people started looking at a UNIX based OS with Motorola 6800 processor. Especially NIC started to push that in a big way.

Assembled PCs take off

Assembled PCs started somewhere I would say in 1985-86 when a lot of these components from Taiwan started coming in individually for people to assemble it. By now we had a standardized Operating System, while the motherboard, chassis and monitor all were available.

They took off in a big way in 1990 and we had assemblers in Nehru Place in Delhi, Lamington Road in Bombay and many other cities. There was a price difference of 30% primarily due to excise duty and the sales tax. The assembled PC flourished because of the unlicensed Operating System.

Practically all the big groups in India at that time went into the business of computers whether it was the Birlas, the Tatas, Mahindras etc. Everybody went out also very soon. Possibly they found this business to be very competitive. Competing with the assembled PC was not a joke. The assembled PC also flourished because it could be custom made.

End of an era

Today, there's not a single Indian company making the PC. The last three companies in this field were HCL, Wipro and Zenith. They also stopped. You can't compete with multinationals. The whole PC industry has been dominated by Intel and Microsoft. With their volumes, multinationals get a much better price on the processor and OS. Any new vendor will find it very difficult to compete with them worldwide. Today in the world there are only five players: HP, Dell, Lenovo, ASUS and Acer. Everyone else is finished.

The problem for the assembled PC had also began when India signed an IT agreement wherein the PC came as duty free. Any passenger coming



RAJ SARAF

Founder, Zenith Computers



from abroad could bring a laptop duty free. The laptop growth continued. Now since all your data is common, people want only one device and that is why the laptop numbers far exceed the desktop.

But the assembled desktop PC is very

much there for the gaming purposes. As far as the gaming market is concerned, 90% is assembled." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

The problem with the “revised” computer policy of 1984

in conversation with

SUNIL AGARWAL

When the domestic manufacturers successfully lobbied to stop computer imports, the government added a clause: Minimum hard disk size to be 300 Mb.

Edited excerpts from the video interview...

“From what I recall, in 1983, the total turnover of the Top 10 of the Indian computer industry was Rs 100 crores. I believe companies would buy computers somewhere in the US or UK, disassemble them, send the parts over here and assemble them again. Many of them used to write their software for these

machines. What the 1984 National Computer Policy did was that it said you can import these computers directly.

The biggest obstacle to this policy was that many of the Indian manufacturers, the large ones, they went to the bigwigs in the government and said that this would kill the initiatives and investments that they had already made in the industry. The government asked the policy makers to do something about the policy, maybe tweak it a little to stop these imports. They added a clause saying that the computers being imported must have a minimum hard disk size (300MB). Amazingly there were very few such computers in the world in 1984 so effectively the imports were blocked.” ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

SUNIL AGARWAL

Founder, 20:20 Media
Former Editor, Dataquest



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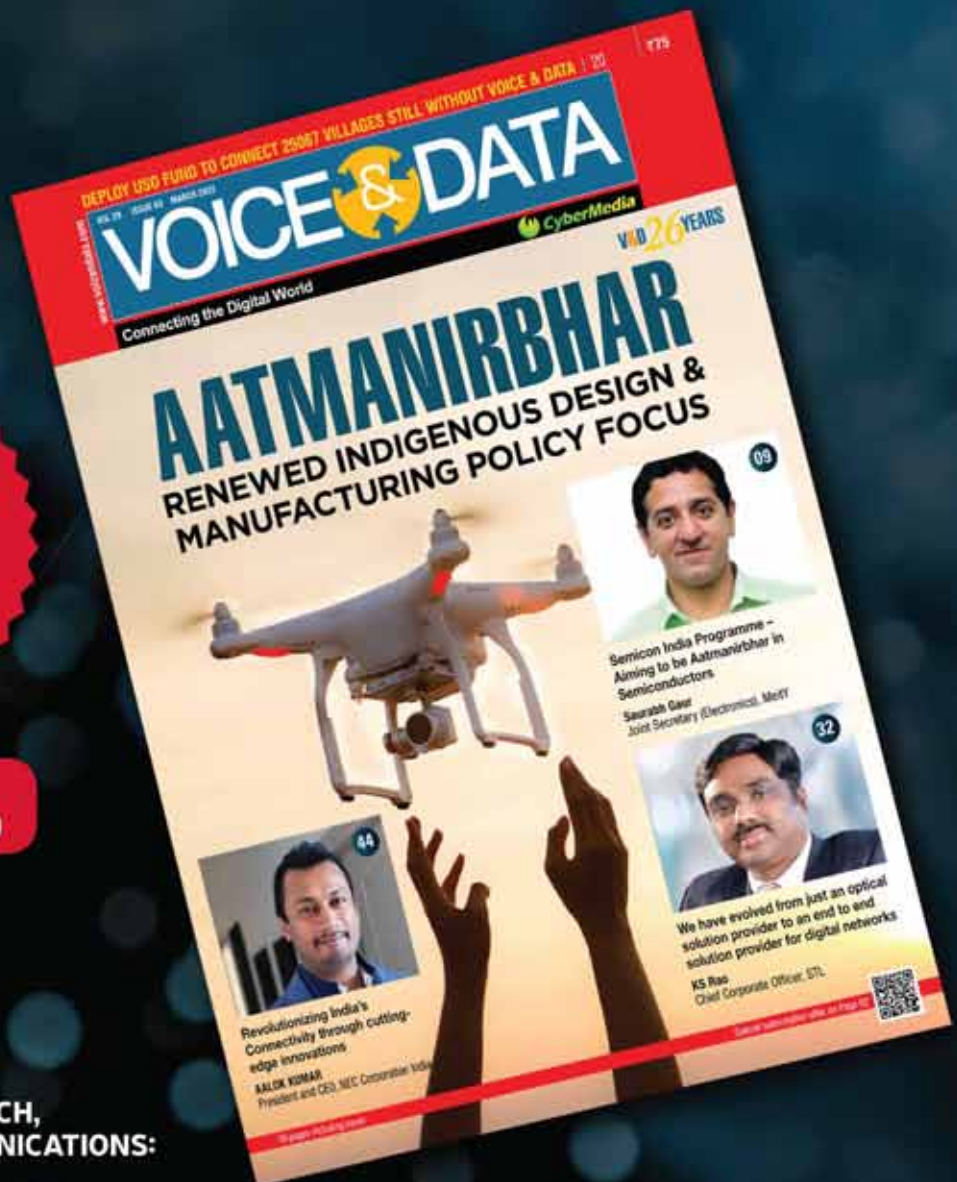
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The story of Indian networking

by

PRADEEP KAR

The transition from mainframes to a client-server architecture came in the 80s, when the price of computers fell. Utah-based Novell seized the opportunity. Novell's NetWare quickly became the default networking technology. It led to the emergence of the Local Area Network (LAN), connecting offices, universities and even residential properties. When Microland was launched in August 1989, Novell was already inching toward having an installed base of half a million networks. The challenge with setting up LANs in India was the lack of trainer professionals. We addressed that challenge. To overcome the challenge, we knew that a Novell partnership was crucial. So, we pursued a partnership with them and trained customers in India on NetWare. As a result, Microland became a pioneer for networking in India. That is how the story of Indian networking began.

India managed to get the finest companies in the world of networking from Day 1. We had partnerships worked out with Compaq (1992), Synoptics (1993), Cisco (1993), Netscape (1996) and CheckPoint (1996), each providing best-in-class network capabilities to our customers.

Networking has evolved since those days. LANs have gone to WANs (Wide Area Networks), and from twisted pair cables and coaxial cables to becoming wireless. Radio, Satellite, Bluetooth, Infrared, Wi-Fi, Mobile, NFC, and now high-speed 5G have made networking unrecognizable from what it was back in the 80s.

The latest in networking technology is Software Defined WANs or SD-WANs. They are application-aware, flexible, cheap and secure. IT administrators love it because they have a high level of control over their SD-WAN implementations.

SD-WANs are behind the growth of Managed Network Services from \$185.98 billion in 2019 to a forecasted \$356.24 billion in 2025 (NASSCOM figures). We are at the forefront of this massive change. Gartner has recognized Microland as a Leader in its Magic Quadrant for Managed Network Services for two years in a row. Global organizations rely on us to keep their networks optimized, available and secure, especially as they begin to extend their organizations on the back of the Internet of Things (IoT).

Although SD-WANs are powerful, they still rely on the Internet for Quality of Service (QoS). This can be tricky and vendors have to devise ways and means to overcome this challenge, especially for IoT environments. Some of the QoS issues are about to get sorted with 5G which will be able to connect millions of devices at extremely high data rates.

IoT and 5G are together set to super charge the results technology can deliver. With the growth in IoT and the introduction of 5G, the story of India's play in the networking space will take a massive leap. ■

The latest in networking technology is Software Defined WANs or SD-WANs. They are application-aware, flexible, cheap and secure. IT administrators love it.

PRADEEP KAR

Founder, Chairman & MD, Microland



Our 35-year-old journey through the history of Indian Electronics

by
**GOPAL
SRINIVASAN**

The Amazing 80s

This decade saw the birth of TVS Electronics as a company that would not just go on to become a leader in its segment, but one that would change the game for Indian industry.

Till the 1970s India was still far behind in the technology game. Telephone and telegraph were the main modes of communication and primarily owned by the Government. The 80s brought with it a new wave of technology with several advancements in electronic engineering. And luckily, India had begun to ride that wave as soon as it had begun.

I remember at the time that with the easing of several norms including foreign investment, 100% foreign equity, reducing customs duties and so on, expansion took place especially in the computer and consumer electronics sectors. Almost all the electronic giants today found their genesis during this period where favourable government policies, easy access to funds and manpower, and a rising market demand, spawned their growth.

For all of us at TVS Electronics, the whole idea was that things had to be made in India... foreign exchange was in shortage, and technology was clearly scarce. Electronics was like this Goddess, completely protected by the priests from the average person... you had to prove that you belong... that you had what it takes to get access to Goddess Electronics.

Clearly, it was a time where knowledge was not freely available, and expertise lay in the hands of a chosen few. However, we were lucky at TVS Electronics that we had the support and vision of people who had helped turn the wheels of Indian industry for over half a century. Consequently, the company was born, and continued to take giant strides.

The Roaring 90s

Suddenly there was a sea-change, as a revolution swept through the nation. Markets opened up, and Indian industry

Even the humble dot matrix printer which had been around for decades before, was now seen as a mainstay in several banks and large PSUs, including the Railways.

GOPAL SRINIVASAN

Chairman, TVS Electronics



thrived. The computer age was here. There was greater access to foreign goods and people were able to compare what's best and buy what they really wanted. For an Indian company, TVS Electronics, quietly but surely was stamping its authority as the definitive player when it came to electronic products and services.

While computers were evolving at a breakneck speed, the electronics sector itself, was undergoing a radical transformation. Small electronics and IT peripherals were growing in demand, especially in the retail sector which was now scaling up and modernizing itself. Even the humble dot matrix printer which had been around for decades before, was now seen as a mainstay in several banks and large PSUs, including the Railways. And TVSE was its primary manufacturer.

Our TVS Electronics strategy was very very simple... We did two things that made us successful and made us No. 1... Fundamentally, we wanted to have a range of products – printer, keyboard, UPS and a bunch of other small things. But the major work we did was to develop a dealer channel – appointing local level distributors, dealer training programmes, incentive programmes – and get the product into the SME market. That was the democratization of the computer. We created a dealer culture in what was essentially a B2B business... We were far more B2B2C and it gave us a formidable advantage.

A matter of pride is the Gold Keyboard from TVS Electronics and is to this day considered the gold standard in keyboards for its longevity and performance. As also many other products at the time, which today may not hold much relevance what with technology having evolved tremendously. However, in the 90s, these were the products to look up to, and they were not just accessible, but also the very best.

The Sparkling 2000s

The late 90s and early 2000s was about moving beyond manufacturing towards creating meaningful products that were world class. People already had a taste of what was best, and Indian companies were mindful of keeping up with the foreign competition. Right from their design to their durability, to the dependability of the technology used, everything was being revamped.

We created the precursor of the 'Make In India' initiative with the "Maha" series, with a banner that time that said, "Taking IT to the heart of India". We invested heavily in R&D, and made simple changes to the products ironing out the chinks that existed.

TVS Electronics was not only keeping abreast of the times, it was redefining the way the market was functioning. Having decided to clearly focus on POS transactions in the late 90s, TVS Electronics looked to expand its portfolio across the Indian marketplace at the dawn of the Millennium.

With the advent of high-performance servers and LANs the country was making giant strides in the field of modern computing. IT was a huge export for India, and a lot of companies were jumping onto this bandwagon. On its part, TVS Electronics decided to focus on the Indian marketplace and was raising the game for the electronics industry. It already had a rudimentary form of cloud computing as part of its POS business, long before the term even existed, with analytics reaching shopkeepers on a timely basis.

Today, TVS Electronics stands as testament to the Glory of the Electronic Age, the Magic of the Computer Age, the Revolution of the Mobile Age, and the Transformation brought about by the Digital Age. And TVS Electronics is still here to not just be a reminder of what was, but the possibilities of what can be, in a future that grows ever brighter. ■

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The story of Indian enterprise software

in conversation with

**TEJAS
GOENKA**

Edited excerpts from an exhaustive video interview...

“Enterprise software probably played on two legs. Within India a lot of our efforts were to use IP that was created elsewhere and then serve customers, some in India and some outside. I think that’s the bulk of what we are known for today. Then there were smatterings of companies like ours that were born where you would see individuals who came up programming almost in a sense in their garage, who thought that they could make Indianized versions of the products. In fact, my Dad (Co-Founder Bharat Goenka) before he started Tally had a small program he made for Lotus 1-2-3 (a spreadsheet) that instead of calculating the numbers in millions and billions, it would do so in lakhs and crores. It was easier for the Indian businessman. That’s how we got started.



Made for India and Made in India

If you look at it worldwide, and so it happened in India, there were several people who were interested in the application market. Makers were excited to create applications, especially for business users, because that’s where the PC was headed. That’s where the first set of use cases were. We ended up making a full stack of products: Made for India and Made in India. That is something that spread at that time: You cannot use a computer without software. A domain specific software like ours: That’s been a large part of how the industry grew.

Catering to the unique SMBs

World over, the SMB is a unique entity. In India where we’ve had the most experience, we’ve found the SMB wants the service of an enterprise at the cost of the consumer. It’s very difficult to solve this commercially. This can be solved through technology only. A lot of insights we had in those days and the many of the demonstrations we used to do... Forget about those days, till date in my house I don’t have consistent power. UPSes were not a thing at all then.

So how do you now make a database-oriented product that would survive in environments which were filled with power fluctuations? How do you create a product that was oriented towards those SMBs that could afford PCs but users that were not yet familiar? In those days there was DOS and no GUI. A lot of our innovation came at the ground level.

We made our own “power save” “power resistant” database. It was made such that, as my Granddad (Co-Founder Shyam Sunder Goenka) put it: Anybody in Tinsukia should be able to operate it without ever calling me. The way he would demonstrate the product: While the owner was entering something, he would go to the back of the desk and just pull out the plug.

TEJAS GOENKA

MD, Tally Solutions



Enterprises can afford large multi-year contracts and so you can afford people to service those contracts. SMBs on the other hand want something like the bike ad catchline: Fill it, shut it, forget it. Creating a software for that kind of a customer takes a different intent, energy and skill.

The LAN, Internet and Mobility

Down the ages, there are two big factors that mattered to our business. First was the landscape of technology. When LAN was introduced into the country and when the Internet came in the mid-1990s, it prompted a big change at our end. After that we've been trying to get the mobility problem solved for businessmen. That's our next big project. Connectivity. Mobility. Integration. How can we do that much better for businesses.

The second big angle that affected us was

tax regime changes. Introduction of service tax. Changeover from sales tax to VAT. Unification of all of it to GST. They have caused inflection points in how we serve our customers.

The road ahead of us...

We've got to help companies stay in India and regulation needs to support that. Regulation also needs to support product companies, not just services companies. We need to see that these aren't employment generation companies but immense wealth generation ones. We've learnt so much over the last 30-35 years. If we share some of that, maybe younger kids can take that up and use those insights to develop a large-scale business environment." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

How successive Intel chips changed India and the world

by
VINOD DHAM

The country that invented zero is now feverishly working on promoting its start-up culture to innovate Artificial Intelligence & Machine Learning to solve problems.

I had the distinct privilege and honor of leading development of Intel's 386 compaction, Intel's 486 and its derivatives and the original Pentium and its family, over the golden era of Intel, with the help of a highly talented and dedicated team of engineers. These three chips helped cement Intel's leadership in microprocessors made it a dominant player and became the largest chipmaker in the world.

Although history of computing in India goes back to many decades prior to the arrival of Intel's chips and computers based upon them, the arrival of Intel-based PCs revolutionized India's computing scene and helped establish it as an IT powerhouse in the world. I vividly recall visiting Dr. Sridhar Mitta, then head of their R&D at Wipro, around 1987 timeframe. I was pleasantly surprised when he showed me a working

Intel 386 microprocessor-based mother board, that was designed by his team with the help of some IISc Bangalore students and professors. The only other company in the world who had a fully working 386 PC at that time was Compaq USA.

I was so impressed by this feat that on return to USA, I mentioned this to Andy Grove, the then CEO of Intel. He would not believe it until we had a Wipro 386 board flown in and shown to him. This turned out to be a game changer for Intel, as it was after this Intel recognized India's local talents and market potential, opening its first office in India (Bangalore) in 1988. Intel, today, is estimated to employ around 7000 employees in its Indian facilities.

Once the Indian government decided to seriously encourage this sector in 1984, HCL, Wipro and hosts of other local vendors pursued PC sales, assembly, and development for the domestic market. They were joined by a host of MNCs such as Compaq, Dell and HP delivering 386, 486 and Pentium based computers. Pentium, with its multimedia capabilities witnessed the strongest growth of the home PC market in India and the world over.

Intel based PCs (marketed as "Genuine") along with more price competitive PCs based on AMD chips (labeled by Intel as "Clones") became popular in businesses and homes countrywide during the 90s. With the introduction of ARM based smart phones over the last decade, India has leap frogged to use of over 600m of these "pocket computers", ushering a new era of digital economy. The country that invented zero is now feverishly working on promoting its start-up culture to innovate Artificial Intelligence and Machine Learning and solve problems in its

VINOD DHAM

“Father of Pentium”



healthcare, e-commerce, online education, and agricultural sectors.

I am very proud to see that recently our Honorable Prime Minister Mr. Narendra Modi and his government has launched powerful

incentives to encourage local development of semiconductor chips, displays and compound semiconductors, so that India can become “Atmanirbhar” in these strategic technologies. ■

India's dotcom revolution

in conversation with
RAJESH JAIN

Edited excerpts from an exhaustive video interview...

// had started IndiaWorld Communications, India's first Internet portals in March 1995, even before commercial Internet was available in India in August. It was initially focused on NRIs. It came from my stay in the US when I realized the challenges for people to get information about India. At that time when we had to upload data to our servers in the US, we had to make international calls, sometimes almost Rs 100 a minute. It would still take an extraordinary amount of time. This was before VSNL launched dial-up services in India.



Is this a new TV channel?

When we spoke to one of India's leading media organizations, to tell them why they should have a website to allow them to reach Indians globally, the first question I got was: Is this a new TV channel? Because no-one knew about it. So, I started doing seminars: How to make money on the Internet. It was very exciting times because I had the sense that this would be big. The Internet had this promise that this was something new. This was a great bridge. In my original business plan, I called it: An Electronic Information Marketplace.

Then we decided to do website development. The first two websites we launched were O&M the ad agency and Boyden the executive search firm. Later in the year we got a very big order from Kotak. In the early days the websites were primarily targeted at NRIs. The first few websites we did really set the trend and were later involved with 200 corporate websites. They were very big innovations at that time. A couple of years later I created verticals: Samachar.com, Khel.com, Khoj.com, Bawarchi.com, which really became very popular. Then the Indian traffic also started going up. But dial-up services were very expensive in the early days. For five years my wife and I essentially ran it 24x7. If a server went down, I would have to go to VSNL where we were doing hosting, in the middle of the night because nobody else could do it.

The \$115 million deal

In 1998-99 there were a lot of portals being launched and investments started happening because the Internet dotcom had become the next big thing globally and people expected that to happen in India also. In October 1999, we got offers from two companies at the same time. The

RAJESH JAIN

Founder & MD, Netcore Cloud
Founder, IndiaWorld Communications



first was US company Mail.com which owned India.com. The second was Satyam Infoway (later called Sify), which had just done an IPO. That was a great event in India, the first Indian Internet company to go in for an IPO and that too on Nasdaq. Their stocks were rising rapidly. After negotiations, our initial valuation of \$40 million went to \$115 million. That was Rs 499 crore and we were a Rs 3 crore revenue company. Six months later

the dotcom crash started happening. But still after that a lot of people told me that the deal was a turning point in their lives. While at that time there were problems like connectivity, the promise was there. A lot of companies started at that time, in the 1999-2000 period, all built for the Internet." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

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Telecom reforms & new paradigms



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Fireside Chat: Network Architecture Needed For 5G Rollout in India



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Technology Track: Keynote Address: Space Race And Ground Realities

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Pathbreaker of the Year



CoWin Platform
[Under Leadership of DR. R S SHARMA, CEO, National Health Authority]

Write to us for the post conference report

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How cybercafes popularized the Net

in conversation with
R RAMARAJ

Edited excerpts from an exhaustive video interview...

// It was not yet Y2K. We at Sify listed on Nasdaq in October 1999. We were the second company from India (Infosys being the first) and the first Internet company to do so. Then we spoke about taking the Internet to the people as one of the ways in which we could open out because in China and Korea, the way was cybercafés. In India there were 60 lakh PCOs (Public Call Offices), so people were used to going out to connect to the phone in some way. The Internet was being connected from homes and businesses to an extent from dial up.

Cybercafés as business centres

We said let us launch cybercafés but try and put slightly higher speeds. (64kbps was a high speed at that time!) We had challenges. How to get that last mile connectivity? How to find line of sight? How to get kids to come to cybercafés because parents were asking them: What are you going there for? We had to sell to the parents courseware for children to come and use the Internet.

Because these were fast connections, relative to anything else, day traders and traveling salespeople would use this place. It became a nice business for a small enterprise. If you had a few hundred square feet and you didn't know what to do with it and you might have a nephew or niece you wanted to put in high tech, then the cybercafé was an option.

Launching 5000 cafés

We at Sify rolled out 5000 cybercafés in 18 months. We franchised, but we had to set up Sify's own to begin with to show people how it was to be done. We learned from the likes of McDonald's that you needed to cookie-cut and standardize everything. Whether it was a two-seater or a twenty-seater it would be completely cookie-cut. Everything was standardized and central supplies would help set it up in four weeks. For staffing we trained school dropouts to become cybercafé instructors. It was evangelizing in a way. That's how people started realizing the power of the Internet.

As games evolved, especially the multi-player games, we set up gaming cafés with a capacity of up to 50 where kids could play against each other and with anyone within the café, across the city and even across the world.



R RAMARAJ

Founder, Satyam Infoway (Sify)



Their décor and screens were very different from the rest of the cybercafés.

The era of cybercafés

In 2005, there were 2 lakh cyber cafes in the country. I would think that might have been its peak. I am told that there are maybe between 50,000 and 70,000 even

today. They are mostly browsing centres, not taking gaming arcades into account. When you go there you can take printouts, so you browse and get additional services. I believe there is still a cybercafé association." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

Indian ecommerce: The story till now

in conversation with

**SANJEEV
BIKHCHANDANI**

Edited excerpts from an exhaustive video interview...

“Ecommerce is a more recent phenomenon. I will broaden the definition of ecommerce to all Internet based business. If you look at early forays into that, they began in 1995-96 as the Internet itself came into India in late 1995 but had very low penetration. We launched Naukri in April 1997 when it was estimated that there were about 14,000 Internet accounts in the country. With shared account usage it meant that they may have been a couple of hundred thousand users.

We had no idea where the Internet would go. There were no dotcom valuations then and almost no Venture Capitalists in India. You needed a dial-up Internet line at a time when there was an 8-year wait for the landline.

Mobiles had come but with no data. So essentially poor infrastructure, low capital and small market. It was do more with less; try and get a revenue model to sustain yourself. That was the era and environment in which we began. But it was easy in some ways as there was no competition. Each era has its own degree of comfort.

Boom, bubble and beyond

There was a very short first wave of funding of Internet companies in India between 1998 and 2000. There was a dotcom boom and bubble in the US. Some of that spilled over into India. But the bust happened in April 2000 before too many companies got funded. That shortage of capital between 2000 and 2004 meant that very few companies survived. But the ones that survived, they all went on to become big valuable companies, because they came through the tough test of that dotcom bubble meltdown. They were able to survive because they were getting customer revenue and they were breaking even.

Venture Capital comes back to India

One turning point was when Baazi was sold to eBay in 2004. That began the interest of VCs coming back to India and getting interested in Indian startups. It was slow initially, but it began in right earnest. Then came the global financial crisis (2008). That was a setback for a couple of years, but VCs persisted after that with the (US) Fed infusing liquidity. To a large extent we have been influenced and benefited by global liquidity. Maybe 95% of risk equity capital is from overseas.

So now a large amount of capital meeting a large number of high-quality entrepreneurs starting out in an environment like India where



SANJEEV BIKHCHANDANI

Co-founder, Info Edge
(naukri.com, jeevansathi.com, 99acres.com)



there is massive massive increase in penetration of the Net and of mobile phones and smartphones at the same time: This triage, confluence of these three things, is what has created and given rise to a lot of the startups and unicorns that we are seeing today.

When ecommerce will come of age

Indian ecommerce will finally come of age when companies become profitable. Has it acquired scale? Answer is yes. Are there large sections of Indian society that are left out of this boom? Answer is also yes. India is, I guess a mish mash of several things happening at the same time. People who are benefiting and buying in this ecommerce boom. People who are making it happen: The startups, the

entrepreneurs, and the employees there. People who are investing in these startups and then earning a return. Large corporations like the Tatas and Reliance acquiring companies. The entry of foreign players like Amazon and Walmart. It's pretty much all happening right now.

In all of this if you have a backdrop of a fast-growing economy, then there will be large successes of large number of people. If the economy however slows down and if the global equity dries up if the Fed raises interest rates multiple times in the next two years, then it's a different environment. It remains to be seen how it will pan out." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

Different form factors for different personas and businesses

in conversation with

**RAHUL
AGARWAL**

Edited excerpts from an exhaustive video interview...

"Traditionally India has been a desktop market given the demographics and the fact that we have been a price-led market. In the desktop era, the perception and reality were that a desktop was much cheaper. The life of a desktop was much longer than a laptop as it was static, in one place. The laptop had a higher chance of getting damaged.

Mobility happened in the laptop era when people started saying we don't want to be chained to our desk. Wherever we go whether it's a café or client meetings or work from home, we would like mobility. But that happened very slowly for some reasons. First was the cost even though that was narrowing.

Second, a lot of organizations did not want the company's confidential information to be taken by the employees back to their homes. Third is parents of teenagers wanting to see what their kids were watching, so they preferred desktops.

All this got shaken in the Covid Era. Everyone wanted a mobile machine because you didn't know when a lockdown would happen, when your office would open and the online education factor. Mobility has become big in the Covid Era. I think the desktop use will become marginal over a period of time. Very specific use cases will be there.

Other form factors of devices

The tab is also doing very well. Lenovo's tab business was doing great, and we were number one for a very long time. It made a comeback when the government found that when they were giving devices to students, the tab price point was the most amenable. Hospitality, education, and a lot of other verticals started using them.

In the past the netbook also didn't take off in my opinion because it was underpowered. People were disappointed with the performance. Maybe products like Apple Newton were too early for their time. The price I understand was too high and the company did not display enough patience to continue.

When it comes to the cloud, key is where the computing power is going to be stored. There is one more form factor that came in called the Thin Client, where even the computing power was in the cloud and not just the storage. That also did not take off beyond a point.

What does the future hold for devices?

People are asking: Hey can I have a small device which I can project on the



RAHUL AGARWAL

Investor, Advisor, & Entrepreneur
Former MD & CEO, Lenovo India



wall? Can it have a virtual keyboard on the table, and can I type on a virtual image? These are possibilities. But will that be convenient?

The question is will there be a point when you will need only one device. There are a lot of people who are just happy with a smartphone. You may have a computer, but you cannot live without a smartphone. My view is that these two devices will continue, but more and more people will find that most of their needs will be satisfied with a

smartphone.

Can there be a smartphone which is engineered so well that it can expand? You press a button; the screen becomes a 10-inch one and a keyboard also comes out. That is a Nirvana! But will it become too bulky? Time will tell whether someone is able to invent such a device." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

How tech has been used in politics and governance

in conversation with

**ARVIND
GUPTA**

Edited excerpts from an exhaustive video interview...

// In the early days, the PC as a proxy for technology and data has been there in the political process in a very loose sense. Parties had websites and emails would go out. Parties were using the PC for their internal accounting, processes and maintaining their own party workers' database. Come election time they would probably use it for voter analysis. That is how it was limited till 2011-12.

The Social Media era

When leaders launched their own websites or blogs, it was considered mainline news. Even when the current Prime Minister came on the social media in the 2010-11 timeframe, it was big time news because he was a first leader in that. But people made the comment: Too much Tweeting will lead to quitting.

The highest usage of social media in the world for campaigning which produced a distinct advantage for the current Prime Minister was in the 2014 elections. The use of data analytics was such a big disruption. The use of outreach based on technology was a pivotal moment and everybody understood the benefits of using this.

The problems with technology

What are the problems that we've seen over the last ten years, especially in the last 4-5 years? The whole battle in the world is around a few areas. Misuse of data. We saw platforms becoming really big without governance. There are issues around privacy and transparency. But the biggest battle we have today is fake news and misinformation. We didn't have these problems 10 years ago. Or you never thought about these problems. You had a PC, you opened the PC, you did your things and went away. Today you are worried you have your location on the phone or whether some app is sharing your data with third parties. But India is doing a very good job of balancing between policy, innovation, privacy and new tech as it is coming along.

Using tech to take governance to next level

For making more trust in technology, we need a global adoption of standards on public platforms. India is already leading that. We have this whole India Stack: Aadhaar, UPI, DigiLocker... We've created the health stack. We are creating stacks related to ecommerce, skills etc.



ARVIND GUPTA

Co-founder & Head, Digital India Foundation



Going forward things like wearables and IoTs will become even more pervasive. With things like a drone policy, you will see newer economies leapfrogging with India leading the way. India will set new standards for governance.

One thing Covid has shown that when revenue becomes strained and you have limited revenue, you need to make sure that the dollar or Rupee amount is spent more judiciously and that's where technology will help a lot. India is already getting its rightful

place in the global world order.

When the Prime Minister went to Silicon Valley in 2015, he said that not only have Indians mastered the art of leading companies and becoming CEOs there, we are now making sure that India also is benefiting from the expertise that we have. The brain bank that we have globally is also benefiting India as a society and a country." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

How Jio spearheaded the mobile data revolution

in conversation with
SANDIP DAS

Edited excerpts from an exhaustive video interview...

// I have no doubts in my mind that the real catalyst to Internet usage on the mobile was Jio. I don't mean this badly to other operators. Speaking extremely objectively... I know a lot of people said they crashed prices etc. The real crux of the matter is much deeper. There was a very strong strategic intent in the manner in which mobile digitization was introduced into the country.

For a very long time, operators sat very pretty on fat cat voice revenues. Their 2G networks had been around for a couple of decades and they had all depreciated. The cost to produce airtime was not that large. They were making comfortable money on voice. Everybody used to boast that 20% income was coming from Value Added Services, part of which there was something called data usage.



Building a mobile data ecosystem

But when Jio came in, voice was saturated so they went about every aspect of network building with a toothcomb. They set up very fine 4G networks and very efficient towers. They had the advantage because they had no legacy networks. When I look back India could have skipped 3G and gone to 4G directly. Substantial sums of money were spent on spectrum and while the companies were still busy rolling out their 3G networks, 4G came.

Reliance said that let's produce a very increased data experience. The consumers actually feel data flows like water. Which means you turn it on, data comes, flows uninterrupted and you don't have to worry about how much you pay for it because you use it like water. It became very important for the pricing of data to be such that all entry barriers to data usage were easy.

Societal impact of the mobile revolution

Others caught on and did extremely well too. When you put data in the hands of people, smartphones in the hands of people, which is affordable and gives a great experience, people find it difficult to get out of it. We all know and there's more than enough evidence of the fact that mobile penetration improves the per capita income of a nation. It provides more opportunities and employment. The Human Development Index goes up and it empowers the individual. Across industries things changed. Every business has something to do with online transactions happening on the phone. When there's a high tide, all boats rise.

SANDIP DAS

Independent Board Director & Advisor,
Sterlite Technologies
Former MD & CEO, Jio



The pandemic was a turning point

We praised the paramedics a lot during the pandemic. But I don't think we praised networks and communications as much. While the paramedics did their jobs and there is no denying the fact that they worked out of their skins to save the lives of people, imagine a life where we would not be connected at all! Companies started doing Zoom businesses and healthcare started happening on Zoom. People started talking to each other. Can you imagine what would have happened to the mental health of individuals in this incarcerated position if you did not have networks?

They played a very important role and continued to do so. People started getting

more comfortable with digital. A lot of people who were not initiated into the world of digital like older people, people in rural and semi-urban areas, they all started getting involved. As a result of which the entire barrier to entry for online shopping, online business, online consultation, online education, online healthcare, every barrier got lowered enormously.

It is clear that the entire pandemic and the manner in which the whole data revolution happened along with it has contributed to what is happening today." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

Is Remote Work here to stay?

in conversation with

PUNIT MODHGIL

Edited excerpts from an exhaustive video interview...

// In the mid-1990s we all got wired up and our computers got attached to servers globally. If I was to call it Remote Work 1.0 that was when collaboration started through email, and we had to go to specialized studios to do video conferencing with expensive airtime. Connectivity went to the next level when data, devices and digital came together in about 2004-05. The next level of what I would call Remote 2.0 continues till now. It is being driven by video and great collaboration tools. That has helped us go to the next level of remote.

Ready from a people perspective?

What we have seen in the last two years is that one, technology has improved drastically. Collaboration has become all-pervasive. It's become inexpensive. We were ready when Corona happened from a tech perspective, even in India. But from a people perspective, from a behaviour perspective, from building high-performance teams only on remote, this is new territory. This even as our workforce is changing and we are talking about the gig economy.

The universe of Remote 3.0

As we go forward to Remote 3.0, a big factor will be technology. There are human adaption and behaviour issues. How do you build sustainable performance just doing remote? We are used to attendance-based compensation, and we are trying to adapt that to remote working. Will we move towards output-based salary packages? What is the new work universe?

We have a lot of young people in their twenties who find it very easy to collaborate. But how do you find out about company culture and how do you find out the unwritten rules of an organization? What about the water cooler moments and the *chai sutta* breaks?

Ultimately culture is what makes companies tick. That's the part which is very intriguing. From a tech stack, it's more predictable. How will the workforce adapt? How will we have new definitions of HR? Remote 3.0 will be a challenge. Humans are getting a fatigue factor looking into the pinhole camera. How do we build health and wellness around remote if you have to sustain it? There will be a lag in human behaviour at our workplace.



PUNIT MODHGIL

Co-founder, Octane Research



Codified versus creative jobs

A lot of those jobs which can be codified—rule-based and process driven—they will be remote-enabled. But clearly all jobs will now be hybrid jobs. Wherever possible, all new jobs will have some component of it which will be hybrid. This demarcation between 8 hours every day and I am off will wear away. Work-life boundaries will blur. Location-premium jobs which can be codified will go away.

But some jobs which need creative iteration between teams, in person collaboration, brainstorming, I don't think we've been able to crack that code yet.

Going beyond, into the Metaverse

As we go into slightly more mid to long-term, the entire hype will be around the metaverse; of AR and VR, augmentation, and AI; how you can have a better virtual presence. Facebook and other folks in the metaverse spending lot of money in what now seems hype, may have something compelling offer 18-24 months from now. I think people ready part will hold us back from going more exploitative technology. ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

Multiple devices and multiple screens in the post-Covid era

in conversation with

**VINEET
TANEJA**

Edited excerpts from an exhaustive video interview...

"Very broadly speaking pre-Covid, laptop was for work, phone was for fun, social networking and on the go. The iPad or tablets were becoming more and more consumption devices. Then we had accessories, the important part of the ecosystem like headsets and speakers etc. Every device had a distinct role. There were different roles for different things. Charging them used to be the biggest pain.

Post-Covid to some extent there was a multiple usage across devices, apps were created, and WhatsApp came on the screen and so on. But in the organized sector devices became more distinct because of a simple reason that security became an issue. For example, I would never use my work laptop for anything else except work. It's just a no-no.

That is why today I know so many people who have two laptops: one for work and one for personal purposes. Also, you need a backup. So work and personal devices became more and more distinct. That's why a boom happened for these devices. Going forward, whether it's things like wearables or headsets, including all the accessories, we will have even more devices.

Multiple devices and multiple screens

I am hearing that a lot of professionals like lawyers and designers are setting up multiple screens to work. Even youngsters work with one laptop below and two screens on top. One revolution that I think is at the cusp of happening: We talk of screens rather than devices. The same device could be projected on different screens. There is innovation happening on the projection system using a very small projector. I use them all the time now. With a connected projector sitting with my laptop, I can put a movie or a match in the background. It will be multiple devices and multiple screens. Or finally you could just have the one computing device and multiple screens.

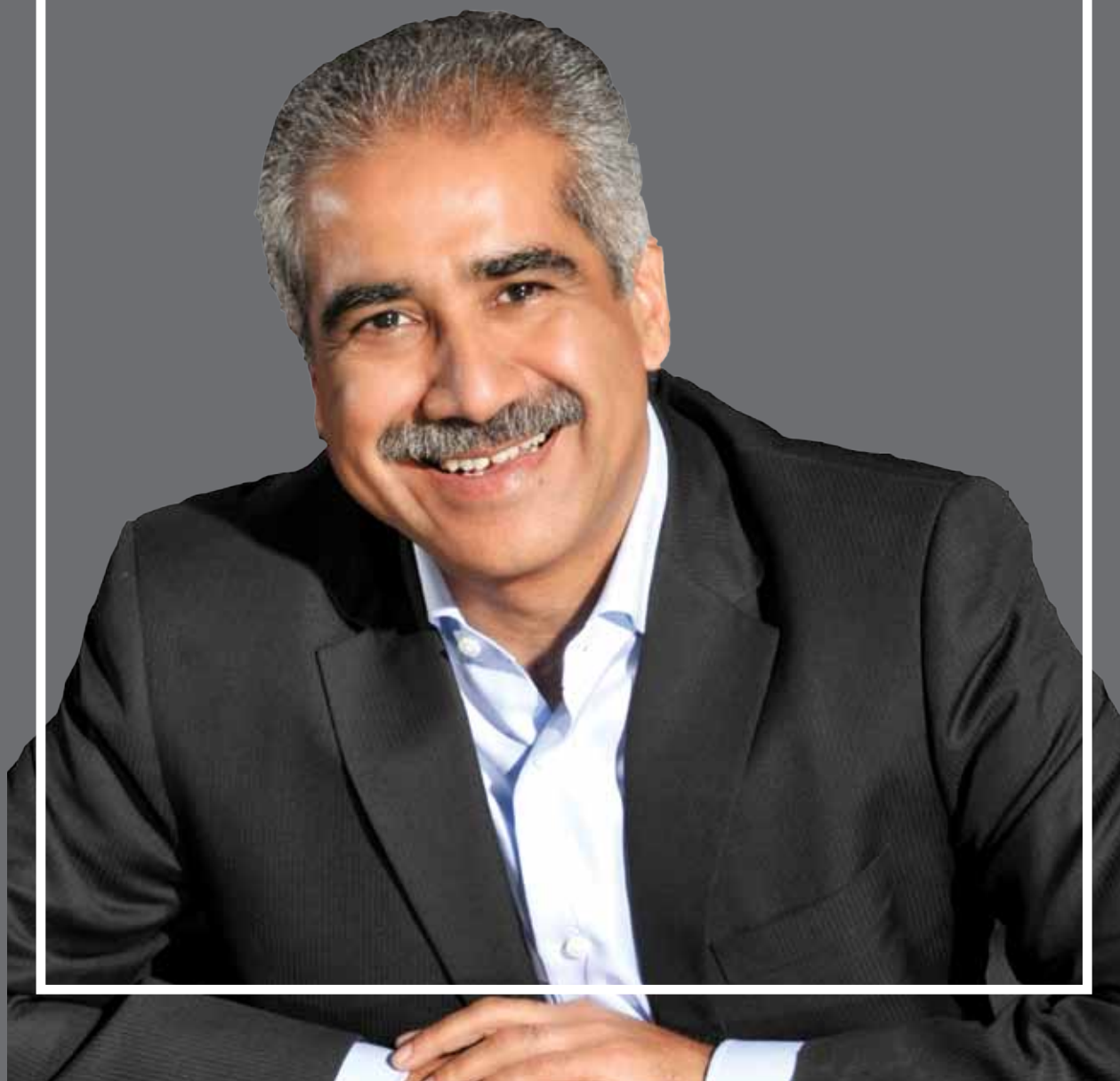
Devices and the future of travel

I think the frequency of travel and meetings will come down dramatically. I find that in my work life if I meet somebody, after that I can go virtual. Sometimes financial and commercial reasons drive these things. It's much more cheaper and corporates will save tonnes of travel and hotel money. I do hope for the benefit of mankind that we do not build personal relationships



VINEET TANEJA

Corporate Advisor, Angel Investor
Former CEO, Micromax Infomatics



remotely. If that was to happen, that would be very very sad. That'll be the end of humanity from an emotional perspective.

To me the speed of change of everything is just phenomenal. I think the human side of it comes through a catalyst and not just through money and ecosystems. A catalyst like Covid has accelerated that. The catalyst was social

networking earlier. Social networking platforms helped the entire penetration of smartphones. Blackberry helped the penetration of work email and devices. I don't write off anything as a crazy idea when it comes to tech." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

A world of just online money: The future is already here

by
**VIJAY
SHEKHAR
SHARMA**

The world is increasingly going virtual. Online money has perhaps solved the greatest problem in today's world – interoperability in a world full of borders.

There was a time, when one would ask the question – is a cashless economy possible? Today, that question hasn't just been answered, it has been won over. With the advancements of technology, we are living in a cashless world where digital payments and financial services have revolutionized the way people transact.

In the past 20 years, cash or physical money as we know it, has once again undergone a transformation. With the advent of the online world powered by smartphones, technology is highly accessible, efficient and economical – thereby boosting adoption. India then further accelerated the adoption of the Internet, riding on its rich demographic dividend.

We, at Paytm, have been driving financial inclusion with products that bring convenience and ease to consumers and merchant partners across the country. We are proud to have pioneered QR code payments in the country, which is today seen at every merchant's counter to easily accept money from their customers. The Paytm Wallet became the point of seamless adoption for the users to become more aware of the online banking platforms – thereby seamlessly adopting multiple technologies on a single platform – to satiate their financial needs – from payments to deposits to investments to shopping to wealth management. Today, we have our own payment instruments that enables Indians with the flexibility to transact with Paytm Wallet, Paytm UPI, Paytm Postpaid (Buy Now, Pay Later), netbanking through Paytm Payments Bank and much more.

The age of online money is here and your smartphone is the doorway. It offers seamless storage and exchange of value, accepted widely owing to interoperable technologies; but more importantly, is highly secure, mobile and indestructible. The biggest challenge online money has solved is to introduce a footprint to the money movement – something which was entirely missing in the physical cash and adds to the legitimacy and social value of online money usage.

The world is increasingly going virtual. Online money has perhaps solved the greatest problem in today's world – interoperability in a world full of borders. Your bank account seamlessly transfers or loads money to your respective app(s) which can be used to transact across geographies, sectors, establishments – across physical, digital and phygital touchpoints. Online money has become the portal to diverse metaverses in a new age always-on world.

VIJAY SHEKHAR SHARMA

Founder & CEO, One97 Communications & Paytm



India, being a dominant cash economy too has witnessed green shoots of accelerated online money adoption. As per the recent survey by RBI titled 'Retail Payment Habits in India', 41% opt for digital payments while 44% of respondents receive money digitally. The important finding from the survey comprising 6,000+ respondents is the preference to use online money for

expenses or transfers above Rs. 500 by more than 50% of respondents. This signals an inflection point for the adoption of online money. Given the government's thrust on Digital India and the seamless interaction of technologies, the change will be much faster than expected.

The future is already here and like online money, it is secure and open to possibilities. ■

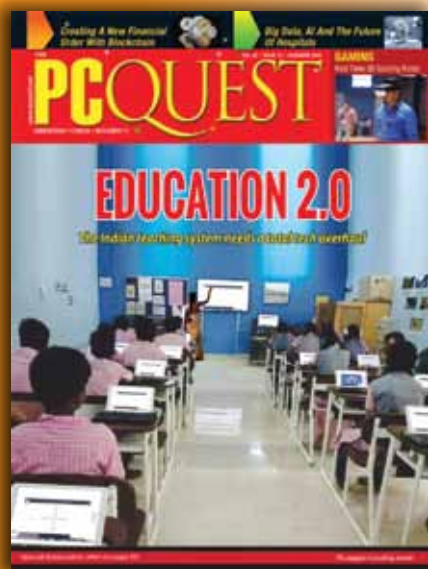
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How students can flourish in the coming online age

in conversation with

ARJUN MOHAN

Edited excerpts from an exhaustive video interview...

“Online education is tougher for the school students. In the younger classrooms, more than the learning you do from the teacher, it is the learning you do from the peers. It is extremely hard for these kids to sit in front of the laptop. I don't think pure online is something any school will be able to do. They will have to continue this offline mechanism.

If you look at any higher secondary or college syllabus in subjects like physics and maths, the concepts and derivations like say the Pythagoras theorem, surface tension: These are standard concepts which have been around for decades. You really don't need a teacher to repeat this

again and again. These can be presented in the form of an impressive video done by a real master with the help of 3D animation. That will make it clearer and easier for a student to learn any level. Going forward every institution will have to do that.

My advice to the students is that you should understand which part can be done easily online and which part you should bring in the social or interaction element. Once you are clear on that, you will not have to spend a lot of time in front of the laptop. Once you know the concept, then you do your discussion in the classroom with your teacher.

The push for a higher gross enrolment ratio

In the New Education Policy (NEP) that the Government of India is championing, one of the big things they are saying is that in colleges there will be an online mode of learning. They will give out online degrees. Now with online can we take the best of the universities and make that quality applicable to everyone? That I feel will become a very important part of the future of college education in India. I feel that is going to be a very important part of our future, which makes it necessary for a lot of students to be comfortable learning online.

5-10 years down the line we may see an apprentice or internship driven bachelor education in India, at least in certain clusters. For a country like India, which has a lot of Maths proficiency, this makes a lot of sense. This will help students become more employable. This will provide students flexibility to do a day job. This is culturally a very different way of doing your college education. That is one acceptance we should have as an economy.

We need it. Without that I don't think we will be able to achieve our lofty GDP projections because we are talking now about a country with a 28-



ARJUN MOHAN

CEO- India, upGrad



29% gross enrolment ratio. Nobody is building universities to take it to 65% in the next 10-15 years. We can solve it online.

Handling the 3 problems of Indian education

upGrad was started because we felt the Indian education system is not able to create highly skilled graduates at scale because of three reasons: Our education system is not accessible to everyone, it's not affordable to everyone and the quality is not great that it excites everyone. First the access part. We built a platform which can be run in any form factor. Even your basic mobile can become your classroom. It will work on low-speed internet. So literally any part of the country can join a university course through upGrad.

When you take a course online and make it on scale, it becomes more affordable.

We have multiple tiers depending on which university level you want. The third, the quality, is a continuous process. You cannot build a high-quality project and retire. The objective has always been to build an online system where you mimic how a student learns and gets outcomes in a high-quality university. The outcome is decided by the industry. We keep in touch with the industry. We rely on subject matter experts from the industry.

Finally, people today need to be at least updated to understand what is happening around them. For instance, nowadays we see a lot of people from non-tech background coming to us to learn data science. Because data science is something which is used everywhere today." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

Smart, connected and automated vehicles

by
**RAJEEV
CHABA**

Just like our smartphones have become personal computers over the last decade, with continuing disruptions in the automotive industry, the car is becoming a smart device.

Innovation and technology have driven the reins of the connected car space in the automobile industry. As consumer expectations continue to evolve, digital transformation has taken the front seat in transforming cars into an ecosystem of on-demand, in-car services.

In the future, cars will not be seen as products but as platforms, paving the way for a lifetime of services to provide key differentiation to customers. This, in turn, will allow innovators and developers to create novel solutions and business models to enhance the ownership experience.

Among the most intensively researched automotive technologies are automated and connected vehicle technologies. The potential of urban automobiles is 'Connected, Electric Shared and Autonomous Vehicles,' thanks to a worldwide shift toward electrified vehicles and significant advances in computer power, Artificial Intelligence, and the Internet of Things.

There has already been significant waves in this segment, and the journey of connected cars has taken a turn for the better. With the advent of 5G, new interface points will emerge and offer new opportunities for the fast-emerging ecosystem of innovators.

In line with this transformation, MG Motor India's vision of CASE (Connected, Autonomous, Shared, and Electric) has empowered us to offer holistic, software-driven mobility solutions to ensure a safer and smarter driving experience.

MG has introduced several 'firsts' in the Indian automotive industry, with the first internet SUV – MG Hector with 50+ connected features, the first Pure Electric Internet SUV – MG ZS EV, the first Autonomous (Level 1) Premium SUV – MG Gloster, and India's first SUV with personal AI assistant and Autonomous (Level 2) technology – MG Astor.

In addition to this, MG Motor India has introduced the automobile industry to the innovative concept of CaaP (Car as a Platform), which caters to the fast-changing requirements of new-age customers. With software at the heart of vehicle development, MG has developed an ecosystem of various in-car services and subscriptions in utility, entertainment, parking, security, consumer payment, and others, evolving with time and creating safer and smarter driving experiences.

ADAS is the leading step towards autonomous vehicles in India that prioritize driver and passenger safety through forward-looking tech-backed solutions. It is not a substitute for human eye and driver vigilance. The technology was introduced in luxury cars, but it gradually made its way to mass-produced vehicles with time. ADAS is a driver assist system that enhances driving experience and safety. As a conduit of automated

RAJEEV CHABA

President & MD, MG Motor India



vehicle technology, MG Motor India is the first carmaker to introduce ADAS level 2 to mid-segment in India, strengthening the future of mobility. ADAS software driving solutions significantly improve driving safety and comfort by tuning the software to Indian roads, ensuring an optimized solution for Indian traffic conditions.

Evolving engineering capabilities have championed trends in the automotive space, bringing enhanced driving performance, power, safety, and reliability. MG Motor India has played its part in developing this market with CASE (Connected, Autonomous,

Shared, and Electric) mobility and industry-first AI-based assistance features. AI/ML advancements combined with the introduction of futuristic and reliable EVs will break down the barriers and transform the automobile industry, making it connected and sustainable.

Just like our smartphones have become personal computers over the last decade, with continuing disruptions in the automotive industry, the car is becoming a smart device on wheels that will allow you to work, socialize, or be entertained, with no compromise on safety, wherever you go. ■

The future of assistive technologies

in conversation with
SOM MITTAL

Edited excerpts from an exhaustive video interview...

"The government believes that we have 2.5% of our population which is disabled. Our view is that it is probably 7.5%. This is the view of the World Bank and WHO. An Act that was passed in 2016 started recognizing 21 disabilities when earlier we were looking at 8. In addition to people who have congenital issues, we have an ageing population, people who become disabled due to either age, accidents etc.

NASSCOM's role in accessibility

When we formed the DAG (Disability Advisory Group) in NASSCOM, our main approach was how can accessibility be dealt with. That is physical access, access to technology, access to education, access to employment. For us in assistive technologies, the main criteria is:

Is that making them inclusive to the society rather than excluding them?

Why should everything not be designed in a manner that is accessible to everyone? There are many assistive technologies which don't cost you money. It is about following certain standards. The reason that NASSCOM got involved is because everything is becoming digital.

What the industry can do

If the main IT companies and product people happened to consider disability as a market, why would they deny a market of 8.5 crores because their products are not accessible to them? There are many startups who are working on innovative ideas. We at the NCPEDP

(National Centre for Promotion of Employment for Disabled People) every year give awards for universal design. There have been some amazing products.

For example, there were five different people who made innovative walking canes, like with lights, those which talked etc. But they never got commercialized. The penchant among investors is less. So, from lab to commercialization there is a hand holding is required.

It takes both the government and industry to get together to do it. USA for example has an association for assistive technologies. Why not an Assistive Technology Incubator where the standards are available, and people are sharing their needs? We can get the users involved. There may be a unicorn in making in the assistive technology domain.

Going ahead with assistive technologies

Your mobile phone has a setting called assistive/accessibility. If you



switch that on, the phone speaks out the text, the visuals increase in size and in many cases a very small app speaks out the colour. We did an event where a speaker was fully visually impaired and travelled from Mumbai to Bengaluru. He travels all over the world and was the best dressed person in the room with co-ordinated clothes.

He said that he uses a tool that tells the colour of the tie or shirt when he points to it. Further there is a lens you can where which will use AI to identify the person in front of you and speak out the name and even identify the colour of the shirt, say. Some of these technologies can be scaled. Large companies can take this up and price them suitably.

There are many people in villages who are disabled and think they are blind but have cataract. There is a hospital that has broken up the process with a single a torch and a trained professional. They're able to diagnose whether a person has cataract, without him coming to city, and whether he is ready for a surgery. We need to design more of this and have a focus.

People who are hearing impaired manage with sign language. But then you require a sign interpreter. With AI you could convert your speech into gestures with a visual robotic movement. Further they are not able to speak because they don't hear despite having proper vocal cords. There are technologies that can make them speak and AI can keep refining it.

People who have lost their voice, have aphasia, have a shortage of therapists and tech can aid them. With 3D printing you can make prosthetic arms and legs along with customized devices to suit to individual needs.

I think that the networks are reaching rural areas where the masses are and

SOM MITTAL

Former President & Chairman, NASSCOM



hence, I think for us the ease of access is there provided we all put this together. Now you can do a lot of stuff online and get access. But we have ignored this sector for too long now.

21 technologies for 21 disabilities

P.S. Som Mittal suggested an idea that PCQuest take up each of the 21 disabilities and explore "which technology can help with which disability" through regular features. We remain committed to this. ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

Is Make in Tech India on track?

in conversation with

**AJAI
CHOWDHRY**

Edited excerpts from an exhaustive interview...

“I am very deeply involved in the whole ecosystem of the startups. To my mind the products and the work that they are doing is not a fad. They are really creating global world class products. Ten years ago, we all used to ask this question in the drawing rooms: Why doesn't India have a Google? I think that's history now. What's been proven now is that many startups have created products in India which are not just Made for India but are Made for the World. You are seeing companies which are amazing and happening.

Look at Zoho. Their headquarters are in a village in Tamil Nadu, but they are catering to the world. There has been a huge movement from services to products. Startups have taken the lead in creating products in India, not the large companies. I do believe that the valuations are very stretched today. But we are going towards being a product nation and that makes me very happy because it is products that will make us be recognized globally.

Our leadership position with India Stack

One very good thing that's happened in India is that because of the initiatives of the government and some of the organizations like iSPIRT, there is a huge growth of India Stack (Editor's Note: The largest open API in the world). This is driving a lot of the product development growth that is happening. India today has an absolute leadership position in the world as far as this is concerned. If we want to do soft marketing of India globally, the government should take this up and do a G2G agreement with many governments and very softly we will be in the minds of the world, just like China. The US and Europe doesn't have what we have.

Collaboration between academia, research institutes, industry

Academia and research are really important if we want to be a world class tech country. I think it's our weakest link. Academia and research organizations still do not work very closely with industry. I think the linkages are pretty much very poor or broken. A lot of times numerous top institutes wait for the industry to come and talk to them. It should be the other way. Academia and research institutes should go out and talk to the industry and give their knowledge, their skills and their capabilities to the industry. They should involve startups, students and industry into research at an early stage. Worldwide universities grow with research and not just with teaching.

Something like this happened during Covid. That was very interesting.



AJAI CHOWDHRY

Founder, HCL
Chairman - Board of Governors,
IIT Patna

The government did a great job of bringing research, academia and startups together. They had so many schemes, campaigns and strategies which they put together to create products in India. So suddenly when we had a shortage of PPE, we grew by hundredfold. Same with testing kits. I was part of a team from IIT Kanpur that created a ventilator in 90 days.

The roadmap for the future

There's a large shortage of AR-VR Metaverse type of skills that you see today. Shortage of blockchain and full stack skills. We need to scale up the education system to keep up with that requirement. Huge amount of work needs to be done on creating the newer IT skills that are missing today.

If you look at software, yes in terms of products we seem to be on track, but if we don't have the right skills that are required for today's products, then we are going to have a situation where products will become more expensive and will take longer to develop.

As far as hardware is concerned, we have just got to start doing designs. We need to bring back the brands of India. A lot of times people say if we are doing so well in software how does it matter whether you are not doing well in hardware. I think that's completely incorrect. Because the real situation is that today the boundaries between hardware and software are blurring. A lot of hardware has a lot of

software. There's no way you can create a hardware product without understanding AI and ML. Very importantly you need to integrate these things even when you design chips. That's what is required for the country. We have to Make and Design in India." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)



Digital India ready to go to the next stage

in conversation with

**NANDAN
NILEKANI**

Edited excerpts from an exhaustive video interview...

“Many of the building blocks of Digital India had already been laid out in the last few years. During the pandemic you had to do everything digitally. You met people digitally, you did your work digitally, you ordered products digitally, you got your food delivery done digitally and so on. What the pandemic did was accelerate existing trends. Digital India has really been a spectacular success. For the first time we have things like the JAM trinity (Jan Dhan-Aadhaar-Mobile). The mobile phone success is well known. We have over a billion phones and maybe 600-700 million smartphones. We have the cheapest data rates in the world that has allowed people to use unlimited bandwidth on their devices.

But we also had the Aadhaar project which I led for 5 years and today we have 1.3 billion people on Aadhaar. That's also the basis for linking bank accounts. There are more than 700 million Aadhaar-linked bank accounts. That provided the fundamentals for the largest cash transfer in the world. All these pieces of the puzzle had been laid in place. What the pandemic did was show the power of these kinds of tools. For example, the government was able to use the DBT (Direct Bank Transfer) to give funding to vulnerable population running into hundreds of millions. Essentially Digital India came in very useful and was strategic when the pandemic struck.

The 3 facets of Digital India

When you look at Digital India, there are three facets to it. The first facet is what we just talked about, that India is building a large set of digital public goods, be it Aadhaar, or UPI, account aggregator, FASTag, CoWIN etc that are enabling the largescale implementation of technology.

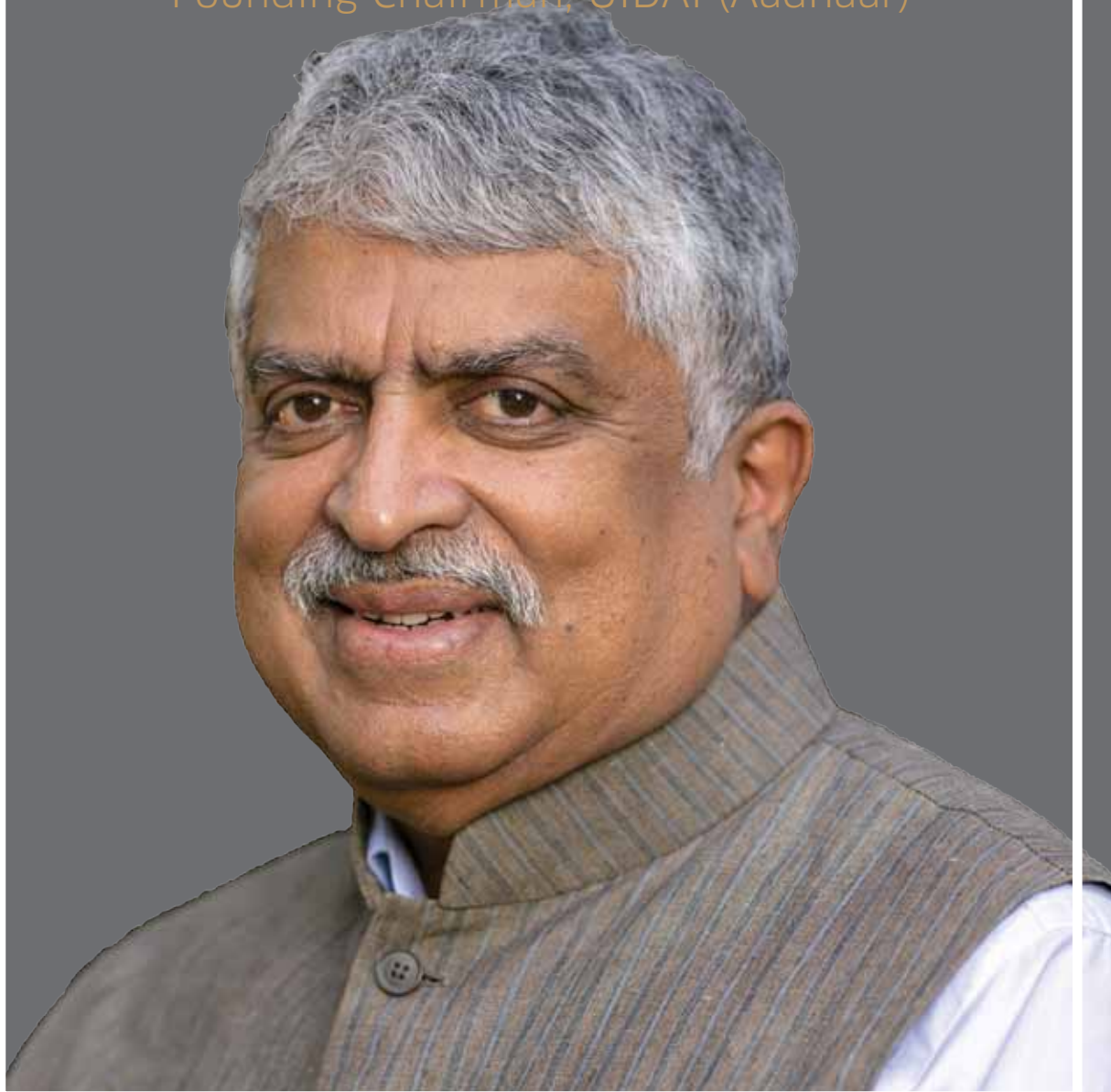
The second is the growth of the IT sector. It took about 30 years to reach \$100 billion in revenue, it took only 10 years to reach \$200 billion and it will take only four years to reach \$300 billion. So you can see the pace has gone up. It took 40 years to reach to reach an employee size of 4.5 million. That is going to double in a decade.

The third leg of this is the startup world. I think there were more startups last year that became unicorns than all the unicorns in the years preceding that. Startups are going to be a huge source of innovation, job



NANDAN NILEKANI

Chairman & Co-founder, Infosys
Founding Chairman, UIDAI (Aadhaar)



creation and solving India's pain points.

That's why we call it the Techade, or the Tech Decade. I am convinced that by 2030, a significant part of India's economic growth, social improvements and per

capita improvements will all be driven by technology." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

The future is Open Source

in conversation with

**MARSHAL
CORREIA**

Edited excerpts from an exhaustive video interview...

“**T**he Open Source movement started in MIT in the early 1970s. Basically what it means is: You do a software distribution along with the source code so that others can use it, modify it and further develop it. That was the basic premise. Over the years it went from strength to strength. Now whatever you do today: You book your airline ticket. You go to the ATM and withdraw money. You do a UPI transaction. You do something with your Aadhaar or GSTN, you would have touched Open Source somewhere. It is that pervasive.

The Open Source community is large. When many people work on solving a problem, it gets solved. The technology is used for enabling the business, it has become a backbone of the business, it is even at the front and centre of the business.

From Linux to the Cloud

One of the first big successes of Open Source was in Operating Systems: Linux. Today you see many mission-critical platforms and workloads running on Linux. Nowadays we talk of Open Hybrid Cloud. There is no lock-in: It gives you freedom and offers you choices. During the pandemic there was need for flexibility and agility. That led to more acceptance of the cloud. There was a lot of public cloud infrastructure that was built in the country. On top of the cloud, in order to accelerate Digital Transformation, there was a need to build modern applications, what we call cloud native applications. A lot of innovation happened around the cloud. All this change had to be managed by automation. In cloud, Kubernetes container was a big thing which evolved. That gave you acceleration to build your say smartphone app and a lot of flexibility.

What Red Hat does here is we work with communities. We take up some projects and kind of convert them into a product as an enterprise software with scalability, a clear roadmap, providing security with innovation.

The future is Open Source

Look at the very vibrant startup ecosystem in India. All of them are using technology whether they want to deliver goods or want to build products. Even in the government. We as citizens use a lot of services



MARSHAL CORREIA

VP & GM- India, South Asia, Red Hat



like Aadhaar and taxation. Everywhere at a platform level you will find Open Source.

No-one knows what the future holds. It is changing rapidly with the advent of 5G, Edge and Industry 4.0. There is a continuous innovation happening. There are millions of developers who are part of the community. They are trying to solve many complex

challenges. Whatever new technology and innovation is happening, take blockchain or AI-ML, all the pillars of Digital Transformation, people are building on top of Open Source and are thus differentiating their businesses. ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

The chipsets of the future

by
**RAJEN
VAGADIA**

Next-generation chipsets, armed with 5G, IoT, Cloud, Sensing, Multimedia and AI capabilities, are already being designed to deliver premium user experiences at scale.

The building blocks of technology will be the bedrock of fast-paced next-gen innovation

Semiconductors have often been called “the crude oil of the information age”, and for good reason too. They are an essential component of electronic devices that enable the functioning of almost every industry and sector – be it telecommunications, computing, healthcare, defense, transportation, infrastructure, manufacturing, financial services, or any other. Semiconductor technologies have enabled researchers to develop everything from complex instrumentation to smart glasses. In recent years, the growing applications of AI and IoT have sparked a fresh wave of innovation in the semiconductor industry. Meanwhile, the launch of 5G around the world and its much-awaited launch in India have coincided with a rising demand for high-performance computing devices. Chipset manufacturers, technology providers and applications and services enablers have a huge opportunity to tap into this market.

Next-generation chipsets, armed with 5G, IoT, Cloud, Sensing, Multimedia and AI capabilities, are already being designed to deliver premium user experiences at scale. As AI-IoT become increasingly pervasive in industrial, government and consumer applications, specialized chips are being created to support computing at the Edge. And this is just the beginning. With huge transformations underway in areas like automotive, Metaverse, and Industry 4.0, there is much more to come in how the world connects, computes, and communicates. If we try to imagine what the future of chipsets might hold, some areas stand out owing to their potential for truly disruptive and wide-scale innovation.

5G and AI, and a ubiquitous connectivity fabric of smart devices and services

5G-AI will be two very important elements of future innovations. Ongoing advancements in AI can help improve 5G system performance and competence, while the increasing number of 5G connected devices can drive distributed intelligence with continued enhancements in AI learning and inference. Going forward, more and more data will be processed closer to the source, either through on-device AI processing or through additional processing by the Edge Cloud over 5G. The former is important because it offers crucial benefits such as privacy, personalization, and reliability, besides scaling intelligence and enabling faster decision-making. The intelligent wireless Edge will enhance existing use cases and verticals and enable new ones.

RAJEN VAGADIA

VP & President, Qualcomm India



Smarter smartphones and a world of extended realities

Until a few years ago, taking a professional-quality photograph at night or in dim light was a job for a DSLR camera. But with advanced chipset capabilities, it is possible to click beautiful, clear, low-light photographs with a smartphone. What's more, the future of smartphone photography will have an element of personalization, wherein the phone will learn about the user's preferences from the look and feel of their earlier snaps! As smartphones get smarter and 5G enables ubiquitous connectivity, Extended Reality (XR) will be no longer a pipe dream but a reality. Augmented Reality (AR) glasses, connected to your smartphone, will enable you to view information on virtual screens. Imagine having a second work screen, or a third or a fourth!

A blending of smartphone and PC capabilities

The widespread shift to "remote" modes of working has accelerated the demand for high-functioning PCs and laptops. As a result, we will see more and more PCs and laptops packed with smartphone-like features through next-gen chipsets. Today, 5G-based chipset platforms are already enabling both high performance and long battery life, without sacrificing one for the other, in thin and light form factors. Advanced AI capabilities work in tandem with 5G connectivity to bring enterprise-grade security, greater privacy, and super-fast remote connections to Cloud platforms.

Chip-rich, feature-rich automobiles

Chipset technology for the automotive industry, too, is witnessing fast-paced innovation owing to the growing demand for personalized, intelligent in-car experiences, autonomous driving, connected car experiences, etc. which necessitate higher compute power than ever before. The advent of 4G some years ago resulted in vehicles adopting many smartphone-like features, which increased the number of chipsets used in vehicles. 5G, AI and IoT will go a step further, increasing not only the number but also the

sophistication of chipsets used in automobiles. As electric vehicles gain mainstream adoption, power semiconductors will emerge as a high-growth segment.

Domestic opportunities and the potential for world technology leadership

Today, the world looks to India for developing affordable and sustainable solutions that leverage technologies and platforms like 5G, AI, IoT, XR, Cloud, and Robotics. The Indian government is cognizant of the world-leading role that India can play in this space and is encouraging industry leaders and innovators to take the next big leap in semiconductor technology development and manufacturing. National programs such as Make in India, Digital India, and the Production Linked Incentive scheme are all supportive steps in this direction.

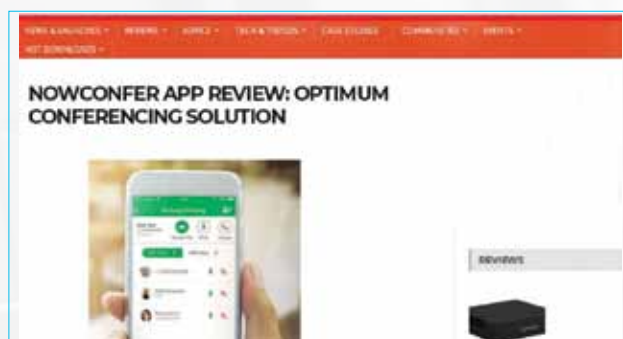
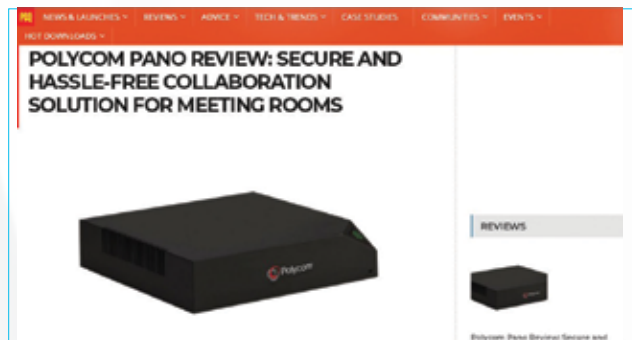
The growth potential for India's semiconductor industry is high indeed, as many of the industries that require semiconductors as inputs are themselves poised for robust growth. With intelligent computing and interconnected devices finding wider and wider applications across industries, it would be reasonable to expect a healthy, sustained demand for semiconductors in the decade ahead. Hardware aside, Electronic Design Automation software firms, which aid semiconductor design, will enable India to leverage its considerable software talent to good effect. Meanwhile, the strong domestic focus on semiconductor design and manufacture will hopefully nudge India's R&D hubs, Centres of Excellence, government programs, and education institutes to address the skills gaps and strengthen the ecosystem for system integration.

According to an estimate by International Business Strategies, India's semiconductor market could grow from a size of \$24 billion in 2020 to \$109.9 billion in 2030, a CAGR of 16.44 percent. It is an opportune time for the semiconductor industry to take centre stage and deliver chipsets that will power the intelligent, connected future we all look forward to. ■

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XR for every citizen and every industry

in conversation with

**SRAVANTH
ALURU**

Edited excerpts from an exhaustive video interview...

"X" R is usually the right term to talk about the umbrella Extended Reality concept. When you're talking Augmented Reality (AR), it's about dropping an augment in the physical reality. You are the centre of the experience. You are dropping something around you. Virtual Reality (VR) is more the classic Facebook way looking at the metaverse in the sense that you are transported into a virtual world and are experiencing it, perhaps dynamically interacting with others as well in a social or gamified set-up. That is the classical VR. There is the Mixed Reality (MR) aspect which is the confluence of both in the sense that something can switch between these two and be interoperable.

The convergence into the multiverse

In each of these, the underlying shift is from the native 2D formats that we see today which are the digital web pages and content on flat screens, all of that shifting into a life-sized 3D. That's the inflection you'll see in the next decade as we evolve in the sophistication in terms of hardware, which is needed to make the switch, equally software, which is going to be capitalizing on these new capabilities, building AI and computer vision on top of that.

All of this is converging into the multiverse. If you were to think about Web3 and the common theme of decentralizing the control into the user's hand, think of XR as an attempt to take experience and make the consumer the protagonist. It's equally about making the user the centre of the experience and spawning the digital worlds around them.

The way forward from now

At Avataar, we are working with large commerce enterprises, bringing 3D to websites, and making the mobile phone literally a 3D device. I call it 2.5D because screen is still 2D, but there is a six-degrees of freedom in terms of you walking around and looking at an object. The next evolution will be a headset. There is an AR smart glass approach which is something similar to your seeing the physical reality and the ability to do digital overlays on top of the shared physical reality. The other approach is the VR headset approach which is saying that I'll transport you into a virtual world and you'll start living in it. The third is the Apple strategy of saying that both will co-exist, but instead of one platform owning it, the consumers will say: These are what I want.

Let's say a salesman wearing one of these devices will see the LinkedIn bios of everyone who's walked into the room and has a lot more context about the person he is speaking with. That's going to be superhuman compared to



SRAVANTH ALURU

Founder & CEO, Avataar.Me



someone not wearing the glasses.

Key will be the moment the first true consumer experience of that device comes in. I see the iPhone being replaced with an Apple smart glass maybe in 5 years. That will be the first tectonic shift of consumers going from flat digital worlds into something like the metaverse or the multiverse.

Helping humans in every sphere

I think a lot of the grunt work can be automated. That could be a powerful government strategy if you think of productivity

and GDP. If you think of industrial use cases, delivery or logistics, you already see AR quietly doing a lot of work. There is a lot of robotics that has come in. There is a lot of image detection that is already bringing productivity and helping humans do a better job. I don't think this is going to eat into human jobs. There is a long way for AI to truly create a threat of that nature. It will remove a lot of inefficiencies and in the process bring in a lot of advantages." ■

(These are excerpts from a video chat with Sunil Rajguru. Catch the complete interview on the PCQuest YouTube channel.)

Future of Tech: Today's Innovation. Tomorrow's Tradition.

by
**KULMEET
BAWA**

On the 50th anniversary of PCQuest, the author would possibly be tapping this article out on a Hand Terminal device, a la the popular sci-fi series, *The Expanse*.

The technology industry today is barely recognizable from the fifties and sixties when the arrival of computers and gadgets heralded the dawn of tech giants as we know them today. With each passing decade, the dizzying pace of advancement gets even faster, the technology even more complex, and the industry even bigger. It is not a surprise, then, that McKinsey & Company predicts that we will experience more technological advancement in the upcoming decade than we did in the last 100 years.

Predicting the future of the technology industry has always been a tricky matter, even for the biggest and brightest minds in the industry. Nevertheless, let me try and crystal gaze into the future and look at what promise technology has for us:

Smart machines to be our co-workers

As cognitive computing systems advance and become more common, we'll see businesses deploy virtual assistants, robotics, and data-driven avatars alongside their high-performing staff, putting the man vs machine debate to rest. With the use of Artificial Intelligence software and equipment, employees will be able to create personal toolkits of virtual doppelgangers – virtual counterparts, making team-based tasks easy and enjoyable even under remote working settings. Furthermore, using cloud-based applications and personal digital assistants, they will be able to take their personal workplaces with them, wherever they go.

Taking customer experience to new heights

Although in its initial phases, the futurists and gaming geeks have been enthusiastic early adopters of Web3 technologies. Years from now, as Metaverse goes mainstream, we'll see brands put culture and design at their core, enabling new modes of expression and immersive experiences for customers. For instance, fashion brands could offer digital clothing and non-fungible tokens (NFTs) to their customers, who'd eventually visit the physical stores to purchase items they become interested in shopping in the digital verse.

Sustainability is the business challenge of our lifetimes

CEOs today agree that sustainability is a critical aspect to the future success of their organizations. Citizens are also increasingly educated and are demanding products and services that minimize negative environmental impact. Just like any other core business function, sustainability performance

KULMEET BAWA

President & MD, SAP Indian Subcontinent



must also be managed in real time, reported, eliminated, and integrated into wider business decision making, and this is where technology will continue to play an enabling role. Steering a company holistically – by looking not only at financials, but also at the social and green bottom lines – leads to better decisions and more resiliency. Together, let's aim to make sustainability profitable and profitability sustainable. This can be achieved with shift in mindset, leveraging with innovations that

create a positive impact on both Society and Business.

I can imagine if someone were to update tech predictions in the near future, on the 50th anniversary of PCQuest, the author would possibly be tapping this article out on a Hand Terminal device, à la the popular sci-fi series, *The Expanse*, while operating out of a remote workstation and downloading the latest upskilling program over a machine-neural exchange. Here's looking at and to the future! ■

Unified DataOps – The Future of Digital Transformation

by
**RAJESH
DHAR**

Digital Transformation isn't a buzzword anymore as organizations are increasingly traversing the journey to transform their operations and processes, taking meaningful strides from digitization to digitalization. It's clearly understood that digital transformation is a process that businesses implement to improve the customer experience and gain new business opportunities. Digital transformation initiatives are mostly focused on developing better applications and underlying IT ecosystems that are designed to enhance the customer experience. Unfortunately, many of these initiatives generate large volumes of data operations that are often inefficient and incur significant financial and compliance risks.

Despite the desire to accelerate their digital transformation, many companies find themselves stuck in a data and infrastructure complexity that holds them back. Such a complexity is usually fraught with fragmented software and hardware approach, inefficient manual processes, and considerable business risks.

The key to successful digital transformation, therefore, is taking a data-driven approach, which means putting the necessary resources and skills at the heart of the project with an agile platform that can support the continuous analysis and management of all the company's data assets across core, cloud, and edge.

Digital maturity has been improving over time, which is evidenced by the number of companies that are now generating business growth through data-driven digital transformation efforts. The companies that efficiently collect, analyze, and manage the data are the ones that can transform it into actionable insights and drive profitable business outcomes. This is being done through a DataOps strategy that unifies people and processes on an intelligent automated platform.

Harnessing Data. Enabling Transformation. Intelligently.

A well-structured and Unified DataOps can help companies optimize costs and increase revenue by delivering a direct impact on their development velocity, business risk mitigation, and operational efficiency. Simply put, Unified DataOps simplifies the management of data by combining cloud-native operations with data-centric automation.



RAJESH DHAR

Senior Director - Hybrid IT
Hewlett Packard Enterprise





"HPE's leading partners like Ingram Micro are playing a pivotal role in deconstructing the complexities of designing, devising, and deploying a unified data operations strategy for our customers on HPE's Intelligent Data Platform. Ingram Micro, along with HPE, has been helping businesses to enable cloud ecosystems to efficiently handle exponentially surging data growth from edge to core, and create a consistent experience in moving workloads across infrastructures to exploit the full potential of their data and accelerate data-driven digital transformation."

Mr. Navdeep Narula, Executive Director – Mobility, Compute & IoT at Ingram Micro India Private Limited

Unified DataOps automate and extend existing infrastructure and operational processes to create a comprehensive, edge-to-cloud approach. This allows enterprises to seamlessly manage the way their data is accessed, protected, and mobilized by automating the cloud operational experience wherever data resides. With AI-powered intelligence, businesses then go beyond automation by continuously monitoring and improving the performance of apps and infrastructure, and enhancing resource utilization while minimizing potential threats.

Driving data agility and disruptive innovation, HPE has been collaborating with global organizations to speed up their data-driven digital transformation with an intelligent platform that unifies data management, runs any traditional or modern application on demand, and leverages industry-leading artificial intelligence to deliver the true value of their data.

HPE's Intelligent Data Platform allows enterprises to unleash their data across

clouds with its Data Services Cloud Console that delivers unified data operations via a suite of cloud services, HPE Alletra that runs cloud-native infrastructure to free data across hybrid cloud for any app, and HPE InfoSight that enables AI-driven autonomous operations to optimize performance, availability, and resource management, all delivered as-a-service with HPE GreenLake.

Using data to gain competitive advantage isn't a recent phenomenon. However, adopting a comprehensive data operations approach across an organization is an elaborate journey, which calls for a significant change in the culture of how a business operates. It is imperative to have internal advocates to help build momentum for an organization to appreciate the actionable value of data. Players like HPE can then take the responsibility off their shoulders to create a unified data operations environment and to work closely with the enterprise to embrace a data-driven transformative future. ■

Memories of PCQuest CDs still linger



Dinesh Sonsale



Santanu Datta

Summer of 96
To get JAVA / JDK, we had to buy Books or
PC Quest Magazine as internet speed and
internet itself was a challenge. Purchased
this PC Quest to learn Java. Even after 25
years CD still works... Thanks Sun
Technologies for Java and even after 25
years Java works :)

#happycoding #java #oracle #PCQUEST
#programming







Charanjit Singh Cheema

#linux #windows #PCQUEST #redhatlinux
I started my journey with Computers with CPUs Intel
80486DX4 sometime it used to call as Dx4 then
Pentium-1, Celeron. my first PC RAM was 16 MB then
later I upgraded it to 32 MB (for supporting Windows
98 SE)

Windows OS I started using from Windows 95 due to
issue in operating Windows 95 I switched to Windows
98 SE (Second Edition) and also upgraded my PC to
run the Windows 98 SE efficiently on Intel Pentium-1
and later on Intel Celeron CPU

First Linux operating system I used Red Hat Linux 9
and PC Quest Linux both Cds I received free from
Mercury motherboard and PC Quest Magazine
respectively.



Arul Amudhan Gunalan

I used to collect PCQuest magazines and
CDs religiously when in college. So this
definitely a proud personal milestone!



Suresh R
@iamabofh

The RH 5.2 CD from @pcquest thanks to
@prasanto and the late Atul Chitnis was the first
distro I installed. Played with a friend's Slackware
install for a while before that. Can't quite find an
image online :(

35

YEARS
1987 - 2022



PKR | প্রশান্ত | پرشانتو
@prasanto



Found my old collection of 1990s PCQuest Cds. Our Linux Cds were particularly popular (lots of work by @AtulChitnis #RiP, and friends).



Chitra Chaudhuri
@ChitraChaudhuri



Hey lookie! Opened the PCQuest magazine, they still give out the free software CD...brings back a lot of memories



Venkatarangan Thirumalai
@venkatarangan



You inspired the early adopters in India to take up a career in technology. I had learned many tricks & trips. Atul Chitnis columns demystified the internet/web/modem in the days when the state had a monopoly in connectivity.



Shekhar Govindarajan
@shekharg



My memories:
1. Avid reader since 98
2. Worked @ PCQ Labs for 2.5 yrs. A crazy, enegetic place, smart boses
3. Continued to write for magazine after leaving
4. Was consulting editor
5. Was part of PCQLinux team starting PCQLinux 7.1 (2002) to PCQLinux 2009) #PCQ35Years



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Kamlesh ®
@kamleshrao



@pcquest wondering what should I do with these CDs / DVDs. This just sample #OldStuff #KRNotes





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