# R&D *to* LEAPFROG ICT

**Digitally Enabled Journey for Next 25 Years**

**Kamendra Kumar,**
Director, Technical, TCIL

**A Lot of Software Goes into Making of Hardware**

**Asoke Laha**
CEO, Interra IT

**India's Electronics Dream: A MAIT Perspective**

**George Paul**
CEO, MAIT

**Can Riafy Emerge as a Unicorn?**

**A Successful Startup**
RIAFY

# BATOI®

www.batoi.com

# Visit us at Booth No. 4.262

**Cloud Platform for managing Business processes and workflows**

# CONTENTS

# EDITORIAL

> **"** Countries, which have made a grade in the ICT sector, have a strong rooting in R&D. Empirical evidence demonstrates in clear terms how a firm or a country can go past others leveraging R&D. **"**

**Gurmeet Singh**
**Editor**

India's focus on development of the ICT sector is unequivocal. Implicit in that is the unprecedented focus on R&D, the key driver of the sector.

Countries, which have made a grade in the ICT sector, have a strong rooting in R&D. Empirical evidence demonstrates in clear terms how a firm or a country can go past others leveraging R&D. Apart from the market domination such companies can command, investment in R&D has direct payoffs in revenue generation, product improvisation including disruption and employment generation in the larger interest of the nation.

R&D, in generic terms, is defined as a process to create improved technology either to a firm, or an organization or a nation at large to give that entity a competitive advantage. Most often, it is capital intensive, risky, since the outcome may be uncertain or farfetched, or fails to give the desired financial results. The outcome of R&D, whether it is a new discovery, product or technology, cannot be appropriated by the originator alone. The person or the organization has to share them with customers, the public and even competitors.

A clear distinction can be drawn between academic and institutional R&D on the one hand and industrial R&D on the other. A company undertakes R&D for business needs that can lead to improved products, processes, systems, or services to increase the company's sales and profits. Academic R&D is a pursuit for acquiring new knowledge, which can help humanity in general. Countries and systems which have dovetailed and synchronized both channels of R&D have always maintained a head-start over those which have firefalls between the two.

ICT and R&D are two sides of a coin and go hand in hand. Short shelf life of a product, higher rate of technological obsolescence and changing customer preferences keep the sector always on toes. That is the reason why global ICT companies spend a higher percentage of their sales volumes on R&D. That is also the secret of their market dominance and expanding revenues.

Coming specific to India, the R&D ecosystem has been undergoing transformation in recent years. Not only the policy-makers but also other stakeholders including judiciary are seemingly on the same page. Over 28,000 patents were granted last year as opposed to 4,000 in 2013-2014. Recently, the judiciary has shifted Intellectual Property Rights (IPRs) jurisdiction from IPAB (Intellectual Property Appellate Board) to the High Courts to facilitate faster decisions on disputes.

Yet, our R&D system and the number of patents being awarded every year is far below that of the US, China and countries in the EU. With ICT in focus and general consensus among stakeholders that R&D should be given primacy in the policy apparatus, the R&D ecosystem in India is in for a revamp. EI-Softech in this issue explores the ecosystem in the ICT sector in India and flags the ideal roadmap India should strive for.

**(Gurmeet Singh)**

# Cloud Computing: New Traction

Cloud computing is becoming an integral part of enterprise services as businesses are increasingly depending on data for taking corporate decisions. As the pandemic has abated, the incremental use of cloud in 2020 and 2021 may gain traction in 2022, riding on the back of payoffs it has given to companies which have deployed that platform, so much so Gartner predicts that global spending on public cloud services would reach $1 trillion by 2024, and 25 per cent of companies would switch over to cloud. El-Softech attempts to portray cloud computing trends for 2022 based on the observations and seminal articles of experts.

**Smarter Cloud Services**

Hybrid cloud and server-less cloud are trending as businesses look for flexibility in their operations. This, in short, means combination of public and private cloud services. Companies, which are in segments like insurance and banking, storing sensitive information, may prefer to store some of the collated data in their own cloud services instead of public cloud storages. That will ensure them more security and gravitas to evolve company-specific products. Closely linked to this is server-less computing, which can allow businesses to access IT infrastructure on-demand without having to invest in infrastructure or manage it. That also will help them to develop new applications fast in tandem with their business requirements.

## Intelligent Cloud

The cloud has various uses other than storage facilities for enhancing computing power. Cloud-based Artificial Intelligence (AI) technologies, such as Machine Learning, can assist organizations in data mining and thereby extract more value from the data they gather. AI algorithms enable organizations to discover new insights from their data. Companies, which do not have the means or talent to construct their own AI infrastructure, can benefit from it by using cloud service providers' systems. This will also pace up automation of companies and can manage their expanding cloud footprints better and ensure that solutions from diverse suppliers operate seamlessly. This will also lead to cost reduction for companies since they can focus on their core activities and the rest of the functions can be outsourced.

## Enhances Cybersecurity and Compliance

In the expanding digital world, IT security and data compliance are a major concern. This has created a huge demand for Secure Access Service Edge and Cloud-based disaster-recovery practices. Cloud-based disaster recovery helps a company to back up its data on an external cloud server. It is less expensive and efficient.

Businesses frequently use cloud-based disaster recovery for critical servers and applications like huge databases and ERP systems. Secure Access Service Edge (SASE) helps security and risk management as employees access more services and data from personal devices outside their organizations' IT networks.

## Emphasis on Innovation

Cloud-based platforms have given impetus to technologies like Containers and Kubernetes, Edge Computing, and Cloud-Native applications. Containers provides enterprises with a specialized cloud-based environment to develop, test and deploy new applications. This enables developers to concentrate on the intricacies of their applications, leaving IT teams to focus on delivering and managing solutions to make the entire process faster and more efficient. Kubernetes is a software which scales apps based on client demand and monitors the performance of new services so that firms can address the concerns before they become a problem. Edge computing puts data processing collection, storage, and analysis closer to the sources of the data, leading to localization of data and helps companies to comply with local legal requirements.

## Gaming, Virtual Reality & Augmented Reality

Huge explosion in cloud gaming is going to happen in the coming years with platforms such as Google's Stadia and Amazon Luna becoming popular. Cloud Virtual Reality and Augmented Reality (VR/AR) have made headsets more affordable and are fostering the growth of cloud gaming across various sections of society ■

# AI for 2022 and Beyond...

Artificial Intelligence (AI) will transform technology landscape in the next five years or so, driving innovations, disruptions and even discoveries. Major beneficiary in the dispensation will be ICT. In 2022, analysts predict that many experiments with AI will come to fruition. That includes significant business problems, which will have business-focussed solutions.El-Softech explores the areas and domains that will be set for a transformation in the coming years impacted by AI, which is a compilation from many scientific sources and published materials.
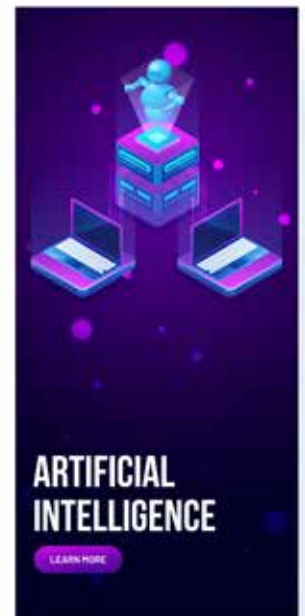
### Data Processing on a Real-Time Basis

Organizations will strive to build flexible data pipelines to support their appropriate decision-taking process on a real-time basis. They have to sieve through thousands of sources containing structured and unstructured data. Traditional ETL (extract, transform, and load) will be complemented with more scalable data lakes, and in many cases data streams must be provided to be processed in real time.

### Automated Process Discovery boosts RPA Efforts

Enterprise will increasingly use intelligent automation process discovery technologies using Robotic Process Automation (RPA)

pipeline, which will have increased deployment of AI at the enterprise level. There will be a focus on taking decision based on data mining. Automation requires lots of human oversight and intervention. Algorithms and machines will be primarily focussed on the tasks of information and data processing and retrieval and administrative tasks. The tasks where humans are expected to retain their comparative advantage include managing, advising, decision-making, reasoning, communicating, and interacting. Undue fear of job losses may be out of place in this context.

### Interface between AI/ Machine Language (ML) and RPA

There will be more intersection points between RPA and AI/ML in 2022, according to some experts. These can lead to evolution of some complex solutions. If automation is being used for bulk data processing, optimization of algorithms can be built in. If automation is being used for human-in-the-loop activities such as customer service, AI may provide a set of possible solutions that a customer service representative (CSR) can choose from, and then carry those out on their behalf.
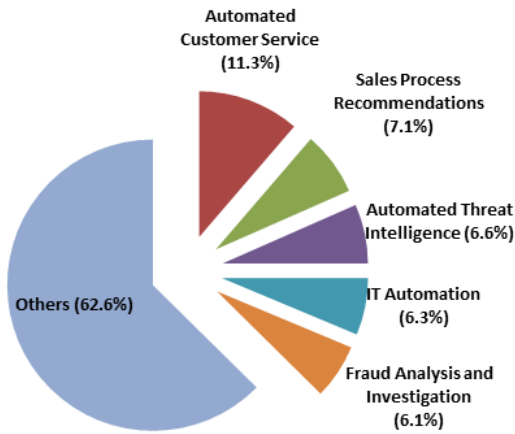
### AI enables Effective Supply Chains

Intelligent supply chain applications should become the rule rather than the exception, going forward. From supply and

### Top Use Cases of Artificial Intelligence (AI) based on 2020 Market Share



- Automated Customer Service (11.3%)
- Sales Process Recommendations (7.1%)
- Automated Threat Intelligence (6.6%)
- IT Automation (6.3%)
- Fraud Analysis and Investigation (6.1%)
- Others (62.6%)

*(Source: IDC Worldwide Artificial Intelligence Spending Guide - Forecast 2020)*

**Steps to maximize AI benefits:**
- o Encourage greater data access for researchers without compromising users' personal privacy
- o Invest more government funding in unclassified AI research
- o Promote new models of digital education and AI workforce development so employees have the skills needed in the 21st-century economy
- o Create a federal AI Advisory Committee to make policy recommendations
- o Engage with state and local officials so they enact effective policies
- o Regulate broad AI principles rather than specific algorithms
- o Take bias complaints seriously so AI does not replicate historic injustice, unfairness, or discrimination in data or algorithms
- o Maintain mechanisms for human oversight and control
- o Penalize malicious AI behaviour and promote cybersecurity.

*(Source: Brookings - https://www.brookings.edu/research/how-artificial-intelligence-is-transforming-the-world/)*

| Tools |
|---|
| Search and optimization |
| Logic |
| Probabilistic methods for uncertain reasoning |
| Classifiers and statistical learning methods |
| Artificial neural networks |
| Specialized languages and hardware |



| Goals |
|---|
| Reasoning, problem solving |
| Knowledge representation |
| Planning |
| Learning |
| Natural language processing |
| Perception |
| Motion and manipulation |
| Social intelligence |
| General intelligence |

demand planning to digital manufacturing and logistics, supply chains in 2022 will need to be continuously transformed. AI will be the tool to achieve these objectives.

**AI for Customer Interface**

The pandemic saw AI adoption in customer-facing roles such as virtual agents increase. This interface will continue with more maturity and vigour, no matter whether pandemic has bottomed out or not.

**Natural Language Generation (NLG) goes Mainstream**

OpenAI recently made its GPT-3 large language model, already being used by hundreds of apps, available by API. The most public example of the power of NLG, GPT-3 can be used in applications that require a deep understanding of language, from converting natural language into a software code to generating answers to questions. NLG, which historically focussed on turning numerical data into text-based insight, is now generating text from text-based data points and starting to change the game in creative writing.

**Talent Shortages threaten Progress**

Effective talent management has become a strategic differentiator for enterprise IT organizations. This will need world-class recruiting and retention-related initiatives that promote inclusivity and a lifelong learning culture. The market has never been more competitive for people with AI skills, and this trend is likely to continue for years to come.

**AI transforms IT Productivity**

AI will be increasingly deployed to enhance developers' productivity. In most of the engineering verticals, AI will be used to derive maximum benefits ■

# Digitally Enabled Journey for Next 25 Years



**Kamendra Kumar,**
**Director, Technical, TCIL**

**As digital capabilities improve, India is likely to create significant economic value, and change the nature of work for tens of millions of Indians. In this background, El-Softech had a freewheeling discussion with TCIL Technical Director Kamendra Kumar. Excerpts are given below:**

*El-Softech: What do you think the course of future developement of ICT industry in India?*

**Kamendra Kumar (K K):** Our government is all set to launch a scheme for design-led manufacturing to build a strong ecosystem for 5G as part of the Production-Linked Incentive (PLI) Scheme. The Union Budget 2022-23 seeks to lay the foundation and give a blueprint to steer the economy over the **"Amrit Kaal"** of the next 25 years – from India at 75 to India at 100. While presenting the Union Budget, the Finance and Corporate Affairs Minister, Smt. Nirmala Sitharaman, said that India continued to build on the vision drawn in the Budget of 2021-22. Its fundamental tenets, which included transparency of financial statement and fiscal position,

reflect the government's intent, strengths, and challenges.

The Government aims to attain the vision of promoting digital economy & fintech, technology-enabled development by achieving certain goals during the Amrit Kaal.

*El-Softech: Industry is upbeat about the PLI scheme since it would also give a push to software also since 5G is partly software driven and they believe that it would widen the scope for R&D in ICT. What is your take on the issue?*

**K K:** The DoT, or Department of Telecommunications, has already notified the guidelines for the Production-Linked Incentive Scheme for manufacturing

telecom and networking products, a fixed amount/ percentage has already capped the expenditure as investment that global companies can make on research and development (R&D), as well as transferring technology. Leading global companies and EMS (electronics manufacturing services) players have shown an interest in applying for the much-awaited scheme. The threshold investment is a key element that determines the financial incentive that a company will be eligible for under the scheme. As part of the detailed guidelines, only 15 per cent of the expenditure on R&D and 5 per cent of that incurred on transferring technology will be considered investment for determining eligibility under the scheme.

Since 5G offers the ability to send and receive data almost instantly with very low latency and extended battery life, current software applications will also need to adapt some architecture changes in both software and hardware to accommodate the current growing demand.

Operators will use network slicing that will ring-fence a certain part of the network for a user or app, providing the necessary speed while preventing anyone else from accessing that fence. As for developers, they will have to work to provide safer ways of authentication.

Video on Demand (videostreaming) and gaming entertainment will also see a boost, thanks to the arrival of 5G.

5G's dynamic software-based systems have far more traffic routing points. To be completely secure, all these need to be monitored. The added speed and volume will challenge security teams to create new methods for stopping threats.

Therefore, 5G requires a new network architecture that is open source, virtualized and disaggregated. The telcos and infrastructure owners in India need to transform their legacy networks through new virtualized tech to deliver ultra-low latency and unlimited data capacity. Henceforth, 5G ecosystem will lead to R&D opportunities in diversified sectors, including 14 sectors under the PLI Scheme.

***EI-Softech: Will that create a momentum in the IP ecosystem in the country and that way more R&D initiatives – an area in which India lags behind?***

**K K:** Yes, definitely this will create a momentum in the IP ecosystem in the country and that way more R&D initiatives. The telcos see 5G as an opportunity area, but they are not in a position to exploit it because of the lack of a clear use-case. There is some evidence of 5G's relevance in the niche industries, but this is not a network that they can scale. Then, there is the question of the high price of the 5G spectrum. It is quite unrealistic right now.

The PLI Scheme is expected to attract global investments, generate large-scale employment opportunities and enhance exports substantially. It will also lead to investments in innovation and research and development and upgradation of technology.

As per the price recommended by the Telecom Regulatory Authority of India (TRAI), the auction includes 8,644 MHz of spectrum for a reserved price of Rs.4,900 billion ($65.78 billion). However, all the Indian service providers have voiced concerns regarding the high base price of the spectrum. Hence, 5G spectrum auction is likely to be held only in the second half

> **Indian semiconductor ecosystem has a great potential. During the last decade, thousands of engineering students were trained in VLSI design and related areas through the Special Manpower Development Programme (SMDP). Technical Education Quality Improvement Programme of the Government of India (TEQIP) is another effort in scaling up the talent pool in design skills.**

of 2022.

The three private telcos, Reliance Jio, Bharti Airtel and Vodafone Idea, are in the process of conducting trials. Jio is testing its indigenously-developed 5G RAN and Core, while Airtel and Vodafone Idea have collaborated with Ericsson and Nokia to test 5G technology and use-cases.

***EI-Softech: India, it is often said, has a complex system for IP registration, which is time consuming. What are your suggestions for streamlining it?***

**K K:** The complexity for IP registration focusses on systems comprised of a large number of interacting components. It explores the rules governing their behaviour and development, and is currently used to analyze and explain a range of human, social, economic and natural phenomena. According to me, if the system focusses on having a transparent process, the complexity is automatically sorted in the channel itself. Moreover, the process can also be streamlined by conducting IP awareness programmes at different levels in different clusters (textiles, auto, educational/institutional level) by conducting seminars in IP registration in consultation with various promotional agencies like FICCI, Assocham, CMAI, TEMA, etc to organize such programmes in different ministries/institutions.

***EI-Softech: The Budget 2022-23 has given a big leg-up to the ICT sector. What are the major recommendations, according to you, that can bring a paradigm shift in the sector?***

**K K:** The Budget for 2022-23 is a remarkable and promising budget for India's overall growth and preparing India for Amrit Kaal up to 2047. The Government is moving at a very high speed, and let us accept the fact that the industry is not able to keep pace. The Budget outlined innovative schemes which were being demanded by the industry for long a time. The Design-led PLI Scheme envisages 5% USD for R&D, domestic procurement of 5G, emphasis on 6G, semiconductors and acceptance of insurance guarantees instead of bank guarantees. We welcome that.

Also, to add on, digitization and hi-tech services are one of the major segments that can bring a paradigm shift in the agriculture sector for delivery of digital and hi-tech services to farmers with the involvement of public-sector research and extension institutions along with private agri-tech players and stakeholders of agri-value chain, a scheme in PPP mode will be launched. Use of "Kisan Drones" will be promoted for crop assessment, digitization of land records, spraying of insecticides, and nutrients.

Similarly, other sectors like ICT have been improvised by way of offering smart classrooms with the use of emerging technological applications like drones, interactive boards, and 3D projectors. And, we see much more beyond the advancements in the near future.

*El-Softech: The Indian ICT sector is small and the focus on R&D is not to the desired level. That way, we lag behind in innovation, employment, value addition and disruption. At the same time, we have huge R&D infrastructure built by the laboratories created by the government. R&D in these hallowed institutions is taking place in silos. How do we bring academia and industry together in the R&D?*

**K K:** R&D is the process by which a company obtains a new knowledge that it might use to create a new technology, products, services or a system that it will either use or sell.

The IT industry has emerged as a major contributor to the industry's revenue as well as an employment provider in the country. Our country is becoming an R&D hub of multinational IT companies. Several India-based multinational IT giants also have set up their R&D and innovation centres. Our government views R&D essential for implementation of the new initiatives such as Digital India. Make-in-India and Startup India and have launched a new scheme in R&D such as IMPRINT, etc.

The objective is to promote Research and Development in the emerging areas of Information Technology for development of new technologies/ software to address various societal/ industrial/ business/ government needs. The thrust areas of R&D in IT Group include Emerging Areas of Information Technology (IT), Blockchain, Data Analytics, Quantum Technologies, IoT, Green Computing, Artificial Intelligence (AI), Perception Engineering, etc.

In order to take up R&D works in the frontier areas of ICT, C-DAC was established in 1988 as a scientific society under the administrative purview of the Department. At present, C-DAC has 11 centres spread across the country with headquarters at Pune. The centres are working in different technology areas such as high-performance computing, technology for Indian languages, e-security, health informatics, IT applications in agriculture, etc. HPC Division provides programme support to C-DAC.

The Government should insist for interaction of engineering colleges with the R&D departments of the IT industry/ businesses to create coordination between academicians and R&D departments. There should be academic courses such as research fellowships etc so that students learn new technologies and then use them in production of new products/ software etc. C-DOT in India is playing a major role in this direction.

*El-Softech: It is a paradox that while Indian ICT companies are shying away from R&D, a number of global companies have set up their R&D centres in India utilizing services of our personnel. Is it a type of brain drain since the outcome of their R&D is not flowing into India? What is your take on that?*

**K K:** I don't think that it is a brain drain completely since the outcome of their R&D is also percolating into India. On the contrary, it has provided more employment opportunities for local talent which was able to lap up good opportunities from global capability centres/ global captives set up in India. I definitely recommend for more and more R&D initiatives and development in collaboration with academic and industrial sectors for reducing brain drain to the minimum from our country.

It is a mixed bag of innovation and R&D in India. In some industries like fintech, India has managed to do exceedingly well by introducing world-class home-grown solutions, e.g. UPI, Paytm, PhonePe, etc. Similarly, in the telecom sector, India is building Open RAN access system for 5G and IoT-based advanced systems. Even in the automobile sector, India has taken the remarkable stride by introducing EV-based two-/ four-wheelers. In fact, Tata Motors is bringing Make-in-India-based EV vehicles.

In continuation, the pharmaceutical

industry has also taken a big stride by bringing a number of medicines and vaccines, including Covid-related medicines.

All the above-mentioned products are being designed, produced and exported globally. But the biggest boon lies in many areas. We are still lagging behind to innovate, as somehow our education system has not moved up in the value chain to produce real core level technical scientists in different basic subjects like Physics, Chemistry and Mathematics, though our Indian students do exceedingly well in the western world and are regarded as the great Maths scholars as they have been excelling in the cutting-edge technologies, and are  associating with the corporates such as Qualcomm, Apple, Microsoft, Google, Amazon, Cisco, IBM, etc. The reason for their success lies with the solid infrastructure provided by these companies for engineers and scientists to apply the learned and acquired high skills from the universities abroad. We have seen in the past that how Dr Homi Bhaba and scientist Vikram Sarabhai had contributed significantly in the atomic and space research areas, with necessary fundings from Tata Group for their R&D projects for the self-reliant country. There was a mission to do so and we did that with a limited infrastructure. Today, ISRO is able to launch the most economical rocket launcher using

those space technologies.

*El-Softech: What changes in the digital technology one can expect from the rolling out of 5G? The earlier generations have brought out a number of significant changes, such as speed, aggregation, evolution of different kinds of apps.*

**K K:** As 5G continues to expand, technology is experiencing faster speeds, larger capacity and reduced latency. 5G is expected to be the key for innovation in the future.

5G has the potential to support millions of devices at ultrafast speeds. In particular, increased speeds can open new opportunities in public safety and business.

With high speeds, superior reliability and negligible latency, 5G will expand the mobile ecosystem into new realms. 5G will impact every industry, making safer transportation, remote healthcare, precision agriculture, digitized logistics—and more—a reality.

*El-Softech: The Indian ICT ecosystem is generally in the realm of MSMEs and so far the exposure of large companies is limited, though some of them are in the fray driven by PLI and capital subsidies for investing in segments, including semiconductors. What, according to you, should be the strategy for attracting*

*global ICT companies and large Indian corporations into the field?*

**K K:** Well, I would like to say that almost each and every global company is interested to work with India which is on fast track for growth. And, Indian ecosystem is great. Here, the MSMEs are also flourishing with global companies. We feel the right environment and policies are already in place and global companies should utilize them now. Widespread consultations are held at multiple places before every policy and views of global companies are considered. At times, global companies wish to lobby for some things which have aspirations on national security and sovereign policies. Everybody needs to appreciate and follow the government policies. All government policies are equally applicable to Indian or foreign companies. We feel the time is ripe for global companies to come and invest and make in India for global market.

The following aspects can be addressed which may be useful for attracting global and Indian giants:

– Conducive environment for setting up business and its accelerated   growth
– ICT infrastructure
– Availability of human resources
– Economies of scale
– Easy exit mechanism ∎

# R & D to Leapfrog ICT



**Every branch of science has a strong bearing on R&D. In the case of ICT, that sync is perfect. That is why billions of dollars are channelized to the ICT segment to stay ahead in the competition. That trend, it seems, is infinite.**

"You can't solve a problem on the same level that it was created. You have to rise above it to the next level." This quote from Albert Einstein may sound apocalyptical to many. But, by wish or design, the genius was alluding to the need for research to reach higher layers of excellence. During his lifetime, ICT was mostly unborn. It would have germinated only in the wild imaginations of futurologists or crazy guys. But years that have passed by since then, have catapulted ICT to every aspect of human behaviour. Every branch of science has a strong bearing on R&D. In the case of ICT, that sync is perfect. That is why billions of dollars are channelized to the ICT segment to stay ahead in the competition. That trend, it seems, is infinite.

There are several seminal articles written by scholars that try to measure the relationship between ICT and R&D. They have flagged three cardinal principles connecting R&D and ICT. The foremost is productivity, followed by revenue realization and market dominance. To put these in perspective, one has to imagine the size and range of ICT products in the 1980s or so to the present times. Look at the number of products and their prices. The products have increased manifold, their price tags and sizes have reduced considerably in recent times. There are products which have multiple uses. More products have been designed and manufactured for purposes which nobody had thought would be in vogue some twenty years ago. How did it come about? The answer is short and crisp: R&D. Coincidentally, a factor relatively less talked about is how R&D has helped market domination, which is correlated to revenue and profit bottom lines of a company.

There was a time when the automobile and engineering giants like Ford, GE, etc ruled the roost in the pecking order of high-income companies. Now, it is ICT behemoths like Amazon, DELL, Microsoft, Samsung and their ilk which are having a market capitalization either over one trillion dollars or in the vicinity of that.

As ICT gained headlines, new terminologies and concepts have come to the fore to describe them or to give a tweak to their legendary presence. One among them is the term – Unicorns – a term used to refer to a startup privately owned with a valuation exceeding $1 billion. Credit for coining that term has to be given to Aileen Lee. She first wrote about unicorns in the venture capital world in her seminal article, "Welcome to the Unicorn Club: Learning from Billion-Dollar Startups."` She looked at software startups founded in the 2000s and

estimated that only 0.07% of them would ever reach a $1-billion valuation. According to Lee, the first unicorns were founded in the 1990s – Alphabet, and then Google. It was the clear super-unicorn of the group with a valuation of more than $100 billion. Many unicorns were born in the 2000s, though Meta, formerly Facebook, is the decade's only super-unicorn. Now, unicorns are proliferating, including in India. One differentiator possibly for such companies is their unflinching faith in R&D and that too in a continuous manner to stay ahead at the top. That helped them to become global companies worth billions of dollars in a relatively shorter time frame with operations and stakeholders across the world. Does this century belong to the ICT companies? Many believe so, going by their growth vectors and market capitalization.

India has already added eight new startups to the coveted $1 billion valuation club in the first 40 days of 2022.

India's newest unicorns include:

**India's newest unicorns**

| Name | Area of Function |
|------|-----------------|
| Polygon | Blockchain |
| ElasticRun | B2B ecommerce |
| Fractal | Advanced analytics |
| LEAD | Edtech |
| Darwinbox | HRtech |
| DealShare | Social commerce |
| Livspace | Home interior and renovation |
| Xpressbees | Logistics |

An important dimension of ICT is inclusivity. The Technology and Innovation Report, 2021 of UNDP had, in detail, discussed how innovation can bring about inclusive growth, negating the widely-held view that machines, particularly digital ones, can replace employment. Its empirical findings collated from

different sources pointed to the contrary. Another interesting feature of the report is the attempt it has made to define frontier technologies. The report defines frontier technologies as a group of new technologies that take advantage of digitization and connectivity which enable them to combine to multiply their impacts. Importantly, the report covers 11 such technologies, such as Artificial Intelligence (AI), Internet of Things (IoTs), Big Data, Blockchain, 5G, 3D Printing, Robotics, Drones, Genome Editing, Nanotechnology and Solar Photovoltaics. Two distinct trends are discernible from this. One, the future growth of nations is dependent on these technologies which are very closely linked to the ICT sector. The second, these technologies not only will push up the growth matrices in GDP terms but also employment, productivity and better income distribution. Of course, countries and people which have better access to these technologies may have an advantage over those which do not.



**There was a time when the automobile and engineering giants like Ford, GE, etc ruled the roost in the pecking order of high-income companies. Now, it is ICT behemoths like Amazon, DELL, Microsoft, Samsung and their ilk which are having a market capitalization either over one trillion dollars or in the vicinity of that.**

Equally significant is the wealth creating abilities of these technologies. UNDP estimates that the market size of these technologies would rise from US$350 billion in 2018 to a whopping US$3.2 trillion in 2025. No wonder, people are betting on these technologies for a faster growth of the least-developed and developing countries in Africa, Latin America and Asia. The track record of these technologies holds good for humanity since they have brought about substantial improvements in productivity, livelihood, transformed processes and enabled production of cheaper and low-value products.

It is a good augury that the unicorn fever in India is fast catching up and such companies are either fully or mostly to do with the ICT sector. While policy tailwinds are geared to give a critical push to the ICT sector in India, it is natural that R&D comes first since it is the lifeline for ICT companies to graduate from the base level to market honchos or technology leaders. That is why a new energy and enthusiasm are permeating to the ICT landscape in India. A crucial component of that new dawn is the focus on R&D. There is an unprecedented support coming from policy apparatus to push ICT to the forefront and to create an ideal landscape for it to grow and flourish. In that policy jigsaw, R&D is the prime mover. Only very recently, as latest as 26th February, at a national Seminar on Adjudication of IPR Disputes in India organized by the Delhi High Court, India's Finance Minister said that the focus on development had to be strengthened from every side and Intellectual Property Rights (IPRs) have an important role in it. The proof of the pudding is in the eating. According to the minister, 28,000 patents were granted last year as opposed to 4,000 in 2013-2014. She also highlighted the importance of innovation for the economy and said that "If general manufacturing and general production give you a level of 3 (on a scale of 10), innovative activities bring in about 7 to 8". Obviously, she was referring to the R&D aspiration of the country since the number of IPRs awarded can be a good measure of gauging the R&D strengths of a country. In the meantime, the judiciary in India has taken an important decision to vest Intellectual Property Rights (IPRs) jurisdiction from IPAB to the High Courts to fast-track the patent ecosystem in the country.

Admittedly, India has to traverse a long

distance in the R&D race to catch up with its peers. There can be a few ways to compare the R&D status of a country, the foremost being the ratio of R&D expenditure to the GDP and the second, ratio of corporations' expenditure on R&D. Not the least, the number of IPRs awarded in a year can be an indicative data of the strength of a country in the R&D power play.

India's ratio of R&D on GDP is way behind the developed world, as revealed from the following table:

| R&D Expenditure (% of GDP) - Top 10 Countries | | | |
|---|---|---|---|
| **Rank** | **Country** | **Most Recent Year** | **Most Recent Value** |
| 1 | Israel | 2018 | 4.94 |
| 2 | Korea, Rep. | 2018 | 4.53 |
| 3 | Switzerland | 2017 | 3.37 |
| 4 | Sweden | 2018 | 3.31 |
| 5 | Japan | 2018 | 3.28 |
| 6 | Austria | 2019 | 3.21 |
| 7 | Germany | 2018 | 3.13 |
| 8 | Denmark | 2018 | 3.03 |
| 9 | United States | 2018 | 2.83 |
| 10 | Belgium | 2018 | 2.77 |
| | India | 2018 | 0.65 |
| | World | 2018 | 2.20 |

*(Source: The World Bank)*

**R&D in India**

There are indications that R&D in India, in general, is on an upward traction. According to the Economic Survey, 2021-22, there has been an improvement in the filing of patents and grant of patents. Filing of intellectual property (IP) patents in India rose by 30% in the last five years, while the number of patents granted during the same period almost tripled. In 2020-21, 58,502 patents were filed in India, up from 45,444 in 2016-17. Importantly, 28,391 patents were granted in India in 2020-21, up from 9,847 in 2016-17. The increase in patent filing boosted India's ranking in the Global Innovation Index from 81 in 2015-16 to 46 in 2021. It also coincides with the recent startup boom in India.

Importantly, the ICT segment has been a major beneficiary of this trend. The domains that have received focussed attention are quantum technologies, encompassing a wide range of varied thematic areas such as computing, communication, meteorology, cryptography and sensing, etc. Yet another area is Blockchain, the Distributed Ledger Technology (DLT), which can help provide to citizens various value-added services and can bring in more efficiency and transparency to government processes. The segments like R&D of algorithms, R&D in Convergence, Communications & Broadband Technologies and Strategic Electronics are also receiving focussed attention.

| Overview of the Top ICT Spenders on R&D – based on Annual Reports (2020) | | | |
|---|---|---|---|
| Company Name | Spend (US$ Billions) | Number of Patents | Main areas of Function |
| Amazon | 42.74 | 2244 | AI, Machine Learning, Computer Vision, Cloud Computing, Voice-based Virtual Assistant, Cashless Go Stores, Drone deliveries or Robotic Warehouses |
| Alphabet | 27.57 | 1817 | AI, AI-enabled devices and software |
| Huawei | 22.04 | - | Cloud Computing, 5G, Internet of Things (IoT) |
| Microsoft | 19.27 | 2905 | - |
| Apple | 18.75 | 2791 | - |
| Samsung | 18.75 | 6415 | AI, Data Intelligence, Robotics, Next-generation Communications & Visual Technology, Security |
| Facebook | 18.45 | - | AR/VR, AI, Blockchain and Cryptocurrencies, Data Science, Computer Vision, Machine Learning, Cyber Security, Natural Language Processing |

| A snapshot of areas where R&D in ICT are progressing: | |
|---|---|
| Design and development of a Zero Trust Network Access system | Design and implementation of secure embedded system for remote-monitored implantable medical devices |
| Implementation of Monitors and Secure manoeuvers for Semi-Autonomous Connected Vehicle Platoons | Designing and development of a mobile device security solution, addressing emerging threat |
| Cyber Security Technology Development | Building trust on Computing Platform and Training of Secure Coding of Security Chips |
| Setting up of a live cyber operations specific exercise training facility (Cyber Closet) | CI Protection Framework with Asset Management tool and SOC |
| Feature augmented Password Cracking for Cryptographically Strong Tools using High-Performance Computing | Review and validation of PDP (Prevent-Detect-Protect) Framework and Design and Development of a Compliance Checker Tool for the Framework |
| Advanced facility for evaluating and Testing security of mobile applications and its threat evaluation | Enhancing security using Lightweight Cryptography in IoT underlying Communication Network |
| Establishment of a National Facility for Security Testing, Evaluation and Certification of IoT Devices & Embedded System leading to Security Assurance | Development of Cyber Forensic Training-cum-Investigation Labs and Cloud-based Centralized Cyber Forensics Lab Infrastructures |
| SAFENET – A Technology Framework for safe & healthy usage of Internet | |

### R&D Society – (C-DAC)

In order to take up R&D works in the frontier areas of ICT, C-DAC (Centre for Development of Advanced Computing) was established in 1988.  The 11 centres of C-DAC are working in different technology areas such as high-performance computing, technology for Indian languages, e-security, health informatics, IT applications in agriculture, etc.  High Performance Computing (HPC) Division provides programme support to C-DAC. The primary activity in all centres of C-DAC is research and development in specific areas of information and communication technology and electronics (ICTE). Broadly, the R&D activities can be divided into two classes – the enabling technologies and application verticals.

The future will see more spending in new technologies such as AI, Robotics, AR/VR, and Blockchain. Next-gen security related to new technologies will also continue to drive significant growth. Businesses in emerging markets have already moved quickly to focus on rapid adoption of new technologies that deliver rapid return on investment. Governments in emerging markets are also keen to drive investment in new technologies, leading aggressive smart city initiatives and integrating ICT with economic planning.

Largely due to the rapid growth of IoT in recent years, led by investments in the manufacturing and transportation industries, new technologies will soon eclipse $1 trillion in annual revenue. This increasing proportion of spending will drive the overall industry to a new growth surge over the next decade as businesses move beyond prototyping into broader deployments of technologies such as augmented reality viewers and AI-enabled robots.

Though patents filed in India have grown considerably, as per the World Intellectual Property Organization (WIPO), the number is still a fraction of the 5.30 lakh patents granted in China, numbers granted in EU and 3.52 lakh patents granted in the USA, according to the Economic Survey. It also noted that 1.79 lakh patents were granted in Japan in 2021 and 1.35 lakh were granted in South Korea, as of 2020. The Survey attributed this disparity to the low expenditure on research and development (R&D) in India, which was 0.7% of the country's GDP in 2020. Procedural delays and complexity are some of the other factors that have deterred many from filing patents in India.

Comparative diagram showing the R&D spend of the world top ten countries during 2021:

Curiously, India is making a mark as a global centre for R&D and that too in the ICT segment. It may sound as a paradox that a country with relatively low expenditure on R&D as a proportion to its GDP, is becoming an R&D hub for global giants, particularly in the ICT segment. Among the IT heavyweights that have set up their R&D centres in India are Microsoft, Intel, Nokia, Motorola, HP, Oracle, IBM, SAP, and Cisco. Aside from these, more than 100 Fortune companies including Delphi, Eli Lilly, General Electric, Hewlett-Packard,

and Daimler Chrysler have also established their R&D centres in India.

Of late, there has been a beeline for using India as an R&D hub in the domains like Internet of Things (IoT), Artificial Intelligence, and Data Analytics. The Chinese smartphone maker OnePlus announced plans to open its first R&D facility in India at Hyderabad. While Oppo, another Chinese handset maker, launched its R&D in India on December 15, 2018,

**India offers a unique blend of massive market opportunity, technical competencies, cost efficiency, proactive government support, and a highly scalable and wage competitive workforce.**

aiming to make it the company's largest outside China. Taiwanese multinational electronics contract manufacturing giant Foxconn, which has already set up its manufacturing facilities in Andhra Pradesh and Tamil Nadu, has decided to set up its R&D centre for advanced industrial Artificial Intelligence at Hyderabad. While Korea's retail giant Lotte Group is building an R&D centre in India to further its digital
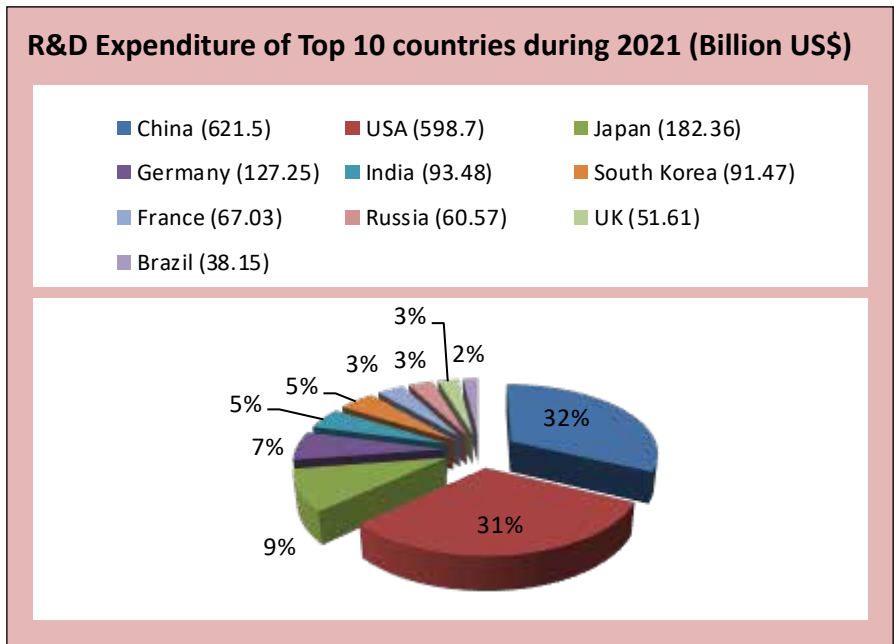
campaign and overseas growth.

Why is India emerging as a hot favourite for such intellectual and value-added operations? India offers a unique blend of massive market opportunity, technical competencies, cost-efficiency, proactive government support, and a highly scalable and wage competitive workforce. There can be differences of views on the employability of the Indian engineers. Yet, India produces a huge number of engineering and science graduates every year. While the quality and employability may vary significantly, the hiring company can select from thousands of promising candidates from some of the hallowed technical institutions. The availability of this workforce at a competitive rate is the key differentiator between India and other countries. It is not just cost alone. Many MNCs are now increasingly outsourcing their corporate R&D efforts to India's local startup ecosystem – to create breakthroughs in innovations that will help their parent companies. For instance, Google, Microsoft, SAP, and IBM have come forward with strategies to invest as well as incubate startups, or collaborate with small early-stage service providers in the form of venture funds, evangelism programmes, and partnerships with a focus on solving problems for customers faster.
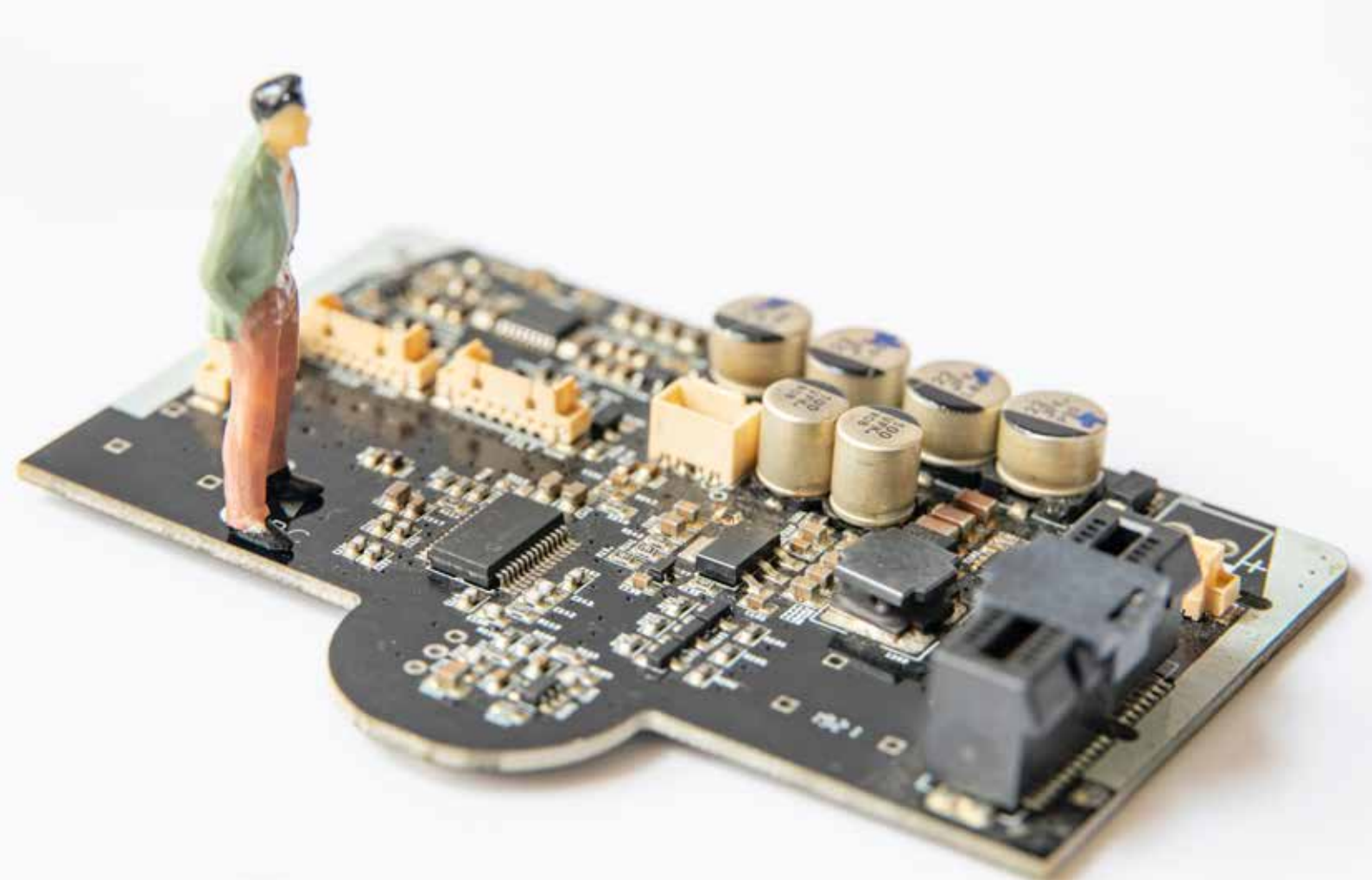
To encourage investments in R&D, the Government of India offers various tax incentives. These include incentives on revenue and capital expenditures incurred by companies for carrying out R&D activities with respect to their business, and the contributions made by them to regulatory institutions for carrying out scientific research.

Some of these incentives are given below:

- A super deduction of 150 per cent is available to manufacturing companies on in-house R&D expenditure, including capital expenditures on scientific research related to the production of articles and products. This includes expenses on filing patent applications, performing clinical drug trials, and obtaining approvals from regulatory authorities.

- A concessional tax rate of 10 per cent (plus applicable surcharge and tax) on

## R&D Expenditure of Top 10 countries during 2021 (Billion US$)

■ China (621.5)  ■ USA (598.7)  ■ Japan (182.36)
■ Germany (127.25)  ■ India (93.48)  ■ South Korea (91.47)
■ France (67.03)  ■ Russia (60.57)  ■ UK (51.61)
■ Brazil (38.15)

income earned by royalty in respect of patents developed and registered in India.

- Customs duty exemption to in-house unit of industries for capital equipment and consumables needed for R&D.

- Duty-free import of specified goods for use in pharmaceutical and biotechnology sectors by importers registered with the Department of Scientific and Industrial Research (DSIR).

- GST concession for research institutions.

**Way Forward**

El-Softech has contacted a few experts to find their views on how R&D efforts can be promoted in India's ICT ecosystem. Some of their views are listed below:

- DRDO started involving the private sector in missile technology. A similar initiative should come from other government departments like CSIR, ICAR, etc to develop ICT-related technologies

- Enhance funding for industry-specific projects

- Better coordination between industry and academia to push research

- Lease out excess capacity in the government laboratories for the private sector

- Encourage joint research between Indian and foreign scientists

> To encourage investments in R&D, the Government of India offers various tax incentives. These include incentives on revenue and capital expenditures incurred by companies for carrying out R&D activities with respect to their business, and the contributions made by them to regulatory institutions for carrying out scientific research.

- Introduce a better system for encouraging best talents to pursue R&D

- Since R&D involves heavy capital expenditure and risks, an insurance cover has to be extended to those who are involved in R&D

- Encourage disruptions in R&D centres by introducing commercialization of products, technologies and processes

- Promote startup ecosystem to encourage not only multinational companies but also large Indian companies likely to enter the Indian ICT segment

Indeed, the Indian R&D system is in search of a Holy Grail. It has many challenges before it. The foremost is the imperativeness of covering the R&D long gap in a relatively shorter time frame. A gradualist approach may not be the need of the hour, but an aggressive and ambitious posture to permeate R&D culture across the spectrum, including MSMEs. That is also the key to India's ICT juggernaut ■

# A Lot of Software Goes into Making of Hardware



**Asoke Laha**
**CEO, Interra IT**

**Asoke K Laha is the Founder, President, and Chief Executive Officer of Interra Information Technologies, Inc. with over forty years of experience in the software industry. As the Managing Director of Cadence India, he has transformed the organization into a highly respected brand in the Indian software landscape. El-Softech had a brief interaction with him and excerpts are given below.**

**The ICT landscape in India is in for a revamp triggered by various proactive policies being announced by the government such as Production-based Incentive Scheme, Design-Linked Incentive Scheme, etc. Do you think the focus of India is shifting more to electronics hardware from software?**

It is a good thing that the government is coming out with various schemes to promote electronics hardware and components, including semiconductors. That will help capacity building in that segment. It should have been done much earlier. But I do not ascribe to the view that it is being done at the cost of software. ICT is an expanding canvass. Software is an integral part of it. Rather, I would say that they are two sides of a coin. There are a lot of software elements going into the electronic hardware. Let us take the example of semiconductors. India still is not producing semiconductors in the country. We are importing them from various destinations, including China.

But we are designing semiconductors in the country. Software is used in designing chips. For instance, designing a modern multicore processor involves software worth many millions of dollars. I am not dwelling further on this since it is too technical. My point is that while

> **There is a lot of software elements going into the electronic hardware. Software is used in designing the chips. For instance, designing a modern multicore processor involves software worth many millions of dollars.**

the government is giving importance to designing and manufacturing of semiconductors in India or for that matter any other product of that ilk, there is a software element in that. That way, software and hardware go hand in hand.

**Do you think the ICT space will be occupied by electronics hardware industry in India?**

I do not want to get into an argument of software versus hardware. What I stress are software and hardware, which are two sides of a coin, which have to support and complement each other. Let us look at the top IT companies in the world. They are Microsoft, Oracle, IBM, SAP and Accenture. They are household names. Also, they are in the software sector. Can we ever imagine these companies would vanish in the near future or become less important? They will continue to have their importance and growth paths.

**How important will be the software companies in the Indian ICT landscape?**

Let me answer your question in a different manner. I have narrated only the top five software companies in the world. You take the next five large IT companies. They are HP Enterprise, Tata Consultancy Services, Cape Gemini, Cognizant and Infosys. Of those, two companies are Indian – TCS and Infosys. What I am driving home is that the Indian software companies have already made grades in the world software landscape. They have large operations across the world. Most of the Indian software companies, including medium ones like mine, have global footprint and they are expanding. Software companies on their own will continue to play an important role in India. With the focus on electronic hardware and Internet products, their canvas of operations will become wider and intense. Also, hardly is there any software company of global reputation, which does not have a base in India.

**With more and more technology companies focussing on India, do you think there will be a groundswell of opportunities for software companies in India?**

Let me explain a bit about technology,

IT and software companies to steer clear of the likely confusion they can create in the minds of the people. IT is a broad term. Broadly speaking, companies in the technology sector engage in research, development, and manufacture of technologically-based goods and services. They create software, and design and manufacture computers, mobile devices, and home appliances. Then, there are Internet-based companies such as Facebook, Adobe, etc. Another set of companies are those doing business using cloud computing, e-commerce, digital streaming, etc like Amazon , Walmart, etc. Software deals only with the development of software and solutions. You can see overlapping in their roles, definition and context. There are some people who believe that there need not be a strict separation among these companies.

Now, let me come to your question about the impact of these companies increasingly setting bases in India in various avenues. For instance, Apple, Google, Microsoft, Samsung, CISCO, HP, DELL, etc have their strong bases in India. There are some companies which are proposing to set up their bases sooner or later. I feel these companies are going to have multiple functions in India. For instance, Apple will operate through their contract manufacturers. Google has their R&D centres. DELL also will set up manufacturing and research centres in India. Most of these companies will have huge use of software products and solutions. Apart from developing such products in their centres, they would like to outsource such works to Indian startups. For instance, a large semconductor company wanting to set up a base in India will outsource the chip designing to startups and other firms. That way, software solution companies gain immensely.

**Do you think startup culture in India has picked up? If not, what more has to be done?**

Compared to what we were some five years ago and what we are now, there is considerable improvement. Now, a lot of youngsters are looking forward to have their own companies instead of looking at a 10-to-5 job. But still we have to go a long way since startups are exposed to a

lot of risks and uncertainties. In most of the cases, the first attempt will not be a successful venture. There can be a higher rate of failures. We have to create a comfort zone for those youngsters who are ready to experiment with new ideas and concepts.

**There is a complaint that Indian software companies spend least on R&D and thrive on labour arbitrage?**

There may be some truth in that. But we have to see things from a larger perspective. In general, India's expenditure on R&D is insignificant. It is less than 0.5% of the GDP, whereas there are countries which are spending in double digits (as a percentage of GDP) on R&D. It is not alone IT or software companies which spend less on R&D in India. Even the automobile, engineering, and other large brick-and-mortar companies spend less on R&D. I only hope this trend will be reversed with the type of encouragement that is being

> **India's expenditure on R&D is insignificant. It is less than 0.5% of the GDP, whereas there are countries, which are spending in double digits (as a percentage of GDP) on R&D. it is not alone IT or software companies which spend less on R&D in India. Even the automobile, engineering, and other large brick-and-mortar companies spend less on R&D. I only hope this trend will be reversed with the type of encouragement that is being given to R&D by the government and streamlining of the IP ecosystem in the country.**

given to R&D by the government and streamlining of the IP ecosystem in the country.

**What are the priorities before the software companies to move in the value chain?**

I feel they have to chase the trend. We have discussed about the software needed for chip designing, and the larger software

architecture needed for technologies driven for automation where Artificial Intelligence, Internet of Things, Robotics, 3D, Drones, etc. You have mentioned about design-linked software requirements, which have an exponential scope in the future. We have to focus more on the software needed for such technologies. That needs a total reorientation in our approach. That does not mean our conventional software strengths are redundant. In certain geographies and domains, they are still relevant.

**How do we reorient our manpower keeping in mind our future requirements?**

I feel our universities and higher schools of learning should introduce more courses and modules on the cutting-edge technologies and automation. We have inherent advantages in software such as reasoning power, sound knowledge in Mathematics and, importantly, quest to acquire knowledge. That is why more and more global companies are starting their R&D centres in India, which need high-calibre talents. They spend a lot of time for training their employees. Our universities should give sufficient attention to these types of manpower requirements. There may be shortage of faculties to teach these quantum technologies. We have to hire them. I know it is an expensive proposition. But, these days, online classes are the trend. If a university or a group of colleges hires the services of a faculty or a group of subject experts, their classes can be beamed across the affiliated colleges. That way, it becomes workable and economical.

**What is your take on the future of Indian software industry?**

I am quite optimistic about this industry. You have to remember one thing that software in India has been growing without much government support or incentives unlike the one being extended to electronics hardware, telecommunications, etc. Yet, when it comes to software development, business process development, IT-enabled services, etc, India's name comes first. Our exports have gained traction ever since software has come to play an important part of services exports from the country. I am sure that trend will continue ■

# PROTONSHUB
### Creating new dimensions

## THE NEXT
## BIG THING
## IN TECHNOLOGY

Protonshub is a technology power-house with innovation and excellence in our DNA delivering high end software solutions to numerous enterprises and Fortune 500 companies across the globe. Heading the team from USA and India, Protonshub has been delivering best of the technology solutions shaping modern day Business.

Be A Protonian -
(Join India's fastest growing IT company to unleash your career)

Contact us at - Contact@protonshub.com

## Our Services

| Web Application | Mobile App Development | Cloud | Devops | QA and Testing |

## Awards And Accolades

| glassdoor | GoodFirms | Clutch | AmbitionBox | Google |
| --- | --- | --- | --- | --- |
| ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ |
| 4.8 | 5.0 | 4.9 | 5.0 | 4.9 |

606-607, Princes Business Skypark, AB RD, Lig Colony, Indore, Madhya Pradesh, India.

800 W El Camino Real Suite 180, Mountain View, CA 94040, United States

# India's Electronics Dream: A MAIT Perspective



**George Paul**
**CEO, MAIT**

**El-Softech has caught up with George Paul, CEO of Manufacturers' Association for Information Technology (India), popularly known as MAIT to understand the dynamics of "quicksand of electronics", how that will impact and inform India's ambitious development pathways and how soon India can emerge as an electronic manufacturing hub.**

The use of electronics is now omnipresent. In almost all facets of life - education, safety, security, health, entertainment, communication, and even in household chores like cooking, cleaning, purchase of groceries, and what have you, electronics plays a crucial role. The flow and control of electrons - basics of electronics - will encompass all avenues of human existence including how one is trading, exchanging currencies, and valuation of capital assets. In short, close to seven billion people living on the planet have something to do with electronics at every stage of their lives.

George Paul, CEO, MAIT, says, "Electronic industry celebrated Budget 2022-23, presented by Finance Minister of India Nirmala Sitharaman since it is a treatise to take India to a new orbit of growth in technology-enabled growth".  This translates into demand for electronics &

technology products and additionally taking the Indian economy to higher efficiency levels.

The Budget and the series of electronics H/w sector announcements have clearly addressed two objectives, viz., capacity building, a euphemism used for import substitution, to meet the country's burgeoning domestic requirements, and two, to emerge as a powerful sourcing hub to cater to the growing global demand for electronics. The Budget had many takeaways including promotion of quantum technologies like Artificial Intelligence, Internet of Things (IoT), robotics, gaming, e-healthcare, setting up the digital university, and e-currency. Many of these are pioneering steps and hence call for celebration.

"Electronics H/w industry is a different animal and calls for a unique treatment

for its development and promotion," George says while trying to distinguish the segment from other industry domains. The quicksand analogy is borne out of its dynamic nature, changing at a rapid speed and velocity, making it trendy and at the same time unpredictable.

An electronic H/w product has a very limited production life. In electronic H/w products, one sees rapid evolution of both the technology and product features. In consumer electronics, a laptop or mobile phone, or a CE device has only a limited shelf life. A new mobile phone model emerges every six months; a new laptop model may have a slightly more productive life of close to nine - twelve months. That quagmire of changes needs quick adaptation and follow-up action to stay in the market. Otherwise, the products and the company will be eclipsed in no time, leave alone the economy that manufacturers it.

That brings to the fore the need for innovation and disruption. "Indian companies will have to invest more on R&D like the global majors, which have huge budgets for R&D," George says. In a high-velocity industry, where your innovation has a life of only a couple of years this can be a major challenge. In the electronics H/w industry, it is "Innovate or Perish".

R&D is a high-risk activity. World over, governments support R&D in private enterprises. There are fiscal incentives, such as weighted tax deductions under  the Income Tax Act for carrying out in-house R&D. What India needs is to increase the percentage and more freedom to use such funds since R&D results are intangible, risky, and commercial success is difficult to come through. R&D done by independent design houses should be incorporated into schemes.  And lastly, a major issue is the lack of funding mechanism for R&D from the commercial banking system. India needs to come up with innovative ways to facilitate this like the use of CSR to fund R&D, tradeable R&D funds, etc.

The other important feature of electronics hardware is the weightage of intellectual properties (IPs). "When a country aspires to go beyond assembly manufacturing, it is R&D-led manufacturing that increases value addition and stickiness. A very critical step in monetizing IP is when IP gets incorporated into standards." George points out, alluding that the need for R&D in the electronics system hardware is unequivocal.

The other distinction that can be attributed to electronics hardware is its unique global nature of the supply chain. It is complex, to say the least. Multiple rapidly-changing sub-assembly components and discreet components from suppliers across various geographies make global electronic supply chains trickier to manage.

The change of even one component needs to have approvals and certifications from the product engineering teams before they can be used on the production line. Therefore, supplier selection is crucial. Having a range of approved global suppliers is key to staying in business.

India is making good progress in aligning itself with global supply chains, although it has to traverse a long distance. The production-linked Incentives being offered by the government to kick-start the electronic industry works towards creating a demand-led superstructure for the industry.

The recently announced directional steps towards sops for "Design-led Incentives (DLI)" and "Funding of R&D in the private sector" are landmark steps for our country and in the right direction. These will enthuse the stakeholders including policymakers in looking at how to support R&D in India and encourage Indian companies to go strong in this direction".

The DLI has also given hope of treating design as a standalone process and not as a part of the manufacturing. This will help create more IPs since investment in R&D by independent electronic design companies will be eligible for R&D support. This can

> **The Production-Linked Incentives being offered by the government to keep the electronic industry ticking can work well in creating a demand-led superstructure for the industry.**

open up a groundswell of opportunities for the design companies, which are mostly startups or under the MSME category.

Equally critical is the monetization of IPs. While more facilities should be provided for R&D, an organic relationship between research output and its commercialization should be evolved. This will happen when IP is built into standards. This needs better coordination between academia and industry with the government acting as the enabler. That will give impetus to the commercial application of IPs generated.

"Our policymakers and regulators are aware of the nuts and bolts of the challenges. This sector needs an Electronics Mission that encompasses semiconductors, components, and Electronic H/w System

design and manufacturing, and what I hope an inter-ministerial panel is very much needed to push through the reforms and streamline the implementation since issues to be sorted out pertain to various ministries, departments both at the Centre and the State," George avers.

Undeniably, India has to catch up with countries like the US, China, and the EU in terms of IPs registered every year. Happily, there is an upward movement of IPs registered in the country in recent years, and we have one of the largest pools of high-tech design engineers. "We should aim at achieving more, particularly in Electronic System H/w designing. For that, the ecosystem should be revamped in a significant manner, as it is one of the key demand drivers for domestic value addition," he says.

Responding to a question on how important it is for India to incentivize the setting up of manufacture of semiconductors and ATMP (assembly, testing, marking, and packaging) in the country, which requires huge investment, George says, "It augurs well for the country that capabilities are created for the manufacture of different kinds of chips. The analog and digital chips are central to electronics and thus for the Atmanirbharta of India".

It is a strategic initiative that tomorrow will yield India's Atmanirbharta in this strategic sector. Acquiring strengths in chip manufacturing would help India to move up in the electronic value chain. Otherwise, we will remain as an incessant chip importer, subject to the vagaries of geopolitical dynamics.

There need to be policy interventions at various levels to support the Indian companies manufacturing semiconductors initially. "World over, such preferential policies is followed to help the local industry and in India also, we have to follow a pragmatic policy to help the nascent industry to grow and consolidate at a faster pace to build capacities and to make forays into exports," says George.

Does it mean the electronics hardware industry in India is on the move? Yes, undeniably we are on the move. India must now set in motion the next set of wheels towards increasing the Domestic Value addition through an Electronic H/w System Design-led Manufacturing strategy ∎

# Will Ukraine make 'IT' or break?

**Europe's sleeping IT giant – Ukraine, weathered the Covid-19 storm amazingly well with the IT Industry rallying through the pandemic with a growth of 20% in 2020 against a drop in total exports by 4.6%. As the war clouds are exploding over one of the Europe's most promising ICT regions, the IT landscape is changing rapidly.**

**BOJAN DIZDAREVIC**
**Head**

Balkans Direct Investment

## Ukraine Overview

Ukraine is Europe's second-largest country after Russia with a population of 44 million. The country is often regarded as the "bread basket" of Europe. Ukraine also has a strong industrial heritage from the Soviet era. Its vast industrial base includes the world's largest transport airplane manufacturer – Antonov, domestic rocket, train, military vehicle, car and tractor industries as well as shipbuilding, iron and steel complexes and chemical plants.

But geopolitical tensions as reflected in the tug of war between the European Union and Russia as well as high levels of corruption have hampered the country's growth. Ukraine has been ranked as the worst-performing country in Europe in terms of GDP per capita. Amidst this, the brightest part of the economy was the country's ICT industry.
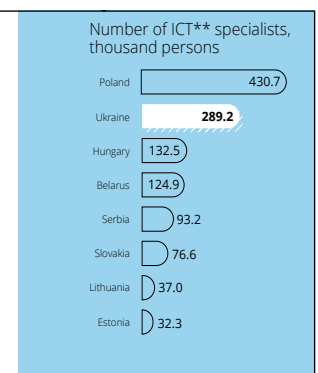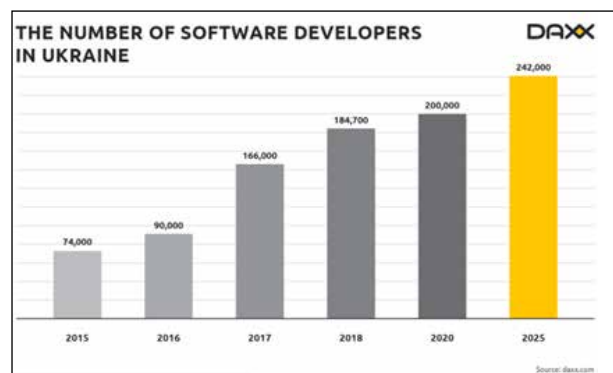
## Ukrainian IT Industry

Ukraine's historic strength in the computer and electronics industry is little known. The first electronic computer to be developed in continental Europe – the MEMS was designed in 1951 by Sergey Lebedev just outside Kyiv, then part of the Soviet Union. This long tradition is backed by a strong scientific base and an extensive network of publicly-funded technical universities. The most powerful education centres form clusters of companies in their regions. Ukraine ranks #1 among European countries for the number of tech graduates.

Wages of Ukrainian ICT specialists are far more cost competitive than western countries as well as in the region. Software engineers in Ukraine receive on average 25 thousand dollars annually which is 4 times less than engineers in the US, 3 times less than in these Scandinavian countries and around half the wage of an average engineer in Canada, Australia or Germany. Regional statistics given below show the competitive nature of the ICT salaries vis-à-vis other countries.

Having such a large, skilled and cost competitive labour force on the borders of western and central Europe is a truly unparalleled opportunity for the ICT industry and that is why the country is home to the second-largest number of software developers in Central and Eastern Europe.



**THE NUMBER OF SOFTWARE DEVELOPERS IN UKRAINE** — DAXX

| Year | Developers |
|---|---|
| 2015 | 74,000 |
| 2016 | 90,000 |
| 2017 | 166,000 |
| 2018 | 184,700 |
| 2020 | 200,000 |
| 2025 | 242,000 |

Source: daxx.com

Number of ICT** specialists, thousand persons

| Country | |
|---|---|
| Poland | 430.7 |
| Ukraine | 289.2 |
| Hungary | 132.5 |
| Belarus | 124.9 |
| Serbia | 93.2 |
| Slovakia | 76.6 |
| Lithuania | 37.0 |
| Estonia | 32.3 |

Most of these developers are outsourced by Western companies, reflecting the proficiency of Ukraine's ICT industry . Around 45% of revenue comes from the US, while an additional 10% from the UK and around 5% from Malta and Israel. In 2020, 27% of FDI projects were in the ICT sector.

Ukraine is home to more than 100 R&D centres owned by or working with global companies, including Oracle, Google, Samsung, Amazon (Ring), Huawei, Snap,
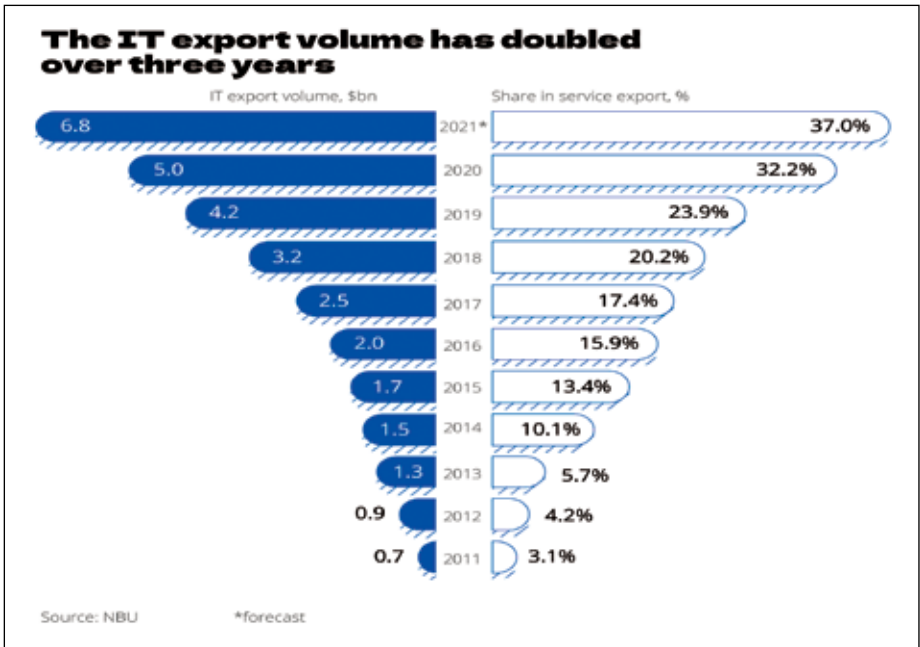
**In 2021, the Ukrainian IT industry grew by 36% from US$ 5 billion to US$ 6.8 billion in exports. At the same time, the number of specialists increased from 244 thousand to 285 thousand. Thus, over the past three years, the industry has more than doubled in exports and has grown by more than 50% in the number of specialists, according to Ukraine IT Association**

Ericsson, Boeing, Siemens, ebay, Upwork, Wargaming, Netcracker, Gameloft, Magento, Wix… But the largest part of ICT professionals are outsourced software developers.

The IT industry registered a CAGR of 24.7% between 2015 and 2020, continuing the

decade-long trend of doubling every few years.  It is estimated that the total amount of IT exports in 2021 reached $6.8 billion (accounting for 37% of all services exports and around 10% of total exports) up from $5 billion in 2020 and $4.2 billion in 2019.

Before the Ukraine–Russia conflict broke



**The IT export volume has doubled over three years**

| IT export volume, $bn | | Share in service export, % |
|---|---|---|
| 6.8 | 2021* | 37.0% |
| 5.0 | 2020 | 32.2% |
| 4.2 | 2019 | 23.9% |
| 3.2 | 2018 | 20.2% |
| 2.5 | 2017 | 17.4% |
| 2.0 | 2016 | 15.9% |
| 1.7 | 2015 | 13.4% |
| 1.5 | 2014 | 10.1% |
| 1.3 | 2013 | 5.7% |
| 0.9 | 2012 | 4.2% |
| 0.7 | 2011 | 3.1% |

Source: NBU          *forecast

# Q CITY

**Defining Workspaces!**
Introducing the Finest Workspace Solution located at the Financial district.
Gachibowli, Hyderabad, right adjacement to the upcoming US Consulate.

## Q City counters COVID - 19


Sanitised


Hygienic


Socially Distanced



**Space Insight**
Luxury office spaces of 8,00,000 Sq. Ft.

## Block A
-2,00,000 sq. ft
10 floors of 20,000 sq. ft floor plate
each of leasable property.

## Block B
-6,00,000 sq. ft
8 floors of 75,000 - 80,000 sq. ft floor plate
each of leasable property.

### Highlights / Facilities

| | | | | |
|---|---|---|---|---|
| 24/7 Electricity backup | Unmatched buildings crafted by experts | Ample Commercial Spaces | Up to 85% Efficiency Ratio | Global Partner Brands |
| Overseas Management Teams at your service | 24x7 Uninterrupted Support | Conveniently Located | ATMs | Business Lounge |
| Fungame zone & Play school | Salon | Supermarket | Medical stores | Fitness gym center |
| Hunger Box | Real estate Serviices | Security | Coffee | |

### Tenant Portfolio
### Trusted by the World's Top Compnies

Vi | DST MASTER COMPLEXITY | Coforge | software AG
MYTRAH | protiviti | erwin | Wabtec CORPORATION
Trinamix | DiYOTTA | DCS | ALLVY
DIGIPROPEL | Gemini | PrimeSoft | InfoLogitech
jade GLOBAL | TekLink | TMX Technomax | ECLATURE
FLYER

**Contact Us**
Mack Soft Tech Private Limited Q City, 6th Floor – Block A, Hyderabad,
Survery No: 109,110,111/112, Nanakramguda Village, Serilingampally Mandal,
R. R. District, Hyderabad,Telangana – 500032

92462 45453
Email: info@q-city.in
Telephone: 040-663-09777
Fax: 040-663-09778; Website: www.q-city.in

| Country | Averge Salary in ICT (Euros) | Average in ICT as percentage of the average regional ICT salary |
|---|---|---|
| Slovenia | 2,452 | 154 |
| Czech | 2,350 | 148 |
| Estonia | 2,342 | 148 |
| Lithuania | 2,340 | 148 |
| Slovakia | 2,156 | 136 |
| Poland | 1,964 | 124 |
| Hungary | 1,916 | 121 |
| Romania | 1,899 | 120 |
| Latvia | 1,731 | 109 |
| Croatia | 1,687 | 107 |
| Bulgaria | 1,542 | 97 |
| Belarus | 1,357 | 86 |
| Serbia | 1,232 | 78 |
| Montenegro | 1,105 | 70 |
| North Macedonia | 1,105 | 70 |
| Bosnia and Herzegovina | 1,072 | 68 |
| Armenia | 876 | 55 |
| Moldova | 802 | 51 |
| Albania | 651 | 41 |
| Ukraine | 606 | 38 |
| Kosovo | 593 | 37 |
| Azerbaijan | 528 | 33 |
| Gerogia | 514 | 32 |
| Emerging Europe | 1,583 | 100 |

*Source: Emerging Europe*



out IT export growth rates from 2021 - 2025 were anticipated to grow:

Optimistic scenario: CAGR 24.3% to $16.3 billion

Baseline scenario: CAGR 21.6% to $14.9 billion

Conservative scenario: CAGR 16.7% to $12.7 billion

It is already very apparent that even the conservative scenario is out of the question with the massive destruction to infrastructure and millions of people fleeing the country.
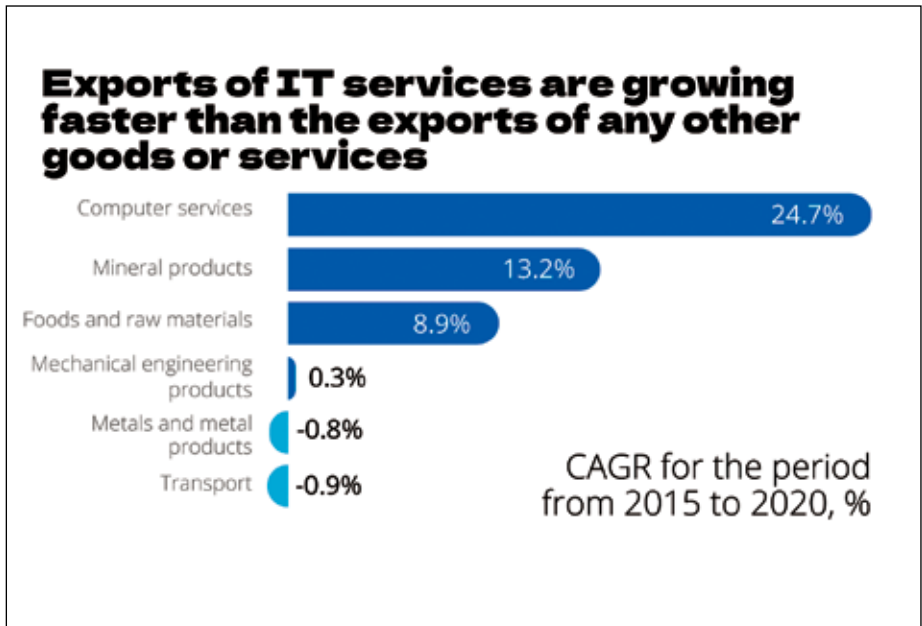
**Startups and Venture Capital**

Ukraine's startup scene has been growing rapidly over the last decade with 188 venture agreements in 2020, up from 85 in 2019 and 70 in 2018.

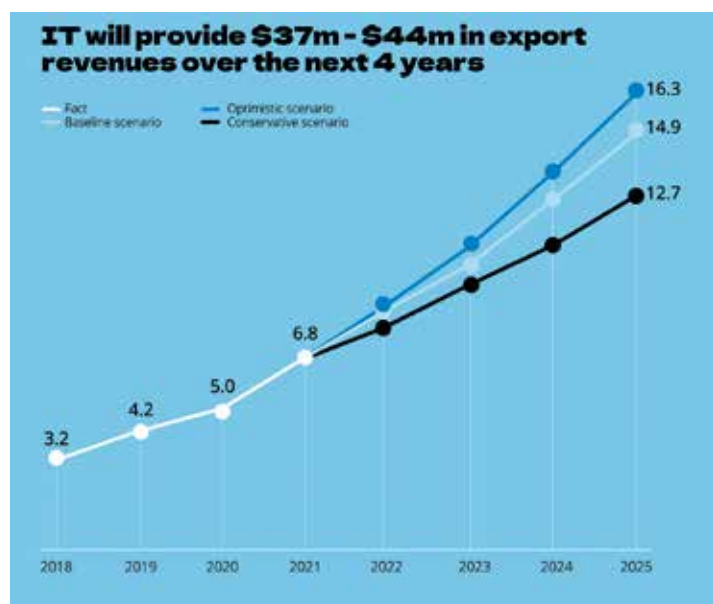In 2021, the number of startups in Ukraine reached a total of 1431.

Companies like Grammarly, Gitlab, jooble, people.io, Preply, Firefly Aerospace, Reface either originated in Ukraine or have founders or co-founders from the country.

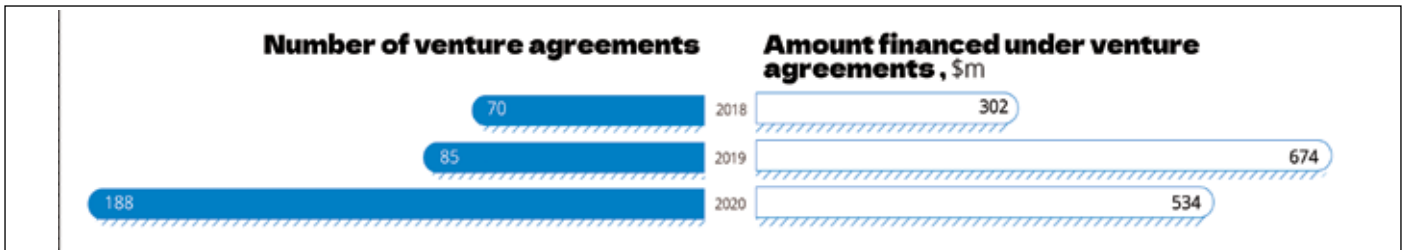"The Ukrainian market has the problem of national identification of startups — many successful projects were founded by Ukrainians, but legally structured abroad and no more positioned as Ukrainian, due to the unfavourable business environment for large-scale development and growth of the company."– Kreston Ukraine

Ukraine is home to a number of unicorns. Even 3 decacorns (startups valued at $10 billion and above) like Grammarly, Revolut and IPO Gitlab were founded in or have founders from Ukraine.

Based on Startupblink's Global Startup Ecosystem Index in 2020, the capital city of Ukraine, Kyiv, was ranked as the 8th best performing startup City in Europe and 23rd globally, while the country as a whole was ranked as the 29th best-performing globally.

| Number of venture agreements | | Amount financed under venture agreements , $m | |
| --- | --- | --- | --- |
| 70 | 2018 | 302 | |
| 85 | 2019 | 674 | |
| 188 | 2020 | 534 | |

### Regional Implications

The Ukraine–Russia conflict has definitely affected the so-called Eastern Silicone Valley comprising Belarus, Ukraine and Russia. Together, these three countries have around 1 million ICT specialists and while the conflict has been contained to Ukraine for now where the infrastructure has been destroyed, the western imposed sanctions on Russia and Belarus will have massive implications on the tech industry of the whole region.

Adobe, Amazon, Apple, Google's advertising services, IBM, Intel, Microsoft, Nvidia, Paypal, Samsung, Sony and many other tech companies have either stopped providing their services or shipping their products to Russia in line with western sanctions.

Other companies like US-based DXC Technologies that acquired a Russian founded software-development company – Luxoft in 2019 is exiting the Russian market and the future of its 4,000 employees in Russia is uncertain.

Accenture, another global consulting

company with 2,300 employees in Russia, has decided to leave the country.

### Responses

Many foreign companies have transferred their IT staff from Ukraine to other countries, while others are supporting the remaining employees in Ukraine by paying a few months of salaries in advance as employees try working remotely.

Wix, which helps people build their own websites, has its headquarters in Tel Aviv, Israel. Some 15% of its workforce is in Ukraine, and the company has been making contingency plans for weeks.

"We approached about 30 or 40 employees who were kind of the critical functions that we knew we cannot replicate outside of Ukraine and asked them if they would be willing to move to Krakow in Poland," said Nir Zohar, Wix's president and chief operating officer.

Another India-founded, New York-based artificial intelligence company - Fractal Analytics that had 81 workers in Ukraine when the conflict broke out, relocated

employees outside of the country or to safer places within Ukraine.

More than two weeks into the conflict and still no signs of truce, It is almost impossible to predict the total impact of the Russia-Ukraine conflict at the moment. But it is clear that the war will have devastating effects on the ICT Industry.

The future of Ukraine's ICT industry, economy and country as a whole will depend on many factors of which some are: period of continuing conflict, agreements after the conflict has stopped and political situation on the ground, the number of displaced people, remaining infrastructure…

If the conflict leads to partitioning of the country or Russia declaring even more independent states, it is quite apparent that western countries and companies will not like to invest in these regions.

The total picture of Ukraine's ICT industry has dramatically changed for the worse in just a matter of weeks, and the future looks very, very dim ∎

# CIS COMTECH®
## INFO SOLUTIONS PVT. LTD.
## AN ISO 9001:2008 CERTIFIED COMPANY

## Services

- Data Processing & Data Digitization
- Aadhaar Enrollments
- Manpower Outsourcing
- E-Governance & Enabled Services
- Survey & IT Turnkey Solutions
- OFC Laying & Telecom Services
- Skill Development

## Projects

- Aadhaar enrollment & Centres.
- NPR Digitization & Updation.
- Socio Economic Caste Census (SECC).
- PDS
- Bhamashah & E-Mitra.
- NDLM
- Bharatnet Phase 1 & 2
- Manpower  Outsourcing.
- OFC (Aerial & Underground)
- Seekho aur Kamao,Nai Manzil ,DDUGKY

## Partners



## Presence

| | |
|---|---|
| Delhi | Maharashtra |
| Rajasthan | Karnataka |
| Gujarat | Chhattisgarh |
| Bihar | Madhya Pradesh |
| Orissa | Telangana |
| Uttar Pradesh | Jammu & Kashmir |

**B-13, Ist Floor, Subhash Chowk Laxmi Nagar Delhi 110092 Ph : 011 43018129**
**E-mail : info@comtechgroup.co.in  Website : www.comtechgroup.co.in**

# Can Riafy Emerge as a Unicorn?



**Team RIAFY**

**Riafy's work with Artificial Intelligence will revolutionize the way we interact with technology. It's sufficient to say that smart and omnipotent AI will soon become integral to our daily lives, much like Iron Man's J.A.R.V.I.S!**

Many feel that there has not been a better time for startups as it is now. Reasons are not far to seek. The terminology is fast catching up not necessarily in the developed or developing world; clones of startups can be seen across the world, including poorer countries in Africa. The present-day unicorns or the so-called super-unicorns had their humble origins as a startup before they have grown into billion or trillion-dollar behemoths.

Startups are perhaps the most interesting form of companies because they offer a unique opportunity for global influence and growth. They do things what others could dream for years. In our innate desire to profile a startup, El-Softech tried to seep through a number of such companies to identify one with credentials and evolved creative deliverables.

"It was in 2020 that we realised it was the right time to build on our Conversational AI vision. Due to the pandemic, the pace of digital adoption rate of people picked up drastically, which encouraged enterprises to quickly adapt to artificial intelligence and digital transformation. This encouraged us to introduce our AI business vertical - Esse".

John Mathew
Co-founder

Our selection process was cumbersome. We wanted a company with a futuristic vision, savvy in converting wishful thinking into actions to accomplish the dream, with a bold philosophy of treating failure as a stepping stone. Riafy, one of the premier app studios in India that makes apps across all customer platforms/devices, countries and languages was a natural choice as the startup of the month.

Riafy Technologies Private Limited was founded in 2013 by six engineers in the southernmost state of India - Kerala. Within a span of eight years building highly scalable and localised mobile apps, it has established a global footprint with operations across 157 countries and a satisfied customer base of 25 million

in 23 languages. In recognition of Riafy's outstanding performance, the company was chosen thrice in a row at Google1/O in 2015, 2016 and 2017. Their global partners include Google, Apple, Sony and Samsung.

## What is their winning strategy?

Its bouquet of consumer-end products touches critical aspects of life - health and wellness, food, and lifestyle and even disaster management. Riafy's contribution in supporting the Government of Kerala to aid rescue operations during the unprecedented floods of 2018 saved thousands of lives across Kerala. Its GPS locating system identified people who needed rescue and materials. During the pandemic, the company's ambulance network came for the rescue of many.

The company was kick-started in 2013 after patenting its Relational Intelligence technology. But at that point India was in the nascent stage of the smartphone era and not market ready yet for AI. Therefore, the company put on hold its expansion plans of AI and decided to focus on evolving consumer apps, particularly building B2C business.

In 2013, Riafy created its first mobile app 'Cookbook Recipes' powered by its own AI tech in the cooking space. Soon, it became India's largest recipe app, with more than 6 million users.

## Introducing Esse AI

Artificial Intelligence has become an integral part of our daily life. The pandemic accelerated the pace of digital adoption by people and enterprises which encouraged Riafy to launch its AI business vertical – Esse in 2020. Esse uses natural language processing and a proprietary Smart Search Engine to understand user intent and retrieve relevant information and insights from consolidated data silos instantly. Esse's multilingual capabilities and omni channel presence make it an organizational asset, both as a customer-freindly product and as an enterprise system. Federal Bank, one of the top national banks in India, was the first customer that adopted Riafy's AI platform. Riafy created 'Feddy' for the Federal Bank, which is now the face of Federal Bank. Feddy now handles over 1.27 million customer service requests for the bank at an accuracy rate of 98%

and has led to a 25% rise in customer satisfaction with a predicted 50% savings in customer care costs by 2025. As a result, Feddy is recognized as one of the world's best conversational AI assistants by Google in 2021.

Riafy's AI assistant Esse, uses a unique combination of machine learning, natural language processing, and proprietary contextual Smart Search Engine to deliver an intelligent AI experience. It was selected as one of the second-place winners in the Build-An-Agent Contest, a competition to create and launch innovative experiences on Google's Business Messages platform. The award to recognize pivotal transformations in the digital space using Business Messages includes a cash prize amounting to US$10,000, along with official recognition as one of Google's Developer Partners.

**Nine years of R&D efforts in AI led to fruition with Riafy's first client Federal Bank, which is a stalwart in the Indian banking industry. Federal Bank was looking to revamp its digital initiatives, and RIAFY's AI platform fits in perfectly with their long-term vision. Riafy created Feddy, which is now the face of Federal Bank.**

## Technology

Technology has to be adapted constantly, as per the changes in consumer behaviour. While earlier users would type key words to get the relevant information for their search query, now, users tend to type long, contextual sentences. AI platforms have to respond interactively to such queries. Esse using proprietary technology addresses three key puzzles:

1. Understand user context - TextMagic for advanced NLP
2. Find relevant information - Relationship Maps for accurate search
3. Respond on any platform/device -

RenderEngine for an Omni channel experience

Esse AI acts as a unified intelligence layer between enterprise data and the end-users and can be applied for multiple uses as a Conversational AI Chatbot allowing interactions in natural conversational language, including Customer-facing chatbot, Internal chatbot, Conversational AI chatbot and for searching data from various departments in the form of pdf, documents, Excel sheets and databases .

## Clients

Starting with Federal Bank, the client profile of the company grew to embrace diverse clientele including Fortune 500 companies and the Government of Kerala. Several MOUs with global clients in retail,



"Back when we first began our foray into AI, the world was not yet equipped with the computational or processing capabilities to adopt AI at scale. India was only in the nascent stages of the smartphone era. Owing to this, we decided to put a pin on expanding our AI vision, and instead, focus on building our B2C business. We planned to find subtle use cases for our proprietary AI technology and develop consumer apps on it".
Joseph Babu
Co-founder

banking, and healthcare are already in the pipeline.

## Growth Plan

Riafy's global expansion plan is to reach out to markets like the US, Europe, and the Middle East and expand to multiple verticals and markets. These include banking and financial services, government, retail, logistics, education, and hiring, amongst others.

It is commendable that the company survived the pandemic-battered startup ecosystem without any external funding or investors ■

# Analytics

**Exports of Electronic Goods in India decreased to 101.42 INR Billion in January 2022 from 126.07 INR Billion in December of 2021**



*(Source: RBI & Tradingeconomics.com)*

**India Exports of Electronic goods in comparison to a few other products during January 2022 (INR Billion)**

| Category | Last | Previous |
|---|---|---|
| Manufactured Goods | 1863.28 | 2012.00 |
| Engineered Goods | 684.88 | 737.81 |
| Chemical & Products | 360.76 | 403.36 |
| Agricultural Products | 350.49 | 375.95 |
| Textile (Excl. Ready-made Garments) | 158.41 | 166.61 |
| **Electronic Goods** | **101.42** | **126.07** |
| Ores & Minerals | 35.35 | 28.82 |
| Leather & Products | 29.79 | 30.48 |
| Handicrafts Excl. Hand-made Carpets | 13.04 | 14.78 |

*(Source: https://tradingeconomics.com/india/exports-of-electronic-goods)*

**Electronics Exports - India**
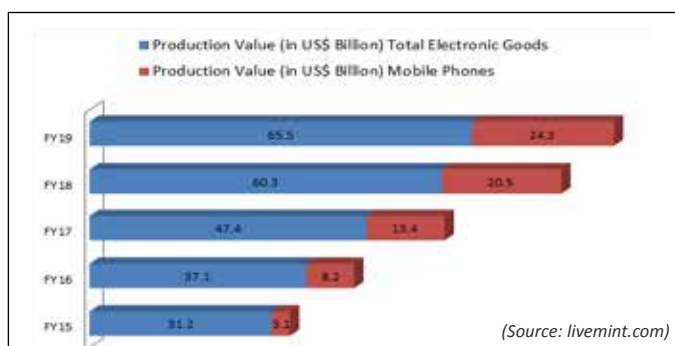


*(Source: livemint.com)*

**Survey on Computer Software and Information Technology-Enabled Services Exports from India: 2020-21**

| Tables based on an RBI survey of 1815 large companies that accounted for 86.5 per cent of the total software services exports during the year. | | |
|---|---|---|

| **Survey Response and Final Estimates for 2020-21 – A Snapshot** (₹ crore) | | |
|---|---|---|
| **Item** | **Reported^** | **Final Estimates** |
| **No. of companies** | 1,815 | 6,115 |
| **Total Exports of Software Services** | 858,608 | 992,141 |
| IT services | 538,395 | 614,678 |
| Software Product Development | 26,958 | 33,230 |
| BPO Services | 236,039 | 278,507 |
| Engineering Services | 57,216 | 65,726 |
| **Total Exports of Software Services (including commercial presence)** | 966,639 | 1,100,172 |
| Cross-border supply | 746,650 | 862,661 |
| Consumption abroad | 1,029 | 1,191 |
| Commercial presence | 108,031 | 108,031 |
| Presence of natural person | 110,929 | 128,289 |
| ^ Responses by the largest 20 companies ensured industry representation in the survey coverage. | | |

*(Source: Reserve Bank of India Survey)*

**Electronic Circuit Component Exports by Country**

The fastest-growing electronic circuit components exporters since 2019 were Taiwan (up 22.4%), Vietnam (up 21.1%), China (up 14.6%) and Hong Kong (up 14.5%). The countries that saw a decline in their revenues in the segment were France (down -15.9%), Germany (down -14.7%) and Thailand (down -6.4%).

| Rank | Exporter | Exports of Electronic Circuit Components - (US$ Billions) | % Growth during 2019-20 |
|---|---|---|---|
| 1. | Hong Kong | 153.93 | 14.5 |
| 2. | Taiwan | 122.94 | 22.4 |
| 3. | China | 177.1 | 14.6 |
| 4. | Singapore | 86.27 | 12.2 |
| 5. | South Korea | 82.89 | 4.8 |
| 6. | Malaysia | 49.29 | 10.0 |
| 7. | United States | 44.21 | 10.3 |
| 8. | Japan | 28.86 | 3.9 |
| 9. | Philippines | 20.22 | 6.5 |
| 10. | Vietnam | 13.95 | 21.1 |

*(Source: https://www.worldstopexports.com/electronic-circuit-component-exports-country/)*

| Industry-wise Distribution of ITES/BPO Services Exports from India | | | | | | |
|---|---|---|---|---|---|---|
| **Activity** | **2019-20** | | | **2020-21** | | |
| | **₹ Crore** | **US $ billion** | **Share (%)** | **₹ crore** | **US $ billion** | **Share (%)** |
| **BPO Services** | 236,172 | 33.3 | 77.6 | 278,507 | 37.5 | 81.0 |
| Business consulting services including public relations services | 30,646 | 4.3 | 10.1 | 34,510 | 4.6 | 10.0 |
| Finance and Accounting auditing book keeping and tax consulting services | 41,867 | 5.9 | 13.7 | 43,223 | 5.8 | 12.6 |
| HR Administration | 1,527 | 0.2 | 0.5 | 1,685 | 0.2 | 0.5 |
| Supply chain and other management services/ logistics | 1,211 | 0.2 | 0.4 | 1,139 | 0.2 | 0.3 |
| Medical transcription and document management | 4,172 | 0.6 | 1.4 | 5,365 | 0.7 | 1.6 |
| Content development and management and publishing | 2,179 | 0.3 | 0.7 | 1,949 | 0.3 | 0.6 |
| Other BPO services | 154,570 | 21.8 | 50.8 | 190,636 | 25.7 | 55.4 |
| **Engineering Services** | 68,327 | 9.6 | 22.4 | 65,726 | 8.9 | 19.0 |
| Embedded Solutions | 7,198 | 1.0 | 2.4 | 10,550 | 1.4 | 3.1 |
| Product Design Engineering (mechanical electronics excluding software) | 25,350 | 3.6 | 8.3 | 29,996 | 4.0 | 8.7 |
| Industrial automation and enterprise asset management | 1,811 | 0.3 | 0.6 | 1,702 | 0.2 | 0.5 |
| Other Engineering services | 33,968 | 4.7 | 11.1 | 23,478 | 3.3 | 6.7 |
| **Total** | 304,499 | 42.9 | 100.0 | 344,233 | 46.4 | 100.0 |

*(Source: Reserve Bank of India Survey)*



**Organisation-wise Distribution of Software Services Exports from India during 2019-20 (US $ billion)**

■ Private Limited Company (67.3)  ■ Public Limited Company (60)
■ #Others (1.3)

1%
47%
52%
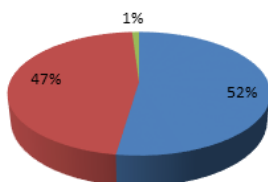
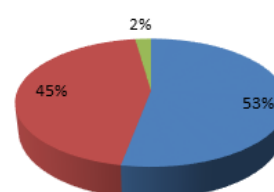**Organisation-wise Distribution of Software Services Exports from India during 2020-21 (US $ billion)**

■ Private Limited Company (70.8)  ■ Public Limited Company (59.9)
■ #Others (3)

2%
45%
53%

*# Others includes mostly LLPs/proprietor firms*

*(Data Source: Reserve Bank of India Survey)*

The US dollar was the principal invoicing currency for software exports with 72 per cent share; Euro and Pound sterling together accounted for 15.9 per cent.

| Software Services Exports - Currency Composition of Invoice | | | | | | |
|---|---|---|---|---|---|---|
| **Currency** | **2019-20** | | | **2020-21** | | |
| | **₹ crore** | **US $ billion*** | **Share (%)** | **₹ crore** | **US $ billion*** | **Share (%)** |
| United States Dollar (USD) | 652,730 | 92.1 | 71.6 | 714,730 | 96.3 | 72.0 |
| Euro (EUR) | 85,543 | 12.1 | 9.4 | 92,230 | 12.4 | 9.3 |
| British pound sterling (GBP) | 66,253 | 9.3 | 7.3 | 65,547 | 8.8 | 6.6 |
| Indian Rupee (INR) | 44,037 | 6.2 | 4.8 | 54,131 | 7.3 | 5.5 |
| Australian Dollar (AUD) | 23,685 | 3.3 | 2.6 | 26,364 | 3.6 | 2.7 |
| Other Currencies | 39,454 | 5.6 | 4.3 | 39,139 | 5.3 | 3.9 |
| Total | 911,702 | 128.6 | 100.0 | 992,141 | 133.7 | 100.0 |

*(Source: Reserve Bank of India Survey)*

The United States was the major destination for software exports accounting for 54.8 per cent; Europe had 30.1 per cent share, nearly half of which was in the UK.

| Software Services Exports – Major Destination | | | | | | |
|---|---|---|---|---|---|---|
| **Region** | **2019-20** | | | **2020-21** | | |
| | **₹ crore** | **US $ billion*** | **Share (%)** | **₹ crore** | **US $ billion*** | **Share (%)** |
| **USA & Canada** | 529,334 | 74.7 | 58.1 | 557,187 | 75.1 | 56.2 |
| **Europe** | 251,812 | 35.5 | 27.6 | 298,932 | 40.3 | 30.1 |
| • UK | 122,259 | 17.2 | 13.4 | 142,670 | 19.2 | 14.4 |
| **Asia** | 64,183 | 9.1 | 7.0 | 66,573 | 9.0 | 6.7 |
| • East Asia | 54,246 | 7.7 | 5.9 | 59,429 | 8.0 | 6.0 |
| • West Asia | 7,202 | 1.0 | 0.8 | 6,747 | 0.9 | 0.6 |
| • South Asia | 2,735 | 0.4 | 0.3 | 397 | 0.1 | 0.1 |
| **Australia & New Zealand** | 27,625 | 3.9 | 3.0 | 31,054 | 4.2 | 3.1 |
| **Other countries** | 38,748 | 5.4 | 4.3 | 38,395 | 5.1 | 3.9 |
| **Total** | 911,702 | 128.6 | 100.0 | 992,141 | 133.7 | 100.0 |

*(Source: Reserve Bank of India Survey)*

The share of off-site mode of exports of software services has increased gradually to 87.1 per cent in 2020-21 from 80.1 per cent five years ago.

| Software Services Exports – Type of Services | | | | | | |
|---|---|---|---|---|---|---|
| **Type of Services** | **2019-20** | | | **2020-21** | | |
| | **₹ crore** | **US $ Bln.*** | **Share (%)** | **₹ crore** | **US $ Bln.*** | **Share (%)** |
| On-site services | 138,120 | 19.5 | 15.1 | 128,289 | 17.3 | 12.9 |
| Off-site services | 773,582 | 109.1 | 84.9 | 863,852 | 116.4 | 87.1 |
| Total | 911,702 | 128.6 | 100.0 | 992,141 | 133.7 | 100.0 |

*(Source: Reserve Bank of India Survey)*

The share of cross-border supply in India's exports of software services increased to 78.4 per cent in 2020-21from 75.1 per cent in 2019-20, at the cost of the other three modes of delivery - consumption abroad, commercial presence, and presence of natural persons. Total exports of software services, including services delivered by foreign affiliates of Indian companies, recorded 2.1 per cent growth during 2020-21 and stood at US$ 148.3 billion.

| Mode-wise Exports of Software Services | | | | | | |
|---|---|---|---|---|---|---|
| **Type of Mode** | **2019-20** | | | **2020-21** | | |
| | **₹ crore** | **US $ Bln.*** | **Share (%)** | **₹ crore** | **US $ Bln.*** | **Share (%)** |
| Cross-border supply | 772,967 | 109.0 | 75.1 | 862,661 | 116.2 | 78.4 |
| Consumption abroad | 616 | 0.1 | 0.1 | 1,191 | 0.2 | 0.1 |
| Commercial presence | 117,662 | 16.6 | 11.4 | 108,031 | 14.6 | 9.8 |
| Presence of natural person | 138,120 | 19.5 | 13.4 | 128,289 | 17.3 | 11.7 |
| Total | 1,029,365 | 145.2 | 100.0 | 1,100,172 | 148.3 | 100.0 |

*(Source: Reserve Bank of India Survey)*

Software exports by foreign affiliates through commercial presence, where the USA is a major destination, stood at US$ 14.6 billion in 2020-21.

| Software Business by Foreign Affiliates of Indian Companies during 2020-21 (Amount in ₹ Crore) | | | |
|---|---|---|---|
| **Activity Distribution** | | | |
| **Activity** | **Locally** | **To India** | **Other Countries** |
| IT services | 12,641 | 548 | 3,104 |
| Software product development | 448 | 62 | 149 |
| BPO services | 14,756 | 515 | 1,533 |
| Engineering services | 2,534 | 19 | 186 |
| Other services | 77,652 | 31,342 | 13,927 |
| Total (₹ crore) | 108,031 | 32,486 | 18,899 |
| Total (US $ billion*) | 14.6 | 4.4 | 2.5 |

| Country Distribution | | | | |
|---|---|---|---|---|
| **Country** | **% Share in Total Software business by foreign affiliates** | **Software business by foreign affiliates** | | |
| | | **Locally** | **To India** | **Other Countries** |
| United State of America | 44.9 | 51,341 | 16,811 | 3,462 |
| United Kingdom | 15.2 | 9,039 | 14,208 | 999 |
| Canada | 4.9 | 7,070 | 11 | 808 |
| Netherlands | 4.3 | 5,530 | 22 | 1,329 |
| Germany | 4.2 | 5,981 | 139 | 507 |
| Singapore | 3.9 | 4,681 | 267 | 1,246 |
| Other Countries | 22.6 | 24,389 | 1,028 | 10,548 |
| Total | 100.0 | 108,031 | 32,486 | 18,899 |

[2] Exports of relatively small non-responding companies are estimates

*(Source: Reserve Bank of India Survey)*
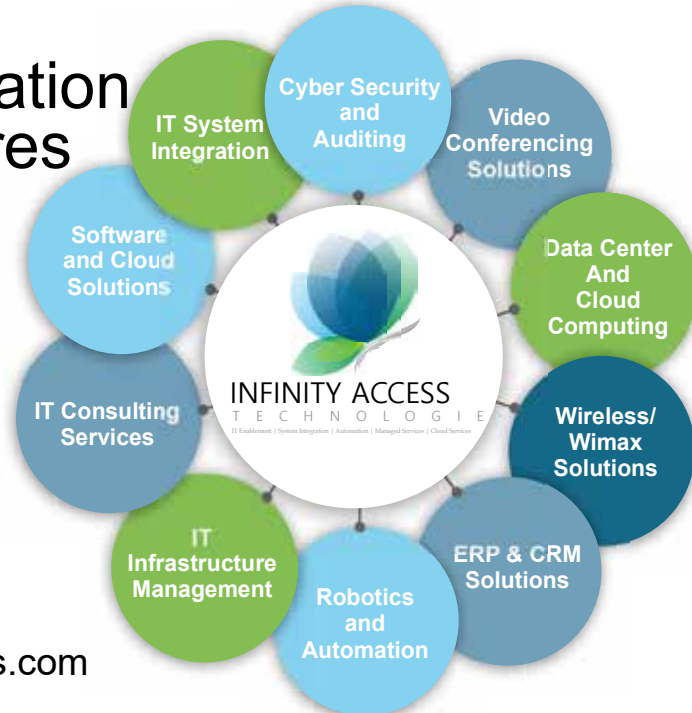
## EL-SOFTECH ADVERTISEMENT TARIFFS

**CAN INDIA JOIN THE SEMICONDUCTOR BANDWAGON?**

El-Softech is a monthly hybrid magazine covering the developments in the ICT sector. Focusing mainly on the policy tailwinds governing the ICT sector, the magazine presents the views, perceptions, and wish lists of the players across the board from MSME to large manufacturers and striving to build consensus in the policymaking.

El-Softech dwells on four verticals viz software, electronics hardware, telecom, and important technology which drive the developments in the three segments. El-Softech carries incisive articles, interviews, features, etc. in the magazine primarily meant for sharing of experiences, promoting good business practices, technology advances, global developments, and important analysis of policies and their impact.

| SPECIAL ADVERTISEMENT PACKAGES* | | | |
|---|---|---|---|
| Insertions | Advt. Position | Special Tariff | Rate per insertion * |
| Twelve | Back Cover | Rs.8,25,000/- | Rs.68,750/- |
| | Front Gatefold Cover | Rs.9,00,000/- | Rs.75,000/- |
| | Inside Pages | Rs.4,68,000/- | Rs.39,000/- |
| Six | Back Cover | Rs.4,87,500/- | Rs.81,250/- |
| | Front Gatefold Cover | Rs.5,85,000/- | Rs.97,500/- |
| | Inside Pages | Rs.2,73,000/- | Rs.45,500/- |
| Three | Back Cover | Rs.3,00,000/- | Rs.1,00,000/- |
| | Front Gatefold Cover | Rs.3,37,500/- | Rs.1,12500/- |
| | Inside Pages | Rs.1,56,000/- | Rs. 52,000/- |

| ADVT. POSITION TARIFF* | |
|---|---|
| Front Gatefold Cover | Rs. 1,50,000/- * |
| Back Cover | Rs. 1,25,000/- |
| Double Spread | Rs. 1,20,000/- |
| Inside Front Cover | Rs. 75,000/- |
| Inside Back Cover | Rs. 75,000/- |
| Opening Page | Rs. 75,000/- |
| Inside Pages | Rs. 65,000/- |
| Bottom Strips | Rs. 35,000/- |

**SINGLE PAGE ADVERTISMENT:** Actual Page Size: 8.26" (W) x 10.74" (H) Bleed: 5mm Bleed to be extended from all sides. All text matter should be at least 7-10mm inside from the cut mark (Dotted white line) **DOUBLE SPREAD:** Actual Page Size: 16.5" (W) x 10.74" (H) Bleed: 5mm Bleed to be extended from all sides. All text matter should be at least 7-10mm inside from the cut mark (Dotted white line).

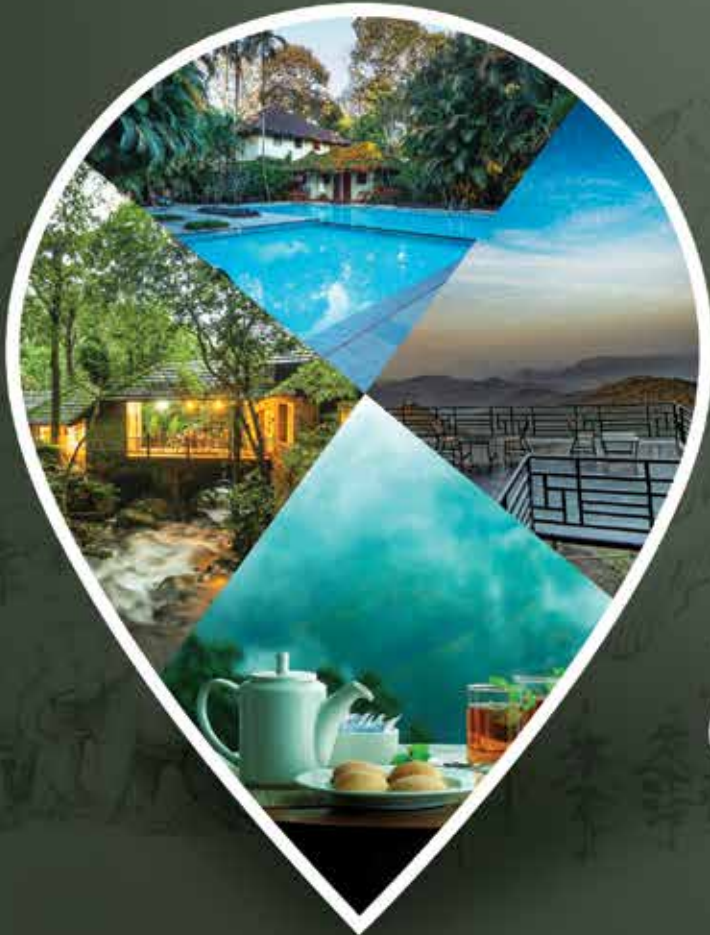*For further details, please contact P L Joseph, QUAD Investors Advisory LLP, Mob: +91 9818031802*
*\* US$ is Rs.76.26 as of 21-3-2022*

*\* Plus applicable taxes*

# ATLANTA
### Innovative IOT Solutions

## BASIC TO ADVANCE
# 2G & 4G
## GPS, WIFI, BLE & IOT DEVICES

**IN-HOUSE R&D**

**25+ COUNTRIES**

**STATE OF THE ART PRODUCTION FACILITY**

**2 MILLION + DEVICES**

**CERTIFICATIONS**
AIS-140, PTCRB, CE, FCC

## WHITE LABELING | CUSTOMIZED DEVICES | OEM & ODM SERVICES

# ATLANTA
### Innovative IOT Solutions

## ATLANTA SYSTEMS PVT. LTD.

**TRANSFORMING TECHNOLOGY**
**27 Years**
**SINCE - 1994**

📞 +91 9990333888 / +91-11-49039700(100 Lines)    ✉ enquiry@atlantasys.com    🌐 www.atlantasys.com

📍 M-135, 2nd Floor, Connaught Place, New Delhi - 110001

Telematics | IOT and Industrial IOT | Electric Vehicle Solutions | Smart Parking Solutions | Smart City Solutions