The Evolving Ecosystem in the World of Digital Data

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Abstract – **Data world is both fascinating and frightening at the same time like two sides of same coin. The article commencing with recall of Voice communication era traces the dawn of new Data communication era touted with various names such as Data revolution, Data economy, Data is new oil Data Deluge/ Tsunami and discusses some of new issues unimagined hitherto and unintended consequences as outcome of Data revolution.**

Keywords: Data revolution, Data privacy issues, Big data, Data Analytics, Digital divide

I. INTRODUCTION

THE early telecommunication had its origins commencing in form of data communication with invention of telegraphy symbols followed by voice communication as Telephony. Thereafter technology of voice based analog networks (PSTN) became predominant to fulfil basic human need to talk. Value-added services around voice centric network grew up didn't meet all needs.

However with the evolution and proliferation of computers and need for data communication applications networking grew up. Initially such needs of computers and devices were met through circuit switched voice centric networks prevailing at time with data riding voice network employing modems for digital to analog conversion and vice versa (*Data over voice*). Data traffic was a small fraction of voice. Voice communication tariff were based on distance and time duration of call. That's why STD/ISD calls were expensive.

Today as legacy networks retire from services we live in full blown era of modern data revolution packet based communication technology of IP based which has evolved so much that networks have become predominantly data centric more complex with data traffic exploding exponentially. Now voice has become one application amongst many others riding on data networks (*Voice over data*) with voice traffic being miniscule of data traffic. With increasing digitalisation and spread of high-capacity optical fibre led to cheaper calls despite distances. In 1998 Frances Cairncross, flagged book, *The Death of Distance*, by the imminent and impending end to astronomical long distance voice call rates.

Today on a full IP end-to-end modern network, a traditional voice call of one minute is equivalent to data packet of about 0.2 MB; (can reduce further with compression). Thus 1 MB data can effectively carry almost six minutes of calling.

As an example average monthly usage 400 minutes of voice translates into consumption of approximately 70 MB data per month on voice calls (say with high volume elasticity, this could be 100 MB a month). In a one GB data pack (1,024 MB), priced at Rs. 50, monthly voice calls (on 4G LTE) will account for Rs.5 a month. In marketing jargon, its free voice. Now free phone calls herald the death of traditional telephony what some people call "death" of voice.

II. INTERNET DATA SERVICES IN INDIA

Twenty three years after launch of public Internet data services by VSNL on August 15, 1995, number of ISPs have tremendously grown and there are 500 million Internet users in India. Lot of policy and regulatory changes have taken place leading to this fierce competition and affordable connectivity. Today Facebook, Whatsapp and Twitter rule the life of large number of masses irrespective of their societal status. Digital India transformative initiatives of Government have further propelled data consumption.

Over a period of time from overcoming initial challenge of standalone computerisation, digital learning and adoption in usage of Internet to abundant dependence and excessive use of internet has led to health problems/addiction of users calling for their de-addiction programmes also called digital Detox initiatives. We are now experiencing a data deluge never seen before: A digital data Tsunami.

Further new issues and concerns hitherto unimagined have cropped up due to such data deluge *viz*. Digital divide, Privacy concerns of users, data protection, Data ownership its utilisation monetisation, net neutrality and related legal issues. Further cyber security concerns for individuals as well as nations (cyber wars) have arisen. Such issues call for appropriate response at individual, societal level, apart from response at policy and regulation level, national, global level and humanity at large. Data world is both fascinating and frightening at the same time like two sides of same coin.

III. BROADBAND (BB) ECOSYSTEM WHEEL

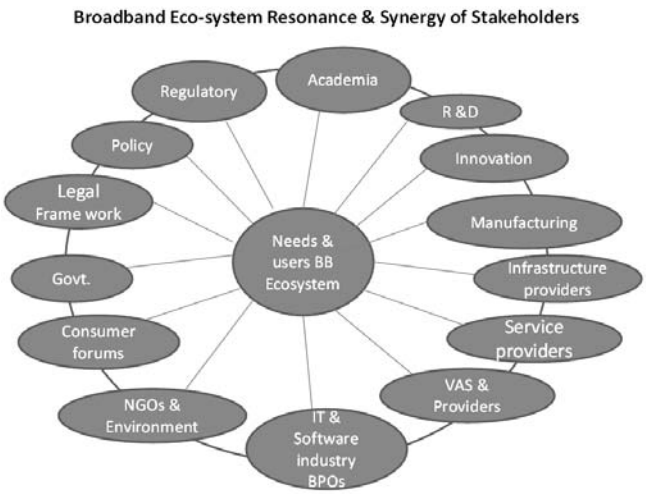

Figure 1. Broadband ecosystem.

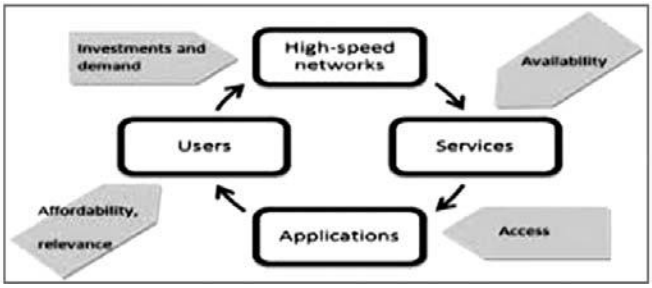

Figure 2. Data ecosystem.

Voice Ecosystem vs data ecosystem: While need to talk and voice-communication comes naturally even without any literacy but need for data communication (Text, data, images, video, multimedia) is cultivated by special efforts of society. Voice ecosystem is far less complex vis-a-vis Data Ecosystem in digital era.

Wheel in Figure 1 captures the evolution of broadband data ecosystem through the active joint participation, initiatives and resource investment of various stake holders with users at hub of wheel *viz*. their collective resonance keeps wheel momentum growing. Data consumption increases as users adopt BB services with availability and access to affordable with increasing network speed. Same thing is expressed in slightly simple way in Figure 2 wherein availability of BB infrastructure and affordable access to it springs up more and more users into positive spiral of usage.

Six major content usage categories : Digital services ecosystem constitutes: entertainment, information, utilities (including government services), business services, social sharing platforms, and communications. Ecosystem evolved so much that Internet has acquired a daily utility status like water and electricity. Ecosystem is further fuelled by enabling technologies like IoT, M2M communication GIS, Big data, Data Analytics, Artificial Intelligence.

Internet of things: Further apart from humans, new areas like Internet of things (IoT), sensor based M2M communications are emerging where machines (refrigerator and other home gadgets and industrial machines) and sensors CCTV etc communicate on internet and create large amount of data. Its finding applications in Smart cites and industry (touted as Industry 2.0).

Unfinished agenda and Digital divide (contrast Have and Have nots): Despite wide spread usage on line adoption of data applications using devices smart phones, tablets as part of our daily living in various sectors e-education, e -governance, e-commerce financial like banking and spread of social platforms sectors, there are parts of country significant proportion of our population are in category of 'have nots' who don't have access to online connectivity due to lack of availability or where available affordability and literacy are concerns.

There is contrasting situation. India is a diverse country. Availability of affordable ICTs is need of the hour.
Rising digital divide due to poor penetration of BB in some parts is a serious challenge in our country. In a world where daily life heavily dominated by online technology Broadband is double-edge sword that puts in advantageous position those who have it and can have crippling effect on those who don't have.

Therefore taking BB to rural areas assumes urgency where 69% our population lives. Affordable access to BB & ICTs has not become mass phenomena like success of voice mobile. Even 2G voice mobile still remains a unfinished agenda for our country as it has not reached several thousand uncovered villages in remote, hilly and difficult parts of some states including islands. Government is rightly addressing these gaps of digital divide through various schemes like Pan India *BharatNet* to *Gram Panchayats* (GPs),Comprehensive Telecom Development plan for NE states and more recent one submarine OFC and satellite scheme for Lakshdweep, A& N Islands through Universal Services obligation funds (USOF).

New Debate . "Data is new oil"- or not? : Data is new oil"- one comes across this hackneyed statement used very often on the cover of prominent publications to speeches by CEOs and world leaders. Data is to this century is what oil was to the last one: a driver of growth and change.

An interesting article dated 6 may 2017 on Regulating the internet giants in Economist - Titled The world's most valuable resource is no longer oil, but data, *The data economy demands a new approach antitrust rules* mentions following:

"A new commodity spawns a lucrative, fast-growing industry, prompting antitrust regulators to step in to restrain those who control its flow. A century ago, the resource in question was oil. Now similar concerns are being raised by the giants that deal in data, the oil of the digital era. These titans—Alphabet (Google's parent company), Amazon, Apple, Facebook and Microsoft—look unstoppable. They are the five most valuable listed firms in the world."

Their profits are surging: collectively net profit in first quarter of 2017 were over $25bn . Amazon captures half of all dollars spent online in America. Google and Facebook accounted for almost all the revenue growth in digital advertising in America last year.

The world's major societies are now wrestling with the enormous social power wielded by the internet's "platform companies". In Europe they speak of "GAFA": Google, Apple, Facebook and Amazon. Twitter, Uber and other aspirant companies hover just out of the main ring.

Such dominance has prompted many calls from some quarters for the tech giants to be broken up, as Standard Oil was in the early 20th century. Of late different counterview to this statement has started emerging:

"Data professionals see big data as oil (for its value) and develop expertise to extract it, process it and convert it into insights/solutions that cater not only to companies but everyone!" While data and oil can both generate value, the parallels stop there. Further there is differences between the two - There is a fixed amount of oil on our planet earth to be extracted. Increasing use of oil has potential to deplete limited resources whereas increasing digital consumption leads to it ever expanding growth of data. Unlike oil, ever increasing amounts of data are being generated at a pace that's hard to imagine: in the next two years, 40 zettabytes (40 followed by 21 zeros) of data will be created. It's roughly equivalent to 4 million years of HD video or five billion Libraries. IDC, a market-research firm, predicts that the "digital universe" (the data created and copied every year) will reach 180 zettabytes (180 followed by 21 zeros) in 2025.

Who generates this new oil: From hailing Taxi through OLA/ Uber, to ordering grocery online, paying utility bills, Payment wallets, or capturing a picture of the whiteboard after a strategic discussion, and sharing it with the team on WhatsApp, or social interaction on Face book, Twitter or filing online taxes or use of Government services - all our day-to-day online actions contribute to the exponential growth in the volume of data generated by us each day.

*Where does New Oil reside and who monetises it?***:** It gets collected from users of digital services into servers of Data centres of Digital service providers. The data sources include mobile, internet and sensors machines, cars and many other things.

Data is collected by various businesses and agencies as a by-product of the user's interactions with them. This data is then retained by the business, and used to its advantage. At the same time, various government agencies also benefit greatly from the generation of vast amount of data, which acts as an enabler for more efficient delivery of services and prevention and handling of crimes.

Overwhelmed by this enormous volume of data at their disposal, businesses that were previously focused only on capturing and acquiring data about their consumers are today faced with a new challenge of making sense of data. Not all data is relevant. Moreover, data is complex and to derive any useful insight from it, one requires advanced analytics capabilities. Amidst all this complexity stands today's marketer – set out to conquer the world. Marketing Literally Lives on Data.

We are all living our lives within the geographical boundaries of India and within the virtual boundaries of Facebook, Twitter, Instagram, Google, Airbnb, Uber, and hundreds of other mobile apps. Our lives today are as much about our physical being as they are about our data. The only difference is that while we are conscious of our physical lives, we are seldom aware of how our data is being used by its custodians, which may not necessarily be a government but could very well be a multinational company based in a developed country.

IV. BIG DATA - NEW OIL

This voluminous data generated and captured in Data centres of service providers is updated at high velocity by batch and streaming platforms. This data is also varied along structured and unstructured types. This volume, velocity and variety of data led to the term 'Big data'. Big data has been premised to contain untapped knowledge, its exploration and exploitation is termed 'big data analytics'. Techniques used for big data are machine learning, Data Mining, Neural Network and Deep Learning. There are Big data architecture offerings from Microsoft, IBM and National Institute of Standards and Technology. Big data potentials can transform economies and reduce running cost of institutions.

Big Data is AI's Food - Big Data key to AI's Success: Its data what trains Artificial Intelligence (AI) to become increasingly powerful and what AI systems are ultimately applied to in order to generate real-world insights. The more data AI systems can tap, the greater their intelligence and disruptive potential. Irrespective of the type of AI being used, however, every application begins with large amounts of training data.

V. DATA PROTECTION-PRIVACY MATTERS

Data protection is very new emerging concern to which whole

world is awakening slowly. In digital world, we all enjoy free services like Whatsapp, Facebook, Twitter and many more free apps and grant them permission to access our phones, computer devices without either bothering to read by simple click or even we read we don't understand the implications of access permission granted to these apps.

With the news that Cambridge Analytica swiped the personal data of more than 50 million Americans from Facebook for use in making electoral propaganda targeted by individual 'psychographic' personality typing, the real cost of our worldwide infatuation with 'convenient' digital services is now coming into view. Facebook should pay a heavy price over revelations that it became an accessory for Cambridge Analytica (CA) to game US presidential elections and the Brexit referendum. A Cambridge University researcher contracted by CA allegedly lured Facebook users to take a personality quiz app which worked in the background to collect personal data of quiz takers and their friends, including status updates and Facebook 'likes'. CA allegedly created a database of 50-60 million Americans – roughly a quarter of the voting population – that included everything known about their personal traits and political persuasions. It then launched information warfare targeting these people through fake news, ads and blogs.

This is a scary case of privacy violation that denies an individual the right to informed consent, morphing into disruption or subversion – call it what you may – of society, politics and elections. Electioneering targeting specific voter groups and even individuals has existed for some time but it has rarely assumed such underhand and insidious proportions. While Facebook CEO, Mark Zuckerberg has called it a "breach of trust" given that mass data collection was restricted to academic use, the company cannot attempt to play victim.

The root of the problem is the business model of these convenient services. The social media companies sell people to advertisers. The value in digital advertising lies in collecting information about peoples' behaviour, on a scale previously unimagined in the history of humankind. Gram for gram, the smartphone is the densest collection of sensors ever assembled: it's a spy satellite in your pocket, aimed at you.

Globally trillions of times a day, billions of people interact with their smart phones, generating immense volumes of data about what they do, what they 'like', and what they want – all of which falls into the big data mines of the social media companies. What we get in return are simple digital services: messaging, chat, calendaring, micro-blogging, photo posting, videos.

Supreme court judgement on Privacy: The Supreme Court in its judgment on 24 August 2017 stated that the "right to privacy is protected as an intrinsic part of the right to life and personal liberty under Article 21 of the Constitution and as a part of the freedoms guaranteed by Part III of the Constitution". Further, it went on to recognize informational privacy as a facet of the right to privacy and directed the Union Government to put in place a robust data protection regime to ensure protection against the dangers posed to an individual's privacy by state and non-state actors in the information age.

Legal enviroment: Data Protection may be broadly defined as the legal control over access to and use of data stored in the digital format. It may also be considered as a process of safeguarding digital information from corruption and or loss. Data Protection refers to the set of privacy laws, policies and procedures that aim to minimise intrusion into one's privacy caused by the collection, storage and dissemination of personal data. Personal data generally refers to the information or data which relate to a person who can be identified from that information or data whether collected by any government or any private organization or an agency.

India presently does not have any express legislation governing data protection or privacy. However, the relevant laws in India dealing with data protection are the Information Technology Act, 2000 and the (Indian) Contract Act, 1872.

Codified law on the subject of data protection is likely to be introduced in India in the near future as can be seen in paragraph on Recent developments in our country. There are a number of applicable legislation and policies that contain provisions with a bearing on the right to privacy and data security in the telecom sector in India. These include:

(*a*) IT Act, 2000: Sec 43A, Sec 69, Sec 69B, Sec 72A, Sec 67C, and Sec 79.
(*b*) IT Rules
(*c*) Indian Telegraph Act, 1885: Sec 5 and Sec 26,
(*d*) Indian Telegraph Rule 419A.
(*e*) Unified License condition 37, 38, 39 and 40.
(*f*) Guidelines, circulars, direction, and notifications issued by DoT and TRAI.

Under Section 70 of the IT Act, 2000, Telecom Sector has been designated as one of the most important Critical Information Infrastructure by National Critical Information Infrastructure Protection Centre (NCIIPC) as incapacitation or destruction of this sector would result in debilitating impact on the national security, governance, economy and social well-being of the nation.

As the economy increasingly moves to the digital/online world, it is all the more important that users are appropriately protected from all entities involved in providing Digital services in the ecosystem that may seek to take advantage of their gate-keeping power. A failure to adequately protect users from the very real possibility of harm (caused by the loss of privacy) may result

in restricting the growth of the entire digital economy which includes telecommunication services also.

The Digital Eco-system comprises of multiple entities like Devices (Mobiles, Laptops, Tablets, PCs etc), Telecom Service Providers (TSPs),Communication Networks (consisting of Switches, Routers, Base Trans-Receiver Stations etc), Browsers, Operating Systems, Applications, Over The Top (OTT) service providers, M2M devices etc. Most of these entities have capability of gate-keeping function, and an asymmetric advantage of accessing, collecting, and collating users' data. Thereby these entities could infringe upon the privacy of users. It is therefore important to ensure that the data is collected, stored, and processed in regulated manner with the informed and explicit consent of users.

Balance needed: While recognizing the vast Economic business efficiency potential of Big data and data analytics, it is also vital to assess whether the data protection rights of individuals are being adequately protected in this changing environment. A fine balance is needed between two conflicting interests. Data protection framework is expected to factor these.

VI. RECENT DEVELOPMENTS ON LEGAL ASPECTS OF DATA PROTECTION

Following are very recent developments in arena of Legal aspects of Data protection:

- **31 July 2017**- Constitution of a Committee of Experts by Ministry of Electronics & Information Technology (Meity) to deliberate on a Data protection framework for India headed by Justice B N Srikrishna, Former Judge Supreme Court of India
- **09 August 2017**- Release of TRAI consultation paper on Privacy, Security and Ownership of the Data in the Telecom Sector
- **24 August 2017**- Declaration by Supreme Court of India privacy constitutes an intrinsic part of the right to life and personal liberty under Article 21 of constitution of India. Informational privacy is a facet of the right to privacy. Directed Union Government to examine and put into place a robust regime for data protection framework.
- **27 Nov 2017**- Release of a white paper on a Data Protection Framework for India by the Committee of Experts & public comments by stakeholders.
- **16 July 2018**- TRAI recommendations on Privacy, Security and Ownership of the Data in the Telecom Sector.
- **27 July 2018**- A report submitted by a panel headed by Justice BN Srikrishna on data protection framework proposed a draft on Personal Data Protection Bill that could form the basis of India's first data privacy law.
- **14th August 2018**- Meity seeks, comments of General Public on Draft Personal Data Protection Bill.

Global developments: **25 May 2018** - General Data Protection Regulation (GDPR) comes into force in EU countries.

The General Data Protection Regulation (GDPR) is a legal framework that sets guidelines for the collection and processing of personal information of individuals within the European Union (EU). The GDPR sets out the principles for data management and the rights of the individual, while also imposing fines that can be revenue based. The General Data Protection Regulation covers all companies that deal with the data of EU citizens, so it is a critical regulation for corporate compliance officers at banks, insurers, and other financial companies. GDPR came into effect across the EU on May 25, 2018.

Three key reasons justify the need for government intervention in this arena to prevent harm to consumers.

First, there is often an '*information asymmetry'* between the digital consumer and the data oil user/exploiter (Service providing entities) on account of the under-estimation by consumers about the value of their personal data and ignorance about the scale and use of the data being collected and its use. The ability of data collectors to unilaterally change their privacy policies also contributes to this asymmetry.

Second, is the 'problem of *bounded rationality'*, which often leads consumers to underestimate the long term consequences of their actions while consenting to share their personal information in the course of availing specific products or services.

Third is the problem of a *'data monopoly'*. Since the service providers, through the provision of service generate and hold the data, it gives them an advantage, which they can use to get into adjacencies (and thus extending their monopoly). This results in harm to the market. The government or its authorized agency may take steps to make this data portable, under the control of the user, thus enabling the creation of newer services. The technical standards for this purpose may have to be defined in this case.

Present plight of end users & need to Empower them: The subject of data ownership, privacy, and security is multi-dimensional and complex, and hence data consumers must be empowered to navigate safely and securely through the maze of the digital eco-system.

The epicentre of the entire gamut of Data Ownership, Privacy, and Security revolves around the data consumers (Individuals or Machines). The end user may be more often at a position of low awareness as well as lower bargaining powers when compared to the various entities of the digital ecosystem. This asymmetry is exploited on many occasions by the entities to

their advantage. The entities in the digital ecosystem may use personal data of individuals to improve their services; they may even monetize this data by sharing it with third parties. Users often get plagued with bursts of targeted marketing, social media engineering strategies etc not knowing that it was their own data submitted in the past which has enabled such campaigns/strategies. In the absence of necessary data protection framework, the end user does not have any recourse to deal with the exploitation by the entities in the digital ecosystem. Very many times, the user is forced to part with his/her personal data with very little information about the scenarios/ uses that his/her personal data would be put to. He has no facilities to access, view, amend, or delete his data submitted. In case of any data breach, he may not even be informed about it till it gets reported.

White paper on data protection legal frame work for India: The Justice Srikrishna Committee released a White Paper (WP) on Data Protection in India on 27/11/2017 for formulation of daft bill for law on data protection available on Meity website www.meity.gov.in.

Meity had called for public comments on WP after which draft bill for law on Data protection will be prepared by committee of experts. As per WP overall key principles on which the proposed data protection law will be framed include:

- A technology agnostic law
- Holistic application of the law to the public and private sector
- Informed consent
- Minimisation of data processing (collection, use and disclosure)
- Accountability of the data controller
- Structured enforcement through a high powered statutory authority
- Deterrent penalties.

Further on 27 July 2018, The committee headed by Justice BN Srikrishna on data protection framework submitted a draft on Personal Data Protection Bill 2018 to Government and that would form the basis of India's first data privacy law.

Few salient points in Draft bill 2018 on Data protection are listed below:

Grounds for Processing Personal Data: The legal ground for processing under the bill include: (*a*) consent, (*b*) functions of state, (*c*) compliance with law or order of court/tribunal, (*d*) for prompt action in case of emergencies, (*e*) purposes related to employment and (*f*) reasonable purposes of the data fiduciary. [Chapter III].

Personal and Sensitive Personal Data of Children: Processing of personal and sensitive personal of children by data fiduciaries should be done in a manner that protects and advances the rights and best interests of the child. Data fiduciaries are required to establish mechanisms for age verification and parental consent.

Data Principal Rights: The bill provides the data principal with the (*a*) right to confirmation and access, (*b*) correction, (*c*) data portability and (*d*) right to be forgotten. [Section 24, Section 25, Section 26, Section 27 of the Bill].

Data Protection Authority of India: The bill establishes an independent authority empowered to oversee the enforcement of the bill. The adjudication process will be looked after by the adjudication wing of the Authority. [Chapter X. Section 60].

Penalties, Remedies and Offences: The bill lays down penalties under chapter XI of the bill, ranging from five crore rupees or two per cent of total worldwide turnover to fifteen crore rupees or 4% of the total worldwide turnover. The Data principle under section 75 has the remedy to claim compensation for harm suffered as a result of any violation of any provision in the bill from the data fiduciary or the data processors. The bill inscribes certain offences under chapter XIII of the bill, which are punishable with imprisonment.

Transition Provisions: Section 97 of the bill provides a 'structured timeline' for enforcement from the date enacted of act. The enforcement duration is 18 months from the date of enactment, other than section 40, the duration of enforcement for this provision would be notified by the central government.

VII. CONCLUSION

With the proliferation of Broadband internet more and more users are reaping benefits of variety of Digital services which have become part of their daily life. They depend on it so much that internet has acquired relevance of utility like water and electricity. On the other hand, there is unprivileged section of have nots predominantly in rural, remote and difficult areas that do not have internet available to them and therefore put to position of disadvantage for no fault of them.

Also for those who enjoy the online benefits of digital revolution are faced with new concerns *viz*. data ownership, data protection, privacy and security. In effect, the subject of data ownership, privacy, and security is multi-dimensional and complex, and hence data consumers must be empowered to navigate safely and securely through the maze of the digital eco-system. Data world is both fascinating and frightening at the same time like two sides of same coin.

While EU countries addressed such concerns by enacting comprehensive law called GDPR that came into effect w e f 25 May 2018, Government of India initiated one step in this direction by formulation of draft bill on data protection law

by committee chaired by Justice Krishna to be deliberated in Parliament. One hopes that it will factor diverse nature of our multilingual country, lack of literacy and come out with meaningful law that will shape destiny of our country.

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