



DIGITAL TRANSFORMATION - INTERNET OF BEHAVIOUR FOR FRAMING BUSINESS STRATEGIES AND VALUE CREATION



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Introduction

The manner of living daily life by mankind is progressively being influenced and impacted by digital devices and applications across geographical regions. In 1960s came the systems for interconnected network of computing devices. Powered by telecom broadband such networks started transcending sovereign boundaries. In no time Internet became a household name. Since then, systems for communication, broadcasting written and illustrated information, as well as ways means for exploring the cyberspace are continuing to be revolutionised by internet. P2P email communication crossing thousands of miles became

a matter of seconds after the email system was invented in Massachusetts Institute of Technology. The revolution started gaining accelerated impetus when personal computers started donning every individual's desk.

Till around 2007 none could think that human life will so radically be changed by smart phones. Steve Ballmer, the CEO of Apple, was also proved wrong in demand projection for smart phones and share of Apple in that. Rest is history, but unending and would continue to remain open for thousands of more footprints of innovative digital transformations. Machinery and electronic devices are more and more being digitally programmed, integrated through smart devices, and linked to digital platforms. Accelerated use of mobile applications and internet of things (IoTs) for multivarious purposes/chores of life are digitally influencing peoples' behaviour, impacting lifestyle with both positive and negative effects. The author has covered many aspects of all these in his earlier twenty-one articles¹ under this monthly Column. The last one being treasure and wealth from digital dusts and smart dusts.

Scientists, engineers, and business strategists did not stop at 'innovating' and marketing digital devices making people to buy. They also attained technical supremacies for making people to use, email, brows, conduct financial and eCommerce transactions and avail of aggregators' services like that of Ola and Swiggy. They started enquiring into the '8Ws&H' of all such usages. Their objectives are to understand and appreciate Who, What, When, Which, Why, Where, Whom, Whether and How of utilising such smart computing devices

Image Source: <https://www.squareoneresources.com/blog/the-internet-of-behaviours-job-an-introduction-256052/>

by various users,

Their purpose is to figure out whether any pattern and trend have emerged out of the footprints and digital dusts² they have left on the storage space, aka cloud-based data warehouses. Data analysts, supported by clinical psychologists, also try to appreciate whether emotional intelligence of users drives usage and has any role to play behind such trend and pattern. Scientists have christened these exercises as the study of 'Internet of Behaviour' or IoB by applications of digital technologies.

Objective

This article will try to find motives behind digital scientists and data analysts studying psychosomatic and psycho-social features in the behaviour of internet users with the help of digital tools like Big Data Analytics, Artificial Intelligence and Machine Learning. This will be done keeping in view how results from such studies can be used/exploited for further ensuring effectiveness and financial success of digital transformation of operations and business management. The objective is to appreciate how such IoB is emerging as important inputs for framing effective business strategies and designing solutions for pervasive value creation. Viewpoints of research scholars will be considered to understand whether addiction for internet can be equated with IoB.

This paper will also briefly state how IoB as a technology can expose business entities to various types of risks which may not always be possible to be predicted and pre-empted despite adopting best of proactive risk management measures. This would lead to the secondary objective of reflecting on the spookier side of IoB where cyber criminals are hacking powerful databases of business entities for publishing in dark web and extracting illegitimate financial gains.

Behaviour, IOB and Emotional Intelligence

Behaviour and Digital Transformation

Oxford Dictionary has defined the word Behaviour or Behavior as "The way in which one acts or conducts oneself, especially towards others." Merriam Webster Dictionary has provided the following literal expansions of the word behaviour:

- ⊙ "Anything that an organism does involving action and response to stimulation."
- ⊙ "The response of an individual, group, or species to its environment."

In the context of this article the above two expansions are important since while using internet for browsing one does not always behave in a particular or pre-decided manner. This is because the browsing tools provided by Google, Yahoo, Firefox, etc. throw alongside the searched object/link many other information, links, clues, alluring/stimulating options, and suggestions with or without relevance to context of the user. All these drives some internet users, popularly christened as netizens, to either drift away from her/his original objective of browsing, and/or end up visiting other or more websites and objects which may or may not be relevant for what she/he was originally looking for. At times such additional inputs from the browser prove to be helpful.

Readers might have observed from such throw-ups by the browsers that as if the browsing tool has read their or have taken cues from the earlier searches performed for throwing up additional inputs. This has been established by the author in his immediate previous article on digital dusts and smart dusts². It is, therefore, evident that those browsing tools are supported by backend cognitive tools which analyses the browsing behaviour of users to figure out what all can influence, allure, stimulate and appeal to them.

Such kind of experiences, that the web browser is trying to drive, occurs quite frequently when one browses for shopping through internet from of eCommerce players or availing of services like of airlines, digital wallets, etc. There can be many more similar types of instances readers might have experienced. Many a times an internet user gets a sense of her/his own heuristic(s) for internet browsing. Parents and guardians might have observed some not so desirable patterns of browsing by their children and wards. Another simple example is current versions of Apple phones providing on every Sunday morning an App-wise summary analysis of the user's time spent in a week. It does mean at backend a software works for storing and analysing the user's habit. Extending this logic, any eCommerce player can also use cognitive tools for studying the product reviewing and shopping behaviour of netizens who visit their sites

IOB and Digital Transformation

Mining of literature suggests that as per popular belief IoB was first ideated by Dr. Gote Nyman, Professor of Psychology of the University of Helsinki in 2012. Although Data analysis for business management purposes started soon after introduction of ERP, drawing out behavioural patterns of customers from data was ideated by Prof. Nyman³. He described the possibility of acquiring voluminous data revealing stakeholders' use and behaviour as they interact with the IoT. He is of the view that, "Computationally, it is almost impossible to detect and reveal individually relevant behaviors and their personal meaningsIn order to manage this computational challenge ingenious data mining systems are created for intelligent business, marketing, political, and other purposes in order to 'dig out' the underlying behaviors like purchasing patterns, voting, preferences, eating, driving and numerous other habits.



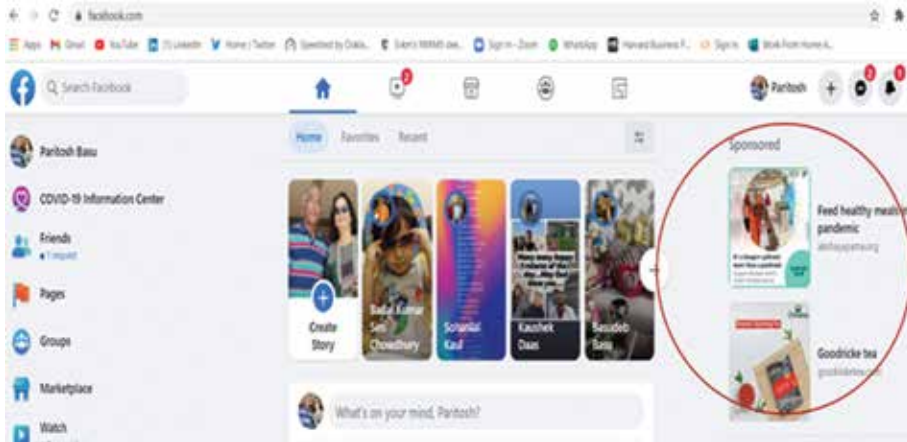
Source: <https://gbksoft.com/blog/internet-of-behaviors/#:~:text=The%20collection%20of%20usage%20data,who%20can%20benefit%20from%20it>

Therefore, the technical definition of Internet of Behaviours⁴ is “*The collection and use of data to drive behaviours is called the Internet of Behavior (IoB). As organizations improve not only the amount of data they capture, but also how they combine data from different sources and use that data, the IoB will continue to affect how organizations interact with people.*” According to Gartner IoB would be one of nine top technological trends of 2021. Its official position is *The Internet of Behavior collects the digital dust of people’s lives from a variety of sources, and public or private organizations can use this information to influence behavior.*”

Digital scientists have made IoB as a technology capable of combining and processing data drawn from many sources including of customers, general citizens, etc. originally collected by government agencies, social media operators, etc. for many purposes including tracking of location. They use advanced cognitive tools for processing this data which can reveal individual behaviour of each user and her/his need. One should not be surprised if it ultimately comes out that various government planning and controlling authorities have used data from various sources for appreciating citizens behaviours and service needs before deciding and implementing strategies

for management of Covid-19 Pandemic.

Readers might have observed that selective product and service-related advertisements pop up on their smartphone or laptop screen alongside the content of the social media they are browsing through. Such advertisements vary according to the time of the day. Geographic region, features of the season, celebration period of the year, etc. At times, those advertised products are found to be relevant and befitting the mood, need and choice of the user. The present author has seen such advertisements while using Facebook and LinkedIn.



Source: Author’s Facebook screen around mid-day hours while writing this article.

On the right hand side of the above screenshot two sponsored advertisements have been circled in. One of those is from www.akshaypatra.org advising for feeding healthy meal in this pandemic, and the second one is from Goodricke for Darjeeling Tea. These pop ups for advertisement change at intervals of about five minutes. These suo moto pop ups are unique examples of digital transformation of business functions by application of IoB technology.

This technology helps business entities achieving success by personalisation of operations and tracking behaviour of customers. Thus, benefits of IoB from the perspective of a business entity can be summarised in the following graphic. It is a no brainer to figure out from the following graphic that one of the capabilities of IoB as a technology is mixing and matching of data, collected from different sources which are generated by different IoTs, and applications. Objective is to conduct psychosomatic analyses to assess behaviour of netizens.

Benefits of Internet of Behaviour



Source: <https://gbksoft.com/blog/internet-of-behaviors/#:~:text=The%20collection%20of%20usage%20data,who%20can%20benefit%20from%20it>

Emotional Intelligence and Digital Transformation

Emotional intelligence also plays an important role in pattern formations for IoB. Oxford Dictionary define emotional intelligence as “*the capacity to be aware of, control, and express one’s emotions, and to handle interpersonal relationships judiciously and empathetically. emotional intelligence is the key to both personal and professional success.*” One needs to know what emotion means to better appreciate this definition. Again, the same Dictionary defines the noun emotion as “*a strong feeling deriving from one’s circumstances, mood, or relationships with others.*”

The author is inclined to accept the above definitions in the context of this article, particularly keeping in view that while using internet, the context of interpersonal relationship comes into play. Albeit there is no interaction with a human being, the browsing tool itself behaves like an artificially intelligent person and interacts with the netizen. Hence, there is a need for the netizen to know about his capacity to control and discreetly express emotions while instructing the browsing tool to search and present the objects she/he is looking for without being allured by what extra items the browser throws up.

Internet based social media platforms like Facebook and Twitter in all probability deploy AI and ML based tools. Analysis performed by those tools can help identification of emotions and thus emotional intelligence embedded in narratives and media posted by users. This ultimately helps them to establish the opinion of the user on the issues being dealt in those narratives. Based on such diagnostic analyses they decide to initiate actions about the account if that crosses the peripheries defined in their governing principles and terms of use by the netizen in their platform. Whether those conclusions are right or wrong is not the point in question. The author wants to convey that such a process can be termed as digital transformation of governance, risk identification and mitigation management. This is another example of using IoB for business risk management.

Those who have browsed the website of ‘Ferns N Petals’ for sending flowers, gifts, etc. to greet and wish friends and loved ones, and commemorate special occasions, might have observed that the website continuously throwing advice and offers. In most cases those are for combos like flowers with cakes, chocolates, toys, etc. A visitor who just wanted to send a flower bouquet ends up being a bit emotionally exploited and ends up sending some other item along with flowers. So is most likely the experience for many others while visiting eCommece websites for other goods and services. This is another example of using IoB for meeting business objectives.

Ethical Dimension of IoB

Users do not have any reason to believe that IoB as a technology will always be used in an ethical manner. David Cearley⁴, Distinguished VP Analyst of Gartner has reminded all that, “*IOB is about using data to change behaviour. IOB has ethical and societal implications depending on the goals and outcomes of individual uses.*” Business organisations may not always use the netizens’ data, extracted from their own databases, for the same business. For example, Amazon used the customers’ data gathered from eCommece business while campaigning for launch and driving users to subscribe their OTT business Amazon Prime. However, they might have not solicited customers’ permission to do so. However, more research is required to establish this quoted example.

IoB as a technology can be powered by data from multiple sources without the knowledge of web users. Business entities and even government agencies can gather netizens’ internet use related data from multiple sources. They can purposefully mix and match those data by collation and consolidation and then analyse for drawing inferences. Their ultimate objective is to draw cues for influencing and driving netizens’ behaviour while they use browsing tools for visting website of any commercial organisation. One should not be surprised if it is established that IoBs are used by sovereign nations for fighting cyberwarfare. More on all these needs to be examined through further empirical research of business practices

Internet Addiction and IoB

Albeit the objective of this article is not to deal with internet addiction, it will be useful to briefly cover addiction and differentiate this phenomenon from what IoB as a technology wants to study and achieve. The author believes that there is no scope for equating IoB in letter and spirit with internet addiction. People centricity is at the core of IoB but not people’s addiction. The later occurs when a user cannot control emotional intelligence and get swayed by one after the other pop ups thrown by the browsing tool. Consequentially in a short course of time, she/he loses power of self-control and cannot resist from visiting those websites forgetting what the priority for life is in her/his ‘To do list’.

Martha Shaw and Donald W. Black has opined in their seminal research work⁵ that “*Internet addiction is characterized by excessive or poorly controlled preoccupations, urges or behaviours regarding computer use and internet access that lead to impairment or distress. associated with dimensionally measured depression and indicators of social isolation. Psychiatric co-morbidity is common, particularly mood, anxiety, impulse control and substance use disorders. Aetiology is unknown, but probably involves psychological, neurobiological and cultural factors.*”

Several research works⁶ have corroborated that emotional intelligence and IoB are inversely associated. “*Researchers have proved that individuals with high emotional intelligence levels are less likely to be addicted to the Internet (Beranuy, Oberst, Carbonell, & Chamarro, 2009; Hamissi, Babaie, Hosseini, & Babaie, 2013; Parker, Taylor, Eastabrook, Schell, & Wood, 2008). Emotional intelligence is also related to one’s personality, social relationships, and life satisfaction.*”

Readers would also agree that it would be far too stretching of imagination to equate IoB with internet addiction. Moreover, such addictions mostly occur for certain categories of browsing like for specific type of posts in social media, pornographic contents, etc. Netizens in general is not expected to suffer from psychological comorbidity yet their browsing behaviour can reveal certain interesting pattern to make meaning out of and facilitate the process for business strategy formulation. For example, mass buying behaviour and product browsing/ reviewing data can prompt an entity about what quantum of demand for a type of product is likely to emerge and what level of inventory to be built up.

IoB and Business Risks

It may not be right to assume that IoB as a technology is devoid of any risks. The very nature of the technology dealing with huge volume of data drawn from different sources exposes it to the inherent risks of breaching data privacy, security, and

safety related risks. Moreover, such data remains vulnerable even if kept secured at the buyer entity's end if the original source is weak in securing from hacking risks. These risks have more been elucidated in the following section.

The next set of risks may arise from improper selection of data masses and inappropriate mixing and matching of data. Again, inadequate, or wrong application of tools for analytics of unstructured data may end up providing wrong results leading to erroneous inferences and strategy formulations. Wrong strategy when converted to actions may boomerang with unwanted results and financial losses. The next group of avoidable risks is depending on old/irrelevant data and inferences drawn there from while taking decisions for future.

There can be exposures to legal and governance related risks. Business entities before sourcing data from different sources under a commercial arrangement may not always be in a position to examine the terms and conditions of those entities agreed with users/visitors of their websites, the data in respect of whom have been obtained. This can ultimately lead the former towards the risks of legal litigations. Introduction of governance policies and SOPs related to data management, processing and information security is one of the most critical imperatives for every organisation using IoB. This should be done simultaneously with introduction of Audit 4.0⁷ befitting the requirements for ensuring risk-free success from digital transformation in this Industry 4.0 era.

Risk Exposures to Cybercrime and DarkWeb

Footprints and browsing history over a long period of time can indicate the behavioural pattern and trend of browsing a particular website, group of websites by one or group of netizens. Even the choice of eCommerce player for buying monthly rations, say out of Amazon, Flipkart, Natur's Basket, etc., by itself is also a matter of IoB. Analyses of these can indicate customers' preference which can further be analysed in terms of geographical region, total value of contents in each shopping cart at exit point, etc.

Research study of this author indicates that IoB is a leeway from IoT because the later are being used for gathering more data for specific purposes. Digital technologies, aided by behavioural psychologists, are more and more focussing on browsing behaviour and choices of netizens on various matters. This is because business entities are more and more driving them to create opportunities for sales, monitoring developments and behaviour of customers. All these are haunting grounds for cybercriminals to spawn malware for not only industrial/commercial espionage but also extraction of ransoms and usage of extracted out data with ulterior motives.

Huge volume of such data stored in data warehouses either in private or public cloud are the target zones for cybercriminals. The recent case in point is the reported data breach of forty-five lakh passengers of Air India⁸ related to name, date of birth, ticket information and credit card. All these were hacked out by an attack on the data base of SITA, the Geneva based passenger system operator. In addition to loss of privacy, individual customers may be exposed to huge financial risks.

Another most recent example is leaked data in respect of customers for eighteen core orders of popular pizza brand Dominos India which are available on search engines created by hackers in darkweb.⁹ Such leaked data contains data related to phone numbers, email address, credit card and payment details.

In a research report on relationship between IoB and

cybercrime Gartner's top strategic prediction¹⁰ for 2020 and beyond was that "By 2023, individual activities will be tracked digitally by IoB to influence benefit and service eligibility for 40% of people worldwide". This means people are highly exposed to cybercrime as the integration of behaviour data can give cybercriminals access to sensitive data that reveals consumer behaviour patterns."

Web browser providers since then have substantially augmented design parameters related to security features to provide more privacy and safety. Readers will recall that all security tools like that of McAfee, Norton, etc. also provide on-line real-time testing of each website being browsed and block if the tool detects any threatening feature.

Conclusion

Internet of Behaviour is one of the most sophisticated technological developments in Industry 4.0 era. It can provide enormous benefits to business entities and government agencies for service delivery. The author wants to reiterate that technologies do not have emotion, ethics, morality, and spirit for equitable judgement. However, technologists have all these human qualities and humanity should be of the first and foremost priority. It is, therefore, a critical imperative for all digital scientists and technologists to design solutions after consciously being aware of and driven by all those qualities. Their utmost efforts should be to ensure that common users of internet are not exposed to any type risks and exploited for meeting profiteering motives of business organisations.

Criminals and crimes were there, are there and will continue to be there as long as human civilisation would survive. They will continue to look for and exploit vulnerabilities of mankind. Efforts of all should be to reduce exposures to cybercriminals and cybermilitants as much as possible. This article will meet a bit of success if general readers also find it useful to become more responsible netizens and exercise more cautions while using internets and browsing cyberspace. **MA**

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Note: All these websites have been accessed during the first three weeks of May 2021.