

## Tata Communications Limited's response to TRAI Consultation Paper on "Leveraging Artificial Intelligence and Big Data in Telecommunication Sector"

At the outset, we thank the Authority for providing us an opportunity to share our comments/inputs on this important paper. Our issue wise comments on some of the issues raised in the consultation paper is given below:

Q.1. What may be the most appropriate definition of Artificial Intelligence (AI)? What are the broad requirements to develop and deploy AI models in a telecom sector? Whether any major challenges are faced by the telecom service providers in adopting AI? Please justify your response with rationale and global practices, if any.

### **Tata Communications' Response:**

The consultation paper has correctly outlined the various ways and means companies and organizations are defining the AI considering their requirement and associated factors with the AI. Hence, there cannot be one definition which would serve the purpose of different organizations and all type of AIs i.e., Responsible AI (RAI), Explainable AI (XAI), trustworthy AI, Generative AI, Augmented AI, and Embedded AI should be considered as defining terms for the AI. AI is basically the simulation of human intelligence by machines/computers which leverages the problem-solving and decision-making capabilities of human mind through analyzing the large sum of data using computers and machines and we are of the view that there cannot be one definition of AI which can be termed appropriate and various versions of AI as highlighted in the consultation paper should be considered in the definition of an AI. AI is still at its nascent stage and defining the same in a certain way may restrict the role of AI and its usefulness in various fields.

However, if at all, TRAI wishes to recommend/prescribe a definition of AI, then we suggest that the definition given by NITI Aayog and the subsequent categorization of AI into narrow(weak) and General AI should be suggested/recommended. As mentioned in the paper, there is no example of application of General AI and hence we would also like to suggest industry specific policy making focus on the domain of Narrow AI. It should also be noted that technologies that combine multiple approaches, e.g. Speech recognition and computer vision would also form a part of narrow AI.

With the launch of 5G services in India as announced by the Hon'ble Prime Minister of India during the India Mobile Congress (IMC) 2022, India has entered in a new era of telecom services where 5G and IoT would transform the industry through their various Industry 4.0 applications. This would not just create an array of use cases towards industrial automation but would also make the telecom network more complex in terms of managing its performance and optimization of the network as per the requirement of various users. AI can help the telcos to build self-optimizing networks (SONs) to support the network functionality which varies with use cases. It can also help the telcos to identify patterns by analyzing their network data and detect/predict the network failure/anomalies. Telcos can use AI for predictive analytics based on data-driven insights that would help them monitor the network equipment's health and create the pattern/prediction about their failure. Thus, one broad use case of AI in telecom would be towards network automation, optimization and prediction of network failure points so that necessary steps can be taken to avoid such incidents before its occurrence. Another broad use case in telecom is to enhance customer care services, better customer experience and identify customer's business need to help creating customized solutions for them. AI can handle the various support requests e.g. installation, set

up, maintenance, troubleshooting and reduce the number of calls which would be required to answer by a customer care executive. Many telcos have started various chat bots which provides basic information, FAQs and self-troubleshooting options to the customers. However, the use of AI and Machine learning for the customer support can vastly be improved where the AI driven algorithms can create customer specific troubleshooting specifications, improving self service capabilities of the customers and create various business enabler as well as identification of needs of the customers. This would not only ensure Ease of Business for the customer but certainly create new businesses for the telcos. Some of the global examples of the use of AI are given in below table:

### How AI Is Helping Telcos<sup>1</sup>

Challenge	Name of Company	Impact
Accelerate digital transformation and improve CX	<a href="#">Vodafone</a>	Increase in Net Promoter Score ( <a href="#">NPS</a> )
Business continuity in a crisis	<a href="#">WCTel</a>	<a href="#">Reduced technician dispatch rate</a>
High call volume and rising operational costs	<a href="#">Orange Spain</a>	Reduced First Call Resolution ( <a href="#">FCR</a> )
Continue operations during pandemic	<a href="#">Verizon</a>	<a href="#">Business continuity</a>

AI would help the telcos to achieve high network performance, fault management, customer support, business enablement, however, telcos have certain challenges in the adoption of the AI with its full ability. The current work force with the telcos have been working on traditional methods of network management, fault identification/restoration and handling customer queries etc. While telcos did adopt AI in some form e.g. chat bots, automatic voice response etc., however, the existing work force of the telcos are yet to adopt the necessary skill sets required to utilize the AI for their day to day work. Another challenge with telcos is to have the clean and standardized set of data which can be used to train and create the AI and its algorithm. Telecom network generates humongous data which are not created in equal i.e. the type and fields of the data varies with the processes, use cases, services and it is difficult to carve out the necessary data which can be used for creation and learning of any AI.

How Tata Communications uses AI<sup>2</sup>:

#### 1. Automating and personalising customer service

Tata Communications have started using AI/ML to automatically diagnose faults in its network services. All faults ranked as 'severity one' are taken through the auto-diagnosis engine, which

<sup>1</sup> <https://techsee.me/blog/artificial-intelligence-in-telecommunications-industry/#:~:text=AI%20in%20the%20telecom%20industry%20uses%20advanced%20algorithms%20to%20look,before%20customers%20are%20negatively%20impacted.>

<sup>2</sup> <https://www.tatacommunications.com/blog/2021/07/3-ways-tata-communications-uses-ai-ml-to-create-future-ready-networks/>

performs a service validation and alarm analysis on it. The diagnosis engine's ML algorithms analyse all of the active alarms on the service and look for correlation to help engineers better and faster understanding of the faults in the future. Currently, 85% of severity one faults are successfully diagnosed by the ML-powered engine, reducing the Mean Time To Recovery (MTTR) while providing a seamless experience to customers. Aside from faults on the network, tata communications is also using AI/ML to automate the response to customer queries. For example, when a customer calls (from a registered number) the AI driven CRM system provides the account details to the customer service representative along with all the open or new fault's that have recently been recorded, along with previous diagnoses and segmentations linked to that caller's account.

Armed with this information, the caller can be greeted by name and provided with an update on all their existing faults, as well as a first level diagnosis of any new fault, making for a much more personalised experience for the customer.

Furthermore, Tata Communications process all interactions through speech analytics to better understand customer sentiment. These analytics provide call handlers with near real-time insights on customer tone, so they can identify potentially dissatisfied callers and attempt customer experience recovery while they're still on the line.

## 2. Improving capital efficiency

As an organisation, Tata Communications remain invested in enhancing and expanding its network coverage. In this, Tata Communications is continuing to use AI and ML to analyse multiple factors and predict where future connectivity demand may come from. With the technology's help, it can provide on-net connectivity for more customer sites with better service experience. For Customer Premises Equipment (CPE) management, Tata Communications is exploring the use of AI and ML to sharpen its CPE stocking algorithm. That way, Tata Communications can stock the right models and quantities of products, speed up service delivery and turn up to customer sites faster.

## 3. Productivity enhancement and better operational efficiency

On an average, Tata Communications receive around 50,000 emails every month. It's a very popular channel for us and in the past our average response time was about 25 minutes. However, as a global provider of business-critical digital services to a plethora of industries, Tata Communications has understood that customers' queries need to be heard as soon as possible. We also felt it important to make sure our customers had the ability to contact our support groups through any channel they so choose.

To aid this, we started using AI and ML in the routing of customer tickets and calls. The natural learning Processing (NLP) engine helps automate our customer support workflows, which includes a chat-bot solution that fully automates third-party ticket resolution. The solution can also understand and respond to supplier updates, escalate when needed, share timely updates with customers and provide RFOs (Reason for Outage) in standardised templates. All of which is complemented by a seamless handover process between human and bot agents in the case of exceptions. Since the shift, 75% of our customer complaint emails are now processed via automation, with no need for human interference. This has significantly reduced our response time from 25 minutes to almost instantaneously – much faster than the industry standard of 15 minutes. There have also been numerous positive productivity benefits as a result, such as lower turnaround time, reduced time to rectify faults and better customer experiences.

#### 4. End-to-end network event management

Because our service offering is so tightly integrated with our partners and suppliers, we're able to provide many additional end-to-end managed services for our customers. However, because of this diverse, third-party network ecosystem, the ability to detect faults in our network (which involves visible alarms and events from our network elements) is sometimes limited by our inability to also monitor all our partners' networks for faults.

To address this issue, our network operations teams deployed AI/ML solutions to observe and learn our ecosystem's network traffic behaviours instead. Major events in the supplier network usually trigger multiple service faults in our systems. So, by comparing advanced fault and ticket patterns with ML-based algorithms, we can detect common and major faults in partner networks and quickly initiate responses.

Q.2. Whether the big data in the telecom sector may be utilised for developing AI models? For efficient and effective handling of big data, whether there is a need for adoption of special programming models or software frameworks? Please justify your response with suitable examples and global practices, if any.

#### **Tata Communications' Response:**

The telecom sector in India is very competitive and telcos thrive on technology to gain the competitive edge which can be achieved by keeping up to date with ever evolving technologies and innovation. Customization of product is one way to keep their customers happy by meeting their requirement as per their needs and demands rather than offering them pool of standards product from where customers reluctantly chose the one which is closure to their requirement. Technologies like Big Data and AI models can help the telcos to create such customized products for their customers.

With the number of internet users increasing with each passing day, Enterprises are getting digitized and availing telecom services like never before, the telco's network and various systems e.g., CRM are handling and processing humongous amount of data. Use of Big Data analytics can help the telcos to identify the correct data which can be used as input to create algorithm for their AI models to handle network outage, troubleshooting, network optimization, fault repairs, customer specific support through AI based chat bots etc. Without the Big Data analytics, it would be difficult for the telcos to identify the right set of data that can be used for the AI models. Thus, Big data are certainly a key factor in the development of AI models. Big Data can help in creating AI models which would help the telcos in fraud detection, analyzing customer's preferences, ensuring data safety, enhancing customer's network experience, designing the network for different use cases through SDN, NFV and SONs etc.

With the evolution of technology and devices, it is now possible to deal with large volumes of different varieties of data at very high velocity. Traditional architectures are not able to tackle these wherein the data are stored in a distributed storage architecture and hence Big Data requires special programming model/software framework, one such framework is Hadoop. Telcos and various enterprises who are deploying Big Data Analytics can leverage the power of Hadoop ecosystem which allows them to have an analytical environment within the Hadoop ecosystem instead of deploying, managing, scaling, and maintaining the ecosystem on its own.

Tata Communications also offer its IZO™ Cloud Analytics Platform to the enterprises which ensures that the potential of enterprises' large datasets is analyzed and configured to provide the required solutions that satisfy the big data needs of the enterprises. Tata Communications usage its flexible deployment models and fully secured real-time monitoring mechanisms that evaluate customer's information using state-of-the-art technology. By putting big data solutions at the helm of affairs, Tata Communications support the customers to make decisive decisions based on their data, thereby ensuring successful outcomes for these enterprise customers.

We believe that there is great potential for leveraging AI and big data (BD) in the telecom sector. It is our view that there is a strong set of open-source tools and technologies available to develop models for horizontal tasks and that a near-term approach could be to develop models that can help solve for use cases specific to the Telecom sector. While the regulator and industry work towards a set of areas where fundamental research specific to the sector is required, there could be a near term focus on the development of such approaches that may not require a fundamental re-invention of the already established cutting-edge approaches but a collaborative effort to apply these technologies for the telecom sector. For e.g.

- (i) Each industry has its own set of terms and any application of AI even in horizontal domains such as Natural Language Processing (NLP) for more efficient customer service that would need language models to be tuned to account for sector specific peculiarities.
- (ii) While there are many approaches to fraud detection such as anomaly detection, use of graph networks, etc. their application is likely to defer from banking fraud detection and telecom calling fraud detection.

In view of the above, we suggest that a targeted effort in building a set of application-oriented open source use cases for the telecom sector that can be further leveraged or fine-tuned by each operator could be one of the focus areas.

[Q.3. Whether deployment of 5G and beyond technologies will help to accelerate adoption of AI in all the sectors and vice versa? Please justify your response with suitable illustrations including global practices, if any.](#)

#### **Tata Communications' Response:**

AI is one of the sought after and most talked about technology today as it has the capability to create a world where virtually all devices/equipment would be more intelligent, can deliver enhanced experience, and new capabilities to the users in unlimited ways. Similarly, 5G technology can provide the connectivity services like never before as it has the capabilities to support various use cases that requires low latency, ultra-high speed, connectivity of massive number of devices/sensors etc. Due to these capabilities of 5G, it allows access to real-time data from various solutions, it leverages IOT sensors and supports facilitating the collection of data at much faster pace from these sensors for processing, and it not just enhances the speed but also support integration of various technologies. Thus, with the help of 5G, the collection of data from various sources is possible in near real time speed which can immensely support the AI algorithms to develop and create AI based application to support various applications/services. 5G is firehouse of data which AI needs to learn, experience and create its models to develop services/application, hence, 5G is what AI needs to analyze and learn from the data created through 5G operations.

We are of the view that 5G and AI forms a powerful duo. Both supports and fulfil each other's requirement and can collectively helps businesses to gain efficiency and run at a much higher level of capacity, supports connectivity amongst millions of IoT sensors and run analytics to achieve the desired outcome which would not be possible alone with either 5G or AI. Due to the intrinsic nature of 5G, it creates a complex ecosystem that requires unique kind of service level assurance which is not possible only through putting large man hours. Network diagnostic to cyber security, customization of network and services to creating array of connected devices, 5G changes the basic building blocks of how the businesses have operated till now and hence AI and its integration with 5G is necessary for the industry to take the desired benefit of these technologies. 'Data' is at the focal point for both 5G and AI and hence the synergy between AI and 5G is necessary for the businesses to utilize their full potential. With the integration of AI into 5G technology, intelligent BTSs can be created that can make decisions for themselves and can create dynamically adaptable clusters based on learned data to serve the mobile devices in most efficient manner by improving the latency and reliability of network applications.

Thus, 5G and AI are supplementary in nature, and both are necessary for other to grow and achieve its full potential to create better customer experience.

Q.4. Do you think that a number of terminologies such as Trustworthy AI, Responsible AI, Explainable AI etc. have evolved to describe various aspects of AI but they overlap and do not have any standardised meanings? If yes, whether there is a need to define or harmonise these terms? Please justify your response with rationale and global practices, if any.

#### **Tata Communications' Response:**

Please refer to our response to Q.1 where we have suggested that there should not be any specified definition for AI or its various variant that may restrict the use and evolution of AI from the perspective of different enterprise and business segments. One AI may be trustworthy for an enterprise wherein the same can be considered more responsible AI by another, depending on their use cases, factors involved in their business needs and how they wish to perceive the AI's involvement in their business operations. Hence, we suggest that at this stage there is no need to define various terms and let the enterprises/businesses consider what terminologies they wish to use for the AI depending on the AI's characteristics.

Given the fast evolving and interdisciplinary nature of the field, we believe that there will always be certain degree of overlap between various AI terminologies/definitions. Thus, we wish to suggest that while an attempt can be made in creating standard definitions for key terms especially in areas such as Explainable AI and Trustworthy AI, however, the same should be open for changes/amendments with the evolution of the AIs. We would like to refer to the following publicly available research papers.

- [\[2202.01602\] The Disagreement Problem in Explainable Machine Learning: A Practitioner's Perspective \(arxiv.org\)](#)
- [\[2209.15104\] OAK4XAI: Model towards Out-Of-Box eXplainable Artificial Intelligence for Digital Agriculture \(arxiv.org\)](#)
- [\[2209.09157\] RESHAPE: Explaining Accounting Anomalies in Financial Statement Audits by enhancing SHapley Additive exPlanations \(arxiv.org\)](#)
- [\[2209.03499\] Sell Me the Blackbox! Regulating eXplainable Artificial Intelligence \(XAI\) May Harm Consumers \(arxiv.org\)](#)

Q.6. What are the major challenges faced by the telecom industry, including policy and regulatory, in developing, deploying, and scaling applications of AI listed in the response to Q.5? How can such challenges be overcome? Please justify your response with rationale and suitable examples, if any.

**Tata Communications' Response:**

AI would help the telcos to achieve high network performance, fault management, customer support, business enablement, however, telcos have certain challenges in the adoption of the AI with its full ability. The current work force with the telcos have been working on traditional methods of network management, fault identification/restoration and handling customer queries etc. While telcos did adopt AI in some form e.g., chat bots, automatic voice response etc., however, the existing work force of the telcos are yet to adopt the necessary skill sets required to utilize the AI for their day-to-day work.

Another challenge with telcos is to have the clean and standardized set of data which can be used to train and create the AI and its algorithm. Telecom network generates humongous data which are not created in equal i.e., the type and fields of the data varies with the processes, use cases, services and it is difficult to carve out the necessary data which can be used for creation and learning of any AI. Data is fragmented, unstructured or incomplete due to which it becomes a resource intensive effort just to stabilize it. Telcos will need big data engineering ecosystem to collect, integrate, store, and process data from numerous siloed data sources.

Q.7. In which areas of other sectors including broadcasting, existing and future capabilities of the telecom networks can be used to leverage AI and BD? Please justify your response with rationale and suitable examples if any.

**Tata Communications' Response:**

TRAI has rightly highlighted various use cases of telecom networks capabilities can be leveraged by AI/BD for other sectors. We would like to add few additional areas which can leverage the capability an AI can provide along with the telecom networks. We are highlighting them as below:

(i) **Navigation/traffic movement across Highways:** Telecom network captures the location details of millions of their subscribers through their BTSs installed across the region. This location information can create a better navigational feature for the customer with the help of AI and BD analytics. For example: The speed with which a customer is moving across various BTSs installed by all the telecom operators that caters the traffic from a highway can be used to create the real time traffic movement mapped with the existing navigational tools to have a real time traffic situation across various highways. This information can also be integrated with the existing maps to provide better navigational facilities to the users.

(ii) **Facial Detection/verification:** Telecom operators have the complete KYC information of the subscribers along with their photographs in their data base. With the help of AI and BD analytics, integration of this subscriber data base of all the operators can be done and a portal can be created for facial detection/verification of the people for security purposes across various Bus terminals, Railway stations, Airports etc. Further, Law Enforcement Agencies (LEAs) are already integrated with the LI system of the operators through Central Monitoring System (CMS). The facial detection/verification system deployed at these locations (terminals/stations) can also be used to locate the person of interest/criminals which would help the agencies to capture them in case such people are seen at various transport locations.

Q.8. Whether risks and concerns such as privacy, security, bias, unethical use of AI etc. are restricting or likely to restrict the adoption of AI? List out all such risks and concerns associated with the adoption of AI. Please justify your response with rationale and suitable examples, if any.

**Tata Communications' Response:**

In our view the risks and concerns associated with the use of AI e.g., privacy, security, biasness etc. may impact and restrict the adoption of AI as the organizations would not like to compromise with any of these important issues which also have legal and regulatory implications.

We are in concurrence with the various risks and concerns listed by the Authority in this consultation paper in para 3.4. Below are some of the comments on the risks and concerns on AI adoption apart from what has already been listed by the TRAI in the consultation paper:

(i) **Accountability Issue:** AI system works based on various data points which are used as input and then based on the algorithm, the AI generates the output from these data points. At times, it is not understandable how the AI has created the outcome due to its constant learning and intelligence it puts based on its continuous experience. Hence, it would also be difficult to establish the accountability in case the desired outcome does not arrive, or some unwarranted issue occur due to the outcome, whether the data used to generate outcome is responsible or the basic algorithm used to develop the AI or the AI itself which intelligently learned and changed/alterd the outcome on its own.

(ii) **Ethical Issue:** Adoption of AI has serious ethical concerns related to job losses, fairness in the interaction with the users in comparison to human-to-human interaction, biasness on the algorithm/programming of AI due to the human's nature who is creator of initial algorithm, Security of AI system especially its ability to act on emergency situation where human decision making prevails over any machines (for example: a case before a human doctor to save mother or the child during a complicated surgery vis-à-vis an AI system handling the same surgery).

(iii) **Unpredictability Issue:** it is necessary to ascertain that any AI system's output should be as per the prediction made by the organization while deploying such AI system. At times, the algorithm of the AI may become too complex (with too many layers) that may at later stage, along with the capability of AI to learn and improve itself based on the past results/outcome which may further result in change/adjustment in the algorithm carried by the AI itself, become unpredictable or non-deterministic for a human. Such unpredictability/non-deterministic outcome would be a major concern towards adoption of the AI system, as the result will not necessary be the same as expected/envisaged while deploying the AI.

Q.9. What measures are suggested to be taken to address the risks and concerns listed in response to Q.8? Which are the areas where regulatory interventions may help to address these risks and concerns? Please justify your response with rationale and suitable examples, if any.

**Tata Communications' Response:**

We suggest the following measures to address the concerns listed by us in our response to Q.8:

(i) To address the accountability concern, there should be a clear goal and objective defined for the AI system with well-defined roles, responsibilities, and line of authority in the organization. Further, it is pertinent to create a risk-management process, system-level governance, technical



specifications for the AI system and identification of the stakeholders for compliance assurance both at design and operation level of the AI system.

(ii) The ethical issues of AI can be addressed by defining the ethical parameters for AI and data. There should be a defined parameters regarding fairness, privacy, data security and other ethical issues on which the AI should be implemented and tested before being deployed in the production environment. Organizations can also create an ethical risk framework (identifying the possible ethical risks and approach to mitigate the same) to redress any ethical concern. The approach/way/algorithm of the decision-making capability of the AI should be well written and auditable so that the experts can check for any ethical issue and take appropriate action to correct the same.

(iii) Similar to the issues related to accountability and Ethical concerns, the unpredictability concerns of AI can also be mitigated by following system-level governance, risk management process and step-by-step process to identify the approach AI undertakes to reach to a certain decision. These steps/processes can be audited to ascertain that the AI's outcome is as per the defined goals/objectives. The data set used as input for the AI should also be checked as per these processes so that any unpredictability due to bad data set can also be mitigated.

While the regulatory intervention is not the necessary requirement at this stage for AI and BD, however, a policy framework can be created by the Government outlining the key focus areas e.g. defining the goal/objective for the AI, Governance framework for system, risk, framework for creation of steps, audit framework etc.

Q.10. What measures do you suggest to instil trust and confidence regarding a robust and safe AI system among customers, TSPs and other related entities/stakeholders? Whether adopting general principles such as Responsible AI and ethical principles at the time of designing and operationalising the AI models will help in developing ethical solutions and instilling trust and confidence in the users? What may be such principles and who should formulate these and how compliance can be ensured? Please justify your response with rationale and suitable examples, if any.

**Tata Communications' Response:**

Please refer our response to Q4

Q.11. Whether there is a need of telecom/ICT sector specific or a common authority or a body or an institution to check and ensure compliance of national level and sector specific requirements for AI? If yes, what should be the composition, roles and responsibilities of such authority or body or institution? Please justify your response with rationale and suitable examples or best practices, if any.

**Tata Communications' Response:**

AI is still at a nascent stage, and we do not see the requirement to bring AI under the regulatory body or any authority for compliance requirement. We are of the view that industry should evolve and come together to create a common rules/SOPs which can be adopted for AI. Government can have the rights to review such rules/SOPs created by the industry and suggest modification. We also suggest that only those AI solutions that can have a larger security concern should be reviewed by Government body/authority and the remaining should be allowed under the SOPs created by the industry. As rightly mentioned by TRAI in this consultation paper, the role of policy

makers is to identify hindrances faced by the industry and address the same in effective manner and we are of the view that at this stage the focus should be on developing an enabling policy for growth and adoption of AI rather than creating a regulatory/compliance requirements.

Q.13. Whether telecom/ICT industry is facing constraints such as access to data, lack of computing infrastructure, lack of standards, and R&D in the adoption of AI and BD technologies? Please list out all such constraints with adequate details.

and

Q.14. What measures are required to make data and computing infrastructure available and accessible to developers and also to make data/AI models interoperable and compatible? Please respond along with examples, best practices and explanatory notes.

#### **Tata Communications' Response to Q.13 and Q.14:**

We are of the view that the most pressing and necessary area where efforts can be supplemented in increasing the uptake of BD and AI are in the area of R&D with domain specific work. Another area where constraints may come is the area of privacy issues and privacy standards that should enable data sharing and use of data (anonymized or otherwise) for development of AI applications. We would suggest the following initiatives:

- Centre of excellence approach – TRAI/DoT in partnership with academia and leading industry participants may look to establish topic-based centres of excellence (CoEs). Each CoE could be based on a specific pan-industry issue for e.g. 5G, Optical fibres, WAN networking, privacy norms, digital twin, etc. The CoE could have a representation of academic experts from telecom domain and AI researchers in order to provide the requisite mix of domain knowledge and AI expertise. Representatives from different companies may possibly be a part of the CoE and can contribute real world experience as well as providing facilities for testing the developed technologies at a large scale. For example, there have been significant strides in leveraging advances in Natural Language Processing (NLP) to create open-source datasets and models for Indian languages.
- The CoE could work to release a set of foundational models, standards and open-source datasets that can be leveraged by industry participants that have requisite privacy safeguards built in.

Q.15. Whether there is a gap between requirement and availability of skilled AI workforce? If so, what measures are required to be taken to ensure availability of adequate skilled workforce in AI domain? Please respond along with suggestions with supporting details and best practices.

#### **Tata Communications' Response**

We would like to submit that while there is an increase in the number of institutes offering AI courses at a graduate and undergraduate level, however, based on our experience we wish to highlight the gaps in developing the desired skilled workforce for AI:

- Domain level data scientists - In order to get the best value from AI we need good quality data and people who understand the data along with the underlying business that it represents. The current courses equip candidates with skills to understand and apply standard algorithms with 'toy' datasets that often have limited relevance to real world data science. We would suggest that existing coursework could include skills such as design

thinking, problem solving and have an extended internship program for academic credit that enables students to get real world experience.

- AI focused applied research for Telecom – As mentioned in our response to Q.14 above we propose a CoE model for applied AI research that has a mix of academic institutes and industry participation. As a part of this CoE we could look at post-graduate and PhD level students who will be groomed as domain experts under the joint guidance of industry experts.

Q.16. What initiatives do you suggest to democratise data required to develop AI models in the telecom sector? Please justify your response with rationale and suitable examples, if any.

### **Tata Communications' Response**

Please refer our response to Q.14

Q.17. Whether the authority or body or institution as suggested in response to Q.11 may also be entrusted with the task to manage and oversee collection, cataloguing and storage of data? Whether such authority or body or institution need to be entrusted to generate and make available synthetic data? Please justify your response with rationale and suitable examples, if any.

### **Tata Communications' Response**

Please refer our response to Q.14. We would further like to submit that the concept of Government Community Cloud (GCC) as envisaged by MeitY, a Telecom industry community cloud (TICC) could be created that can serve as a repository of open-source datasets. The data stored can be contributed by industry participants and be subject to adequate privacy and storage norms that can be customized based on the GCC requirements. The respective CoEs can be custodians of the datasets.

Q.18. Whether the legal framework as envisaged in para 3.5.3 and Q.12 should also enable and provide for digitalisation, sharing and monetisation for effective use of the data in AI without affecting privacy and security of the data? Please justify your response with rationale and suitable examples, if any.

### **Tata Communications' Response**

As opined in our response to Q.11, at this stage the need is to identify hindrances faced by the industry and address the same in effective manner and we are of the view that at this stage the focus should be on developing an enabling policy for growth and adoption of AI. However, as a policy framework, Government can create a group/institution (as suggested in our response to Q.17) that can frame requisite guidelines and take necessary initiatives towards growth of AI and also towards producing/providing the necessary data set for research and development of various AI systems. As a policy initiative, the suggested group can also frame rules/guidelines regarding sharing and monetization of data to ensure its effective use and ensure the privacy and security of the data.

Q.25. Whether there is a need to create AI-specific infrastructure for the purpose of startups and enterprises in the telecom sector to develop and run AI models in an optimised manner? Whether such an infrastructure should cover various real-world scenarios such as cloud AI, edge AI and on-device AI? Please justify your response with rationale and suitable examples, if any.

## **Tata Communications' Response**

Please refer our responses to Q14 and Q17

Q.26. Whether the emerging trends of development of foundational AI models such as GPT-3, Gopher etc. are leading to democratisation of AI space by offering fine-tuned or derived AI models? Whether such a trend will also help in reducing costs for the AI developers? Whether similar approach will help in development of large-scale AI model for the telecom sector? Please justify your response with rationale and suitable examples, if any.

## **Tata Communications' Response**

We are of the view that these foundation models as mentioned in the consultation paper (GPT-3, Gopher etc.) and other approaches that require deeper research; e.g. Graph Neural Networks (GNNs) need to be further built upon and customized for the telecom industry. For e.g. research on the ITU GNN challenge or detection of fibre cuts.

Q.27. Whether there is a need to establish experimental campuses where startups, innovators, and researchers can develop or demonstrate technological capabilities, innovative business and operational models? Whether participation of users at the time of design and development is also required for enhancing the chances of success of products or solutions? Whether such a setup will reduce the burden on developers and enable them to focus on their core competence areas? Please justify your response with rationale and suitable examples, if any.

## **Tata Communications' Response**

Please refer our responses to Q14, Q17 and Q26

Q.29. In response to Q.27 and Q.28, whether establishing such a campus under government patronage will enable easy accessibility of public resources such as spectrum, numbering and other resources to the researchers? Whether it would be in mutual interest of established private players as well as startups, innovators and enterprises to participate in such experiments? Please justify your response with rationale and suitable examples, if any.

## **Tata Communications' Response**

Please see our responses to Q14, Q17 and Q26

Q.30. Whether active participation in the international challenge programs such as ITU AI/ML 5G challenge will help India's telecom industry in adopting AI? Whether similar programs are also required to be launched at the national level? Whether such programs will help to curate problem statements or help in enabling, creating, training and deploying AI/ML models for Indian telecom networks? What steps or measures do you suggest to encourage active participation at international level and setting up of such programs at national level? Please justify your response with rationale and suitable examples, if any.

## **Tata Communications' Response**

Please see our responses to Q14, Q17 and Q26

Q.33. Whether active participation in the international bootcamp programs such as MIT Bootcamps, Design Thinking Bootcamp by Stanford University etc. will help India's telecom industry workforce to find international developers community, navigate challenges and learn from experiences of others? Whether similar programs are also required to be launched at the national level? What steps or measures do you suggest to encourage active participation at the international level and setting up of such programs at the national level? Please justify your response with rationale and suitable examples, if any.

#### **Tata Communications' Response**

We suggest that the programs as mentioned in this question should be held at national level under the CoE ambit.

Q.34. Whether the courses or programs related to AI/ML currently being offered by various institutions and universities in India are adequate to meet the capacity and competence required to develop and deploy AI solutions or products in the telecom networks? If not, what additional steps or measures are suggested to fill the gap? Please justify your response with rationale and suitable examples, if any.

#### **Tata Communications' Response**

Please see our responses to Q14, Q17 and Q26

Q.37. Whether there is a need to prepare and publish a compendium of guidance, toolkits and use cases related to AI and BD, to foster adoption in the telecom sector? If yes, what should be the process to prepare such a compendium and who should be assigned this task? Please justify your response with rationale and global best practices, if any.

#### **Tata Communications' Response**

We suggest that such provisions of preparing and publishing a compendium, toolkits etc. should be conducted under the ambit of Centre of Excellence (CoE).

Q.38. Whether there is a need to establish telecom industry-academia linkages specifically for AI and BD to accelerate the development and deployment of AI products and solutions? Whether there is a need to establish Centres of Excellence (CoEs) for this purpose or it can be achieved by enhancing the role of existing TCoE? Please justify your response with rationale and global best practices, if any.

#### **Tata Communications' Response**

Please see our responses to Q14, Q17 and Q26

Q.39. Whether there is a need to establish telecom industry-academia linkages specifically for AI and BD for AI related skill development? Please give the suggestions for strengthening the industry-academia linkages for identification of the skill development courses. Please justify your response with rationale and global best practices, if any.

**Tata Communications' Response**

Please see our responses to Q14, Q17 and Q26

Q.40. Any other issue which is relevant to this subject? Please suggest with justification.

**Tata Communications' Response**

No Comments