Enterprises in the transportation industry are increasingly leveraging information and communication technology (ICT) solutions to improve their overall efficiency and deliver world-class services. Besides deploying solutions such as enterprise resource planning (ERP), supervisory control and data acquisition (SCADA), signalling and train information management (TIM) to improve the operational efficiency of their systems, enterprises are taking several customer-facing initiatives such as setting up websites, mobile applications and payment solutions. However, challenges in upskilling the workforce and building long-term IT flexibility and competency continue to exist. Experts from leading enterprises in the transportation space discuss their company's ICT roadmap, deployment challenges and the way ahead...

How have your ICT requirements changed over time? What are the key telecom and IT solutions used by your company? What have been the benefits so far?

It can be said that, as humans, we are fast in proposing and making any change but slow in accepting it and adapting to it. Unlike technologies that directly deal with the physical world where the laws of physics and chemistry seldom change, ICT evolves with our constant learning of the application domains. This leads to constant change and evolution in the ICT requirements in the application domains. At Bangalore Metro Rail Corporation Limited (BMRCL), our IT solutions portfolio can be divided into the following major categories:

• E-governance-related solutions for managing the data and information that the organisation deals with. These solutions include ERP, asset management, project management and computer-aided design and manufacturing. Relevant tools have been standardised for internal consumption.

• E-monitoring and e-control of all the functional systems specific to metro rail infrastructure

using SCADA, signalling, TIM, etc.

• Public interfaces that include mobile applications, portals/websites, travel assistance and public notification systems.

The e-monitoring and e-control solutions are provided by vendors/contractors, which use their own communication/data networks. These solutions have touchpoints for the data/information of the other two categories, and help in defining/designing and implementing the interfaces.

The key changes in ICT requirements are a result of service and solutions integration across various functional departments. We are striving to work at a higher level of information abstraction by creating comprehensive views and reports using information management approaches that integrate information from ERP, project management and 2D/3D design environments in the company. We are also in the process of bringing digital asset management to more departments. On the signalling side, we plan to use communications-based train control technology for improving the headway performance. On the public information interface, our mobile application for commuters is increasingly incorporating their information/functional demands. The introduction of new modes of digital payment such as prepaid instruments, UPI-based facilities and new credit/debit cards is also changing our IT ecosystem.

The benefits of ICT in the metro rail sector are, in general, the same as the benefits for other sectors. The key among these are a reduction in paperwork; minimisation of human errors/intervention; enhanced service efficiency; better collection, organisation and management of data in digital formats; and faster and more informed decision-making.

What are your views on the use of emerging technologies like cloud, big data, artificial intelligence (AI) and internet of things (IoT)?

In my view, the proliferation of new technology solutions is directly proportional to their demand, and technological innovations. We need to be aware of the emerging technologies and their rate of obsolescence. We need to take into account the requirement of the future generations of users rather than the current generation while designing and deploying IT solutions.

Many technologies including hardware like microcontrollers and software like Java have found application in domains that they were not designed for in the first place. This suggests that we need to encourage IT innovations in the organisation to make the best use of technology, and map the technologies on to the specific needs of the organisation. I will not just adopt a technology based on its popularity, but rather understand the current needs and anticipate the future needs before picking new technologies.

In the face of rising data and cybersecurity concerns, how are you ensuring the security of your system and processes?

We get our IT infrastructure security audited on a regular basis by third parties. In addition, we are extra careful while touching the periphery of any subnet in the IT infrastructure, especially if it deals with data related to physical systems control. We also encourage relevant staff to get cybersecurity-related training.

What are the issues and challenges faced in the deployment and management of ICT solutions and infrastructure?

Bridging the gap between the understanding of user requirements by the IT staff and the IT understanding of users is a major challenge. This is being overcome by formalising the requirements elicitation phase, and management level discussions with user teams before the IT team takes up the assignment.

Also, a long-term roadmap is required for the integration of ICT solutions across functional departments. This gives quantity-based cost benefits while procuring product licences and infrastructure components.

What are your views on the digital transformation of the transportation segment? What are the key upcoming technology and telecom trends in this space?

Users of urban transport systems are looking for convenient, available, fast, and safe/ secure travel facilities that can connect multiple modes of transport for planning their trips from the start

location to the destination. On the other hand, transport service providers are constantly trying to improve their service performance as well as their revenues while catering to the demands of commuters. Digital transformation is a must for meeting the expectations of the two groups.

Wireless communication provides mobility, while digitalisation provides remote data/information management. IoT leverages the wireless and digital infrastructure and technologies to provide a distributed sensor/actuator network for monitoring and controlling the environment, and providing inputs for contextual decision-making systems embedded in the ICT infrastructure.

A standardisation trend has been seen in data exchange formats, like the General Transit Feed Specification in location-based services, for efficient data/information management in the transport sector.

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