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Discussion guide

The Role of Emerging Technologies in Driving Operational Efficiencies and Business

The transport sector's relationship with tech is changing. To create more efficient and proactive services, the sector must overcome its hesitance to emerging technologies and embrace the new digital world. With the support of a trusted partner, making crucial tech decisions that shape the future can be considerably easier.

The transport sector is experiencing a shift; not only are market disruptors, such as car and bike hire schemes threatening the status quo of urban transit, but emerging technologies such as Artificial Intelligence/Robotic Process Automation, analytics, Internet of Things, Blockchain and Quantum Technology are radically transforming the sector at a rate that transport providers are struggling to keep up with.

These technologies have the potential to create smarter and more responsive systems that can improve performance across whole industries – even whole economies. However, the pressure of operational and maintenance expenditures, asset and legacy technology management, and squeezed margins leave transport organizations little room to invest in new innovations. As the market accelerates, transport organizations have no choice but to mirror its speed and integrate innovative technologies into their working practices. Fail, and they risk falling behind growing competition and changing customer expectations.

As a business leader, it is vital to understand the potential for new technologies to alleviate and manage these pressures. But, we realise that striking the balance between investing in tech and ensuring maximum cost-efficiency can be a daunting task. The challenge for those in the transport sector is to drive away from traditional technologies and towards smarter forms; ones that have the longevity to compete with the constant disruption in the market.

In this discussion paper, we'll take a look at why these technologies are the focus of so many industries, before evaluating how they can support the ambitions and needs of the transport sector.

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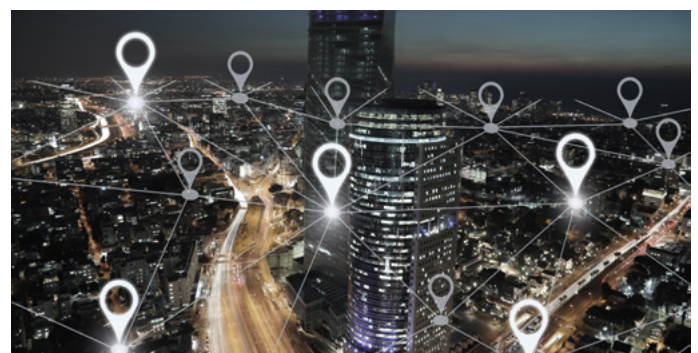
A look at the changing world of transport

What is the challenge?

The end-user experience is constantly being innovated and revolutionized with the power of tech. Although online platforms, such as Amazon and Netflix are competing in a completely different sector to transport, the rise of these on-demand services has primed audiences to expect a similar experience everywhere. For example, taxi-hailing apps make it possible for the passenger to move from A to B at the touch of a button.

This advanced service has set a new standard for transport providers. Passengers now expect a service that is powered by the latest digital innovation, tailored to the individual and goes beyond answering immediate transport needs. For this generation, seamless, end-to-end journeys are a priority. This has put the onus on transport providers to react and form ecosystems which are centered around the passenger experience. Part of the challenge for transport operators is to understand the full capabilities of new technologies; by doing so, they increase the ability to provide a better service and improve operational efficiency.

Technology has the potential to provide more intelligence, insight and allow transport systems to be much more agile and responsive. But, providers are under pressure to prove the worth of their investments, while ensuring interoperability and integration into huge legacy systems. Which makes onboarding new technologies easier said than done.

The transport sector is incredibly stretched financially; battling low margins and investment opportunities mean the ability to innovate is not as achievable as it is for other sectors. Providers have a lot to think about when investing in innovation: the cost to invest, the implementation stage and the integration with legacy technology. It can seem like a battle not worth fighting when the value is not foreseeable. So, how are other industries leveraging new technologies? And, what is the value for the transport sector?

The five emerging technologies

Blockchain: What is it?

Blockchain technology is a decentralized network that helps transfer anything of value. This means transactions become more peer-to-peer and lessens the need for intermediaries, such as banks. It also means there is a record of authenticity, which can be verified by an entire community of internet users. The future global economy means that anyone who has access to the internet is also free to participate in blockchain-based transactions (source).

How are other industries using it?

Blockchain technology is set to make waves in the banking and financial services industry, though is currently far from mainstream – only 24% of financial executives from around the world are familiar with the technology (source). Which means, the vast majority are unaware of blockchain's potential to revolutionize the way data, information and money are exchanged. By eradicating the need for mediators, it can drastically save operational costs and reduce human errors.

What are the benefits for the transport sector?

The transport sector hasn't adopted blockchain technology as quickly as other industries, meaning the benefits of blockchain have not been realised in the sector. For transport providers who are eager to create greater efficiencies, blockchain has the potential to be a really valuable tool. For example, by removing the overhead that is associated with invoicing and supplier transactions, providers can enjoy more automated processes that are faster and more accurate.

According to Frederik de Breuck, Head of Fujitsu's Blockchain Innovation Center in Brussels, "Blockchain and other DLTs (Distributed Ledger Technologies) hold the potential to transform organizations and entire industries." He believes that blockchain has the ability to play a crucial role in the development of Smart Cities. For example, by enabling data sharing to become more transparent between operators within one ecosystem, blockchain can help to develop MaaS (Mobility-as-a-Service) platforms; the value is to help travel organizations share valuable passenger information securely and collaboratively to better improve services and end-user experiences (source).

AI: What is it?

Artificial Intelligence (AI) is the simulation of machines that use reasoning and self-correction to function with human-like intelligence. AI is fast becoming a fundamental technology with applications, such as voice recognition, and behavioural algorithms making their way into our everyday lives. Machine Learning, a key part of AI, has the ability to process huge amounts of data and recognize data patterns to benefit autonomous decision-making. AI adoption in organizations has tripled between 2018 and 2019, becoming a top priority for CIOs (source). By helping to reduce human error and complete mundane tasks, this technology is set to be the future of automated decision-making and improved productivity.

How are other industries using it?

A respected leader in the renewable energy industry, Siemens Gamesa is using AI to create a more efficient quality checking system during the manufacture of wind turbines. Before implementing the technology, the inspection of each blade was carried out through ultra-sound scans, a process that took between 6-8 hours by a specialized engineer. With Siemens Gamesa, we co-created a strategy that transforms the process by using AI to combine image and signal processing techniques with deep learning technology. This transformation meant we were able to automatically analyze and detect relevant patterns in Non-Destructive Testing (NDT) ultrasound data. Through deploying AI technology, we were able to cut the inspections time by 80%, resulting in significant cost savings and time taken to identify defects.

What are the benefits for the transport sector?

The transport sector can be unpredictable, but AI can help organizations regain control. With predictive decision-making capabilities, this technology can help to manage human errors, accidents and traffic to improve public safety and increase service efficiency. In recent years, AI has been developed to predict traffic demand to alleviate congestion during road accidents, so that public transport routes can be better optimized and passenger demand can be distributed accordingly, as well as being able to predict the queuing time for taxis in stations. As key rail infrastructure begins to deteriorate, operators have a need to carry out proactive maintenance, such as covering cracks in rail tracks in order to maintain service levels. In this sector, it's about creating better passenger experiences managing legacy technology to provide excellent customer services.

Quantum-inspired technology: What is it?

Quantum computing technology is the key to quick and efficient decision-making. Rabih Arzouni, Chief Technology Officer for transport says, 'If you're able to use quantum-inspired technology capabilities to run combinatorial optimization problems, you can then learn quite a lot very quickly within such a short time to react to a particular situation'. Quantum-like technology has the ability to streamline and reduce inefficiencies in all aspects of the transport eco-system by using predictive data to better serve communities.

As the use of Artificial Intelligence (AI) escalates, there is a need for computer technology to tackle transport organizations' most pressing needs. Quantum computing is able to complete complex calculations much quicker than a traditional computer, with an even higher degree of accuracy. But as a high, upfront investment, many are easily put off. That's why Fujitsu has designed a cost-effective solution, in the form of Digital Annealer. The technology works by solving complex optimization problems that traditional computers aren't able to solve quick enough. For example, if a salesman needed to visit several cities, Digital Annealer could offer the route with the shortest total distance within seconds. Innovation at its best.

How are other industries using it?

We have recently co-created a strategy with NatWest to solve complex financial investment problems. Previously, the process of calculating the best mix of assets is undertaken infrequently and is extremely expensive. By introducing Digital Annealer, NatWest is now able to implement quantum-inspired computing power to complete complex calculations at 300 times the speed of a traditional computer. This now means that they are able to solve combinatorial problems much faster and with a greater degree of accuracy than if it was carried out manually. For NatWest, they see this example as just the start of their quantum-inspired computing journey, foreseeing that the power could completely change the way they operate, resulting in a more efficient service and a better experience for customers (source).

What are the benefits for the transport sector?

For transport operators, quantum-like capabilities can be used to solve practical issues using data. Opposed to traditional computing, the Digital Annealer allows providers to work out algorithms much faster and without the need for a large data center. Better yet, it can run on cloud service and the provider's platform. For example, if a passenger wants to find the best way of getting from A to B in an optimal timeframe, this technology is able to present them with the best solution straight away.

For the travel provider, the benefit is being able to route traffic without guesswork. The data and analytics are able to predict and react to all scenarios without human intervention. This is especially valuable when you consider the changing expectations of passengers, who are increasingly seeking on-demand, instantaneous journeys and updates. And when you consider the rising demand for Logistics companies to deliver goods as quickly as possible. Supported by innovation, like Digital Annealer, they can remove the trial-and-error approach, effectively manage their fleet and boost service efficiency.

IoT: What is it?

The Internet of Things (IoT) is about connecting billions of smart devices together to create greater control of systems and – ultimately – change the way we live and work for the better. IoT technology has the power to impact every area of your business, allowing you to connect, exchange and act on data without any human intervention. And, create new opportunities for connecting the physical and the digital, which is essential for powering today's smart cities.

How are other industries using it?

In the utility industry, more and more businesses are making use of connected devices to generate real-time insight and enable workforces to be more efficient. For example, utility businesses need to proactively manage a fleet of vans, keep their operations running efficiently and ensure their customers are seen as quickly as possible. Using IoT to power hyperconnected vehicles, workforces can stay connected at all times and engineers can ensure they are equipped with the correct parts to carry out jobs. Hyperconnected vehicles mean having access to dashboard cameras to support health and safety, real-time stock monitoring to ensure they are always equipped, and GPS to help coordinate routing and parts collection. With these innovations as its foundation, the utility industry is able to realise a world of new capabilities and opportunities.

What are the benefits for the transport sector?

More than half of us live in urban areas [(source)](#), which means the transport industry is under increasing pressure to future-proof operations to meet demand. At Fujitsu, we believe IoT could shape the way we manage the demand of expanding cities. Regarded as the driver of smart city initiatives, IoT is already making its mark in the transportation sector – whether that be on the small scale of real-time travel applications or on the large scale of Autonomous Vehicles.

IoT wearables combat driver fatigue through monitoring drivers biorhythms. By collecting insights on blood pressure, heart rate and stress, operators can use insights to prevent accidents before they occur. This data insight can also be used to better manage shift patterns and support individual wellbeing of the drivers.

Data Analytics: What is it?

Data is a central part of how organizations function. However, as data collection increases, managing and analyzing becomes more complex. In order to gain better value from data, it needs to be thoroughly understood. Collecting data across a multitude of sources can be crucial to deriving insights and driving change. Through the use of IT, data can be analyzed to provide actionable insights, inform better decisions and interpret meanings more quickly. The result of this is the ability to make decisions faster and drive competitive advantage.

How are other industries using it?

In manufacturing warehouses, the vast amount of data reports being processed can be complex to manage and time-consuming to analyse. Manufacturers need a solution that can provide advanced data analysis that increases the speed and depth of reporting across several sites. Trailblazers in the manufacturing industry are upgrading their data analysis. For example, we co-created a solution with a large-scale manufacturing company to help them simplify their existing architecture. Through integrating a SAP HANA platform, it was able to run reports much faster, allowing employees to focus their attention on the analysis of the data – rather than the collation.

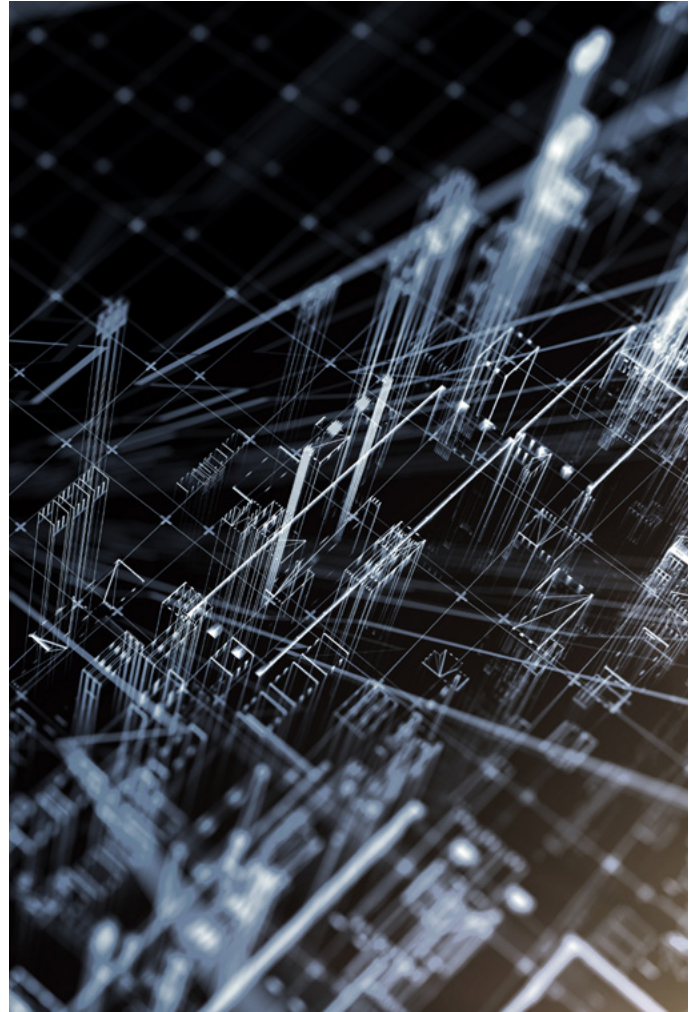### What are the benefits for the transport sector?

As the transport sector becomes more data-driven, operators are able to respond to passenger expectations much quicker and gain an advantage on competitors. However, the vast amount of data captured from sources, such as onboard sensors and ticketing systems make the ability to extract insight more difficult. The likes of cloud computing and Big Data have the ability to process real-time data. For example, if a public transport delay or incident was to occur in a city center, Big Data can apply analytics and generate real-time information to passengers via mobile technology to encourage them to take an alternative route or to make them aware of delays. This information can also be communicated to control centres to help them deploy security staff effectively. By innovating the decision-making process, operators are empowered to react to data in real-time and can predict future conditions. Altogether, creating a more streamlined transport ecosystem and helping customers to receive the most efficient service.

Selecting the right technology with Fujitsu

We understand that identifying the right technology in the transport sector can be daunting – it may seem like a risky decision or unnecessary stress. With the increasingly fast development of technology, it can be easy to fall behind. For Transport providers to deduce the most from emerging technologies, they must be proactive in understanding it's potential. Through co-creation and partner ecosystems, we can work with you to help find the answers fit for the development of your business.

For Rabih Arzouni, CTO for Transport at Fujitsu, selecting emerging technology is 'not about technology, but a business challenge'. First, we work with our partners to find a technological solution to a business problem. Then, we work on integrating that solution into an existing platform to create a business case. Through collaboration, we can co-create a solution that works to overcome your challenges and achieve greater efficiencies in your business. And, one that ensures you're making the most out of your technology while providing the best experience for your customers.

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Contact Fujitsu to discuss how we can adopt emerging technology together.

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