Optimization services for the evolving mobility ecosystem

Optimization and AI-enabled analytics for the mobility ecosystem offer unprecedented scale, speed and simplicity

- Traffic Flow Optimization
- Delivery Vehicle Route Optimization
- Autonomous Vehicle Route Optimization
- Flying-Taxi Path Optimization
- Electric Vehicle Charging Location Optimization
- Fleet Management Optimization
- Freight Traffic Optimization
- and more...

Organizations in pursuit of competitive advantage typically look for ways to optimize – the ability to minimize resources such as energy use, operating costs, time, complexity, space, investment, environmental footprint– in fact, any factor that gives them an edge – while also maximizing revenue, profitability, sustainability, and customer satisfaction.

In particular, the transportation and mobility sector faces unique optimization challenges across sea, air, rail and road. Whether it's enabling a stress-free customer journey, minimizing traffic congestion, managing fleets more efficiently, or generally reducing costs across the board, overcoming these optimization challenges is crucial for success in the evolving mobility ecosystem.

With digital technologies reshaping the world we live and work in, optimization using emerging technologies such as Quantum-Inspired Computing and Artificial Intelligence (AI) holds the key to unlocking many of the mobility challenges facing today's urban environments.

As per research by Forrester Consulting, 71% of surveyed leaders agree that, companies that fail to master AI will risk irrelevance in the next 24 months.[1]

[1]"Starting today, AI will power businesses into the future", a commissioned study conducted by Forrester consulting on behalf of Fujitsu, May 2020.

Fujitsu has worked with the Hamburg Port Authority in Germany, to cut traffic congestion and speed up journey times, by optimizing traffic light sequencing in the port area and on roads into the city of Hamburg. The complex calculations to come up with an optimum solution, typically impossible to compute in an acceptable timeframe with classical computers, was made possible using Fujitsu's Digital Annealer – not a quantum computer, but works a lot like one. First set of results already indicate that using a technology such as quantum-inspired computing holds the potential to reduce traffic congestion by up to 40% by dispersing traffic to less congested routes.

78% of business leaders surveyed by Forrester Consulting, conveyed that optimizing traffic flows for mobility platforms, first responders and to relieve city congestion was a standout use case they were very interested in solving, by applying Quantum-Inspired Computing.

Closely behind, **77% of surveyed leaders were very interested in applying Quantum-Inspired Computing** for solving logistics / warehousing problems such as optimal route management and inventory placement in real time or based on manufacturing demand in warehousing.[2]

The potential social benefits are also significant: organizations can play their part towards a sustainable environment by helping improve air quality, and therefore lower respiratory diseases, and simply help increase citizen well-being.

But the potential of these technologies extends to any organization in the mobility sector looking at optimizing the locations, availability and route of a fleet of vehicles - whether it's cars, bicycles or delivery trucks. For example, Fujitsu has enabled Japan Post to optimize transportation route combinations, truck types, and cargo loads for reduction distribution and allocation problems, by calculating the appropriate distribution of bicycles at the right location, at the right time for optimal utilization. Similarly, garbage disposal companies may also consider using such technologies for optimal placement and routing of garbage trucks for maximum efficiency in a minimum time.

Finally, if optimization examples in the global mobility sector weren't enough to reiterate the point, here's an out-of-the-world illustration, literally, in outer space. Fujitsu, in collaboration with Astroscale, The University of Glasgow and for space debris removal missions by developing a proof of value to make these missions more commercially viable. With the evolution in the mobility sector pointing towards a future with drone taxis, it is not a stretch to imagine the value of fuel consumption. Undoubtedly, the ability to uncover insights and leverage stakeholders in the mobility ecosystem, paving the way towards the rapidly evolving mobility of the future.

Hamburg Port Authorities

Traffic Flow Optimization

Business problem
- Hamburg Port handles about 136.5 million tons per year and ~12,000 trucks per day.
- Hamburg Port wanted to optimize this traffic flow problem for more efficient utilization of the Port Infrastructure.

Fujitsu solution
- Application of Quantum-Inspired Optimization with the Fujitsu Digital Annealer.
- Complex calculations of a high number of possible scenarios made in a few seconds

Business impact
- Reduced **X%** traffic congestion
- Speed up journey times
- Societal benefit with reduced emission values and better quality of life

Japan Post

Delivery Route / Fleet Optimization

Business problem
- Japan Post wanted to optimize transport route combinations, truck categories, types of loads, and personnel, for faster and more efficient delivery of postal services.

Fujitsu solution
- Using Fujitsu Digital Annealer optimize transportation route combinations, truck types and cargo loads

Business impact
- Reduction of operating times by ~30% and delivery fleet from 52 to 48 trucks
- Reduction of costs by 7% while improving capacity by 12 times

Astroscale

Flight Path Optimization

Business problem
- Astroscale wanted to optimize the flight path of spacecrafts for space debris disposal missions.

Fujitsu solution
- Fujitsu Quantum-Inspired Optimization Services in collaboration with Astroscale, University of Glasgow and   AWS Cloud
- Calculation of optimal flight path to cover maximum debris locations with minimum usage of fuel
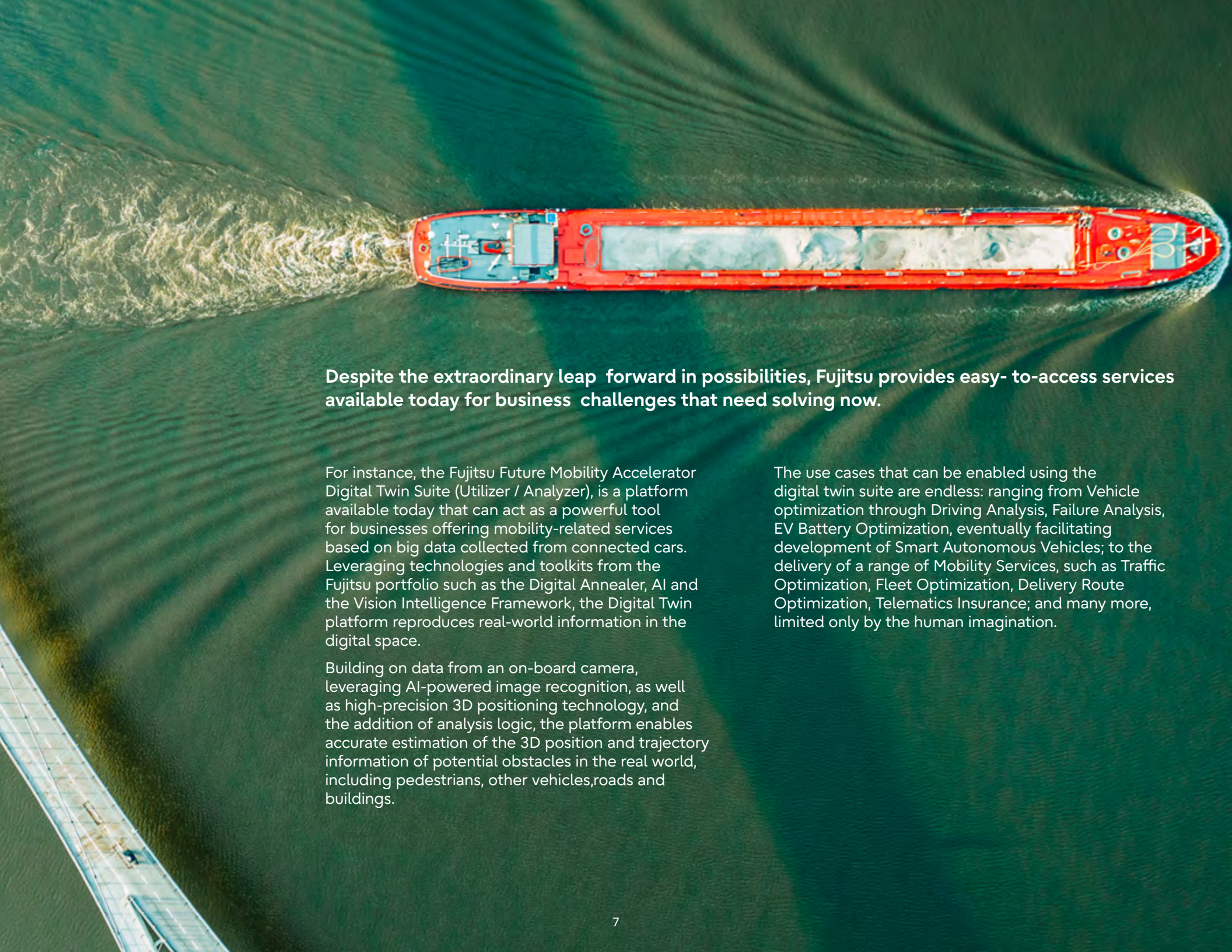
Business impact
- Reduced fuel usage
- Reduced costs
- Higher efficiency of debris collection.

Despite the extraordinary leap forward in possibilities, Fujitsu provides easy- to-access services available today for business challenges that need solving now.

For instance, the Fujitsu Future Mobility Accelerator Digital Twin Suite (Utilizer / Analyzer), is a platform available today that can act as a powerful tool for businesses offering mobility-related services based on big data collected from connected cars. Leveraging technologies and toolkits from the Fujitsu portfolio such as the Digital Annealer, AI and the Vision Intelligence Framework, the Digital Twin platform reproduces real-world information in the digital space.

Building on data from an on-board camera, leveraging AI-powered image recognition, as well as high-precision 3D positioning technology, and the addition of analysis logic, the platform enables accurate estimation of the 3D position and trajectory information of potential obstacles in the real world, including pedestrians, other vehicles,roads and buildings.

The use cases that can be enabled using the digital twin suite are endless: ranging from Vehicle optimization through Driving Analysis, Failure Analysis, EV Battery Optimization, eventually facilitating development of Smart Autonomous Vehicles; to the delivery of a range of Mobility Services, such as Traffic Optimization, Fleet Optimization, Delivery Route Optimization, Telematics Insurance; and many more, limited only by the human imagination.
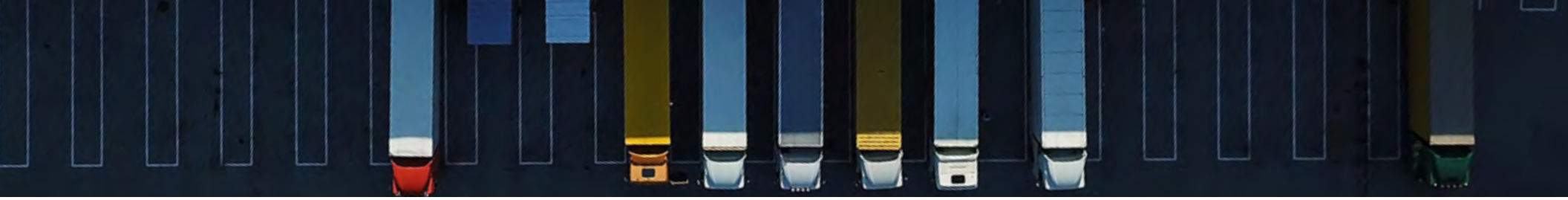
Electric vehicle charging stations planners

Electric Vehicle Battery Optimization

Business problem
- Optimal placement of electric vehicle charging stations given the complexities of different charging technologies, vehicle range, and increasing number of EVs on the road.

Fujitsu solution
- Leverage Fujitsu Future Mobility Accelerator Digital Twin Suite to analyze EV usage patterns, forecast energy needs, and come up with optimal charging point locations and smart energy hubs to ensure easy and continual availability of power all the way from customers' homes to any destination within the city.

Business impact
- More efficient utilization of EV charging infrastructure
- Better driving experience
- Increased viability of sustainable transport

Delivery fleet operators / ride-share service providers

Fleet Management Optimization

Business problem
- Distributing and providing the right amount of vehicles in the right location at the right time for optimal utilization and cost
- Organizing a fleet of vehicles and a limited pool of drivers to deliver packages in an efficient yet timely manner.

Fujitsu solution
- Every fleet management problem, regardless of the vehicle (Electric cars, normal cars, scooters, bikes, bicycles, etc.) is a resource distribution and allocation problem and can be optimized with Fujitsu Quantum-Inspired Optimization Services

Business impact
- Efficient fleet utilization
- Better user experience
- Reduced fleet emissions

Fleet insurance companies

Telematics Insurance

Business problem
- Difficulty in processing insurance claims with more subjective data than objective information.

Fujitsu solution
- Leverage AI-powered, in-vehicle camera image analysis and using the Fujitsu Future Mobility Accelerator Digital Twin suite to process insurance claims faster, based on an objective, trustworthy report.

Business impact
- Faster insurance claims processing
- Increase customer trust with transparency in claims process

No company will be able to solve the world's challenges on their own, nor will they be able to deliver everything you need to solve your specific organizational challenges. Fujitsu recognizes this very well, which is why, we have built partnerships across platforms, applications and the data ecosystem globally. For instance, Fujitsu is a day-one member of GAIA-X, the Europe-wide initiative for a safe and secure data infrastructure, and is actively involved in the design of this data ecosystem, in support of the idea of data sovereignty for companies, authorities, society and every individual citizen. Fujitsu is also a founding partner of the AI4People global forum, focused on developing policies for a "good AI society" and collaborating with key players to create a better world, in line with Fujitsu's human-centric approach to AI and the principles of ensuring AI is ethical and explainable.

Combining our decades of advanced technology experience with carefully selected partner capabilities, we are better positioned to work closely with you to solve your challenges – from initial ideation, through to implementation, training, and deployment – including all supporting technology and consultation along the way.

About Fujitsu

Fujitsu is the leading Japanese information and communication technology (ICT) company offering a full range of technology products, solutions and services. Approximately 130,000 Fujitsu people support customers in more than 100 countries. We use our experience and the power of ICT to shape the future of society with our customers. Fujitsu Limited (TSE:6702) reported consolidated revenues of 3.9 trillion yen (US$35 billion) for the fiscal year ended March 31, 2020.

For more information,
please see www.fujitsu.com

Can you think of an Optimization problem holding your business back?

**Email us at:
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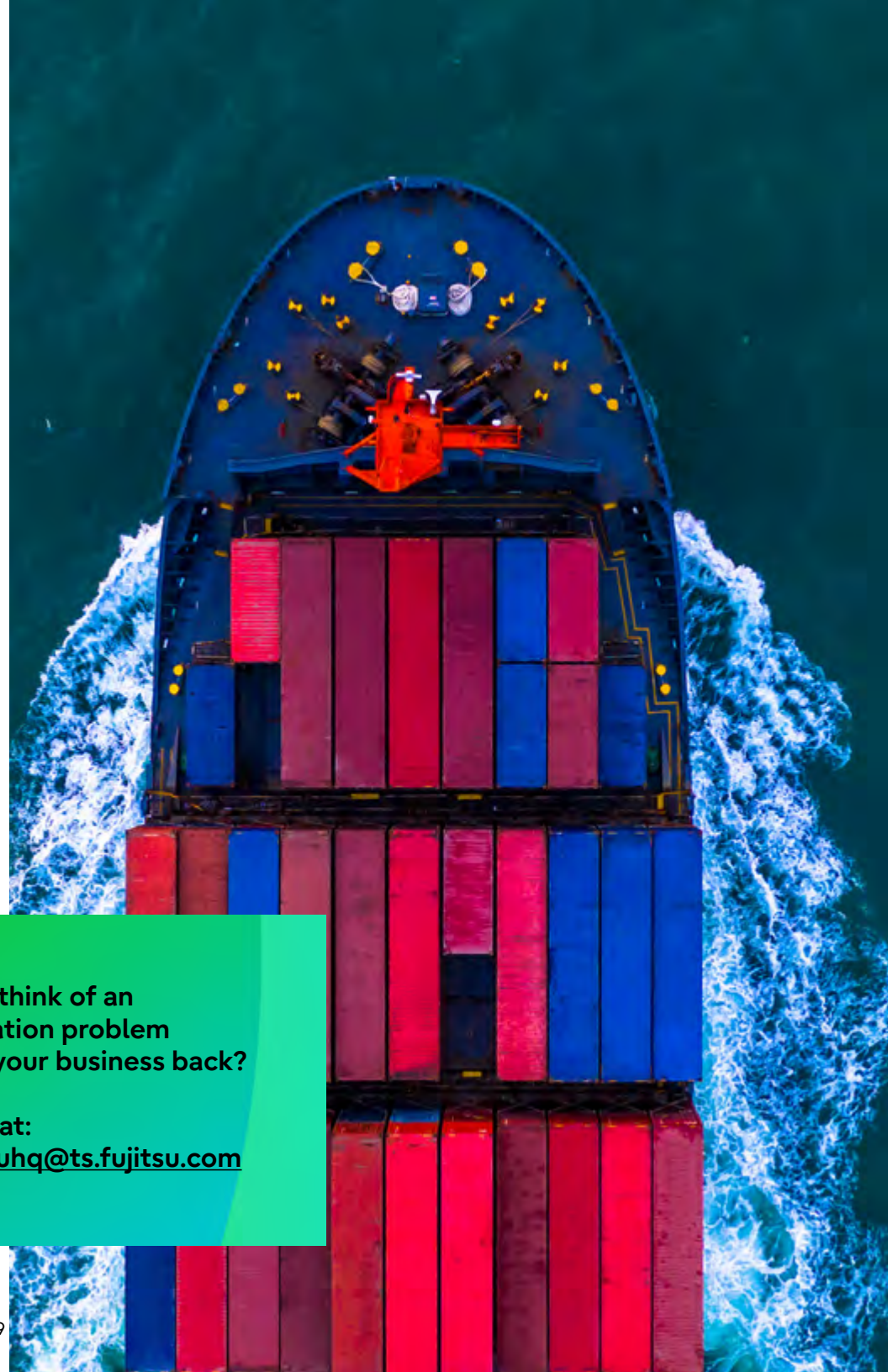
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