Smart City Insight

Smart Transportation

Making smart transport networks a reality with DAS

www.fotech.com

Making smart transport networks a reality with DAS

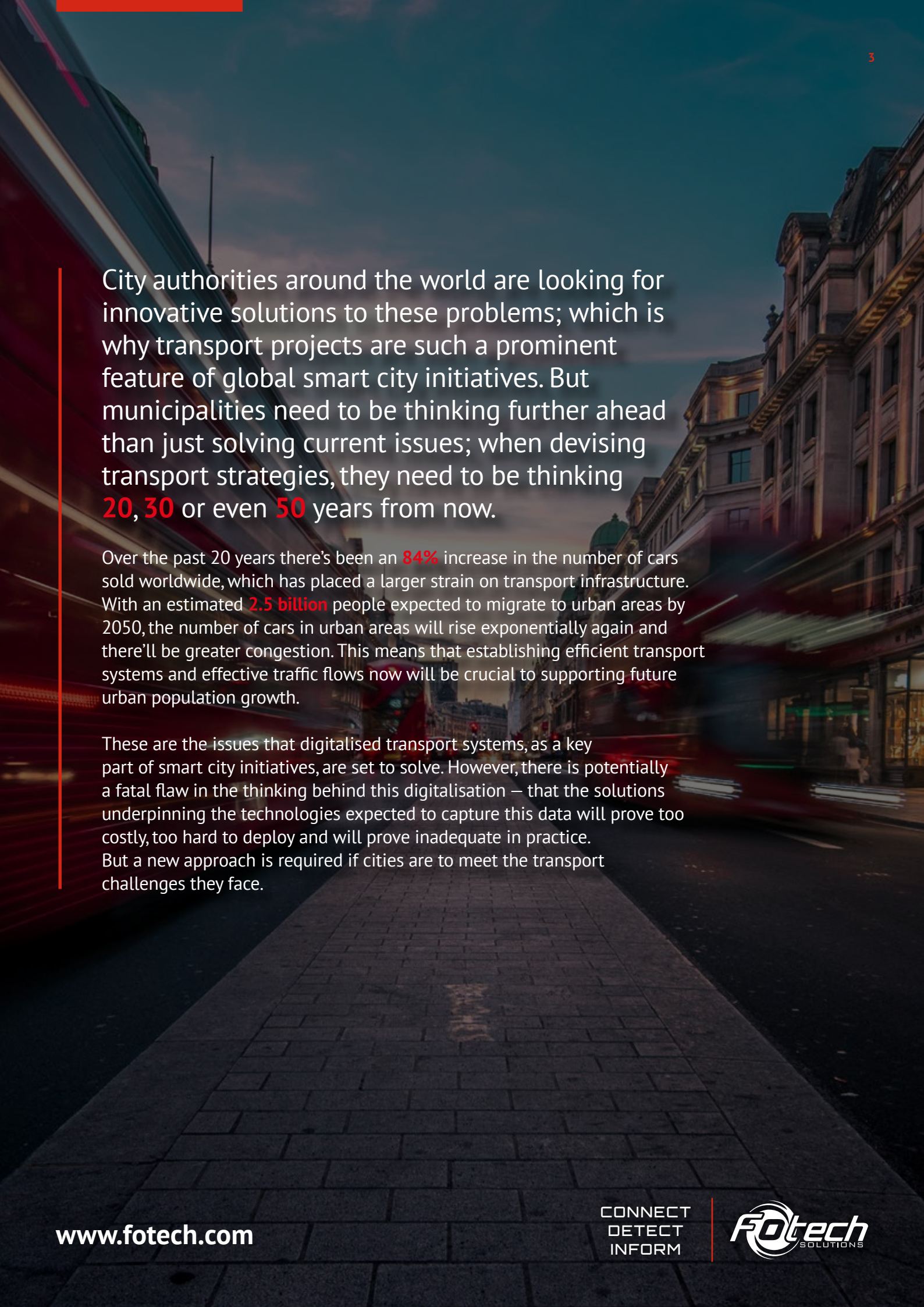
If there is anything that truly binds modern cities into cohesive economic entities, it is the transport networks that flow through them. They are the main arteries connecting citizens to businesses, and cities to suburbs and surrounding towns.

As a result, transport infrastructure and traffic management systems have a major impact on a modern city, affecting everything from the environment (the current transport sector contributes **27%** of energy-related CO2 emissions) to innovation, productivity and economic growth.

This makes transport infrastructure both uniquely valuable and uniquely vulnerable. As anyone that lives in one of the world's major cities will tell you, traffic jams, packed metro systems and train delays are just some of the frustrations commuters encounter on a daily basis.

Today, the economic cost of traffic congestion is estimated to be **$461 billion** in the US, UK and Germany alone. By **2030**, congestion is forecast to further cripple traffic systems — with drivers in London predicted to be stuck in nearly **300 hours** of traffic a year (or 40 full working days).

Of course, transport networks are highly dynamic environments, where incidents are to be expected. However, part of what makes these networks so vulnerable is that existing systems are in many ways inadequate – or are focused primarily on highways, rather than all roadways. Technologies such as cameras, over-roadway sensors and inductive loop detectors are meant to represent 'smart' technology, but in fact they are unable to provide dynamic responses to irregular events such as accidents, roadworks or major construction. The consequence of this is that when pre-programmed flows are disrupted these technologies are unable to react and adapt.



City authorities around the world are looking for innovative solutions to these problems; which is why transport projects are such a prominent feature of global smart city initiatives. But municipalities need to be thinking further ahead than just solving current issues; when devising transport strategies, they need to be thinking **20**, **30** or even **50** years from now.

Over the past 20 years there's been an **84%** increase in the number of cars sold worldwide, which has placed a larger strain on transport infrastructure. With an estimated **2.5 billion** people expected to migrate to urban areas by 2050, the number of cars in urban areas will rise exponentially again and there'll be greater congestion. This means that establishing efficient transport systems and effective traffic flows now will be crucial to supporting future urban population growth.

These are the issues that digitalised transport systems, as a key part of smart city initiatives, are set to solve. However, there is potentially a fatal flaw in the thinking behind this digitalisation — that the solutions underpinning the technologies expected to capture this data will prove too costly, too hard to deploy and will prove inadequate in practice. But a new approach is required if cities are to meet the transport challenges they face.

Beyond the hype

The drive for new technologies to increase the efficiency, capacity and safety of transport networks means that the smart transportation technology market is forecast to reach nearly **$44 billion** by **2021**.

Although this investment is much needed, city authorities must take all reasonable precautions to avoid squandering the investments we are seeing. And there are undoubtedly risks involved in selecting the technologies that will make up future traffic management systems.

There are countless technologies that are being proposed as potential solutions, but decision makers need to look beyond the hype of these technologies and really focus on what value they can bring in real-world deployments.

For example, GPS technology has been widely touted as a possible solution to improving the quality of live traffic data. On the surface there is some merit to its case: it's a known quantity with proven capabilities, and the infrastructure to capture the data is already largely in place. However, this ignores that research has shown that GPS-enabled smartphones only have an accuracy of five meters under an open sky in urban environments. Cloud cover, tall buildings and other factors can interfere with, and degrade the signal further, not to mention sub-surface roads where the signal is eliminated altogether. These limitations must surely rule GPS out as a reliable, safe traffic monitoring solution when it comes to operating on a city-wide scale, and beyond.

Other wireless technologies have also been put forward, in particular 5G. In January 2019, SK Telecom announced plans to build a **5G network for Seoul's intelligent transport project.** Again, there is no doubt that from a technological point of view 5G could add significant value to smart transport systems.

But in terms of infrastructure the world is starting from scratch. Building the necessary sensor networks and backhaul to provide total coverage of any major city would entail huge capital expenditure that most city authorities, particularly in developing regions, will be unwilling or unable to afford.

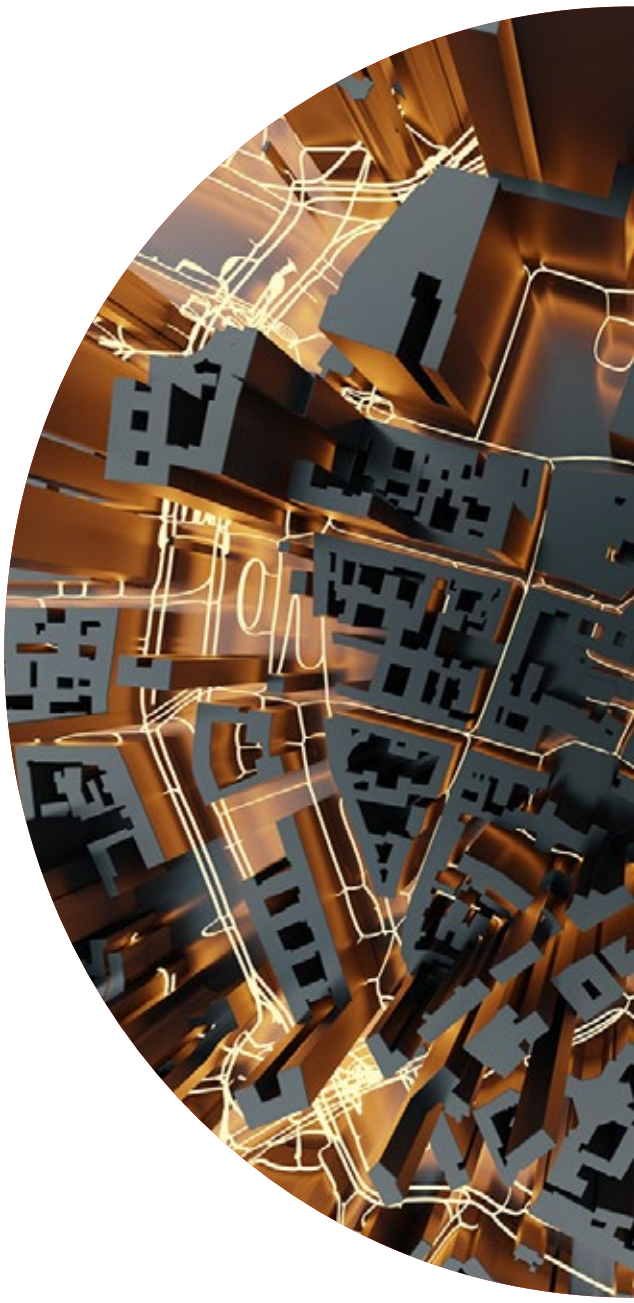
Other technologies also run into similar technical or commercial barriers. The key problem is that any intelligent management system needs continuous, real-time, real-world 'physical' data regarding traffic flows if any useful level of dynamic response or automation is to be possible. Therefore, most solutions would require a huge programme of installing sensors that would capture that data.

Distributed acoustic sensing (DAS) technology has the potential to provide the sensor networks smart transport systems require without the need for new infrastructure. Instead, DAS monitoring platforms harness a key piece of existing city infrastructure – the fibre optic cable networks beneath our feet.

www.fotech.com

Real-world, real-time benefits

By combining state-of-the-art photonic technology, artificial intelligence systems and edge computing, DAS converts a fibre optic telecommunication cable network into an ecosystem of sophisticated 'acoustic' sensors. All traffic generates acoustic or seismic data as it passes over roads.



Crucially, certain activities and incidents produce specific acoustic signatures. Fotech's DAS monitoring platform recognises and detects these signatures, enabling the physical monitoring of traffic flows in real time.

This approach is not only a more efficient use of existing resources. It also gives city authorities a real-time view of their entire road network, enabling them to precisely monitor traffic and public transport flows — analysing the speed and density of traffic, predicting congestion, and identifying irregular disruptions like broken-down vehicles.

Access to such real-time intelligence opens significant new possibilities for transportation management, allowing for far higher degrees of automation in traffic systems. For example, in the case of a broken-down vehicle blocking traffic, a DAS-enabled road network could be used to dynamically adapt traffic controls and redirect vehicles to balance overall flows and avoid crippling congestion. Automated accident or collision alerts could also help direct emergency response teams more effectively.

Ultimately these capabilities mean that cities can make far more efficient use of road networks for the benefit of all road users.

The future is now

There are tens of thousands of kilometres of suitable fibre already in place under our streets today. If we are serious about improving traffic flows, gaining new insights to manage road and transport networks better, improving road safety and reducing emissions then DAS has to be a big part of the smart cities of the future.

Making transport networks fit for purpose for the cities of the future is a major challenge, one that we need to start solving now. Deploying DAS monitoring platforms will deliver the smart transport systems we need more quickly, cheaper and, most importantly, with less disruption. Not digging up roads to make them smarter makes sense.

As city authorities around the world continue to adopt this technology, they demonstrate just how powerful the combination of Fotech's DAS and existing fibre networks can be. There is no doubt that this combination holds huge value as city authorities tackle the challenges they face to keep their populations flowing, happy and prosperous.

Fotech Solutions

Titan House, Redfields Industrial Park,
Redfields Lane, Church Crookham,
Hampshire, GU52 0RD

Tel: + 44 1252 560 570
Email: team@fotechsolutions.com

www.fotech.com

CONNECT
DETECT
INFORM