

EXIST

Exeter Initiative for Science & Technology

insight

A focus on science,
technology & innovation
for the business community

JUNE 16 **ISSUE 01**



Exeter Chamber
of Commerce & Industry

TACKLING BIG DATA

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WITH ALBERTO ARRIBAS*

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ABOUT EXIST AND INSIGHT

The Exeter Initiative for Science and Technology (ExIST) is a sub-group of Exeter Chamber of Commerce and Industry. The Initiative was founded in June 2011 by a group of business leaders in Exeter and the sub-region. The group aims to optimise interaction between science and technology businesses trading in the area, to increase awareness of Exeter as a centre of science and technology, to build relationships between education at all levels and business and to encourage investment in the STEMM industries in the region.

ExIST Insight is the newest project from the Initiative and aims to raise recognition of the STEMM organisations and its community within Exeter and the local region. The quarterly newsletter enables us to share information within the network and for external promotion to encourage increased visibility of Exeter as a science city.

Find out more
www.existexeter.co.uk

 [ExIST_Exeter](#)

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ISSUE 01

WE ARE PROUD TO PRESENT THE VERY FIRST ISSUE OF EXIST INSIGHT

In 5 short years ExIST has grown from a notion - to start a Science, Technology, Engineering, Mathematics and Medicine (STEMM) group in Exeter - to an organisation with a proven record of promoting and supporting science and technology activities in our region.

We now felt it was the right time to start publicising the work of some of the exciting organisations operating in and around Exeter and to create something that highlights how many science and technology opportunities exist around us

We would like to thank those who have contributed to this first issue and we would



welcome ideas and articles for future issues so we can share your events and news. Please tell us what is going on and we will help you to get your messages out to our STEMM community.

We are only able to continue ExIST, our publications and events, through the continued support of our sponsors, help from Exeter Chamber, and the outstanding contributions of our Steering Group. I cannot thank them all enough for what they do to support ExIST.

I hope you enjoy this first issue as much as we have enjoyed putting it together.



STEMM NEWS

COMMUTE EXETER LAUNCHES

Exeter is a wonderful city in which to live and work, but every car driver will agree that there is definitely room for improvement. For example, the frustrations of Exe Bridges at peak times - an uneven mash of static queues, and green lights with no cars able to move through them.

Thanks to funding from Innovate UK NERC, there are positive changes on the horizon. Dr Sal Lampkin and colleagues from the University of Exeter are part of a group made up of commercial specialists in IT, data analytics and infrastructure technology, and the Devon and Exeter Councils. Sal explains: "Central to this learning process is participation by local people - the people who actually make these journeys, who know how it feels to sit in queues of traffic, to have unexplained delays and few options at the time to improve the situation. We need to hear from you!"

Funded for two years, this project aims to influence real-time decision making about how and when people commute into and across Exeter, and to improve the flow across all transport networks.

Alongside the data collected by its commercial partners, the University will be focusing on why people make the travel choices they do - key factors that affect these choices and which interventions are most likely to achieve long term changes and a better commute overall. The survey is available on the website below. www.commute-exeter.com

DEVON TECHNOLOGY IMPROVES DRIVING

Fuel is a substantial cost for all drivers but especially for anyone managing a fleet of vehicles so improved efficiency can produce major savings.

A company based in Exeter, Ashwoods Lightfoot Ltd, has developed a gadget that can help improve drivers' habits. Developed here in Devon, Lightfoot can fit into almost any car or van to help drivers lower fuel consumption by around 15% while also reducing accidents because of a smoother and steadier driving style. The Company has over 250 trade customers, including the likes of South West Water, Aggregate Industries, and Vospers, and has doubled the number of vehicles fitted with Lightfoot over the past year to over 10,000. They've recently appointed former Red Bull marketing chief Tony Harbron to help manage their growth.

While at Red Bull, Tony was responsible for the strategy and many of the marketing programmes that helped turn the brand into a huge UK success, and he then built and sold his own marketing agency in London before moving to Devon a few years ago.

Tony, who has been an advisor to the Company since last year and is also an investor in the business, will be overseeing the communications strategy as Lightfoot expands into the consumer market as well as further developing its existing core fleet market.

"Lightfoot is the kind of innovation that, if based in Silicon Valley, I would be hearing about on tech podcasts but instead it's all happening here in Exeter. And there are others out there with similar stories to tell. These are definitely exciting times for the city!". www.lightfoot.co.uk

APPRENTICESHIP EXPO

The Apprenticeship Expo 2016 was held at Exeter College Technology Centre on Tuesday 15th March 2016 as part of National Apprenticeship Week. The event was open to businesses who employ or plan to employ apprentices and over 50 businesses provided interactive exhibits and talked to visitors regarding the opportunities that they offer for apprenticeships, whilst supporting their business staffing needs.

Prior to the visitors arriving, all the employers were invited to a 'Future of Apprenticeships' event during which they were all acknowledged for their commitment to apprenticeships by receiving a certificate of recognition.

The event was attended by over 900 visitors, all interested in apprenticeships and looking for more information and available vacancies. www.exe-coll.ac.uk

MAJOR GROWTH IN THE PIPELINE FOR DASHBOARD

Dashboard is a company newly based in Exeter offering data analysis of industrial processes. This technology can be applied across many industries, but Dashboard's current focus is on the oil and gas sector.

In a farm west of Exeter, Dashboard has created a mini test-rig that mimics oil pipelines. Using 10 metres of pipe arranged into a complete circle, Steve Weber, Dashboard's Solutions Architect, can recreate the flow of oil in pipes that would usually cross continents. By using data collected from this test-rig, Steve develops and refines the code that converts large, complex datasets into clear, easily understood data, that can be used by businesses to monitor and assess issues before they become problems. Steve values the networks you can quickly develop here in Exeter: "When creating something that cannot be ordered off the shelf you need an inventive bunch of people who can think on their feet as new project challenges are presented. Within 10 miles of our testing rig we were fortunate to find Brian, a highly skilled local mechanical engineer, and Matthew's Pump engineers who had the requisite knowledge and skills to help us build the test rig. We can genuinely evidence the fact that Exeter has great business and community support."

Based at the Science Park, Dashboard hopes to grow its current staff from 10 to 50 over the next 12 months, with a hiring requirement for skills in mobile communications and data analysis. The Company arrived in Exeter in January 2016, and has been able to benefit from the local business networks. CEO Piers Corfield comments: "UKTI has been a great support and here in the South West, their knowledge of the global oil market has helped us enormously. Recent introductions to ProMexico, the India Business Council, and the China-Britain Business Council have further strengthened our abilities to reach new markets."

There are clear applications for this software in other industries, and Dashboard aim to develop partnerships in new markets over the next 5 years. www.remotedashboard.io



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A DAY IN THE LIFE TACKLING BIG DATA

The Met Office innovates with Alberto Arribas



SINCE ITS 2003 MOVE TO EXETER, THE MET OFFICE HAS BEEN ONE OF THE REGION'S KEY STEM EMPLOYERS.

Alongside its operational requirements of providing global weather forecasting, last year it created a small team to explore more innovative ways of using and storing the massive amounts of data created. Alberto Arribas heads up this Informatics Lab team. A small mixed group of around 10 people, their expertise includes programmers, designers, developers and academics,

all recruited from within existing Met Office positions. Their role is to make the Met Office's science and data available to the outside world in formats that are as useful as possible, and to explore ways to improve the existing internal work processes.

Their working environment is deliberately cluttered and creative. There's a small polystyrene rhino covered in computer-controlled LEDs – an offshoot contribution to Paignton Zoo's Great Big Rhino Project. Scattered across the central large table there are programmable LEGO robots, an Amazon Echo (to be explained later), and piles of gadgets and papers. It's clearly a creative, busy working environment, but what is it that they do here?

"AN IMPORTANT THING TO KNOW IS THAT WE ARE, IT-WISE, COMPLETELY SEPARATE FROM THE MET OFFICE. NONE OF OUR LAPTOPS CONNECT UP TO THE CENTRAL IT INFRASTRUCTURE."

We use the guest wifi the same as any

visitor to the building would. This gives us the opportunity to explore what's possible, and share and download anything we think is interesting without a risk of bringing down the supercomputers. We cannot put any of the Met Office's computers at risk. We're here to look at how to improve things, but at its core, 70% of what the Met Office does here cannot change. The weather needs to be continually monitored, and the forecasts produced. We're here to see what is possible with the remaining 30%."

Working with open-ended research, the team carefully structure their week – they spend Monday to Wednesday on projects, but save Thursdays for open days – an opportunity to meet with people and groups interested in their work – and Friday on admin and inbox clearance. They're also looking forward to hosting the graphical web conference (2016.graphicalweb.org) in November – sponsored by organisations including Google, Amazon, the Met Office, and Exeter City Council, it's an international conference for the visual representation of information on the web.

For one of their current projects, they're playing around with an Amazon Echo

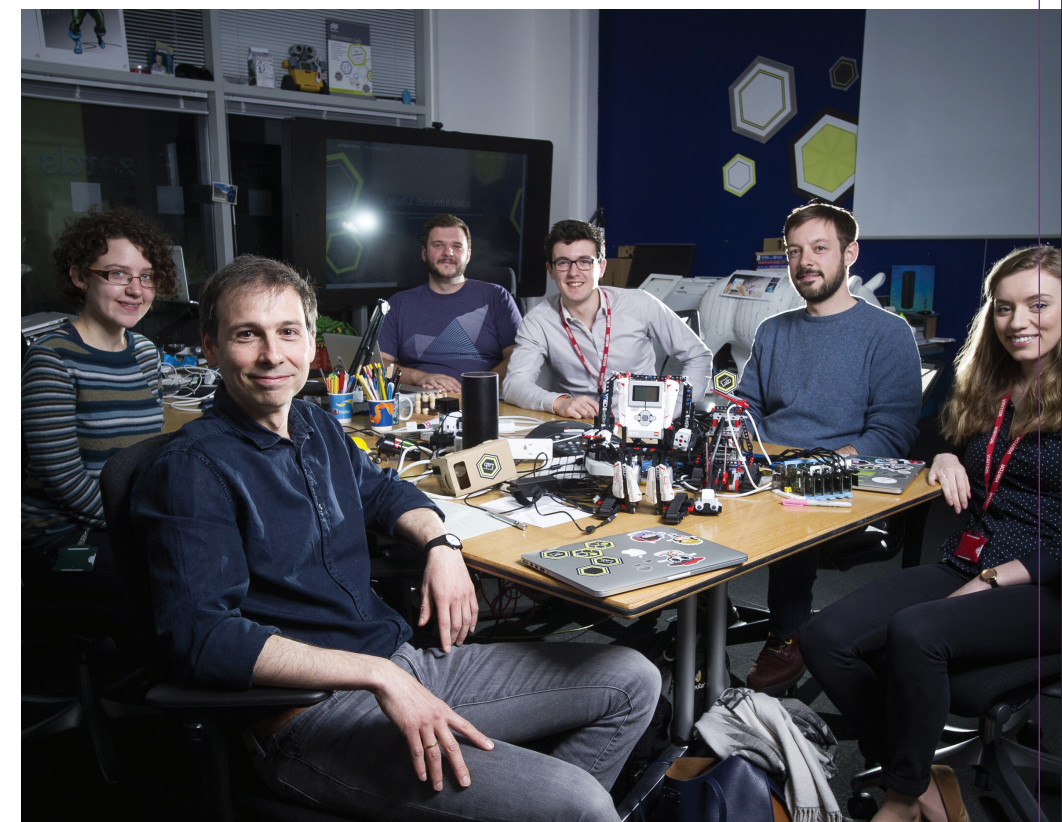
device. Although not yet available in the UK, this small tower sits in your home, and responds to any voiced question as long as you use its name, 'Alexa'. Like similar devices on your smartphone, you can ask it specific, and random, questions – 'what's on TV tonight?', 'how big is Jupiter?' But you can also write your own plug-ins. The team have been exploring how to combine their weather forecasts and other relevant information to provide a personalised and dynamic answer.

For example, asking the best time for you personally to go for a run: Alexa checks location, checks your preferences or calendar, checks the weather, and asks you for any other information that she may need to find out what slot is best for you. What's interesting is that this is not scripted dialogue; the Lab has created the functionality for Alexa to recognise when additional information is needed and request it seamlessly.

This work leads naturally on to the concept of a personalised weather forecast – an understanding of what temperatures you personally find too hot or cold, or whether you're likely to be affected by the pollen count. Once your devices know who you are, they can adjust the data accordingly.

DEALING WITH BIG DATA IS AN ISSUE. EVERY SINGLE DAY, THE MET OFFICE CREATES MORE THAN 40TB OF DATA, (THIS WILL SOON BE 300TB/DAY THANKS TO THE NEW SUPERCOMPUTER). ITS ARCHIVES NOW STORE NEARLY 1 EXABYTE (18 ZEROS).

"There are other organisations who struggle with how best to share data efficiently – for example, netflix and youtube. For them, it's about how to get the best quality film into your home, whereas we're trying to get the best quality weather forecast into a



commercial airline's cockpit."

A focus for the team has been on how to transmit such large amounts of data. Previously, there has been an attempt to achieve lossless compression. With this, users receive all data, but this includes a lot of data the user doesn't need. Now the group uses the term lossy compression – where you can decide which data you need and which you do not – for example, do you need to know the temperature with 5 decimal places? A decision gets made about what data needs to be transmitted. As an example, by moving to lossy compression, data packets used in web visualisation have dropped from 5GB to 10MB.

Other projects work around the concept of data gravity – a metaphor to explain that data is heavy and difficult to move. Rather than getting data sent to you, which can take days or even weeks, and you mining it for your needs, you could send a small program to the data which is almost instantaneous. It's about not getting slowed down by unnecessarily moving data around.

"We need to transform the current situation in science where it takes so long to find and move data that, by the time you have it, you've almost forgotten why you needed it in the first place."

www.informaticslab.co.uk



The Informatics team, left to right: Antoine de Darn (visiting scientist at the Lab from Nantes University), Niall Robinson, Alberto Arribas, Jacob Tomlinson, Rachel Prudden, Zoe Fitzgerald (visiting scientist from Innovate UK)

INNOVATION WITH PURPOSE

We ask Liz O'Driscoll how Exeter City Futures hopes to transform Exeter



Liz O'Driscoll is the Head of Innovation at Exeter City Futures – a Community Interest Company created in January 2016 by Oxygen House with the support of Exeter City Council. Exeter based business Oxygen House also owns Sparx and ATASS Sports: all three organisations share a focus on data and innovation.

Liz explains ECF's aim: "Cities are continuing to grow worldwide, and their infrastructure is struggling to cope. Globally, we know that we need to transform cities into cleaner, more sustainable places. But keeping a growing population moving around quickly and cleanly is a complex problem, and one that every city struggles with."

It's Liz's background in research and change management that brought her to Exeter. Liz joined ECF in February, and has a research career in engineering. After a PhD in optics and electrical engineering from Bristol she began an extensive career at BAE systems where she progressed from R&D, to Head of Information Processing, through to managing complex long-term change projects (looking 40+ years ahead).

This expertise in managing long-term change is central to Liz's role at ECF. The overall role of Exeter City Futures is to facilitate and support positive changes – transforming Exeter into a cleaner city with a sustainable travel network. It's Liz's role to engage with organisations and individuals in Exeter to help initiate and develop projects that will help improve the City for all its residents. Its measure of success is clear – for Exeter to have zero congestion and be fully energy independent by 2025.

A Community Interest Company, ECF is set up as a social enterprise – designed to use its assets and profits for public good rather than being driven by the need to maximise profit for shareholders or owners. Its business model will be to develop what works in Exeter – successful projects can then be exported to other cities. The opportunity to develop clear examples, with demonstrable evidence of improvement and how it was implemented, in Exeter could attract the next stage of funding and investment.

"Exeter is an amazing city. It has the attributes of large cities such as hospitals, a major university, and an airport, but it is small enough to be able to try out new things, and measure their actual impact. This could be trialling transport as a service for example – working in partnership with local businesses to offer tailored commuting services for their employees."

"By understanding demand we can offer alternatives to private car use directly to where there is a need. This offers an opportunity to create efficient travel services that will ease congestion in the City. If successful, it's a model that could expand and become available to everyone in Exeter."

Exeter City Futures, in collaboration with the University of Exeter, The Innovation Centre, SETsquared Exeter, and Canopy Exeter are targeting the creation of 10 new investible start-ups in Exeter by the end of the year. Exeter City Futures is especially interested in encouraging new business ideas that respond to the needs of sustainable cities – specifically to realise the goals of zero congestion and zero carbon by 2025. At the Start-up Weekend on 10th June, Exeter City Futures is offering a prize of a 6 month mentoring programme and possible investment for businesses that demonstrate scalable opportunities within these areas.

To find out more about Exeter City Futures visit exetercityfutures.com

Liz hopes to engage with as many local businesses and organisations as possible to identify specific problems and develop solutions. Over the next few months ECF will be running a series of Future Visioning workshops which will offer businesses, policy makers, community groups, and residents the chance to engage in generating a combined vision of the future and begin to identify jointly "the hard problems that we need to solve."

"What we can do is deploy projects that the public sector may not be able to. We are able to take the initial risk and test what works. It's of utmost importance to ECF that we engage across the community and identify as many potential partners as possible and work to see their goals in our own so that we really are a collaborative city.

"WE ARE DRIVING INNOVATION WITH PURPOSE. INSTEAD OF KNOWING THE SYSTEM DOESN'T WORK VERY WELL, WE WANT TO WORK WITH EVERYONE IN THAT SYSTEM TO IMPROVE IT."



STEMM NEWS

SEE DATA: DESIGNING DATA

SEEDATA IS A WEB SOFTWARE COMPANY BASED IN EXETER WHO IS DEVELOPING A REPUTATION FOR ANALYTICAL AND DATA-FOCUSED APPLICATIONS.

Jason Williams, Business Development Director explains, "In the first few years, we were typically delivering software, websites and design, but our expertise is now focused on developing specialist software applications that analyse and visualise data."

As an example, one project that has developed from its close links to the University (it started out based in the Innovation Centre on the

Streatham campus) is linked to the growing problem of students buying essays online. It's easy to do, and relatively cheap – less than £300 for a 2:1 standard 5,000 word essay on your chosen topic.

Working with academics within the University, SeeData has incorporated forensic linguistic techniques into an online application that analyses submitted essays and compares them to previous essays the student has submitted. Everyone has their own writing style – vocabulary, punctuation, and sentence length – and texts can be analysed to assess whether they're likely to have been written by the same author. SeeData has taken a process which previously took a forensic linguistic expert 5 days and reduced it to 4 seconds.

Its expertise in text analytics is also being used in an ongoing collaboration with the NHS to

aggregate and analyse patient experience stories on a mass scale using Natural Language Processing techniques. SeeData has also developed a Quality Improvement platform for the healthcare market built around the improvement methodology widely used by healthcare organisations across the world. Its approach to clear intuitive design and integrated charting has led to the platform being rapidly adopted across the NHS and it now has trials running in Denmark, Canada, Singapore and New Zealand.

"It's important for us to keep the culture right at SeeData – everyone here wants to keep that work-life balance. Working on interesting and relevant projects, but also making the most of living in such a beautiful part of the UK. We're looking at developing more international opportunities at the moment, but we'll continue to grow here in Exeter."

TECH NATION 2016

Exeter leading on Employment Growth

Tech Nation is an annual national report by Nesta and Tech City which is recognised as the most comprehensive review of the digital tech economy, writes Julie Hawker, CEO of Cosmic, a digital agency and tech consultancy based in Honiton.

In the latest report for 2016, Exeter is highlighted for its exceptional levels of growth, specifically the increase in employment in digital tech jobs, which grew by 161%, alongside growth in turnover in the digital tech companies of 41%. It estimates that 11,412 jobs in the Exeter area currently involve digital technologies, with key sectors including e-commerce, digital advertising and marketing, app and software development, and fintech.

Nationally the UK's digital tech economy now employs around 1.5 million people, 41% of which exists in non-digital sectors (a figure set to rise significantly

over coming years). There are around 58,000 active digital tech businesses in the UK, and they can be found in clusters around the UK, with three-quarters operating outside of London. The report estimates that UK's digital tech industries grew 32% faster than the rest of the UK economy between 2010 and 2014.

Ed Vaisey, Minister for Digital Economy, says:

"Tech Nation 2016 sets out how digital tech innovation is disrupting the UK economy, creating high quality employment opportunities and driving productivity nationwide".

A more in-depth analysis of the report and its findings, indicates interesting issues around sustaining further growth and successes, for example:

- 43% of respondents to the report survey reported difficulties in sourcing sufficiently skilled talent to their businesses
- Average pay premium of digital versus non-digital jobs is currently estimated at £15,000
- Exeter's average salary in digital tech industry is £39,695,

which is lower than 14 of the clusters studied in the report including Bristol, Cardiff, Liverpool, Edinburgh

Businesses (digital and non-digital) in the local areas will need to take a very close look at their staffing plans for the years ahead, understanding very clearly their need for digital talent, ways to attract the right people, and the business advantage which those skills deliver. And in the wider education sector we need to herald the opportunities for increased employability, better opportunities and improved salaries to students, parents, careers advisors and employers.

Geoff Mulgan, CEO of Nesta, says:

"Digital technologies are unlike any others – they change everything businesses do. That's why, as this research confirms, digital jobs and activity are becoming ever more important in apparently non-digital industries... I hope that parents and teenagers will get the message – that acquiring digital skills pays off, wherever you are."

UPCOMING EVENTS

JUNE

Internet of Things drop in session – Exeter Library, Thurs 2nd June. 19:00-22:00

Café Scientifique – Exeter Phoenix, Mon 6th June. 20:30 start.

Start-up Weekend Exeter – The Innovation Centre, Fri June 10th – 12th. 17:30 start

Soapbox Science – Princesshay Square, Sat 11th June 2016. 13:00-16:00

SIA: Resilience, Environment and Sustainability, Exeter – Exeter Science Park, Tues 14th June. 11:00-14:00

Big Bang Fair South West – University of Exeter, Wed 29th June 2016. 10:00-15:30

Exeter Web – Summer Fruits Flavour – The City Gate Hotel, Thurs 30th June. 19:00-21:00

JULY

Digital Leadership – Taster Session – Exeter Science Park, 1st July. 10:00 – 12:00

Café Scientifique – Exeter Phoenix, Mon 4th July. 20:30 start.

ExIST Event – Sandy Park, Thurs 7th July. 08:30 start

Breakfast Briefing on Innovation Exeter – Exeter Science Park Centre, Thurs 14 July. 08:30-10:30

StartUp Britain Tour Exeter – Princesshay Square, Tues 19th July. 10:00 – 16:00

Castle Demos – Exeter Castle, Wed 20th July. 18:00 – 21:00

OCTOBER

Sidmouth Science Festival – Sidmouth, Sat 8th – 16th

Venturefest South West – Sandy Park, Tues 18th. 09:00 – 17:00

NOVEMBER

The Graphical Web – Met Office, Tues 1st – 4th.

For full details about these events, visit the ExIST website.

MET OFFICE | TACKLING BIG DATA

In 2017 the HPC system will:

At the end of February, Phase 1b (the second of 3 phases) of the new Met Office high performance computer (HPC) became operational at the Met Office some 5 weeks ahead of schedule. The combined processing power of the Phase 1a and 1b machines make the Met Office in Exeter the home of Europe's largest operational HPC - and at present this represents only 30% of the total capacity that will be available when Phase 1c goes operational in 2017.



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EXIST

IN NUMBERS

5 YEARS OLD

24 MAJOR EVENTS

84 SPEAKERS

700 COMPANIES



2000+ ATTENDEES

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9,500+ USERS
39,550 PAGE VIEWS
250 DATABASE ENTRIES
950 TWITTER FOLLOWERS



APPRENTICESHIPS

AT EXETER COLLEGE

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800

Exeter College has an employer network of over 800 businesses, has been awarded Gold Winner in the Training Provider Awards 2015, and has been shortlisted for a Times Educational Supplement Further Education award for Apprenticeship Programme. Exeter College are above the national average for overall success rates.

60

Exeter College's award winning Apprenticeship Programme offers over 60 different pathways in Business, Care and Education, Construction, Engineering, Hairdressing, Hospitality, Logistics, Motor Vehicle and Sport.

A focus on science, technology & innovation for the business community

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