PJ Belcher popped along to the Science Museum's IMAX Theatre for an ARM-hosted event about the IoT

Internet of Things is digitising EVERYTHING

CAMBRIDGE is home to probably the world's most important technological sequence of innovation in recent times.

That innovatory sequence, the unique 'instruction set architectures' developed by Fulbourn-based ARM, allows modern micro controllers and application processors to be as small, powerful, energy-efficient and cost-effective as they are. In fact look inside nearly any small, mobile and powerful piece of digital hardware and you'll likely find a chip with ARM digital architecture on board. Got an Apple iPhone? It'll have an ARM processor in it – Apple, Broadcom, Nvidia, Samsung Electronics and Texas Instruments are just a few companies producing chips that implement ARM's architecture from more than 300 establishments.

It's probably worth pointing out at this point that ARM don't manufacture the chips: the firm licences its architecture for others to produce. This model has seen more than 50 billion ARM-based chips shipped to date.

So when they mentioned holding a forum to discuss the Internet of Things, or IoT, the answer was "we'll be there". The forum was held at the London Science Museum in their IMAX Theatre. Hosted by ARM's CEO, Simon Segars, the discussion was moderated by Rory Cellan-Jones, the BBC's technology correspondent.

Nicola Tesla's vision of a world of wireless connectivity

Speakers and panellists included Clive Selley, CIO for BT Group and CEO for BT Technology Services and Operations; Pilgrim Beart, CEO of 1248 and developer of AlertMe smart home platform; Delphine Rivé, MD of Accenture and business minister Ed Vaizy, who has responsibility for digital industries.

The IoT era began in 1926 when Nikola Tesla envisaged a world of wireless connectivity where we would all have small items you can put in your pocket. That

sounds remarkably familiar, but are we at the stage that Tesla describes in his interview with *Collier's Weekly*? Perhaps not, which is where the IoT comes in.

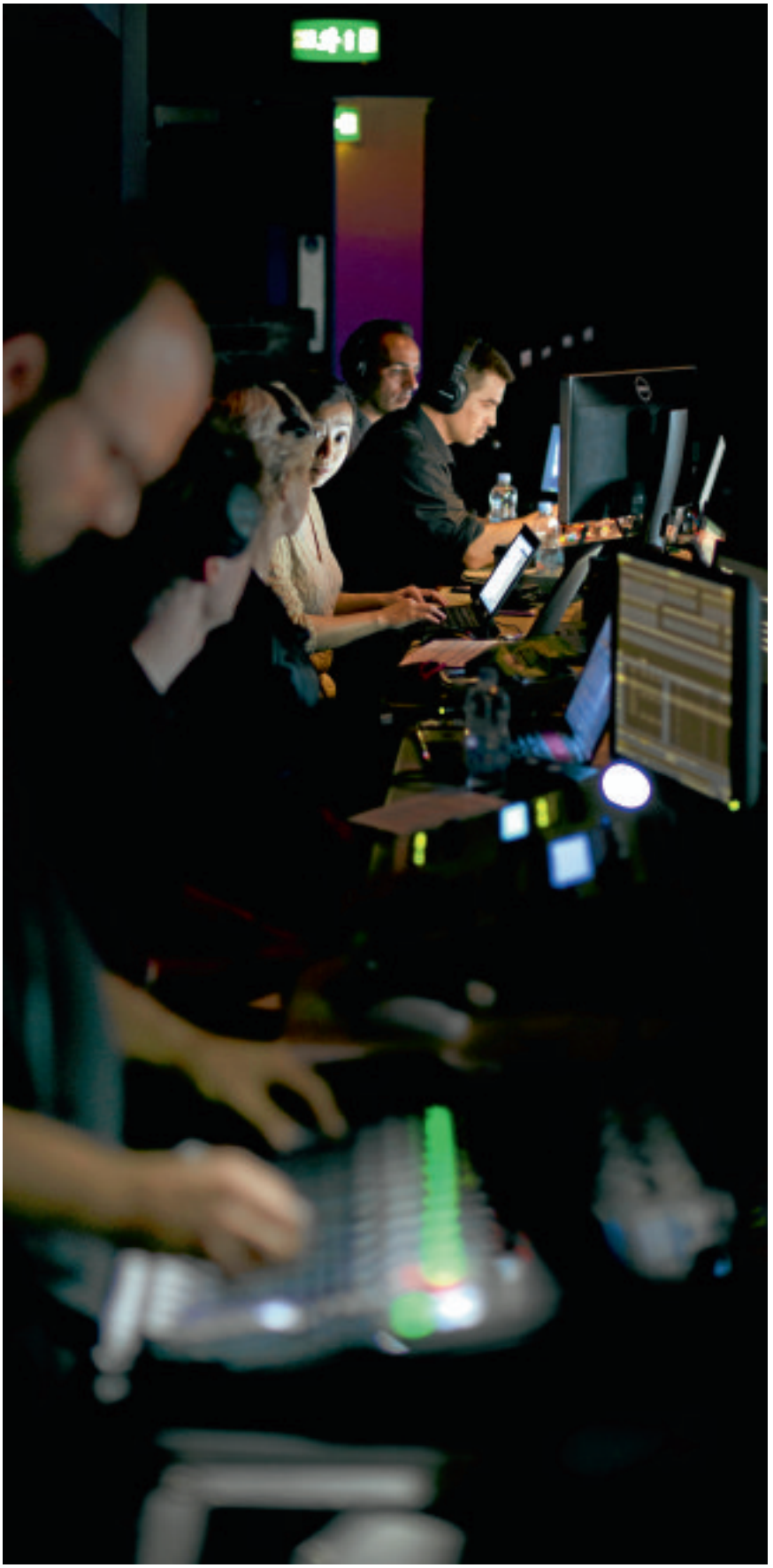
The IoT – also known as the 'Internet of Everything' – is a digital revolution that interconnects computing systems using the existing internet infrastructure. This could be anything, spanning from your home to agriculture, and the idea is breeding some interesting innovation – an example would be Hive by British Gas, which allows you to control your home's heating system remotely using your smartphone. Your heating system has a computing device connected to the internet and an app on your smartphone allows you to control it wherever you are. It even goes into contextualising data derived from your phone if you're out of the house or on your way home.

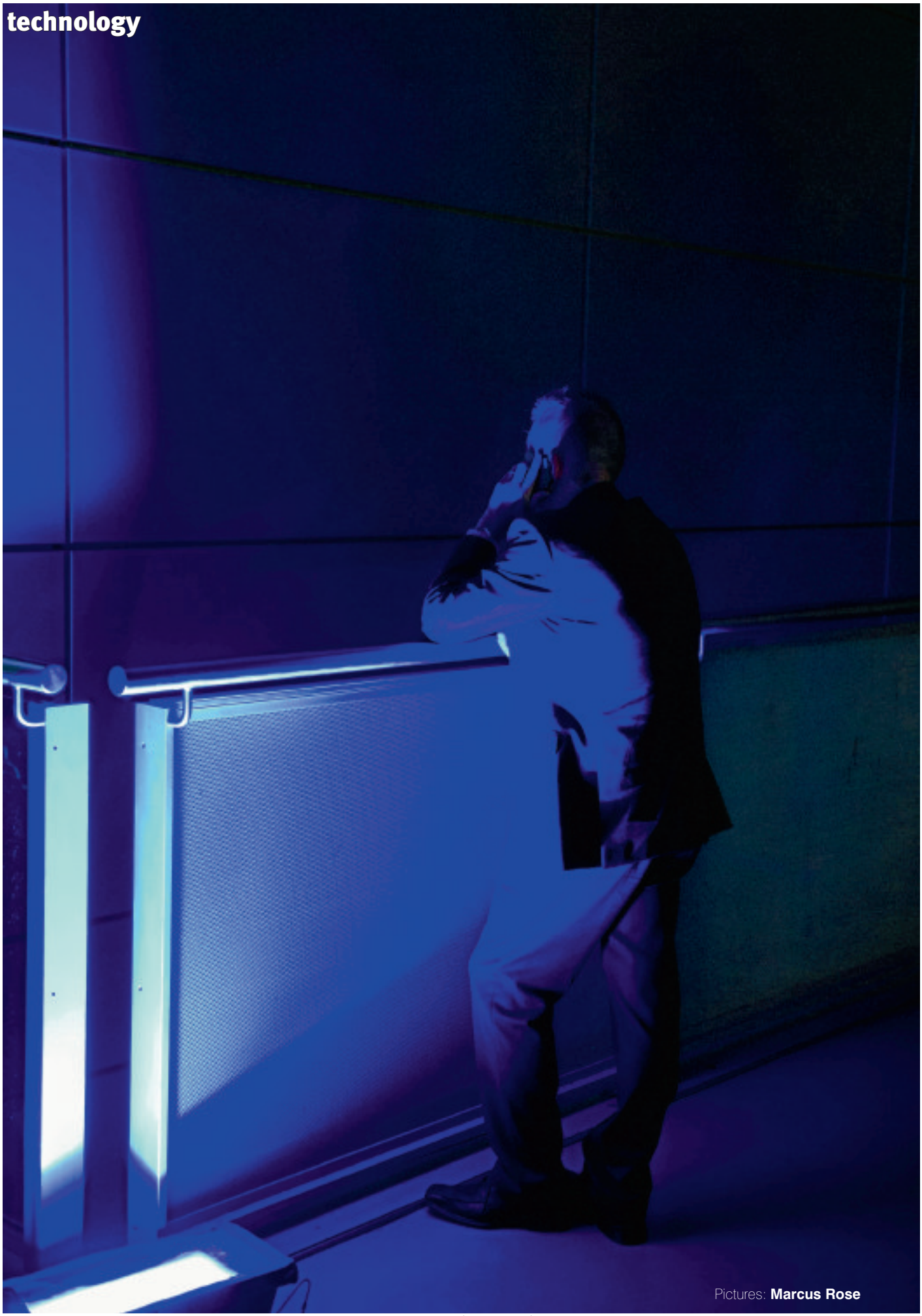
Anyway the IMAX show floor also sported a selection of ARM-powered IoT companies and devices for demonstration. These included Lively, Inc, an independent living IoT company which has digitised home care and vulnerable person monitoring in interesting and innovative ways, such as a medication box that would wirelessly tell family member's smartphones whether or not it had been opened the correct amount of times on any given day.

Slightly closer to home was EnLight, a company producing lighting control and energy management for street lighting. By modifying the existing infrastructure and connecting to the internet, their system can be retrofitted to public lamps which then communicate with each other before a final lamp transmits data to an end user (ie blown bulbs), and receives input controls (ie when to turn off). In fact this system is currently in use in ARM's very own car park.

Finally, with offices in Cambridge itself, was Electric Imp, a platform as a service company offering fully integrated hardware, software, OS, APIs and cloud services designed to make connecting devices to the internet simple. The platform features two hardware modules: the imp002, which utilises the ARM Cortex-M3; and the >

"Cambridge is one of the biggest IoT clusters of all"





Pictures: **Marcus Rose**

>> mp003, which utilises the ARM Cortex-M4.

"Electric Imp has offices in Los Altos, California and Cambridge, England," said Electric Imp spokesperson, Tom Sarris. "We chose to locate an office in Cambridge for the convenience of current employees, to have access to the area's considerable talent pool and thriving tech culture, of which the Internet of Things is an important part."

The forum was launched with Cellan-Jones introducing the panelists before pointing out that, to date, the IoT has not been mentioned on a mainstream BBC programme.

Segars confirmed that IoT is only starting to be introduced into mainstream circles, while in 'techy' circles it's been around a while. His opening speech noted that the IoT is all about the data, and while it can be contentious there's no denying that data monetisation is a goldmine. Now is the time to be making considerations for what data there will be as we start to see increasing consumer devices (like the Hive and Nest thermostat systems).

The discussion then veered away from the consumer to "the massive opportunities for business and society at large". The potential is for businesses to become more efficient using the IoT, and we are likely to observe networks transforming business and society as we begin to see the UK's first 'Smart Cities'.

An example of a Smart City is Milton Keynes: this is powered by MK:Smart, a £16m 'smart city' project to develop innovative solutions to support the significant growth of Milton Keynes. Data will be collected to improve all elements of the city's infrastructure. This is done through a series of interconnected and intelligent systems - find out more at mksmart.org.

Segars concluded by stating we face two big challenges. The first is collaboration: early deployments so far are closed systems, and the network has to be truly open to be effective- which means industry standards.

The second is privacy – protecting information and moving it through the network securely. There's plenty of existing technology to secure data completely, but the key will be controlling the use of that data and deciding what data gets used in the first place. For example, car insurers could use the collected data to reward good driving, but you probably don't want that data being sold off to health insurers.

Simon Segars, the CEO of ARM, addresses the IMAX audience

From left are Simon Segars, Clive Selley (CEO of BT TSO and chief information officer for BT Group plc), Pilgrim Beart (CEO of 1248 and developer of AlertMe smart home platform) and Delphine Rive (MD of Accenture) in conversation

Conclusion? There needs to be help and support to engage new users, to which end ARM is putting together a white paper.

Segars wrapped it up by saying no data is equal and that the IoT is going to take collaboration to be successful.

Finally Vaizy thanked ARM and concluded by noting that Cambridge is one of the biggest IoT clusters of all. ■