

British High-Tech
and VC Industry
Digest



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Editor's word

The Google-backed genetic sequencing company **23andMe** (www.23andme.com/) has been forced to stop the sales of its popular saliva-collecting testing kits by the US Food and Drug Administration. The government agency demanded that the company stop selling its at-home testing kits "immediately" because they required regulatory clearance and were supposedly being sold in violation of the US Food, Drug, and Cosmetics Act.

At this stage, the company has stopped marketing its products and has stressed that their relationship with the FDA is "extremely important". The sales of testing kits have not been stopped yet and the kits can still be purchased on the company's website.

23andMe said in September that its database had reached 400,000 people. The market for at-home genetic testing kits has grown in the past decade and the US Department of Health and Human Services has echoed the FDA's concerns, cautioning the at-home tests "have significant risks and limitations".

The FDA said some of the intended uses of the PGS were "particularly concerning" because false positives or negatives may lead consumers to make important decisions about their health based on inaccurate information. FDA is also concerned about the possible inaccuracy of the test results and about the possibility that customers might be misguided by the data or simply frightened at an apparent high risk of a disease, leading them to make rash decisions. As a hypothetical example, false-positive results when assessing the risk of breast cancer or ovarian cancer might push one to undergo prophylactic surgery to remove an organ. False-negative results may lead to underestimating the risk of developing a disease, and as a result a person will not go to a doctor in a timely manner.

Despite the fact that most of the world's pharmaceutical regulators look closely at FDA and when it says 'jump' mainly ask 'how high?', the British regulator – MHRA – is quite independent in its opinions regarding the management of the healthcare system. This (independently or not) resulted in one of the strictest regulatory systems in the healthcare world; yet this independence may prove advantageous to the innovation community if the regulator decides not to push for a suspension or ban in Europe. As usual, the developing countries stand to win as well by delivering successful products in the field of personal genomics.

Venture Capital Market

Jason Hollands, managing director of London-based financial adviser Bestinvest (<http://www.bestinvest.co.uk/>), recently said that venture capital trusts

are the 'ultimate play' on a recovering UK economy¹. Small businesses look to expand and seek finance, and with corporate bank lending squeezed, many turn to venture capitalists for funding. 'Many trusts raise funds at the moment, providing plenty of choice for investors and an opportunity for them to invest in a renaissance Great Britain', Hollands says.

Possible risks are offset by considerable tax breaks. Investing in a new share offer from an existing trust (the main way managers now raise money) or in a new trust altogether, any of such investments attracts upfront relief of 30 per cent.

The tax break – available on sums invested up to £200,000 in the current tax year – means that for every £10,000 invested one gets back an income tax rebate worth £3,000. In case of failure to hold the shares for a minimum five years, the rebate has to be handed back.

Some brokers, such as Bestinvest, Chelsea Financial Services, Clubfinance and Hargreaves Lansdown, allow investors to buy trusts online. They will also discount initial charges, which range from 3.25 per cent to 5.5 per cent. Some discounts can reduce this initial charge to as little as one per cent. Minimum investment is typically between £3,000 and £5,000.

Move Guides, a London-based startup that helps companies to relocate staff (www.moveguides.com), has raised \$1.8 million in a seed funding round² led by Notion Capital and NEA. Started by Brynne Herbert in 2011, this latest investment brings their total funding to \$2.4m.

Brynne started the company after struggling with the process of relocating from the US to London. In July 2012, she raised £400,000 of seed funding while completing her MBA at London Business School. The Move Guides now operates across more than 85 cities and operates in the estimated \$40bn global relocation market.

Information and communication technologies

Huawei (www.huawei.com) pledged £10m to UK universities³ to fund research projects in telecommunications technology. The money will come from the £1.2bn investment the Huawei announced in September 2012 in a bid to bolster its presence in the UK, which has already gone towards building new research and development facilities, as well as a UK headquarters for the company in Reading.

¹ <http://www.thisismoney.co.uk/money/diyinvesting/article-2516084/Its-hig-h-risk-long-term-investment-What-venture-capital-trusts-invest-them.html>

² <http://techcitynews.com/2013/12/04/move-guides-raises-1-8m-seed-funding/>

³ <http://www.computerweekly.com/news/2240210311/Huawei-invests-10m-in-UK-university-research>

The £10m will be split between six universities, including the University of Cambridge and the University of Southampton. It will be used on projects including advanced multimedia, IT and optical technology, green radio, 5G technologies, optical technology, wireless communications and product engineering. Huawei hopes the findings will enable it to improve on its own products, used by large telecom companies in the UK such as BT and EE.

The investment has gained the support of the UK government. MP David Willetts, minister for universities and science – and the man appointed by Prime Minister David Cameron as Huawei’s key government contact – praised the move.

"This investment is a vote of confidence in UK universities and their world-leading science and technology skills," said Willetts.

ARM (www.arm.com) chip co-designers Stephen Furber and Sophie Wilson will be honoured at the Economist Innovation awards on Tuesday at Bafta in London.⁴ Furber was the principal designer behind the BBC micro home computer. Just over 30 years ago, in October 1983, he began work on the Acorn RISC Machine project, which ultimately led to the development of the ARM chip that now powers 10 billion devices, ranging from iPhones to in-car infotainment systems. Furber is the ICL chair and professor of computer engineering at the School of Computer Science, University of Manchester, where the world's first stored program computer, the "Baby" was invented.

ARM has shipped 40bn processors, roughly equivalent to half a dozen chips for every person on the planet. A typical smartphone has 10 or more ARM processors inside doing various jobs. The elegance of ARM's approach to the design of the processor is that it is architecturally a simple system, a reduced instruction set computer.

Furber believes the UK computing industry is in good shape. He says: "We have gone through two generations of computing. The original UK computer industry was amalgamated from a set of mergers into ICL, and was very focused on mainframe and the heavy end of computing." But since the 1990s, Furber says the emphasis of computing has moved away from mainframe hardware to consumer electronics and the web.

Furber believes the UK's role in the history of computing technology has been to make such technologies available to the masses. Speaking of the wider opportunity for startups in the UK, Furber says: "The UK is an entrepreneurial society. We are behind the US but probably ahead of most of Europe in encouraging

⁴ <http://www.computerweekly.com/news/2240210183/Visionary-Interview-Steve-Furber-on-UK-chip-innovation>

people to start their own businesses. If you have a reasonably viable idea, it is not too difficult to get things going”.

Biotechnology and medical technology

Celgene Corporation (www.celgene.com) is paying OncoMed Pharmaceuticals \$177.25 million to get access to its pipeline as part of a deal to develop and commercialise six anti-cancer stem cell (CSC) therapies⁵. That money includes a \$22.25 million equity investment in OncoMed by Celgene, and rights and costs will be shared in various ways across the portfolio.

The agreement includes OncoMed’s demcizumab (OMP-21M18, Anti-DLL4), which is one of the company’s most advanced candidates: Celgene can take up an exclusive option on it either during or after OncoMed completes a Phase II programme. Demcizumab is currently in three Phase Ib studies in combination with standard-of-care therapies, including one in patients with first-line advanced pancreatic cancer, and OncoMed could make as much as \$790 million from it.

Tom Daniel, Celgene’s president, global R&D, says: ‘Demcizumab’s substantial early clinical activity warrants aggressive yet careful evaluation in several indications where we have strength, including non-small cell lung cancer and pancreatic cancer’.

OncoMed Pharmaceuticals is a long-standing partner of GlaxoSmithKline, having signed a strategic partnership agreement for the development of four product candidates (including OMP-21M18) in 2007.

The UK’s universities and science minister David Willetts has unveiled a £93.2m (\$141.6m) package designed to boost the country’s life sciences sector⁶. The funding includes £29.3m to be directly invested into innovative life sciences firms, including university spin-outs.

Other parts of the package include £25.9m that forms Round 3 of the UK’s Biomedical Catalyst initiative, which supports 29 firms and five universities, and a further £38m to support the construction of the National Biologics Manufacturing Centre.

David Willetts said: “By investing in new technologies now we are maintaining the UK’s position as a world leader for innovation. The biomedical industry is a fast moving, high growth sector and the Catalyst has proven to be

⁵ <http://www.pharmafile.com/news/181734/celgene-signs-177-million-oncomed-deal>

⁶ <http://www.globaluniversityventuring.com/article.php/2854/uk-biotechs-93m-boost>

extremely successful in supporting new business ideas. This investment further drives forward our life sciences strategy”.

London-based **IXICO** (www.ixico.com) signed a memorandum of understanding with the Beijing Union Medical and Pharmaceutical General Corporation during the British Prime Minister’s trade mission to China⁷. Secretary of State for Health Jeremy Hunt has expressed his support for IXICO’s MOU to develop dementia diagnostic and research services for the Chinese market, the world's largest dementia market.

Innovations portfolio brain health company IXICO has announced that it has signed a memorandum of understanding with the Beijing Union Medical and Pharmaceutical General Corporation (‘UMP’). UMP is a fully owned subsidiary of the prestigious Chinese Academy of Medical Sciences (CAMS) and is its innovation arm.

The MOU states that IXICO and UMP plan to work together to deploy a neuroimaging informatics platform in China to support dementia diagnosis, to advance public understanding of dementia, and to use imaging biomarkers to enrich study populations to streamline the evaluation of new dementia treatments.

It is estimated that in China a significant majority of the dementia population remain undiagnosed and currently an estimated 6-10 million people have dementia (c. 20-25% of the world’s dementia cases), of which c. 60% of which have Alzheimer’s disease. The total annual healthcare costs for dementia are estimated at £5.5 billion and the annual loss to the economy is around £9 billion. The incidence rate of dementia is estimated to double over the next 20 years as the Chinese population ages and by 2040, the population with dementia in China is expected to equal the total in all high income countries.

IXICO’s chief executive, Professor Derek Hill, is a member of the British Prime Minister’s current trade delegation to China along with the Secretary of State for Health in England and other representatives from British business.

Chemical technology

University College London's (www.ucl.ac.uk) biochemical engineering department has won a 2012/2014 Queen’s Anniversary Prize for higher and further education⁸.

⁷ <http://www.imperialinnovations.co.uk/news-centre/news/ixico-signs-mou-beijing-union-medical-and-pharmace/#sthash.3ZkZHqZ1.dpuf>

⁸ <http://www.ucl.ac.uk/news/news-articles/1113/221113-Queens-Anniversary-Prize-awarded-to-UCL-Biochemical-Engineering>

The awards are given out every two years by Queen Elizabeth and her husband Prince Philip, to recognise world class excellence in the work of UK universities and colleges.

Biochemical engineering at UCL was set up to convert new biological discoveries into commercial products, including vaccines, regenerative medicines and therapeutic drugs, and its main focus is improving global health and well-being.

The department works with other university departments and charities and end users including major pharmaceutical companies and NHS doctors. The department recently collaborated with London's Moorfields Eye Hospital to develop stem cell treatments for blindness, and with the Health Protection Agency to increase the UK's anthrax vaccine production capacity. The department also worked with Merck to develop the manufacturing process for Gardasil, the world's first cervical cancer vaccine.

In the past, UCL's biochemical engineering department also developed the world's first production process for semi-synthetic penicillin and carried out groundbreaking research into anti-viral flu medicine and the use of proteins as catalysts.

Engineering and aerospace

The Manufacturing Advisory Service (MAS, <http://www.mymas.org/>) launched a new initiative to help manufacturing directors manage expansion and retain their best staff.

The Financial Expert service is looking to provide firms with access to support on financial issues that could hold back their growth plans. Working with Grant Thornton, the interactive MAS workshops are expected to help companies understand the best options for accessing finance, tapping into alternative funding streams and unraveling the tax implications of innovation and expansion.

There will also be sessions on succession planning and strategies for retention of skilled employees.

The Stirling engine, brainchild of a 19th-century Scottish clergyman, may at last be ready for market⁹. In 1816 Robert Stirling patented a device he hoped would sweep aside the then-dominant "atmospheric" steam engine. Instead of using steam to make a vacuum beneath a piston, thus causing atmospheric pressure to drive the piston down, Stirling's version uses the heating and cooling

⁹ <http://www.economist.com/news/science-and-technology/21590877-200-year-old-invention-may-last-be-ready-market-stirling-silver>

(and thus expansion and contraction) of gas sealed inside the engine to do the piston-driving. At first the idea did not appeal to the industrialists who preferred the tried and trusted way commercialised by James Watt. But now engineers have found, over the years, a few niche applications for various forms of Stirling engines.

Two groups in particular are planning to deal with the invention. One is at Sunpower, an American company founded by William Beale, the principal inventor of the free-piston design. The other is at the University of Oxford, and is led by Paul Bailey, Mike Dadd and Richard Stone. Both have previously built and deployed satellite-cooling systems, and both now plan to use free-piston engines to drive electricity generators.

One version, called a free-piston engine, runs backwards: it uses mechanical energy as the input, rather than the output, to pump heat away from where it is not wanted. In other words, it is a refrigerator. These specialised fridges chill the infra-red sensors on orbiting telescopes. On the basis of that success, some engineers believe free-piston engines can be brought down to Earth and deployed in a less recherché role. From a user's point of view the Stirling approach has two advantages. One is that because, like a steam engine, a Stirling is an external-combustion engine, it can run on a variety of fuels. Both designs can thus be powered by wood, dried animal dung or more or less anything else that will burn.

The second advantage is that a free-piston engine suffers little wear and tear, so it should be able to run for a decade or more without servicing.

Advanced materials

Morgan Advanced Materials (<http://www.morganadvancedmaterials.com/>) announced that, using an innovative new process, they can now press, fire and machine blocks and other shapes of components up to a thickness of 45mm, resulting in the production of considerably larger components than those previously manufactured at the plant. The larger blocks can also offer a much lower thickness frequency output than their smaller counterparts, resulting in enhanced imagery and range for SONAR at lower depths for 2-2 and 1-3 composite applications.

The new range of blocks will typically be supplied with fired-on silver electrodes as standard to ensure good adhesion for soldering and bonding, and to a thickness which can safeguard durability in high-drive applications.

Richard Carus, product sales manager for Piezo Components at Morgan Advanced Materials, said: "We have a rich heritage in the design and manufacture of PZT ceramics, and as a market leader in the field we continue to push the boundaries of technology. This latest manufacturing-led innovation has seen not

only a major breakthrough in manufacturing process capabilities enabling us to manufacture thicker components, but has created a new range of products for our defence and commercial sonar customers. We believe this breakthrough opens the door to further additions to our large components range”.

Energy efficiency

The EU is to apply a 42.1% anti-dumping duty on Chinese solar glass manufacturers, according to a document published in the organisation's official journal¹⁰.

The new levies are applicable from November 28, 2013. The investigation was announced in February this year with a parallel anti-subsidy inquiry following in April.

Companies that cooperated with the EU investigation will be charged slightly lower rate of 38.4% with Henan Yuhua given the lowest rate of 17.1% to reflect its smaller dumping margin. Hehe Group (<http://www.heheglass.com/en/>) was given a 32.3% levy and Xinyi Group a 39.3% rate.

The EU believes that the duties could allow manufacturers that ceased production due to price pressure from an influx of low-cost Chinese solar glass to begin again.

UK Universities and Regulatory Environment

The Higher Education Funding Council for England (HEFCE) is launching a programme to strengthen social entrepreneurship and social enterprises across England's universities¹¹.

Funded by £2m (\$3.28m) and outsourced to social enterprise support network UnLtd, the project will seek to encourage universities to act as hubs in support of social entrepreneurs from staff, faculty, and from surrounding communities.

The project will aim to unite universities with surrounding institutions, local authorities, and private sector companies to create 'ecosystems' that support social entrepreneurship.

¹⁰ http://www.pv-tech.org/news/eu_to_impose_42.1_anti_dumping_duties_on_chinese_solar_glass_firms

¹¹ <http://www.globaluniversityventuring.com/article.php/3181/uks-2m-for-social-ventures>

UK deputy prime-minister Nick Clegg has announced that the government will invest a further £250 million into the **British Business Bank**, a scheme to help early-stage companies in the country gain access to funding.¹² Previously, the government had invested £1 billion into the bank, which will be based in Sheffield and plans to provide up to £500 million a year in affordable loans and investments for British start-ups.

¹² <http://www.bbc.co.uk/news/uk-politics-25176615>